THROUGH THE WARDROBE

Exploring the potential of headset augmented reality to provide a Thirdspace immersive media experience

Rob Eagle

A thesis submitted in partial fulfilment of the requirements
of the University of the West of England, Bristol
for the degree of Doctor of Philosophy

Faculty of Arts, Creative Industries and Education
University of the West of England, Bristol
July 2022

Abstract

This research investigates the potential in employing headset augmented reality (AR) for interactive documentary when the contributors are collaboratively involved in the production process. This research has grown out of the intersection of interactive documentary (incorporating methods from documentary production more broadly), immersive media studies, gender studies and social and visual anthropology.

The research explores how headset AR invites a complex interaction amongst the immersant, the physical objects of a place, the physical affordances of the device and the virtual content that is activated. Headset AR affords a porous 'diegetic bubble' that integrates multisensory stimuli with physical and virtual elements in a storyworld. Presenting marginalised voices in a headset AR documentary can facilitate a Thirdspace, a hybrid space where physical materiality and virtual media come together simultaneously offering potentially radical and transformative ways of understanding and experiencing the world.

To investigate the use of AR headsets for interactive documentary, I conducted research through dialogically engaging with both practice and theory. The research has been practice-based through the process of developing, iterating and exhibiting a headset AR documentary installation, *Through the Wardrobe*. The production process involved the collaboration of four nonbinary/genderqueer contributors. In addition to contributing their stories, they participated in the processes of interaction design, installation and exhibition of the work. Feedback from immersants also dynamically shaped the iterative process of exhibiting the installation.

Both this written thesis and the resulting practice output, the headset AR installation *Through the Wardrobe*, demonstrate the rigour in my practice-based research.

Acknowledgements

To my four fantastic contributors: Jamie, Sammy, Rex and Micah. Without you, this research would not exist. I will be eternally grateful.

To my supervisors, Professor Mandy Rose and Dr Gillian Swanson – I feel indescribably fortunate to have had your support intellectually and emotionally, especially through a pandemic that has challenged us all. Thank you for your astute feedback and guidance throughout this journey.

To Dr Judith Aston, for her advice at every milestone and feedback over several versions of *Through the Wardrobe* and early outlines, draft chapters and the final version of this thesis.

To my creative production team: Scott, Marcus, Jon, Harry, Nagore, Dan and Andrew. To those who helped facilitate the logistics and physical spaces needed to conduct this research: the Bristol VR Lab and Nick Triggs in the DCRC. To the force of nature that is Verity McIntosh, a brilliant colleague, sounding board and cheerleader.

To the organisations and festivals that supported *Through the Wardrobe*:
- Mark Atkin and Tom Millen, who mentored and fostered my work before the PhD.
- Sheffield Doc/Fest – Joe Cutts, and especially Dan Tucker for believing in the project, taking a risk in premiering it and for your mentorship.
- Alternate Realities touring exhibition at HOME MCR and the Barbican Centre, London – Isabelle Croissant, Alex Davidson, Alex Lancastle and their teams.
- IDFA – Caspar Sonnen, Matthijs Rietveld, Carlotta Luppi and the team.
- Goethe-Institut China – Silva Jährling, Che Lin and Lars Rummel.

My research was supported by the Arts and Humanities Research Council through the 3D3 Centre for Doctoral Training programme. The prototype for *Through the Wardrobe* was funded by the 2019 CreativeXR programme (Digital Catapult and Arts Council England), while the first proof-of-concept was made possible by the 2018 Being Human Festival of the Humanities.

The most personal thanks go to Maciek and my lockdown support bubbles. I could only write this in the middle of a pandemic thanks to your emotional support, hugs and much-needed distractions. And, of course, thank you Madre for supporting my ambitious dream to study in the UK in 2002… two decades later, I'm still here, still studying.

Fig. 1 – Flyer used at exhibitions to promote Through the Wardrobe

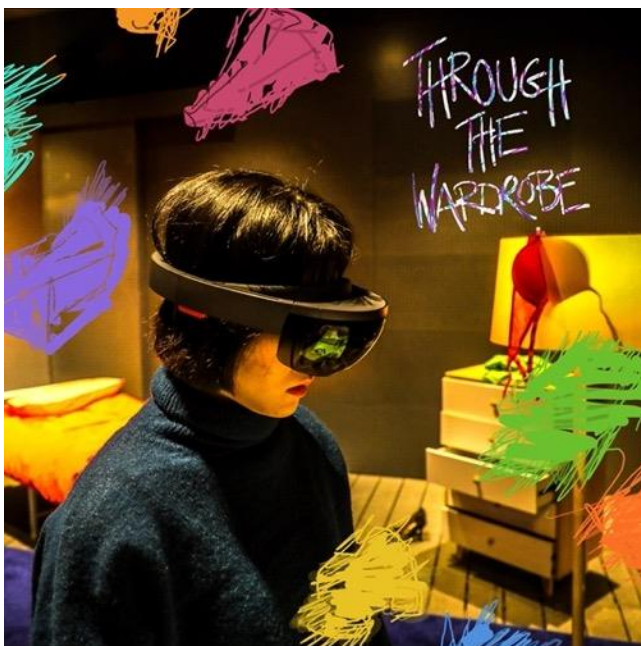*Fig. 2 – Promotional image for* Through the
Wardrobe

Fig. 3 – Promotional image for Through the Wardrobe

Introduction

One thing that always has a place in whatever I wear is combat boots. I think that's one of very very few items of clothing that are actually viewed as neither of the binary genders.

I feel ready to go and smash the world, smash the system, smash the government, smash anything I need, any obstacle that I can have in the world.

So wearing combat boots – not only can it be really fashionable and really pretty and really empowering, but it's also definitely given me the feeling that I can go through the everyday shit. And there's a lot of it.

- Excerpt from Micah, *Through the Wardrobe*

The insider-outsider ethnographer

Micah was one of the first nonbinary people I met in Bristol when I moved to the city in 2017 for my PhD. They worked on the city's ferry boats and dreamed of one day getting their captain's licence to pilot their own ship on the seas beyond the quiet waters of Bristol Harbour. Up until they were forced to return to the Czech Republic in 2020 – as the pandemic had eliminated their job opportunities – I never saw them wear anything on their feet other than boots. In fact, all four nonbinary people who contributed to my main practice output as part of this PhD described a similar love for the queer, utilitarian and non-gender-specific qualities of boots as part of their daily attire.

I entered my PhD with an established practice in documentary-making across a variety of media formats. Since 2005, I have been making linear film and audio documentaries. In 2010, I began creating interactive work, mostly webdocs with branching narratives or gaming elements. And in 2015, I began working in immersive formats, producing audio documentaries for installations and filming with 360-degree cameras for short VR documentaries. Across all of these media formats, I made work on the subject matter most familiar and interesting to me at the time: queer and genderfluid spaces and club nights in London. These works were collaboratively shot and produced with genderqueer contributors. This practice formed the foundation for the topic and use of media for my practice-based research in my PhD.

My documentary production practices are rooted in ethnographic methods, involving me spending time in places with those who become my main project contributors. As I will illustrate in vignettes in Chapters 3 and 4, I became acquainted with my four contributors, Micah, Jamie, Rex and Sammy, through my social circles and local queer communities. Over hours that turned into days, months and years, we exchanged stories and shared experiences of our own journeys of our queerness, including genderqueerness. My methods can be understood in the ethnographic tradition of participant-observation (DeWalt & DeWalt, 2011). As this research involved an ethnography of my own community in Bristol, I occupied a position as an 'insider-outsider' ethnographer (Chawla, 2006). I had to navigate my role as a resident in the city and participant in local queer events whilst reflexively analysing my relationship with my contributors.

By 2017, trans visibility in Western mainstream media had grown over the preceding decade, reaching what *TIME* magazine in 2014 called the 'transgender tipping point' (Steinmetz, 2014). The assumption was that greater visibility in mainstream media would lead to greater liberation for trans people (Keegan, 2022). However, the increasing coverage of trans stories in British media was accompanied by transphobia and the pathologisation of trans people (Lester, 2017; Lees, 2017). According to trans writer CN Lester (2017), in stories of medical intervention and surgery, gender dysphoria is at the centre of the narrative. Dysphoria is when someone's gender identity does not match with aspects of their body and/or the social gender role assigned to them at birth. In Lester's experience of being contacted by multiple journalists and documentary producers to contribute to stories on trans experiences, producers rarely wanted accounts of trans happiness and *eu*phoria without mention of medical transition. Lester found that British documentaries perpetuate the optics of aesthetically 'passing' from one side of the gender binary to the other.

As I examine in Chapter 1, most British TV documentaries have focused on medical and surgical transition and the aesthetics of the trans body. I argue that the portrayal of trans stories in British mainstream nonfiction media continues what Brian Winston (1988) calls 'the Griersonian tradition' in documentary in which society's victims become a spectacle. I discuss how this focus on the downtrodden – emphasising individuals and groups within society that are considered an Other – has manifested in the cliches of queer, genderqueer and trans people in contemporary British documentary as social victims. Amongst these tropes are the narratives that focus on the bodily transformation of trans subjects through medical intervention. Nonbinary and trans subjects find themselves framed as social victims in contemporary British nonfiction media, including documentary and news (Riggs et al, 2016; Humphrey, 2016; Hines, 2020).

It is precisely this exploitation of queer and trans stories in the media that the approach and methods in my practice are countering. I worked with four contributors for the main practice output to result from this research, the headset AR installation *Through the Wardrobe*. Audio interviews recorded with them form the spoken content of the experience (see Appendix I). In these discussions, the four contributors mostly focus on euphoria over dysphoria. They share stories of their methods of self-care, ways of dressing to help oneself feel gender euphoria and moments in childhood when parents, siblings and peers forced them to conform to social expectations of gendered clothing. They speak of how they find euphoria in relation to everyday objects and spaces.

I negotiated with each contributor their involvement in the project. Sammy participated in the audio interview process, although our friendship began before the project, and she contributed drawings that we animated in AR. Micah and Rex both contributed interviews and participated in user-testing early iterations of the project. And Jamie recorded an interview, user-tested and acted as assistant producer when installing the work in London and Bristol.

With their gender identities falling outside of the gender binary (i.e. the person identifies with neither or both male/female), the terms they use to describe themselves are generally *nonbinary* or *genderqueer*. Some genderqueer people may use the terms 'gender fluid' if they switch or vary between maleness or femaleness, 'nonbinary' if they are neither exclusively male or female in gender identity and sometimes 'trans' to denote part of the wider category of non-cisgender identities. Both genderqueer and nonbinary have been in use as terms since the mid-1990s, although nonbinary has more recently overtaken genderqueer in popular usage to describe those outside the male/female binary (Stryker, 2017).

In the excerpt from Micah at the start of this Introduction, they highlight how combat boots can be seen as belonging to 'neither of the binary genders'. For Micah, their boots (and their gender identity) defy a definitive or stable position in a gender binary. Their boots and gender actively resist binary categorisation, instead occupying an *other* space. They do not frame themself as a victim. Rather, their boots 'empower' them to fight against the cisgender-heteropatriarchal institutions and transphobia in society.

Situating key concepts

This thesis investigates the potential of using headset augmented reality (AR) for interactive documentary when the contributors[1] are collaboratively involved in the production process. This research has emerged from the intersection of interactive documentary (and methods in documentary production more broadly), immersive media studies, gender studies and social and visual anthropology. I do not assume that the reader possesses comprehensive knowledge of each of these fields, so this introduction provides essential context, key concepts and terminology[2] pertinent to the body of this thesis. To explore the use of headset AR for interactive documentary, I conducted the research through dialogically engaging with both theory and practice. Both this written thesis and the primary practice output – the installation *Through the Wardrobe* – demonstrate the variety of methods and rigour in my practice-based research.

This research is situated within the interdisciplinary field of interactive documentary. I am responding to and contributing to a rich area of research and practice that extends and innovates documentary-making in a variety of formats, including webdocs, virtual reality (VR), AR, audio walks, installations, performances and more. Aston et al (2017) define an interactive documentary (or, 'i-doc') as 'any project that starts with the intention to engage with the real, and that uses digital interactive technology to realise this intention' (p.1). User (or 'interactant') agency is privileged via digital technology that often presents alternatives to a linear, singular narrative. Some of the first examples and use of the term interactive documentary emerged out of the experimental practice-based research projects of film-maker and computer technologist collaborative teams at MIT in the 1980s (Sasnett, 1986, pp. 42–4; Davenport, 1988). These early interactive documentary experiments used console interfaces in which interactants could assemble their own sequence of materials, including film clips, documents and photographs accessed from videodisc. According to researcher-practitioner Glorianna Davenport, the interactive format that she called 'evolving documentary' would allow the audience to 'trace their own path through the material many times, and continue to gain an understanding of the story' (1998, p.441). Producers continued to innovate interactive storytelling formats with technologies like CD-ROM in the 1990s and webdocs in the 2000s (Aston et al, 2017; Nash, 2022).

As a number of journalists, film-makers and theatre makers began to take up immersive media for nonfiction subject matter in the 2010s, the field of interactive documentary underwent an 'immersive

---

[1] While documentary scholars may refer to documentary protagonists as the 'subject' (Nichols, 2001) or 'participant' (Winston, 2000), I shall call them 'contributors' throughout the rest of this text in line with British documentary broadcast industry standards (e.g. terminology employed in the BBC's Editorial Guidelines).

[2] For reference, there is also a glossary of the technology and gender studies terms in the appendix of this text.

turn' (Rose, 2018b). Nonny de la Peña first demonstrated the potential of using VR for journalism through her work *Hunger in Los Angeles*[3] with an experimental prototype headset at Sundance in 2012. Soon thereafter, increasingly more documentary-makers created work within VR, gathering attention within the industry at film festivals and galleries and then opening up to wider audiences with headsets at home through platforms like the Oculus Store and Steam. Major news outlets like the Guardian, BBC and New York Times produced VR works for those with just a smartphone and stereoscopic goggles, such as the cheaply produced Google cardboard viewer. My own practice in creating 360-degree films in 2015 and later more interactive VR work was responding to and participating in this immersive turn in interactive documentary.

VR emerged as the dominant medium in this shift towards more immersive formats for interactive nonfiction. But makers also took up other devices and tools, like projection mapping and spatial audio experiences, that could also be broadly considered 'immersive'. A few interactive documentary producers took up AR headsets, such as the Microsoft HoloLens and Magic Leap. Headset AR nonfiction works like *Terminal 3* (2018), *The Chorus* (2017) and *Elephants Can Remember* (2017) allowed for virtual 3D animations and spatial audio in a headset (the HoloLens) to appear as if holographically projected in the physical space. I will be examining these three works in greater detail over the next two chapters.

Here it is useful to differentiate my use of the terms 'interactive' and 'immersive'. Interactive media, as I will explore in the next chapter, is loosely defined as a format in which the audience (or interactant) has some degree of control over the outcome or direction of elements that make up an experience. Janet Murray (2012) offers the term 'multisequential' for formats that may involve hyperlinks or other media segments on which the audience can effect some sort of impact.

The term 'immersive media' is defined not by a specific device but broadly by a sense of being surrounded by a story experience or digital media. This thesis distinguishes between immersive *technologies* and immersive *media*. The HoloLens, for example, is a device, emerging from recent developments in immersive technology. The birth of AR as a digital medium can be traced to Ivan Sutherland's first head-mounted display (HMD) prototype in 1967, the Sword of Damocles, that gave the wearer the illusion of a 3D wireframe box projected in the middle of the room. The medium can be defined by a set of characteristics, not restricted to particular technologies, as we shall see in the next two chapters. The drive for immersive storytelling stretches over millennia, as Oliver Grau

---

[3] The work reconstructs an incident in which a diabetic man, waiting for a meal outside a food bank, falls into coma because his blood sugar drops dangerously low (https://emblematicgroup.com/experiences/hunger-in-la). It is 'considered to be the first positionally-tracked virtual reality journalism experience that allowed the audience to walk around the scene as the events unfolded' (de la Peña, 2017, p.210).

(2003) traces, from cave paintings, Roman murals, the 19th century panorama and the Sensorama of 1960 to the full visual occlusion VR headsets of the 1970s and 80s. The murals of Pompeii, for example, envelop the observer within a mythical scene so as to give the illusion of involving the sense of standing in the presence of deities (p.27). In short, techniques in using a variety of media to provide an illusion or sense of immersion are nothing new. I employ the term immersive media[4] in this thesis as an umbrella term for formats that include VR and headset AR.

AR and VR both grew out of Sutherland's Sword of Damocles HMD prototype. Aerospace and military funding in the 1970s pushed forward the development of VR headsets that displayed fully enclosed computer-generated environments (Grau, 2003; Crogan, 2011, p.43). Following the first wave of VR in the 1970s and the second in the 1990s, VR was best known for aerospace simulations and arcade gaming (Lanier, 2018). Artists and theatre makers also took up the medium in the 1980s and 1990s, exploring its potential for storytelling and experimental, participatory artistic experiences (Krueger, 1991; Laurel, 1991; Davies, 2005). However, the high cost of the equipment and the necessity for advanced computer programming skills restricted use and generally confined VR to the research lab. In the 2010s, the medium entered its third and most commercially successful wave, accelerated by the commercial release of the Oculus Rift in March 2016, alongside accessible stereoscopic goggles from Samsung and Google that turned just about any smartphone into a VR headset. This third wave delivered wider relatively wider and proliferation of the medium that saw numerous applications including gaming, virtual social spaces (called 'social VR') and immersive interactive documentary.

While VR went through waves of innovation and application, AR did not see much adoption until the 1990s, mostly limited to industry and training (described in more detail in Chapter 1). What I term 'headset AR' has also historically been described as 'see-through head-worn displays', 'AR HMDs' and 'wearable AR displays' (MacIntyre et al, 2001; Sutherland, 1968; Azuma, 1997). Confusingly, Microsoft has labelled the HoloLens a 'mixed reality' headset to distinguish it from the form of AR in which in a smartphones or tablet is used, known as 'mobile AR'. I, however, find the term 'mixed reality' too prone to misunderstanding for readers today; it has a history of wildly different definitions from use as an umbrella term for all forms of immersive media in the 1990s (Milgram and Kishino, 1994) – what many industry or academic researchers now call XR, or 'extended reality' – to use in the 2000s by researchers to describe the embedding of digital technologies in live performances (Benford and Giannachi, 2011). I employ the term headset AR both to specify the use of headsets and to distinguish it from mobile AR. While both headset AR and mobile AR fall under

---

[4] The label is more recognisable to wider audiences than the more industry or academic-focused term like 'XR' – short for extended reality.

the broad umbrella of the same medium, they are distinct from one another in how the user physically engages with the respective interfaces. By projecting 3D graphics onto the lenses that appear holographic-like, an optical see-through AR headset, like the HoloLens, is worn by a person as an interface in front their eyes. Mobile AR, meanwhile, requires the user to hold up a smartphone or tablet continuously as that device composites 3D graphics in real-time on a live video view. VR headsets with passthrough capabilities, such as the Quest, work similarly to mobile AR in displaying a live composited image but in an HMD.

In reviewing the extant literature on headset AR, I saw numerous unknowns for its potential for storytelling, especially for interactive nonfiction. Headset AR continues to be relatively under-investigated when compared to the amount of research on VR and mobile AR. While the majority of literature on AR exists within the domain of HCI (see meta-studies from Azuma, 1997; Suh and Prophet, 2018), and I will be referencing some of it, my focus in this thesis is on gaining a better understanding of the artistic potential of the medium for interactive nonfiction.

In 1997, computer scientist Ronald T. Azuma defined AR through three characteristics: combining the real and virtual, interactive in real-time and registered in 3D (Azuma, 1997). The medium can be experienced through different types of interfaces (headsets, smart glasses, mobile phones, tablets, etc) either projected through a lens (e.g. the HoloLens) or composited real-time on a screen (e.g. mobile AR). According to Azuma, what matters is not the device or function of the application but the perception for the user/immersant that the virtual elements are occurring in the physical space, conforming to the three characteristics. The medium can be understood 'as a perceptual phenomenon and not as a technology' (Avram, 2016, p.47). More than a purely *visual* medium, AR can be understood as 'polyaesthetic', as Bolter et al (2021, p.20) term it, for bringing multiple senses into play through merging the physical and virtual. Following Bolter et al, this research views AR as an integration of multisensory modalities – including audio, touch and smell – that accompany Azuma's three visual characteristics.

This thesis focuses more on the *experience* of immersive media (especially headset-based AR) than on the latest innovations in the immersive technologies (e.g. AR headsets). Doing so centres the research on the immersant and the interaction of their body with multisensory stimuli and the virtual components experienced via the headset within a particular place. This echoes what Judith Aston (2017) terms the 'emplaced interaction' of interactive documentary: the physical and social context in which an audience experiences a work. As Aston explains, i-docs are not experienced in a dislocated vacuum; interactants engage with them in locations like galleries, festivals or at home, sometimes alone or with others. By examining the experience of an i-doc within social and physical

context, rather than just the digital technology employed in it, we can, as Aston (2017, p.234) articulates: 'keep technology in its place'. This way of framing immersive media values the human over the digital devices.

Depending on the context throughout this thesis, I often use different terms for the person known conventionally in film and theatre as the 'audience'. For the agent engaging with an interactive documentary, I use 'interactant' (Gaudenzi, 2013). For the person operating a digital device, regardless of medium, in line with many computer scientists, I employ 'user'. And for someone in an immersive environment, I use 'immersant'. Pioneering VR artist Char Davies (2005) coined the term in response to the inadequacy of existing language when thinking of the embodied and psychological process/state of being immersed in a virtual world. Davies found that many VR designers favoured the terms 'user' or 'player', which reduced the actions of the person in the headset to merely a technical or game-focused experience. Immersant, by contrast, allows for many forms of physical and psychological engagement with immersive media. Throughout this thesis, I also generally refer to people who come to galleries and festivals as 'visitors' before they become immersants. Those who took part in my audience feedback studies (Chapter 4) are research 'participants'.

To investigate the potential of headset AR for interactive documentary, I conducted the research through dialogically engaging with both theory and practice. I adopt the definition of 'praxis' from Robin Nelson (2013) as 'theory imbricated in practice'. By this I mean that the theory (e.g. media studies, anthropology, geography) is intertwined with the practice (e.g. audio recording/editing, virtual world-building, exhibition installing). My praxis is a dialogic process; the two are interdependent within my research. To explore my research topic, the practice (as imbricated in theory) is essential.

Practice-as-research offers an opportunity for greater understanding of practice through critical engagement with theory. Within this thesis, the practice does more than illustrate theories of headset AR; my praxis is a process of testing and innovating methods to generate new knowledge. I approached my research enquiry with an established practice in documentary film, audio and immersive media; I interrogated my practice through theory; then I iteratively tested new theory-informed understandings of methods through practice. This process and the practice output have led to new knowledge about the practice.

Linda Candy (2006, p.3) defines *practice-based research* as 'an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice'; new works created within the project are vital to demonstrate critically the researcher's processes.

Hence, I consider both this written thesis and the physical experience of my main practice output as evidence of the rigour in my practice-based research. Both outputs demonstrate methods that include practice, ethnography and text-based research.

Finding a medium for my practice-based research

When I began my practice-based research in 2017, I was not certain on which immersive medium I would focus. Building on my pre-existing practice, I proposed using immersive media for presenting documentary stories of genderqueer lives, but I was open to exploring devices, methods and format. I formulated a research question to guide my enquiry as I mapped out the relevant disciplines through a literature review (which forms much of Chapter 1) and developed my practice:

> Within a practice-led research framework, how can an immersive media installation (incorporating methods from immersive theatre, interactive digital art installations and audio documentaries) present the experiences of genderqueer contributors and how they physically express their identities through clothing and the body?

I started developing my practice in response to this research question by making 360 videos. I then collaborated with a developer who specialised in the 3D games engine Unity to create a prototype for an interactive VR documentary. One of the great promises and joys of VR is the illusion of presence – the feeling of 'being there', often in a far off or completely fanciful place (Slater et al, 2009). The sense of presence in a virtual world can lend itself to great freedom to embrace an entirely different appearance and rules of conduct or physics. In 6-degrees of freedom (6DOF) VR – a computer-generated environment where the immersant can move around – immersants can embody avatars that either resemble their own bodies or something altogether different. In the social VR app AltSpace, for example, the immersant can modify their avatar through hundreds of options, becoming anything from an alien to a giant stick of butter with arms and legs.

Online and virtual worlds, not just in VR, have long been acknowledged to allow the players or users to create substantial new or alternative realities for themselves. As Sherry Turkle (1995) found in her pioneering study of online MUDs (multi-user domains, or shared virtual spaces), users could build and live out fantasies that might be impossible in the physical world. As virtual characters, users could project and explore elements of their desires, building entirely virtual identities online. This is not a false or artificial world for them but one that is meaningful and, in many ways, preferred to

their physical environment. The online self became a significant part of who they are, inseparable from the 'in real life' self.

The supposed freedom to be anyone or anything in any place can also be one of VR's most significant limitations. The lack of ability to look down in the headset and see one's actual body can create a dissonance between the way one thinks of their own body and the way one sees it in VR. While 3-degrees of freedom (3DOF) VR, such as 360-degree film, may offer a powerful sense of witnessing an event or place, the immersant is almost always without a virtual body. The viewer becomes a 'conscious dot' (Scott-Stevenson, 2020). This disembodying separation between body and mind in VR has long been acknowledged as a potential problem in the medium (Balsamo, 1996; Barlow, 1990; Rose, 2018a). It can create a Cartesian divide between mind and body, where the mind in the illusion of being in another place does not align with the fleshy body left behind in the physical world.

This divide can be exploited to great artistic effect, as in the VR experience *The Machine to be Another,* where the immersant dons a VR headset and looks down at the body of another person of a different sex. The intent is to foster empathy through allowing the immersant to see from the physical point of view of another (Bertrand et al, 2014). Participants reported a feeling of disorientation of having a body in the virtual world that was not the body with which they identify. The work creates a feeling of dysphoria all too familiar for most transgender people (Lester, 2017: p.206). Gender dysphoria as experienced by trans people is a sense that who someone is in their gender identity does not match with the characteristics of their body. VR as a medium can either induce this feeling of bodily dysphoria or conversely allow the immersant to embody an avatar of the sort of body they wish they had.

Throughout my first year of research, while I explored the affordances of VR, I also continued my practice as a producer of audio documentaries. In working as a contributing audio producer to a project called *A Mile in My Shoes* (AMIMS)[5], I came to appreciate the potential of using physical objects in my practice. AMIMS is a travelling work, often installed in outdoor locations for a week or so at time, in which visitors put on headphones and listen to a stranger's story over about 10 minutes. But the most powerful part of the experience, according to the visitors I spoke with,[6] was in putting on the physical shoes of the person whose story they were hearing.

---

[5] https://www.empathymuseum.com/a-mile-in-my-shoes
[6] In February 2018, I conducted a visitor feedback study, involving semi-structured interviews with people who had experienced AMIMIS in a park in London. This feedback research study and the practice-led research that followed (described in Chapter 3) were both approved by the UWE Ethics Committee.

One visitor described this transformative process: 'Initially, I was just kind of walking and listening to the story. And then I thought like "Oh!", imagining I was walking in his shoes. And it felt a bit more embodied and connected […] I remember feeling the shoes on my feet and imagining that they were his feet or imagining that I had his body, what that would feel like'. This visitor touches on a powerfully imaginative sense of embodiment: by inhabiting someone's shoes (whilst listening to their voice), he imagines inhabiting the person's body. He was not the only visitor who experienced this. Another said: 'There is probably no boundary between me and her at this point. And I just switched to her story. I'm just thinking about her more than about me.' More than once, visitors stated feeling so absorbed in listening to the story that they felt distracted or removed from their own bodily concerns and oblivious to certain environmental stimuli ('forgetting the cold', for example). Absorption in the story translated to thinking of the other person's situation more than their own.

This profound connection visitors felt to a stranger's story through their shoes prompted me to focus my practice in immersive media to integrating physical objects connected to person telling the story. Ultimately, if I would want my audience to view their own bodies and interact with both physical and digital elements, I would need to rethink my choice of medium. In working with my contributors, listening to my audience in feedback research studies and developing my own artistic practice 2017-8, headset AR, over VR, emerged as the most suitable medium to investigate my research questions.

While my initial enquiry included 'immersive theatre', my practice developed more towards installation art. I still considered what a theatrical set affords in which the audience themselves become the performers. I examined the literature on participatory performance art, such as the Happenings of the 1960s (Kaprow, 2003) and early interactive digital art (Krueger, 1993; Dinkla, 1996). What happens when I (the artist) give my audience physical objects and digital media devices (whether an MP3 player or a headset) and create a space in which they can explore stories of another person and potentially learn more about themselves? A physical set with objects within an interactive installation could help create that space.

Because a significant part this research investigates how documentary contributors can be collaboratively involved in the production process, we discussed how to combine their audio interviews with 3D animations in the HoloLens headset, set in a physical installation. As we spoke about clothing and accessories, the themes emerged of spaces to get ready to go out and a wardrobe – hence the title we would eventually give the project, *Through the Wardrobe*. We focused on what physical items we could bring into the installation, starting with the clothing that sparked euphoria and extending to jewellery and perfumes. The first proof-of-concept installation in

November 2018, an event titled 'End of Gender?', also included furniture like clothing racks, lamps and chairs. This hands-on process of engaging with headset AR pushed me to evaluate ways of integrating physical and virtual elements in an installation.

In engaging with headset AR in my practice over the first year of my PhD, I explored what are known as *affordances* of the medium. An affordance is 'the relationship between the properties of an object and the agent's capacity to determine how the object could possibly be used' (Norman, 2013, p.10). In grasping the affordances of the technology and the specificity of an AR headset, the immersive experience designer can capitalise on elements that are unique or especially heightened in that medium. Understanding a device's 'possible uses, actions, and functions' requires iterating, user testing and prototyping (Norman, 1988, p.82). After establishing some of the affordances of headset AR for interactive documentary in Chapter 2, I trace the journey of making the installation *Through the Wardrobe* in Chapters 3 and 4. Through photos, videos and my digital practice diary on OneNote, I documented the process of planning and recording with my contributors then designing and iterating with the HoloLens 2018-20. I include some highlights of this documentation throughout the text and in Appendix II.

As my practice matured through exploring the physical and interactive narrative affordances of the HoloLens in late 2018, I searched for an appropriate conceptual model to describe the potential of the medium for interactive nonfiction. At the first proof-of-concept installation, 'End of Gender?', I conducted semi-structured interviews with 19 immersants. They provided insights into their experiences of the work, their impression of the HoloLens and their reflections on the content. While AR has traditionally been conceptualised as superimposing digital elements on top of the physical world (Sutherland, 1968; Manovich, 2006, p.220; Uricchio, 2012; Greenfield, 2017), that was not how my user-tester immersants were articulating their experience in 'End of Gender?' They described their simultaneous experience of the physical and digital – the inter-connection and interdependence of the virtual and the physical. For them, this constituted a hybrid experience, neither separate from the physical surroundings nor entirely enclosed in a virtual world. Headset AR afforded an intertwinement of virtual elements *within* the sensoriality of the physical world.

This proved a watershed moment: through practice (specifically, an iterative approach to exhibition), I was challenged to develop a framework for myself that reflected how my immersants experienced the medium and how I could employ the medium for interactive documentary. What resulted was an understanding of headset AR as, what I term, a *porous diegetic bubble* in which the experience consists of various multisensory elements. Defining 'diegesis' as the elements that pertain to a storyworld, I apply the term to the sense of the schema, logic and aesthetics of an immersive work. I

employ the term 'bubble' as a model for the boundaries of that world, technologically (e.g. within the headset and headphones), physically (in the space of an immersive installation) and virtually (e.g. animations and audio). The audio and visual porousness of the AR diegetic bubble affords a fluidity of barriers and boundaries. This affordance of the medium opens up opportunities for a hybrid experience that can integrate multisensory stimuli, including touch and smell.

The concept of a porous diegetic bubble helps us to understand the affordances of headset AR for the immersant inside a HoloLens. But this research explores more than the functions of an AR headset; this is an investigation into its potential use for interactive documentary. How does the porous diegetic bubble of headset AR enable narrative affordances for interactive documentary?

To interrogate the narrative potential of the medium, I turned to the spatial theory of geographer Edward Soja. For Soja (1996), the postmodern world can best be conceptualised as spaces that are simultaneous and layered. What he terms *Firstspace* is the realm of observable, knowable and concrete materiality (p.56). *Secondspace* constitutes the layer of representation and imagination, for example, in art and media. *Thirdspace* is where these two come together simultaneously, offering new and potentially radical and transformative ways of understanding and experiencing the world.

Thirdspaces occur within locations where First- and Secondspaces intermingle with marginalised voices. These provide alternative, 'radically open and openly radical spaces' (Soja, p.86), such as the borderlands between US and Mexico and in urban developments in which residents create alternative ways of operating as a community. The radical potential of Thirdspace is in contesting the use of space through centring the diverse voices that are systemically excluded from societal hegemonic discourse. Polyvocality of the marginalised asserts a separate use of space that does not strive to assimilate into the mainstream; resistance to hegemony is key to a Thirdspace. Equally, there may not be a unified vision for how to resist; there is no monolithic marginalised community experience. What results is polyvocality within the marginalised group that occupies the Thirdspace.

Soja's Thirdspace provides a rich model for understanding how headset AR can be employed in interactive documentary. AR, when integrated with objects, scents and a room-scale installation space, creates a hybrid experience that does not exist only in the physical, non-digital space (Firstspace) or in the headset on its own (Secondspace). In my practice, I am using an AR headset in which the immersant moves and touches physical objects in the Firstspace (the set of a stylised bedroom) whilst simultaneously interacting with the Secondspace (3D animations and spatial audio presenting the stories of four nonbinary contributors). This embodied intertwinement of First- and Secondspaces creates a Thirdspace. In Chapter 2, I explore how a temporary Thirdspace

experienced through headset AR also requires the centring of voices from the margins. Bringing in marginalised experiences makes Thirdspace a space that can challenge dominant narratives from the media, for example – and the stories presented in *Through the Wardrobe* certainly counter dominant forms of representation of trans/nonbinary narratives in broadcast media documentaries.

The technology itself does not create a Thirdspace; the body of the visitor engaging with physical objects and the multisensory stimuli of the environment, activating the documentary stories in the headset, is what activates a Thirdspace. It is a dynamic, hybrid experience of space, centring the agency of the immersant.

Three sub-questions to guide phases of my research

I had started my research with a broad research enquiry into the uses of immersive media for telling stories of genderqueer lives when the process involves the contributors themselves in the production. As I focused on headset AR, I broke down my enquiry into three parts with sub-questions. My first sub-question led my inquiry into the affordances of headset AR and how they contribute to a Thirdspace for an immersant:

> 1. How can headset AR facilitate a Thirdspace for an immersant? What is needed more than simultaneous physical and the virtual components?

Chapter 2 addresses this question through an exploration of Thirdspace, applying it to headset AR. I expand on Soja's model and read it with Michel Foucault's (1986) model of heterotopia. The chapter argues for a conceptual framework with which to understand the potential of the medium. I first consider approaches to the concept of 'affordances' (Norman, 1988). I then analyse the specific affordances of headset AR and the device I use in my practice, the HoloLens. This leads to what I term porous diegetic bubbles, the storyworlds that are created in AR experiences. The porousness of headset AR allows for the sensory stimuli outside the headset to be acknowledged or incorporated into the experience.

The physical and the virtual intertwining, interdependent upon each other, creates a *new* hybrid reality. The medium is more than a virtual layer applied to the physical world; AR, as activated through the body of the immersant, is an intertwinement of the physical and digital. When this hybrid space centres the voices and experiences of those from the margins of society, it becomes a dynamic, polyphonic Thirdspace. Chapter 2 analyses the experience of Thirdspace through Soja's

(1996) original intention of the term and the ways that other theorists have applied it models of hybrid digital-physical experiences.

I formulated a second research sub-question to guide my methods in incorporating the input of my four main contributors into the design and iterations of the project. These methods are based in the relationship-building and participant-observation of ethnography. Through inviting and incorporating the input of the contributors into the production process, this collaborative approach builds on the work of documentary makers over the past century who have questioned director-subject power dynamics:

> 2. How can a collaborative approach with contributors allow for representations of the complexities in the expression of genderqueerness as a gender identity beyond the binary? What is the potential of collaboration with headset AR when employed in an interactive documentary installation?

Chapter 3 builds on the Winstonian critique of British documentary producers' focus on queer/trans subjects as 'social victims'. I outline my production methods for recruiting the four contributors and recording audio interviews with them. I provide four vignettes (one for each main contributor of *Through the Wardrobe*) to illustrate my ethnographic approach. Through my contributors, I highlight key themes in the content of *Through the Wardrobe*: everydayness and ethnographies of trans experiences; the role of clothing in genderqueer expression; the necessity of 'unlearning' the rules and roles of gender for genderqueer people; and understandings of gender as emergent.

The excerpt from Micah's interview at the beginning of this introduction highlights how nonbinary people can actively resist binary gender categorisation whilst not framing their position as social victims. In Chapter 2, as we will see via the African American scholar bell hooks (1990), those who already occupy a space outside of the hegemonic discourse of society need not fight for acceptance or assimilation. Choosing marginality opens up a space for 'radical openness' for a community 'to see and create, to imagine alternatives, new worlds' (p.149).

According to Soja, 'thirding-as-othering' makes Thirdspace a space of possibility and emergence for those from outside the hegemonic order. Foregrounding marginalised voices within a Thirdspace moves beyond a linear dialectic trajectory of thesis-antithesis-synthesis (p.61); it opens up 'a multiplicitous "alterity," a transgressive "third way" that is more than just the sum or combination of an originary dualism [… This] rejects authoritative and paradigmatic structures that suggest permanence or inviolability' (p.107). Chapters 2 and 3 will illustrate how both nonbinary genders and

the use of headset AR in *Through the Wardrobe* constitute 'thirding-as-othering' that exist outside of binary or dualist models.

My third sub-question guided the iterative design process of my practice in this research:

> 3. How can feedback from user testing and audience studies contribute to the design of a headset AR installation?

Chapter 4 offers insights into the development and exhibition of *Through the Wardrobe* 2018–20 in which the immersants are framed as collaborators in the iterative process. The headset AR installation evolved through multiple iterations from a proof-of-concept in November 2018 to a working prototype in June 2019 to an internationally touring and bilingual installation in November 2020. Through gathering feedback from immersants and observing their reactions, I adapted the installation for each iteration. Thus, the immersants become collaborators in the design process.

The chapter examines how imbricating theory and practice led to new insights into and forms of my practice. As my understanding of the affordances of the medium grew and I learned from audience feedback, my practice evolved. I conducted research and development (R&D) playtesting, prototype user-testing and exhibition audience research, learning from verbal feedback and physical cues. These immersants played a vital role in the design iterations. *Through the Wardrobe* responds to my research questions and was developed in response to and informed by a range of theoretical literature, existing works and practices (surveyed in Chapter 1) and audience feedback studies.

Why else is it important at this time to explore the potential of headset AR for interactive storytelling? The next chapter charts how AR has broadly existed since the 1960s and has seen a number of applications in aerospace and military training before enterprise adoption in the 1990s. Military and enterprise are still the primary drivers of today's AR headsets, such as HoloLens and Magic Leap. The proliferation of smartphones and tablets and their increasingly sophisticated computing capabilities has facilitated the growth of AR (Pesce 2021). Today's smartphones are capable of delivering AR from face and clothing filters (as popularised by SnapChat) to location-specific apps that serve tourist or gaming purposes, such as Pokémon Go, to in-home product-centred visualisers, like IKEA's app mocking up furniture in a prospective buyer's own home. AR has seen uses focused mainly around social, touristic and marketing apps. Artists have also used mobile AR for at-home and location-based experiences. As artists have also started to explore the potential uses of AR headsets, now is a crucial time for critical reflection on what this medium means for both artists and immersants beyond technological discussions of affordances. HoloLens and Magic Leap are presently the two main AR headsets used by artists in Europe and North America, but their cost

has been prohibitively high for widespread consumer adoption. The largest tech companies in the world are now developing AR glasses that should make the medium more accessible. Before Facebook, Apple and Google determine for us how we should use their new AR wearable devices, it is important to ask ourselves how we can harness the medium for our own artistic interventions and independent storytelling experiences.

Millions of people daily are engaging with AR, substantially more than VR. But whereas there are spaces in VR for socialising (like VRChat) and options for gaming and entertainment, similar ecosystems do not as yet exist in AR that invite repeatedly prolonged and engaging experiences. That is why this research investigates the potential for storytelling with AR, specifically headset AR, that offers the immersant a potentially profound experience or connection with someone they have never met before.

Chapter 1 – Situating my research

Interactive documentary, 'social victims' and augmented reality

The scholarship in this thesis and the methods within my practice (explored in Chapters 3 and 4) respond to established discourses of interactive documentary scholarship and production. Interactive documentary is an area of practice and study in which nonfiction material can take a variety of formats, including webdocs, games, performance, installations and immersive media. Aston et al (2017) define interactive documentary as 'any project that starts with the intention to engage with the real, and that uses digital interactive technology to realise this intention' (p.1). Within these experiences, interactant agency is privileged via digital technology, often presenting alternatives to a linear, singular narrative. In this chapter, I map out the key affordance of interactant agency in interactive documentary that I take up in my practice in Chapter 4. I understand interactive documentary as an interdisciplinary field that incorporates documentary practice and theory with an understanding of technologies from HCI and scholarship from wider media studies. As such, this chapter relies on work across these disciplines to situate my research.

The first section of this chapter also situates my research in relation to a tradition of documentarians who have focused on the narratives of victims from the poor or exotic to the queer and trans outcast. Through the work of Brian Winston (1988; 1995), I examine how his model of documentary's tropes of 'social victims' maps onto recent representation of genderqueer and nonbinary contributors in mainstream British documentary. In examining British nonfiction representations of trans stories, I identify the need for alternative methods and formats to be employed on the topic. This provides the groundwork for the examination in Chapter 3 of the use of ethnographic and collaborative methods in my praxis.

The second section of this chapter provides an overview of the historical and most recent developments of headset AR. Along with applications in military, enterprise and aerospace industries, AR devices – including, but not limited to, head-mounted displays (HMDs) – have a history spanning decades of alternative and innovative artistic applications. I highlight the key historic, artistic developments of the medium that establish the context for my understanding of headset AR from which I develop a critical theoretical framework in Chapter 2.

1.1 Interactivity and the documentary tradition of representation

<u>1.1.1 Interactive documentary: the postmodern documentary form?</u>

This section provides key concepts of interactive documentary, building on the scholarship of the field over the past fifteen years (Galloway et al, 2007; Aston and Gaudenzi, 2012; Aston et al, 2017; Nash, 2022). In tracing some of the philosophical and practical beginnings of interactive documentaries, I argue for an understanding of the format as hybrid, containing practices developed in legacy media (e.g. film and audio documentary) with new media interactivity and agency. Practices from linear film production informed the field and are still at the core of many interactive documentaries today, including *Through the Wardrobe*, as will be seen in Chapters 3 and 4.

As the study of interactive documentary has matured over the past decade, scholars and practitioners have viewed the field both as an evolution of documentary film practices and as a revolution for producers, subjects and audiences. Kate Nash (2022) argues for understanding interactive documentary as an extension or evolution of documentary; new formats that adapt to new technologies are still documentary. Interactivity merely expands on established documentary film-making and watching practices. Just as documentary films have always facilitated shared experiences for audiences that engage with and make meaning from film, the participatory nature of interactive documentaries continues these practices. In fact, having a webdoc already within a website allows for the audience to follow up on calls to action, whether that be contributing their own testimony or joining online communities. One of documentary's missions since its early Griersonian days has been the civic purpose of informing audiences, helping to rally both contributors and audiences to correct social injustices in what Nash calls 'convening publics' (p.68).

For Nash (2022, p.6), interactive documentary is inherently hybrid. She argues that the format is a *remediation* of legacy media practices. According to Jay David Bolter and Richard Grusin (1999), remediation can be understood as the incorporation of previous (sometimes long-standing) media and production practices into new digital media. Remediation is a process of competition and cooperation amongst these media, where the new does not necessarily supplant the old but can exist alongside. For example, theatre, film, TV and the internet have all come to co-exist in relation to each other and have been adapted according to cultural and technological changes. Many interactive documentaries incorporate elements and practices developed in legacy media.

One particular example of interactive documentary that Nash examines is *Fort McMoney* (2013)[7] by David Dufresne, produced by the National Film Board of Canada. *Fort McMoney* integrates filmed footage and virtual recreations of spaces within an interactive gaming interface. It presents interviews from multiple viewpoints of Fort McMurray, a complex, fast-changing Canadian city in the middle of an economic boom resulting from oil extraction and processing. As a 'docugame', players acquire points as they develop the local oil sands reserves and decide the city's (virtual) future. *Fort McMoney* presents an example of how to incorporate linear, edited film material into an innovative, interactive online interface. Below I will examine the heritage of the format – the combination of legacy media production methods with new media computer technologies – through early examples of interactive documentaries that brought clips of observational documentary material into an interactive database.

Sandra Gaudenzi (2013) argues for understanding interactive documentary as more than 'the extension of linear documentary into digital media' (2013, p.73). The affordances of emerging digital technologies have enabled shifts in linear documentary film-makers' practices. As a *distinctive* form of nonfiction media practice, interactive documentary is, as she says, 'something else' (p.73). That 'something else' is a hybrid that both continues the ethos and methods of documentary film-making (such as observational or verité) and embraces digital technologies that enable new nonlinear formats. She proposes that we look at interactive documentary as an assemblage of objects and artefacts (usually digital media files) that gain meaning for the interactant through their choices and actions. Unlike the closed text of linear film documentary where the film itself does not change, an interactive documentary constitutes what Gaudenzi terms a 'living documentary' that tends to allow for change in content or perspective each time it is experienced. Interactive documentary prompts a re-evaluation of the relationship of users, technologies and documentary makers.

The producers of interactive documentaries have harnessed the affordances of emerging digital technologies, what media theorists termed *new media* (Sabbah, 1985; Manovich, 2001; Murray, 2003). François Sabbah (1985) observed that while 'old' media of film and TV delivered messages to a mass audience, *new* media gave a 'multiplicity of messages and sources' so that 'the audience itself becomes more selective' (p.219). According to Lev Manovich (2001), the roots of new media can be found in the postmodern intellectual shift of the last century. If the Enlightenment gave us singular 'grand narratives' of history and humanity (Lyotard, 1984 [1979]), then the industrial era gave us media that delivered those narratives in linear form (Manovich, 2001, p.232). Manovich echoes Sabbah in observing how legacy media, that which is mass produced as identical copies of images, films or music, is a product of the industrial age where 'everyone was supposed to enjoy the same goods' (Manovich, 2001, p.41). Within linear media formats, the outcome of the work does not

---

[7] https://www.nfb.ca/interactive/fort_mcmoney/

depend on the participation of the viewer or audience. A film can play from start to finish with or without an audience.

New media, by contrast, offered an interactive and open-ended form of communication (Murray, 2003). This allowed for personalisation, responding to the commands of an individual person. Media was no longer restricted to a limited number of centralised outlets; individuals could begin to customise and construct their own lifestyle from a wide range of choices of media (Manovich, 2001, p.41). Janet Murray (2012) has also differentiated legacy media from more recent interactive and programmable digital media. Legacy media formats like film and audio can be understood as linear (or 'unisequential'), comprised of a sequence from beginning to end with a set duration (p.427). Interactive formats, such as those using hypertext, Murray refers to as 'multisequential' to encapsulate the complexity of possible story routes through a set of segments (pp.430-1).[8]

Practices of the reader navigating through nonlinear text to assemble story or meaning have existed for millennia and are not strictly a postmodern phenomenon (Aarseth, 1997; Murray, 1997, p.28). This shift towards the participatory, multiple and individualised could be seen in other artforms in the 1950s and 1960s (Dinkla, 1996; Kaprow, 2003). However, it was not until the further development of processing capabilities in the era that computer technologies could begin to facilitate multilinear content. Audience agency over the pace, direction or outcome of the narrative could be seen in both innovations in interactive film (Hales, 2005) and interactive narratives supported by computer systems (Murray, 1997). Early interactive and open-ended experiences could be seen in computer games (e.g. *Spacewar!*, 1962), chatbot-style conversations (*ELIZA*, [Weizenbaum, 1966]) and story generation (*Grimes' Fairy Tales*, 1960, chronicled in Ryan, 2017). These applications demonstrated the ability of computers to be used for imaginative interactive scenarios and storytelling. Both Ted Nelson (1965) and Douglas Englebart (1962) laid the architecture for hyperlinks and hypermedia to create connections and cross-referencing of text, audio and moving image. They hoped this cross-linking would give the artist and historian far greater ability to present connected, parallel and subtopic material beyond the constrictions of linear media (Nelson, 1965, p.96). The emphasis both Nelson and Englebart made was the increased ability for the user, reader or student to choose alternative material without the singular, central narrative. Nelson (1965; 1982), in particular, was aware of this intellectual trend in the 1960s – that old systems of centralised classification were quickly being swept aside for more individualised and flexible processes, and any new computer system ought to be continually adaptable, flexible and always evolving (calling his system an 'Evolving List File').

---

[8] Murray argues for using 'multisequential' over 'nonlinear', as the latter is framed as a negative – that is, *not* linear (p.427).

New media theorists have grappled with understanding the role of the reader who engages with hypertext narratives that contain interlinked and cross-referenced text (Landow, 1992; Moulthrop, 1997; Manovich, 2001). They have argued that new media, in allowing the reader greater possibilities to assemble meaning across linked media and text, presents what Roland Barthes termed the 'death of the author'. Barthes (1977), in writing about embracing multiple perspectives and ideological positions, declared 'the death of the author' in an influential essay of the same name. Barthes asserted that literature that resists an 'ultimate meaning' in fact 'liberates' the work from society's narrative inherited from religious institutions (p.147). He traces this back to theology and the Church's mission to glean the true intention of God through a text, such as the Bible. For Barthes, refusing a singular accepted narrative is 'truly revolutionary'. Without fixity, meaning becomes multiple and emergent. According to Barthes (1977, p.148):

> a text is made of multiple writings, drawn from many cultures and entering into mutual relations of dialogue, parody, contestation, but there is one place where this multiplicity is focused and that place is the reader […] a text's unity lies not in its origin but in its destination.

The death of the author does not mean there is *no* author; rather, there is no singular meaning from a single author, or 'scriptor', as he calls a writer. The scriptor produces a text but cannot explain all of its meaning(s). For Barthes, the multiple voices inherent in a text that may be in dialogue or conflict only find their focal point in the reader. Barthes privileges the reader (over the author) as the maker of meaning of a text. Ultimately, by declaring the death of the author, Barthes refocuses postmodern understandings of storytelling on the agency of the reader.

The roles of the author and of the reader and the relationship between the two were of core concern also for Mikhail Bakhtin (1986), who considered the *openness* of a text. For Bakhtin, this openness is critical to the dialogue between author and reader for multiple potential meanings to emerge. Bakhtin employs the term *heteroglossia* to describe how even the same language can encapsulate multiple viewpoints, meanings and values for each person. What matters most is the context and conditions in which a word is uttered. The context in which a work was initially created may be far removed from that of the audience that now engages with it, for example, but the openness of meaning allows for new audiences over time to find new resonances and relevance. According to Bakhtin, past meanings of a work, 'can never be stable (finalized, ended once and for-all) – they will always change (be renewed) in the process of subsequent, future development of the dialogue' (p.170). Therefore, the role of the author is one of constant dialogue with the reader in which meanings are always shifting.

While Barthes declares that the original author's intention is of less import than the reader's interpretation, for Bakhtin, meaning is always a dialogue between the author and reader. Whereas for Barthes, the author is 'dead' – that is, true authorial intent is unimportant for the reader's interpretation – for Bakhtin, the author's voice is *essential* in the dialogue between author and reader. Where Bakthin and Barthes align is in deconstructing the notion that an author's intent is *the* primary and singular meaning of a text that we the reader ought to strive to understand – as illustrated in Barthes's illustration of theologians attempting to glean the intent of God through the Bible. Barthes and Bakhtin also align in the way they view the potential of a text to bring together multiple (potentially conflicting) voices in together in a text for a reader. Bakhtin calls this 'polyphony', while Barthes calls this 'dialogue'.

We can apply Bakhtin and Barthes to other forms of media, whether unisequential or multisequential. The dialogic approach to text of both Bakhtin (Flanagan, 2009) and Barthes (Polan, 1981) have been taken up in film studies, as scholars grapple with the ways of 'reading' film. Specifically with interactive documentary, Judith Aston and Stephano Odorico (2018, p.75) ask: 'What would Bakhtin have made of the possibilities of i-docs, where the author can genuinely become a context provider or even an enabler? In these terms, orchestration and responsibility are still required to give artistic integrity and coherence'. Indeed, in the example above of *Fort McMoney*, David Dufresne is recognised as the lead creator and director – collaborating with game designer Guillaume Perrault – constructing an interactive world that contains both elements of unisequential media (documentary video clips) and multisequential game play. The vision of creators is vital for establishing rules and logic of a space in which multiple voices come together, for multiple interpretations (with multiple possible outcomes) for the audience. For an interactive documentary, the creator can take the role of facilitator, designer or curator who selects and edits the elements with which the audience engages. This point will be taken up and further illustrated through my own practice in Chapter 4.

From the late 1970s to the 1980s, a number of multimedia technologies began to enable the first digital interactive documentary work. At MIT, an interdisciplinary team of technologists, computer programmers and film-makers created *Aspen Moviemap*[9] (1978-80), an interactive map of Aspen, Colorado. Using a computer touchscreen, an interactant could navigate a map of the streets of Aspen through wide-angle video footage and 3D computer-generated replicas of buildings (Lippman 1980). As the makers were interested in creating a digital replica of the town, a sort of proto-Google maps, its main purpose was to serve as a virtual simulator. Soon after *Aspen Moviemap*, two projects also at MIT would pave the way for innovating both tools (hardware and software) and

---

[9] http://www.naimark.net/projects/aspen.html

format of interactive multimedia on computers: *Marital Fracture: A Moral Tale* (Gerstein and Sasnett, 1986) and *A City in Transition: New Orleans* (Davenport et al, 1988). Both of these projects combined the observational tradition in documentary film-making with relatively new hardware (workstation from IBM and videodisc system that stored the video files) and newly created software programmed for the works.

In 1983, Rosalyn Gerstein, a PhD student describing herself as an 'artist/ethnographer', began filming with a couple undergoing mediation in their divorce, Judy and Alan (Gerstein, 1986). Gerstein captured 24 hours of footage in total, shot in a cinema verité style. She worked with fellow PhD student Russ Sasnett, who programmed software for a 10-minute interactive version, 'Marital Fracture', exhibited with other video works within an interactive computer console called 'Elastic Movies'.[10] Sasnett (1986, pp. 42-4) described the project as 'the first computer-controlled interactive videodisc by artists' and described 'Marital Fracture' as 'an experiment in interactive documentary'.[11] Gerstein and Sasnett then created a more complex version, *Marital Fracture: A Moral Tale*, that presented text and a number of verité video clips – some that focused on Judy's perspective and others that centred Alan (Gerstein and Sasnett, 1988). The makers hoped that, with no voice-over or singular narration, the audience could build their own interpretations of the material (p.120).

At MIT, Gerstein and Sasnett had been under the supervisory guidance of film-maker-technologist Glorianna Davenport and veteran observational documentary maker Richard Leacock. The two working together over four years (1983–7) filmed several hours of footage with 40 contributors affected by or involved in the development of New Orleans's downtown riverfront. The resulting project, *A City in Transition: New Orleans*, consisted of three hours of edited documentary sequences contained within a database that interlink and cross-reference with each other, images and text (Davenport, 1988). It ran on a unique workstation that had been developed with IBM at MIT. Referencing Englebart's and Nelson's 1960s innovations in hypertext and hypermedia, Davenport (p.1-2) declared that 'a new age has dawned' where the audience can 'edit video footage, create graphic models and link their notations to the master database'.[12]

In the UK at the same time, the BBC was also driving innovations in interactive multimedia. The *Domesday Project*[13] (1986) marked the 900th anniversary of the Domesday book through engaging a

---

[10] Documentation of Elastic Movies survives in this video from 1984, featuring a brief clip of 'Marital Fracture': https://vimeo.com/22695464

[11] The 10-minute version of 'Marital Fracture' featured in 'Elastic Movies' is both the earliest example of a documentary with interactivity provided by digital means, and Gerstein and Sasnett are perhaps the first to employ the term 'interactive documentary' to describe this hybrid form.

[12] https://ic.media.mit.edu/icSite/icprojects/NewOrleansInTransition.html

[13] https://www.domesday86.com

million schoolchildren across 9,000 schools in the UK to record details of their local communities. The project brought together 108,000 still images, 500,000 text pages and clips of video and computer-generated simulations (Domesday86). Building on the system developed for the *Domesday Project*, the BBC's next interactive videodisc project, *Ecodisc[14]*, was 'one of the first to be designed from the outset using both television and educational computing expertise' (McCormack, 1987, p.175). *Ecodisc* brought together computer-generated graphics, still photographs, and film sequences with a gamified user design. It enabled 'the user to walk and look around both in time and space, to explore, investigate, and attempt to manage the area', in line with the GCSE curriculum on ecology and conservation (p.175). Intended to take several hours to 'complete', *Ecodisc* can be viewed as an early precursor to digital docugames like *Fort McMoney*.

These early examples of interactive documentaries at MIT and BBC support the claim from Gaudenzi (2013, p.73) that the form is more than 'the extension of linear documentary into digital media'; 'it is "something else"': the combination of methods and craft of 'old media' documentary-making with new digital media devices and software. All of the projects present a Bakhtinian openness in presenting a variety of viewpoints and material from video clips and CGI to still images and text, all with interactive computer interfaces. While *Movie-Maps* allowed the interactant to roam the streets of Aspen (via a touchscreen), *Ecodisc* presented a gamified structure with materials for students to explore. *Marital Fractures* and *A City in Transition* especially allowed interactants to form their own connections between photographs, text and video clips that presented voices in dialogue or conflict with one another. Those early projects also established the precedence of artists and documentary-makers collaborating with computer programmers to innovate in storytelling forms, exploiting the affordances of new hardware and software. The first interactive documentaries were hybrids of observational film (borne out of the verité methods of the 1950s and 1960s, involving the building of trust and relationships between producers and subjects) with then-new digital technologies and bespoke software programming.

The teams, often involving film-makers and computer programmers, also demonstrate how the theoretical approach and the practice in the field of interactive documentary has been shaped since the beginning by interdisciplinary exchange. New concepts, terms and technological innovations emerged from these hybrid (and often highly experimental) collaborations. That interdisciplinary collaborative tradition has continued to today. As Gaudenzi (2017) found in her survey of interactive documentary practitioners, collaboration and interdisciplinary complementarity is necessary for most large-scale works. Interactive media production is often highly collaborative and requires re-negotiating roles practitioners may be tempted to carry over from traditional media production.

---

[14] https://www.domesday86.com/?page_id=149

These involve the input of programmers, user experience (UX) designers, content producers and area specialists, such as historians, and sometimes the input of the contributors themselves. Gaudenzi found that interactive media production teams need to work in dialogic ways with each other – and with their users. Producers surveyed stated that they had to shift attention from their own design ideas to prioritising UX to ease navigation for the user. Producers had to test their interactive designs and learn from users. This testing is more than simply 'pleasing' the user 'but rather seeking to learn enough about their assumptions, existing knowledge and context of use, to make an informed decision on how best to communicate with them. This is a form of collaboration' (p.124-5). According to Gaudenzi's survey, interactive media production demands collaboration in authorship and production from the creative team who must negotiate their own roles and responsibilities (including who has final say in the production), whilst valuing the input of the end users in the design process.

A decade after *A City in Transition*, Davenport developed *Jerome B. Wiesner: A Random Walk Through the 20th Century* (1994), a multimedia documentary, one of the first that was available online instead of a CD-ROM or local storage device. A 'mosaic' of materials (videos and text) could be explored online in what she called 'evolving documentary', wherein the audience took the place of the traditional film editor in sifting through material and building their own narrative (Davenport, 1996). Depending on the interactant, experiences could vary significantly, which would also result in different understandings of the material. The key affordance of the format for Davenport was the ability for the audience to explore; they can form connections through association at their own pace. Interactivity allows 'cinema to become something new, something more complex, and something more personal, as if in conversation with an audience' (Davenport et al, 2000, p.456).

Davenport also highlights how this interactive format undermines the linearity of traditional film documentary. Multilinear story formats can host multiple options, alternatives and experiences for the interactant or immersant. The affordances of platforms of interactive documentaries invite multiple versions of experience, allowing for repeated encounters, sometimes with alternative story paths or outcomes.

By the 2010s, the interactive formats of webdocs and multimedia platforms also incorporated a range of experiential games/gamified formats, such as the docugame *Fort McMoney*. Nonny de la Peña's series of experiments in 'immersive journalism', starting with *Hunger in Los Angeles* (2012), ushered in a new era for the major showcases of new media and experiential media (e.g. Sundance, Tribeca, Sheffield, IDFA) in what Mandy Rose (2018b) identifies as the 'immersive turn' in interactive nonfiction. Content makers, many of whom came to VR and AR from film, journalism and theatre,

were grappling with what exactly made the audience experience of immersive media different from legacy and unisequential media. Despite lofty claims of VR as an 'empathy machine' by putting the immersant in the shoes of another (Milk, 2015, discussed in Rose, 2018b), more critical evaluations of VR argue that its narrative power and potential depends on its ability to facilitate a thoughtful 'encounter' (Sutherland, 2015).

One maker who rejected the overly simplistic empathy machine view of VR was Oscar Raby, creator of the nonfiction VR experience *Assent* (2014). According to Raby, the benefit for the immersant lies in 'finding something in yourself, not putting yourself in someone else's shoes' (Tortum, 2016). Raby compares the role of a director of a linear film to his experience in creating *Assent*:

> If it was film, I would be choosing what to show you, the frame [...] But in VR, I am only suggesting it. In film, you say, this is what it is. But in VR this is a constellation of what things can be. A complex system of meaning, not just one thing. In that regard, it has a lot to do with theater design and architecture. (Tortum, 2016, no page).

Raby identifies how immersive media affords the maker to choreograph materials, creating a 'constellation' that allows the audience to make meanings through association. He reflects Gaudenzi's view of interactive documentary as an assemblage of objects and artefacts and echoes the tradition identified by Barthes in which it is the reader, not the author, who creates the ultimate meaning of a work. For Barthes, the 'scriptor' is the producer of a work, but the reader is the producer of the meaning. For Raby, the VR director suggests meaning through a constellation of elements, but it is up to the audience to form their own connections. The work of Raby, Gaudenzi and Barthes all helped shape my theoretical approach to practice, described in Chapter 4.

As part of the immersive turn in interactive documentary, a few producers took up AR headsets. One such notable work was *Terminal 3*[15] (2018, dir. Asad J. Malick), an experience that combines elements of immersive and participatory theatre, taking place within a set of white walls and signage to resemble a US airport immigration detention area. After passing through a waiting area, the immersant dons a HoloLens and sits down opposite an empty stool. The immersant plays the uncomfortable role of an airport immigration officer interviewing Muslim passengers who have just arrived in the U.S. The immersant must interrogate the holographic character, visible in the headset, appearing to sit on the stool in front of the immersant. A script displayed in the headset provides the immersant with a branching narrative structure with the speech registered through voice recognition. Lasting about ten minutes in total, each option the immersant chooses begets another story node from which to decide the next path.

---

[15] https://1ric.com/terminal-3 – Premiering at Tribeca Film Festival in 2018, *Terminal 3* has since toured international festivals and venues, including Sheffield Doc/Fest 2018.

Malick created *Terminal 3* based on his own personal experiences as a Pakistani student passing through American immigration. He devised the work with others of Muslim backgrounds who had faced similar difficult questioning at the hands of immigration officers. Using a 3D (volumetric) capture device, he filmed his performers and translated that to mesh-like figures so they appear as life-size holograms through the HoloLens in front of the immersant. The work highlights the possibility of constructing a theatrical set within which the experience occurs. An immersant can do the work multiple times and experience multiple outcomes.

1.1.2 Documentary film subjects from the social victim to the trans victim

This section situates the subject matter and methods in my practice (explored in Chapter 3) within a wider context of documentary practices and media representations of trans stories. As mentioned in the Introduction, when I began the PhD, my practice in documentary film and immersive media focused on the queer – especially genderqueer and gender-nonconforming – events and groups in which I was involved in London. We were acutely aware of the way trans and nonbinary stories were portrayed in the British media. We made work as part of queer DIY film festivals: this was media produced by us, about us, for us. Why did we feel the need to see our own stories, lives and communities reflected onscreen?

In examining instances of trans stories in American media 2009–2013, media scholar Jamie Collette Capuzza found that the representation and mention of trans people mostly perpetuated stereotypes of trans 'otherness' (Capuzza, 2014). These stories often involved cisgender journalists and media producers focusing on hormone therapy and surgery in narratives of transitioning, thus pathologising the trans body. According to Capuzza, while trans stories are frequently covered in the media, rarely are trans people themselves involved in the production of that media. British writer and researcher CN Lester sums up the situation: 'trans people are far more likely to be written *about* as a trans "issue" than we are to be recording our experiences and insights as equal participants' (Lester, 2017, p.12, italics in original).[16]

As in Cappuza's study of American media, in the UK, most nonfiction representation of trans stories are centred around medical transitions and physical abilities to 'pass' as one binary gender or the other (Lester, 2017, p.6). Often TV documentaries, such as Channel Four's *Born in the Wrong Body* series (2015) and ITV's *Transformation Street* (2018), follow contributors' medical journeys,

---

[16] There are a few exceptions of mainstream trans-directed documentaries, such as Kristiene Clarke's *Sex Change: Shock! Horror! Probe!* (1988) and Fox Fisher's *My Genderation* series for Channel Four online, but these are rare.

emphasising (in the tradition of transformation reality TV shows) the aesthetic before-and-after. British TV channels have produced dozens of journalistic and nonfiction investigations into trans bodies and identities, often relying on cameos from doctors and scientists to prove or test the legitimacy of the trans person's claims. In Channel Four's *What makes a woman* (2018), for example, presented by trans model Munroe Bergdorf, the producers focused on surgery, genitalia, transformation (including pre-transition photos), subjected Bergdorf to a meeting of anti-trans people who repeatedly refused to recognise trans as a valid identity and ended with Bergdorf undergoing an MRI scan to prove scientifically that she possessed a 'trans brain'. The British media's – especially the BBC's – contested requirement for 'impartiality' has pushed producers to seek opposing and anti-trans views for the sake of 'balance', presenting trans identities and rights as a 'debate' (Lees, 2017; Lester, 2017; Hines, 2020).

According to Lester (2017), in stories of medical intervention and surgery, gender dysphoria is at the centre of the narrative. In Lester's experience of being contacted by multiple journalists and documentary producers to contribute to stories on trans experiences, producers rarely wanted accounts of trans happiness and euphoria without mention of medical transition. Lester found that British documentaries perpetuate the optics of aesthetically 'passing' from one side of the gender binary to the other. These tropes reinforce assumptions of trans narratives as a binary journey from unhappy to happy, from one's birth gender to a medically-assisted gender.

These representations of trans stories can be understood as operating within a wider tradition of what media scholar Brian Winston (1988) calls 'the Griersonian tradition' in documentary in which society's victims become a spectacle. Film-maker John Grierson was instrumental in shaping the form of documentary film through the films he produced in the 1920s and 1930s and in establishing the Documentary Film Movement in Britain and heading the newly founded National Film Board of Canada (1939–1945). Defining the genre as 'the creative treatment of actuality', Grierson viewed documentary's use as primarily utilitarian in providing information for the audience (Grierson, 1946; discussed in Winston, 2000). Grierson (1934) suggested that documentary could act as an educational and propagandistic tool; documentary can play an influential role in a democracy in persuading the public to care about an important issue. In 'Industrial Britain' (1931), a short film produced by Grierson and Robert Flaherty, the film-makers highlighted the oppressive and dangerous working conditions of workers in the North of England from miners to factory workers. As the first time the topic had been shown on screen, the film set a direction for documentary in which producers would focus on social issues, emphasising the plight of the disadvantaged and victims of society (Winston, 1988).

The limitations of early film technology required film-makers like Flaherty and Grierson to stage or recreate situations with their contributors. Innovations in handheld cameras and sync sound in the 1950s and 60s allowed American Direct Cinema and French *cinéma verité* film-makers to portray a seemingly spontaneous, life-on-the-fly style (Henley, 2020). According to Winston (1988), handheld cameras allowed producers to intrude into the lives and homes of their subjects, as seen in the early work of Fred Wiseman and the Maysles brothers, all in the name of authenticity. Rooted in 'objective' journalistic ideals, the documentary-maker was framed as a witness to the unfortunate circumstances of society's victims from those living in poverty to those battling substance addiction.

This tradition of focusing on the downtrodden, emphasising individuals and groups within society that are considered Other, can be seen in contemporary forms of documentary. Nonbinary and trans subjects find themselves framed as social victims in contemporary British nonfiction media, including documentary and news (Riggs et al, 2016; Humphrey, 2016; Hines, 2020). By focusing on bodily transformation through medical intervention, series like *Born in the Wrong Body* and *Transformation Street* emphasise how trans people do *not* fit within the established order of society and must seek solutions as drastic as surgery. Both series use gender dysphoria to justify the physical transformation that helps the contributors to 'pass' as cisgender male or female. Surgery is treated as a necessary process to correct their body. (In actual fact, as will be explored in Chapter 3, the choice for any type of surgery is a personal one and not universal across all experiences of trans people.)

With the emergence of small, high-definition cameras in the 2000s, British TV also saw a wave of self-shot, video diary-style documentaries. For programmes on trans experiences, these video diaries appeared to lend a stamp of authenticity and collaborative production – the assumption that, without a film crew capturing the person, they could choose when and how to put themselves on camera. However, as seen in Channel Four's *Girls to Men* (2015), footage (mostly video diaries) and still photographs from contributors were edited in a way in which contributors felt sensationalised and misrepresented them (Ewens, 2015). In fact, producers added images of contributors pre-transition in without their consent (Bruce, 2015). Such images are used to create a character arc – in this case, reinforcing the tropes of physical transformation from one gender to another.

To counter the mostly cisgender and heterosexual gaze of broadcast documentaries, queer and trans directors and producers have created alternative, often low-budget and DIY documentaries on trans stories – of which my practice before this PhD was part. Fox Fisher's *My Genderation* (2016) series, for example, involved video diaries in which contributors are working *with* the film-maker in telling their story. The director maintained editorial oversight and control whilst providing

participants with access to training to develop the skills required for filming themselves. For queer and trans producers, a DIY approach presents a rejection of mainstream aesthetics and tropes and instead allows for building the kinds of film festivals and media ecosystems that cater to a sub-community (Heath, 2018). Online platforms, such as YouTube and Vimeo, have also offered trans and queer film-makers platforms without the gatekeepers of broadcast media. Across immersive media platforms, experiences have emerged in recent years, led by queer producers, collaboratively with queer and trans contributors. Nonfiction VR experiences, such as *Made this Way* (2018)[17] and *Authentically Us* (2018)[18], have examined trans experiences, told through trans voices. These collaborative productions tend to present the trans contributors as active participants, rather than passive victims.

1.2 Histories of headset augmented reality

1.2.1 Technological innovations and applications since the 1960s

The spatial audio and responsive 3D animations of *Through the Wardrobe* are experienced through an AR headset, the Microsoft HoloLens. While the next chapter explores the affordances of the HoloLens, this section provides an overview of the historical and recent developments of headset AR. Many immersive digital technologies were (and continue to be) developed within the context of military, enterprise and aerospace industries. According to computer scientist-turned-digital artist Myron Kruger (1991; 1993), parallel to and countering the military and aerospace developments of immersive media, artists have innovated in alternative and playful applications. Here I highlight some of the key developments of AR to contextualise the critical theoretical framework I develop in Chapter 2.

The first major innovations of the headsets and computer graphics that laid the foundations for today is headset AR resulted from the 1960s work of Ivan Sutherland. The computer scientist had established his reputation in advancing interactive computer graphics through a programme called *Sketchpad* (Sutherland, 1963), which allowed the user to draw directly onto a monitor screen with a hand-held light pen. This was the first programme to allow physical interaction directly on a graphical computer interface.

In his 1965 paper 'The Ultimate Display', Sutherland built on the lessons of *Sketchpad* to propose how the future of computer graphics might look, sound and act. The paper lamented the limitations

---

[17] https://www.labiennale.org/en/cinema/2018/lineup/venice-virtual-reality/made-way-redefining-masculinity
[18] https://www.authenticallyus.com

of computer displays as static and two dimensional. While keyboards and joysticks of the time allowed for commands, the result was limited to a flat screen. Sutherland proposed a computer visualisation system that could track more than a hand-held light pen. It would detect the position of the head and body and allow the user to move about and feel computer-generated objects (what today we would call haptics). He dubbed such a system 'the ultimate display'. More than merely replicate reality through a computer interface, this display would also be able to transcend the logic and physics of our physical reality.

> There is no reason why the objects displayed by a computer have to follow the ordinary rules of physical reality with which we are familiar. [...] The ultimate display would, of course, be a room within which the computer can control the existence of matter [...] With appropriate programming such a display could literally be the Wonderland into which Alice walked. (Sutherland, 1965, p.508)

At the time, computers – such as the enormous TX-2 on which he had developed *Sketchpad* at MIT – required an entire room. Sutherland envisioned that the display itself could take that space. He drew inspiration from Lewis Carroll's tales of Alice as passing from this world into the imaginative alternative reality of Wonderland. The ultimate display does not directly replicate physical reality but rather allows a person to see, hear and touch a more imaginative reality. Sutherland identifies two key affordances still relevant to today's immersive media: 1) the ability to eschew the restrictions of the physical world by creating an alternative virtual world; and 2) the ability to create room-scale environments through which the immersant can move their body. In allowing the user's body to roam, the 'ultimate display' would be interactive, tactile and multisensory.

Sutherland's paper laid out the philosophical blueprint for the system he would develop two years later. In 1967, he assembled a team of students and researchers at Harvard to explore the feasibility of building a head-mounted display that would both stereoscopically display 3D graphics and dynamically respond to the user's position (Grau, 2003, p.162-4; Fuchs et al, 2018). Sutherland's team modified headsets that were originally intended to be used for training helicopter pilots and developed algorithms that would generate an impression of a 3D object (a 6-inch wireframe box) to appear suspended in the middle of the room[19]. The HMD system was connected to a computer and could be adjusted to each user through a telescoping boom pole and set of sensors. The appearance of the large telescopic pole over the wearer's head resulted in the team giving it the moniker, 'The Sword of Damocles'. A stereoscopic image was displayed in two cathode-ray tubes and projected

---

[19] See *Virtual Reality Before it Had That Name* (1996) [online] Computer History Museum. USA. Available from: https://youtu.be/Y2AIDHjyIMI [Accessed 18 June 2019].

onto half-silvered mirrors in front of the eyes. This was the first HMD system that produced 3D shapes responding and adjusting to the wearer's movements *and* gave the illusion of placement within the physical environment.

The HMDs that would become VR and AR were further developed in the 1970s and 80s by computer scientists in the Air Force and the Universities of Utah and North Carolina (Krueger, 1991; Caudell and Mizell, 1992). They mainly focused on improved real-time head tracking and responsive computer graphics. In 1990, Boeing were building the first entirely computer-designed jetliner, the Model 777, when Tom Caudell in the research lab of Boeing Computer Services saw the potential to apply see-through HMDs in manufacturing. The complexity in design required sophisticated instructions previously displayed on paper diagrams and computer screens. Caudell believed see-through displays could improve the process by 'augment[ing] the worker's visual field of view with useful and dynamically changing information' (Caudell and Mizell, 1992, p.660). After two decades of aerospace applications, 'augmented reality' as a term was coined in contrast to the full visually immersive computer-generated environments of virtual reality.

Computer scientists in engineering labs in the 1990s demonstrated multiple potential uses for headset AR, including training surgeons in medical operation techniques (Bajura et al, 1992) and assisting technicians in carrying out repairs on machines (Feiner et al, 1993). These see-through headsets, derived from the mould of Sutherland's HMD, displayed graphics (such as instructions) over physical objects. Computer scientists at the time hoped that these HMDs would become smaller and lighter with a wider field of view and, combined with better tracking technologies like internal sensors (called 'inside-out tracking' in today's VR and AR headsets), they hoped the medium would 'become the method of choice for explaining complex physical tasks' (Feiner et al, 1993, p.61). As the popularity and access to the internet in America and Europe grew over the 1990s, computer scientists hoped that AR headsets with geolocative and wearable technologies would enable mobile computing in the world outside the engineering lab. In a prototype combining an AR HMD with GPS trackers and the text of pages cached from the internet, one team at Columbia University in New York demonstrated how the technologies could help with wayfinding around the campus (Feiner et al, 1997). There were limitations in the quality of the display and the GPS tracking technologies, but the team proposed that such an AR system could be employed in a variety of applications, including nonfiction storytelling that would combine historical images and audio recordings overlaid on points in the campus. AR headsets demonstrated great potential for the spatialisation of the internet. Rob Kooper and Blair MacIntyre (2003) developed this technology further into a prototype with a 'real-world' web browser that immersed the user in a spatialised web browser information, merging with digital augmentation their perception of the physical world. This pointed to the everyday use of such

an AR HMD that could provide information of locations, to-do notes or names of people recognised by the headset.

While the applications of AR headsets or glasses stayed within computer science labs and enterprise R&D in the 2000s, mobile AR, on the other hand, began to see a greater proliferation of applications. This was owing to the growing sophistication first of tablets (like the iPad) and then smartphones (Steffen et al, 2019; Cipresso et al, 2018). Today millions of people worldwide engage with AR regularly through games like Pokémon Go and social apps, like Instagram and SnapChat. There are many other uses, including e-commerce (such as IKEA's AR app for visualising furniture in the home), fashion and make-up face apps, locative art and tourism apps and the occasional table-top theatre or journalistic experience. AR is used for gaming, tourism, heritage and augmenting the body. Nearly all of this activity occurs via smartphones.

AR headsets have seen applications across enterprise, aerospace and military training but as yet have not been marketed for widespread consumer use. The HoloLens first became available for developers in 2016, followed by the Magic Leap in 2018. Despite Microsoft and Magic Leap's support for artistic and entertainment applications for the first editions of their respective HMDs, both companies prioritised enterprise for their second-generation devices, marketing themselves as useful for applications like architectural visualisations, manufacturing and training (including military). Both headsets have depth sensors and sophisticated processors that power their systems and yet make them awkward and far from stylish as everyday-wear devices. Their cost was also prohibitively high for widespread consumer adoption.

Several of the major tech companies – including Apple, Google and Meta – have been developing AR glasses with the planned release of products in the next few years. These glasses, in contrast to AR headsets, will be slimmer, presumably cheaper and more oriented towards everyday use, including integration with popular social media apps (Peddie, 2017; Pesce, 2021). At the same time, these corporate-driven innovations may, at best, not consider the full potential of ethical implications of their technologies and, at worst, intentionally harvest data (Pesce, 2021).

When Google Glass was released in 2014, it worked with the wearer's smartphone to display apps and web browser windows in the lens[20]. Glass was meant to take many of the app functions of a smartphone and move them conveniently into the wearer's frame of vision. However, Glass's capability to record what the wearer was seeing led to it being perceived as a personal surveillance

---

[20] As it did not render 3D graphics or contain depth cameras to respond to physical surroundings, Glass was technically 'smart glasses' and not AR glasses.

device that gathers information on places and other people without their consent (Healey and Stephens, 2017). After seven months on the market, Glass was promptly cancelled by Google as a consumer device and has been rebranded for enterprise applications[21].

The emerging AR glasses, such as those developed by Meta's Reality Labs under Project Aria, go much further in recording personal information, such as capturing the wearer's movement, location and gaze data. In the most recent keynote talk between CEO Mark Zuckerberg and colleagues in which Facebook announced their name changed to Meta[22], the company revealed their vision for AR glasses. This device is able to recognise objects and the environment around the wearer, operating an assistant and everyday tool. Included in these glasses is eye-tracking so that the glasses record the direction in which the wearer looks and for how long. These devices continue a trend set by Meta and other large corporations of what Shoshana Zubboff (2019) identifies as surveillance capitalism. According to Zuboff, users of apps, devices and social media platforms (including the AR game Pokémon GO), often unknowingly offer their personal data in exchange for free or subsidised access to services. Amazon's in-home Alexa devices, for example, appear to offer the convenience of controlling appliances or electronics like lamps or stereo systems, but the device is also harvesting an enormous amount of personal data through recording the user's voice (Zubboff, 2019).

How immersive HMDs, including AR glasses, capture personal data is at the core of privacy concerns flagged by an increasing number of computer scientists, media watchdogs and XR advisory groups (Heller, 2020; XRSI, 2020). According to one study from Stanford University's Virtual Human Interaction Lab, current VR systems track enough body movement data to identify the wearer within five minutes (Miller et al, 2020). This works like a fingerprint, an identifier that is unique to each person. Given that Meta has planned to launch ads in the Oculus Quest, how can the tracking of personal data like gaze indicate the interests of the wearer? Could they use gaze data to build a profile of the wearer of demographics like gender, income, sexual preference and consumer habits? Facebook built its commercial model from the harvesting of personal data of users. How they will gather and exploit users' bodily data from AR and VR headsets is uncertain.

While gaze tracking seems like the latest technology to expand the surveillance capitalism of companies developing immersive HMDs, the concept was in fact proposed by Ivan Sutherland in 1965 in 'The Ultimate Display'. Sutherland had hoped gaze detection could replace the use of input devices like the light pen of Sketchpad or the joystick. He wrote:

---

[21] https://www.google.com/glass/start/

[22] Meta keynote, 28 October 2021: https://www.facebook.com/Meta/videos/282623437072819

Machines to sense and interpret eye motion data can and will be built. It remains to be seen if we can use a language of glances to control a computer. An interesting experiment will be to make the display presentation depend on where we look (Sutherland, 1965, p.508).

In reflecting on the evolution and applications of immersive HMDs since the 1960s, we can see how the headsets have long promised the potential for delight – what Sutherland compared to Wonderland – and yet have applications that invite close ethical scrutiny. As both designers and consumers look to using AR glasses, now is a crucial time for critical reflection on the potential implications of these devices for how personal data is captured and exploited by surveillance capitalist corporations.

1.2.2 Artistic innovations of early AR

Computer scientist-turned-artist Myron Krueger (1993) has observed that the history of VR focuses primarily on Sutherland as the father of VR with praise for the universities of North Carolina and Utah in the 70s and NASA and Tom Furness at the US Air Force in the 1980s. There is a danger, as Krueger (p.148) warns, of believing 'that the Big Bang occurred at NASA in 1984 and that virtual reality is a triumph of the technical establishment alone'. That view is perpetuated in recent scholarship on immersive media, as illustrated by Bolter et al (2021, p.17-18), stating: 'Beginning as early as the 1960s, artists played a role in mapping the dimensions of virtual, augmented, and mixed realities, even if they did not contribute directly to their technological development'. In fact, there was an alternative stream of artists and computer scientists who developed playful and experimental outputs of computer graphics and interactive and immersive technologies (Dinkla, 1994; 1996). Not only did artists adopt immersive media for their work, but crucially, Krueger asserts, immersive media's emergence 'as a technical field was triggered by the efforts of artists, and that increasing the involvement of artists now would foster more rapid development of the field in the future' (Krueger, 1993, p.148). Sometimes artists (such as Krueger himself) could programme work, and at others, a collaboration between artists and computer scientists resulted in innovation (Dinkla, 1994). It was not technologists alone or programmers who were commissioned to provide a service; new approaches derived from the exchange of artist and technologist.

One illustration of Krueger's argument is the work of A. Michael Noll. Working at Bell Labs, a research facility dedicated to innovating new computer technologies, from 1961 to 1971, Noll consulted and collaborated with artists, musicians and dancers in creating 3D graphic drawing software, improving computer holography and iterating with stereoscopic computer displays (Noll, 1994). At the same time Sutherland was creating his head-mounted display system, Noll was also using a stereoscopic HMD. With this, he designed and constructed a system with a motorised joystick with which 'a user could feel around some computer-simulated object or shape within the

42

space of a cubic foot' (Noll, 1994, p.43). As the joystick fed back a response to the user, he dubbed it a 'feelie' device, in reference to the cinema experience depicted in Aldous Huxley's *Brave New World* in which cinema audiences feel elements of a film whilst watching it by placing their hands on metal rods in the armrests (Noll, 1972). Noll's innovation is today known as haptics, present in VR controllers and wearable devices.

In a way similar to how Sutherland's 'The Ultimate Display' envisioned the future of HMDs, in the 1970s Krueger hoped that immersive and interactive technologies (what he called collectively 'artificial realities') would 'seek not to simulate the physical world but to define arbitrary, abstract and otherwise impossible relationships between action and result' (Krueger, 1977, p.433). Crucially, Krueger saw the potential of immersive technology not as a tool for simulation, but rather as an artistic platform for the audience to explore their relationship with computers. Krueger was countering the dominant approach to technological innovation that its sole purpose is to solve problems (p.433). He saw the drive to innovate technology for utilitarian applications as narrow-minded and corporate-driven. Rather, artists ought to be empowered to code (or partner with technologists) and the results would be more creative and innovative than those from engineering and corporate R&D labs.

In 1969, Krueger began creating a series of interactive environments with 'full-body, multi-sensory participation in computer events' (Krueger, 1991, p.19). He took inspiration from the open-ended nature and audience participation of Allan Kaprow's Happenings for his approach to interactive digital art where the technological display was generative and reliant on the audience's improvisation (Krueger, 2001, p.105). Kaprow's Happenings had been abstract performance art events that mixed mediums like painting, poetry, music, theatre and dance, open-ended and fluid in form (Kaprow, 1993, p.16). Each performance was unpredictable and dependent on the choices and actions of the audience who contributed to the work. Playfulness in particular was at the heart of the Happenings, subverting formal rules of the art world and opening up possible actions and meanings for the audience experiencing the work (Kaprow, 1993).

Likewise, Krueger created work wherein the computer would be activated by the presence and actions of the audience, prioritising the *potential* of actions of visitors over a prescribed encounter. With *Videoplace* (iterations 1974-1985), Krueger created an installation where cameras trained on the visitor triggered real-time corresponsive graphics on a large screen in front of them (Krueger, 1991). It was the first computer art experience in which the movements and gestures of a user's body interacted with virtual objects. This represents a watershed moment where the relationship

between the user's physical body and the virtual body is not centred around head movement and tracking but sensors that track and trigger a response to the whole body.

Kruger hoped that eventually technology would allow for his responsive environments to translate to 'reality glasses' that the wearer could use out in the world, indistinguishable from eyeglasses. 'You should be able to look through them into the real world […] graphic objects and creatures could be displayed as though they existed in the real world' (Kruger, 1991, p.78). What Krueger envisioned three decades ago can be seen as coming to fruition currently in 'smart glasses'. R&D for Meta's AR glasses, for example, promises this level of fashionable everyday aesthetic combined with sophisticated location mapping and graphics display (Facebook Reality Labs, 2021; Pesce, 2021).

Conclusion

From *Marital Fractures* and *A City in Transition* to *Fort McMoney* and *Terminal 3*, interactive documentary practitioners have grappled with complex 'constellations' of voices, digital and physical materials and technological innovations. *Marital Fractures* pointed to the dialogic potential of creating material with the contributors themselves, Judy and Alan. Both early MIT experiments demonstrated the interdisciplinary collaboration necessary between storyteller and technologist – a process that, as illustrated in Gaudenzi's study of interactive media producers, continues to this day. In *Fort McMoney* and *Terminal 3*, we also see the potential in audience agency for bringing together voices, materials and story elements to create their own meaning.

This chapter has situated key themes of my practice-based research that I will take up and respond to in this thesis. The experiential storytelling potential of headset AR I will explore in greater depth in Chapter 2. The situating of trans narratives as 'social victims' provides the foundation for my ethnographic research methods with genderqueer and nonbinary collaborators, explored in Chapter 3. And the relationship between author and audience – in Barthes's and Bakhtin's work, Gaudenzi's study and Raby's reflection on his own practice – forms the theoretical foundation for the iterative method of my practice, described in Chapter 4.

Chapter 2 – Technologies, affordances and Thirdspace

The second half of the previous chapter examined the history of headset AR. This chapter builds on that overview through exploring the affordances of headset AR with an examination of the HoloLens device and the immersant's experience within the medium.

A term central to this discussion is *affordance*. Coined by perceptual psychologist James J. Gibson in the 1960s, it was popularised in interaction design studies by design researcher Donald Norman (1988). To afford means to provide 'strong clues to the operations of things' (p.9). A power button on a HoloLens, for example, affords how the headset can be switched on and off. Norman (1999) divided affordances into *real* (that is, the physical properties and limitations of an object) and *perceived* (meaning, the purposes of the object for the user).

This chapter first outlines the technical specifications and the real affordances of the HoloLens before exploring the perceived affordances of the medium of headset AR. The medium has been conceptualised as 'annotating' or 'layering'/'overlaying' information and imagery onto the physical world (Uricchio, 2012; Greenfield, 2017). This chapter examines from a practitioner point-of-view how the medium can be perceived as more than a passive layer sitting on the physical world but is activated through the user's choices and actions. The medium can be employed to engage interaction that blends the physical and virtual.

Headset AR, in particular, is a complex relationship of the body of the immersant in relation to the physical objects of a place, the real affordances of the device and the content that is activated in this exchange. The medium is constituted by the dynamic interaction between these elements. When AR is reduced to a digital overlay on the physical world, it neglects the importance of the role of the immersant. An immersant activating the medium allows for an experience with impact and interactivity in both physical and virtual environments. This happens in what I term a porous 'diegetic bubble'. AR offers porous diegetic bubbles that afford the integration of senses and physical/virtual elements in a storyworld. In this thesis, a storyworld is defined as the elements that comprise the atmosphere, logic and schema within a narrative, including aesthetics, architecture and interactivity (Ryan, 2014). With headset AR, it is more than the digital content in the headset (e.g. the animations and audio) but also includes the physical objects, multisensory stimuli and space that are part of the

experience. In *Terminal 3*, for example, the storyworld is the immigration interrogation space in which the immersant is playing the role of the officer.

By understanding the affordances of headset AR, we can begin to understand the potential of the medium for facilitating hybrid physical-virtual spaces for interactive documentary storytelling. In adapting a term from geographer Edward Soja (1996), I propose how this hybrid space can become a Thirdspace: a space where physical materiality and imagination in digital media come together simultaneously, offering potentially radical and transformative ways of understanding and experiencing the world. I do not subscribe to a techno-centric view that AR (or technological devices in themselves) create a Thirdspace. The relationality of content, device and immersant is what activates a Thirdspace. The Thirdspace of AR is not a virtual world ready and waiting but is negotiated and emergent as the immersant continually orientates themself amongst the physical and augmented.

2.1 Affordances of headset AR

In *The Psychology of Everyday Things*[23], Donald Norman (1988) lays out principles for 'user-centred design' to be applied to the design and development of everyday objects, such as doors or taps. These are objects that ought to be obvious to operate. According to Norman, 'bad design' is marked by the need for more instructions and lessons required to operate something, making it less intuitive - such as an ambiguous door handle or unnecessarily complicated bathroom tap. 'Good design' makes operation or use as simple and smooth as possible. How do users glean the potential use of objects?

Norman set out a theory of affordances for design: objects 'convey messages about their possible uses, actions, and functions' (Norman, 1988, p.82). In this definition, an affordance is what an object communicates to the user for possible actions to be undertaken with it. The function and operation of the object should not need explicit instructions but are intuited by the user. Norman adapted his theory of affordances from perceptual psychologist James J. Gibson (1966; 1979), who had been interested in the way that we visually perceive the world and then cognitively determine actions based on that perception. Affordances are what we perceive as the potential actions with an object. Subjective perception and potentiality are key – e.g. we perceive a chair, and that affords our sitting

---

[23] Later retitled *The Design of Everyday Things* to reflect the focus on design, rather than psychology (Norman 2013: ix).

on it. Our reactions to and potential actions with objects are subjective, depending on our previous life experiences and familiarity with that object.

After widespread adoption of the term across design and tech industries, Norman (1999) feared that not everyone understood what he meant by affordances. He clarified that there are two types of affordances: *real* and *perceived*. *Real* affordances are the properties of a physical object, often the physical constraints of what an object can or cannot do. In section 2.1.1, I outline the technical specifications and the real affordances of the HoloLens; these are descriptions of what functions the headset can perform. The rest of 2.1 explores debates in HCI and media studies on how headset AR can be understood and expands on the *perceived* affordances of the medium.

2.1.1 Technical specifications and the real affordances of the HoloLens[24]

i. Optics

The HoloLens has see-through lenses through which 3D imagery is projected, providing the illusion of a hologram. The technology, called a waveguide, is a thin, transparent lens that acts as a prism, refracting the light to appear as a 3D image for the wearer. The field of view is approximately 30 degrees, which restricts the size of the image the wearer can see. If the image is too large, it will be cropped, so the wearer needs to move back to view it through the limited window.

The processing power of the first-generation HoloLens limits the potential sophistication of 3D imagery, especially animations. This has serious implications for anyone wanting to use the headset for complex or intricate visualisations. The more complicated the image or scene, the more likely the headset is to freeze and crash. Consequently, animations need to be limited in their polygon count (or 'poly count') so as not to overwhelm the processing power of the headset.

ii. Audio output

There are built-in speakers positioned above the wearer's ears. The speaker system allows for both the illusion of spatial audio (that is, audio projected as if it is coming from different directions around the wearer) and to blend with the ambient audio of the room. If the ambient audio is too loud, there is the option to plug in headphones.

iii. Interaction inputs for commands

There are four microphones in the headset that allow for voice commands. *Terminal 3*, for example, used these microphones in registering the voice input of immersants.

---

[24] For official specs from Microsoft, there is documentation online: https://docs.microsoft.com/en-us/hololens/hololens1-hardware

The HoloLens uses a depth sensor to recognise hand gestures. This allows the wearer to 'tap' buttons and pinch and drag virtual objects. In conducting HoloLens games demos in September 2018, I received feedback from participants that these gestures became frustrating, requiring lengthy instructions and practice for the depth sensor to register the motion accurately. Chapter 4 will explore alternatives to hand gestures for interaction design in the HoloLens.

iv. Location-awareness capabilities

The HoloLens has four head-tracking cameras and one depth camera to register planes and objects in the environment. Every time a user turns on the headset, the device sensors scan the space. Through this process of simultaneous localisation and mapping (more commonly referred to by the acronym SLAM), the headset constructs a mesh, necessary for registering where digital objects will be placed (see figure below). Using the sensors, the headset is continuously orientating and reorientating itself in a space as the wearer moves around. Even if the headset is turned off and on again, the spatial data stored in the memory of the HoloLens allows it to locate where virtual elements ought to be in the physical space. These locations where virtual elements are located are called *anchors*. An anchor in the HoloLens can be something like a plane (such as a tabletop) or an image that is recognised by the headset cameras.

The HoloLens does not operate on its own; it needs someone to wear it to trigger the SLAM process, and it automatically turns off if no wearer is detected. As dynamic and responsive to their movements and actions within the environment, it is activated by the wearer. Without clear objects to the left and right, above and below, the headset loses tracking. Large, dark surfaces that absorb light, like a black curtain, and reflective surfaces, such as shiny floors and mirrors, also may interrupt the headset in registering familiar objects in the space. This results in a pause in the display as it attempts to locate a familiar object, and sometimes virtual objects lose their anchors in the physical world.

2.1.2 Conceptualising a medium: the digital dualism of AR

With the key technological specifications and *real* affordances described above, how can we understand the *perceived* affordances of the medium? To answer that, we need to examine the language used to conceptualise AR. Most of the terminology and conceptual models for understanding the properties and the potential uses of AR have come from human-computer interaction (HCI) (Heemsbergen et al, 2021). These frame AR either as a set of technologies (Cipresso et al, 2018) or as media that provide information, annotation or interpretation of the physical world through the virtual layer (Drakopoulou, 2013). In some surveys of AR, the utility of

the technology has been evaluated in relation to how effectively it works as a tool for completing tasks (Steffen et al, 2019).

The focus on how technology facilitates the layering of the digital on the physical in AR can be traced through many of the most prominent voices on AR, starting with Ivan Sutherland. Describing what the headset wearer sees, Sutherland (1968, p.759) called the projected 3D images an 'illusion' that can be viewed along with 'objects in the room simultaneously': 'displayed material can be made either to hang disembodied in space or to coincide with maps, desk tops, walls, or the keys of a typewriter'. For Sutherland, the physical and the computer-generated images were simultaneous, but one was real while the other was an illusion. Aware of the utilitarian potential of the technology, he imagined its potential to 'coincide' with physical objects like maps, blank surfaces (desks and walls) or mechanical devices, like a typewriter.

This notion of 'simultaneous' layers (one real, the other illusory) has persisted and was expanded in the 1990s. For Tom Caudell, the computer scientist credited with coining the term 'augmented reality', and fellow researcher David Mitzell, AR headsets projected computer-generated graphics onto the 'real world' (Caudell and Mitzell, 1992). Developing HMDs for Boeing factory workers to wear whilst building components for the 747 jetliner, Caudell and Mitzell described the headsets as 'superimposing' 'information necessary in the performance of the current task' (Caudell and Mitzell, 1992, p.660). As with Sutherland, Caudell and Mitzell distinguish a superimposed, computer-generated visual illusion from the 'real' world.

Paul Milgram and Fumio Kishino (1994) established the dominant (and highly influential) model in the study of immersive media that creates a binary of the physical and virtual through codifying and plotting out AR and VR technologies on a continuum. Technologies were ranked by how visually immersive they were for the user. At one end was fully (visually) enveloping Virtual Virtuality, considered the most 'immersive' form. On the other 'non-immersive' end is physical reality. In between are various forms of what are now considered to be mixed reality and AR, including handheld devices that act like portals for the user to peer into the virtual graphics overlaid onto the physical world.

By 1997, there were sufficient innovations and applications of AR to warrant a survey of the field by Ronald T. Azuma. In bringing together the HCI literature and applications of AR, Azuma (1997, p.356) defined the medium through three characteristics:
1. Combination of real and virtual
2. Interactive in real time

3. Registered in 3D

Azuma's taxonomy establishes that it is not the device (PC monitor, handheld device or HMD) or the method of display (optical or composite) that defines AR; it is the three characteristics through a digital interface. The medium requires computer vision systems that allow users to see with interactive 3D virtual objects superimposed upon or composited within view of the physical world in real time. The technology provides the bridge between the two worlds.

Both the Milgram and Kishino and Azuma articles set the standard within HCI and beyond for how immersive technologies would be conceptualised. Heembergen et al (2021, p.834) found that both articles, plus a third by Azuma et al (2001), occupy the three most cited articles in AR research papers over the past two and a half decades with influence beyond HCI. When we look at most media studies analyses of AR (and other networked or immersive technologies), they too adopt the language of 'layers' and concepts of annotation of the virtual on the physical. Manovich (2006, p.220) describes augmented space as 'the physical space overlaid with dynamically changing information'. This applies broadly to a number of technologies embedded within and employed on the built environment that 'augment' the human experience of space. Architects in particular need to consider a future in which 'virtual layers of contextual information will overlay the built space' (p.225). Specifically pertaining to AR, Maria Engberg and Jay David Bolter (2014, p.6) view the medium as encouraging 'us to occupy two locations at once [. . .] situated in our immediate physical and cultural location as well as in the virtual world of the Internet'. Adam Greenfield (2017, p.64) describes AR as a 'conceptual shear between the physical world and the realm overlaid onto it'. And William Uricchio (2019) refers to a key affordance of AR as 'markers' on the landscape that provide 'informational overlay' 'tagged to particular places'. All of these media studies models emphasise how AR bridges a gap between two layers wherein physical locations acquire virtual content pinned to them through environment-recognition technologies, such as geolocation or object recognition.

These models extend the theoretical split between 'cyberspace' and the physical in the information age media theory of the 1990s, epitomised by the observation from theorist Manuel Castells (2010 [1996], p.3): '*Our societies are increasingly structured around a bipolar opposition between the Net and the self*' (italics in the original). Castells posits a rift between networks of ideas including audio-visual media and the rooted, local, social self. He then analyses how the relationship of the virtual can impact on the physical and vice versa. Castells understands the technology and the platforms as the conduit between the online and offline worlds.

Theories of a physical/virtual split are what media theorist Nathan Jurgenson (2012; 2019) calls 'digital dualism'. According to Jurgenson, this dualism follows from the socially dominant idea that

you either are online and absorbed in a device or you are offline and in the 'real' world. The two are considered separate, though linked with social, political and legal implications in either world. With the ubiquity of mobile phones, we are now nearly always connected to the online world, even in our most mundane daily activities. Hence, there is a popular sense that we have traded our offline lives for a near-constant online existence. However, according to Jurgenson (2019, p.68), 'our lived reality is the result of the constant interpenetration of the online and offline'; the physical and the virtual are enmeshed. Castells even revised his dualist language in the preface of the 2010 edition of his 1996 *The Information Age*, observing that the increasing ubiquity of the internet 'integrated with other forms of interaction [… is creating] an increasingly hybridized everyday life' (Castells 2010, p.XXIX). For Castells, employing the concept of hybridity is one solution to the orthodox view of a physical/virtual binary.

The language from HCI of layers tends to emphasise the computer technologies, rather than phenomena or media (Heemsbergen et al, 2021). According to Apple technologist Tim Oren (1990, p.467), as technologists perceive computers as tools for storing or manipulating data, HCI struggles to frame them as media. The shaping of the discourse around a medium must be done by those creating the content in the medium. Oren gives the example of Thomas Edison who invented motion pictures but did not create the medium of cinema:

> it is unlikely that the inventors of the technology will be the creators of such visions [of the potential of the medium]. This is more likely to fall to the authors, educators and artists who have something to say and who find that the new medium offers them a way to say it for the first time (p.479).

For Oren, technologists cannot envision the potential of a medium when they design it; they need to listen to the artists who are pushing its limits. This echoes the conclusions of computer scientist-turned-artist Myron Krueger, discussed in Chapter 1, who believed that immersive media innovation is more creative in the hands of artists and those who help shape the media beyond utilitarian applications developed in engineering and corporate R&D labs. The filmmaker-technologist teams of the early MIT interactive documentaries and the more recent producers in Gaudenzi's study also illustrate how innovations in the applications of a medium occur through interdisciplinary collaboration.

Researchers of immersive media and interactive documentary do need the input of HCI and technologists – hence, I have cited them abundantly in the previous and current chapters. My own understanding of AR is built from learning from multiple disciplinary concepts of AR, including HCI, phenomenology, media studies and my own practice-informed methods of working with the medium (a process explored in Chapter 4). And yet, following Oren, practitioners and media studies scholars

should not solely rely on technologists for determining how the medium of AR should be described or applied. To conceptualise the interdependent relationship of the physical and virtual in AR, a multidisciplinary model is needed.

2.1.3 AR as hybrid, fluid, 'a reality of its own'

When AR is described as a digital overlay on the physical world, it does not take account of the immersant, who is an essential component of activating the medium. An overlay or annotation imagines a cloud – and some influential people in the AR industry refer to an 'AR Cloud' (Inbar, 2017) – that rests upon the landscape (Bolter et al, 2021). But without an immersant to activate it, no such virtual content would materialise; the content would be locked in an app behind the interface of a device. In the case of the HoloLens, if there is no immersant to keep the device moving, it will turn off.

Headset AR is more than a cloud of 3D animations visible via an HMD. The medium is a complex relationship of the body of the immersant with the physical objects, planes and multisensory stimuli of a place, the specifications and affordances of the device and the content that is activated in this exchange. Headset AR is constituted by the dynamic interaction between these elements, and without one of them, the medium ceases. The content – whether an interactive documentary, game or architectural model – is activated by the immersant, dependent upon the physical environment and facilitated through the device.

As I used the HoloLens frequently in late 2018 and early 2019 for playing games, drawing and painting in 3D, my developing practice reinforced for me that headset AR is more than a simple layering of a digital world on top of a physical one. The medium requires the immersant to move their body through space to engage with both physical and virtual environments simultaneously. In February 2019, I wrote a note, a metaphor to explain how I perceived the phenomenon:

> When we look at a blue object through a red lens, it appears purple to us. Our eyes mix the two different colours to perceive a third colour. But neither the object nor the lens itself is purple; they are still blue and red, respectively. Rather, it is *we* who perceive the third colour from the two colours.

If my physical space is the blue object and the AR media (both spatial audio and 3D animations) equates to the red lens, then the immersant's perception of both physical and virtual simultaneously is the purple. In this metaphor, I was searching for the vocabulary and a framework to conceptualise what a hybrid experience is in combining real and virtual worlds through the body of an immersant.

If, according to Manovich (2006), all the built environment is becoming augmented by a number of electronic media (e.g. screens, phones) that present dynamically changing information, and AR is the latest addition to a larger ecosystem, how does the medium afford a hybridised experience that other media forms do not? One place to start is by framing 'AR as a perceptual phenomenon and not as a technology' (Avram 2016, p.47). AR occurs through different types of interfaces (headsets, smart glasses, mobile phones, tablets, etc) either projected through a lens (e.g. the HoloLens) or composited real-time on a screen (e.g. mobile phone AR). What matters is not the device or function of the application but the perception of the user/immersant that the virtual elements are occurring in the physical space, conforming to Azuma's three characteristics (combination of real and virtual, interactive in real time and registered in 3D).

Two decades ago, an interdisciplinary team at Georgia Institute of Technology led by computer scientist Blair MacIntyre and media theorist Jay David Bolter examined what makes AR a new medium: the 'fluid blend of the physical and the virtual, and the inevitable tension between them, offers rich dramatic possibilities that are impossible in any other medium' (MacIntyre et al, 2001, p.2). Employing AR headsets, the authors collaborated with historians and theatre makers to create two prototype narrative experiences. Whilst using existing hardware and developing new software, they found that they were remediating techniques and tropes from 'old' media formats, using actors and scripts and using surfaces that perform the function of sets and stages on which the images in the headset appeared to sit. The software they developed allowed the immersants in the headset to affect the narrative flow and direction, following a branching narrative structure. As photorealistic 3D avatars at the time were difficult to construct in both software and hardware, they opted for 2D video clips of actors that then appeared as flat ghostly holograms. In combining pre-existing methods from film, stage and interactive narrative storytelling with emerging technologies, they found that what made AR a new medium was the 'fluid' combination of physical and virtual components.

We can also look to lessons from GPS-linked wayfinding AR prototypes from Columbia University in the late 1990s described in the previous chapter (Feiner et al, 1997) and locative art of the 2000s (Hemment, 2006). Both the GPS-triggered AR systems and locative art reveal the potential of AR to be rooted in place. Castells (2010) considered internet forums and identities as lacking a physical space, instead creating their own alternative space on the web that was tied to the physical world through the computer. The machine acted as a portal to a world that – to the users and players – was no less real than the physical, but it was still globalised and therefore placeless (Turkle, 1995). What theorists perceived as 'cyberspace' by its very nature lacked any geographical bearings. Geolocative technologies, by contrast, rooted media – such as audio, multimedia guides, historical tours and participatory art – in specific places. For Feiner et al (1997), GPS trackers allowed for

information to be viewed by the immersant in the headset within the built environment. Researcher-practitioner Drew Hemment (2006) examined locative work that required the participant to engage with media (mostly audio and images in GPS-triggered wearable devices) in a specific place through movement. This engagement created an experience 'between virtual and physical, data space and geographical space' that did 'not just mix realities but produce[d] a reality of their own' (p.354). The media enabled an experience that was *more* than combining virtual and physical; it allowed for an alternative experience of 'reality'.

How can we understand the role of the body of the immersant in constructing this hybrid space? Mueller et al (2018) have proposed that immersive interaction designers ought to think of the immersant's body holistically both in practicalities (how it moves in a space) and how it perceives and responds to multiple stimuli. The researchers build on Maurice Merleau-Ponty's and Martin Heidegger's distinction between *Körper* (the body as an object) and *Leib* (the lived body of emotions and memories). In what they term 'body as play', Mueller et al propose that interaction designers ought to design for the *Leib*, engaging the 'emotions & feelings, sensations & perceptions' of the body, rather than thinking of the body as something functional that acts merely as an embodied controller or cursor in a spatial game (Mueller et al 2018, p.4). In understanding the immersant's lived body (*Leib*) as containing memories and emotions, it does not merely move through space, making selections as a game controller. The *Leib* feels its way through the space, each with its own individual pace and gait.

Any time an immersant in an immersive environment is triggering an interaction in the world – whether that is pushing a button, gaze activation or moving in/through a space – their lived body is doing so in a multisensory way. Therefore, as Mueller et al propose, immersive interaction designers ought to think of ways to engage the range of emotions and senses in that body that are part of the story. Thus, the *Leib* can do more than select game functions; it can play and explore through emotions and sensory feeling.

One notable example of a headset AR work in which the narrative elements are determined by the immersant's movement around the installation space is *The Chorus* (2017)[25] by Sophie Dixon. Developed over Dixon's two-year master's programme at the Netherlands Film Academy, *The Chorus* was first exhibited at the EYE Filmmuseum in Amsterdam in 2017. The work combines audio (excerpts of oral histories), images, videos, documents and volumetrically-captured 3D objects related to the memories of the former inhabitants of a town in northern Czech Republic. As a room-scale installation, blank plinths provide the surfaces on which the objects appear in the

---

[25] https://sophie-dixon.com/The-Chorus

HoloLens, thus presented as a sculpture or museum artefact but without the physical object present. The non-sequential structure allows the immersant to explore and move at their own pace. This allows the immersant to view the virtual object from different angles whilst listening to the audio, situating the viewer as an active participant (Dixon, 2021, p.158–9).

The *Chorus* requires the immersant to move throughout a space to activate new segments of the story. The movement of the *Körper* is essential to progress the experience. If the immersant stands still, the story does not move on. And yet it is the *Leib* that encounters and engages with smells, sounds, temperature and tactile objects. This *Leib*'s heartbeat reacts to a moment of excitement and laughs at a moment of irony and humour. Nearly all the literature on AR focuses on the *Körper*. They neglect the living, breathing, emotional person with a body that feels and moves through a space, activating the spatial audio and 3D animations. The roles of both *Körper* and *Leib* are key in perceiving, enacting and contributing to the hybrid reality of headset AR.

2.1.4 Diegetic bubble: an affordance of immersive media

Immersive media affords – what I term – a diegetic bubble in which the story consists of various multisensory elements. Studies in literature and narratology define diegesis as the elements that pertain to a storyworld (Genette, 1997, p.295; Bordwell et al, 2016, p.76). Here I use diegesis in a broader sense of the schema, logic and aesthetics of an immersive experience. I employ the term 'bubble' as a model for the boundaries of that world, technologically (e.g. within the headset and headphones), physically (in the space of an immersive installation) and virtually (e.g. animations and audio).

Different disciplines other than literary studies have also employed and adapted the concept of diegesis to fit their respective mediums. In documentary film, directors must factor diegetic and extradiegetic sound into the production (Henley, 2020). Diegetic sound is the audio that is captured in the environment of the film production, including the ambient or background sounds that relate to what is seen onscreen. Extradiegetic sound includes a narrator or music track composed and added in postproduction. Extradiegetic music often helps with the pace of the film and sometimes even changes the interpretation of the image, but it exists outside the material captured in the original filming process. Most films today have a mix of diegetic audio that comes from the environment of filming and extradiegetic that enhances the editing but was not native to the filming process (Branigan, 1992, p.86).

In game studies, user interface elements – such as a menu, directional arrows or text instructions – are considered either diegetic or non-diegetic (Salomoni et al, 2016). These are needed to indicate

to the player how to progress or stop the game. For a diegetic interface, the elements are integrated into the 3D environment and logic of the virtual world, such as signs or maps that appear on a table or wall in the storyworld. Non-diegetic instructions are those that appear as flat 2D text, often like a menu. In studies of diegetic interface design in VR, integrating these elements into the environment enhanced players' feeling of 'being in the flow of the game' (Salomoni et al, 2016).

In VR, generally story diegesis exists within what is seen on the screen, what is heard through the headphones and sometimes what is felt through the controllers or haptic device. Anything beyond that in the physical environment is usually regarded as a distraction to be excluded from the experience within the headset.[26] The lack of ability to look down in the headset and see one's actual body can be one of VR's most significant limitations. While 3-degrees of freedom (3DOF) VR, such as 360-degree film, may offer a powerful sense of witnessing an event or place, the immersant is almost always without a virtual body. The viewer becomes a 'conscious dot' (Scott-Stevenson, 2020). This disembodying separation between body and mind in VR has been acknowledged as a potential feature in the medium (Rose, 2018b). It can reflect a Cartesian divide between mind and body, where the mind in the illusion of being in another place does not align with the fleshy body left behind in the physical world. In fact, Palmer Luckey, the creator of the Oculus Rift, the VR headset instrumental to the early success of VR's third wave, named his headset the Rift because it 'creates a rift between the real world and the virtual world'[27].

At-home VR generally serves to transport the immersant virtually to anywhere but their home. The 'goal' of VR is twofold: 1) audio-visual immersion, requiring visual occlusion and producing an illusion of a virtual world surrounding the immersant, and 2) a sense of presence – that is, the feeling of being there (Slater et al, 2009). As Oliver Grau (2003) has demonstrated, sensory (mostly visual) immersion can be traced from cave paintings, Roman murals, the 19th century panorama and the Sensorama of 1960 to the full visual occlusion VR headsets of the 1970s and 80s. The illusion of the murals of Pompeii, for example, 'seeks to meld the observer spatially with the mythical scene, demands a pictorial form that will envelop the observer hermetically' (p.27). For the immersant in a VR headset, anything experienced outside that controlled audio-visual environment is a distraction and breaks the illusion and sense of presence.

---

[26] There are exceptions, especially in highly sophisticated location-based VR experiences, often theatrical and large-scale. At-home VR, however, generally serves to transport the immersant virtually to anywhere *but* their home.
[27] Luckey originally explained the reasoning behind the name on an online tech discussion board in 2012, discussed in context in Harris (2019).

VR (within a headset and with headphones) affords a *closed* diegetic bubble, a microenvironment in which everything the immersant sees, hears or feels (and very rarely, smells) ought to adhere to the logic of that world. This is what Milgram and Kishino (1994) envisioned as full Virtual Virtuality in their continuum. In high-end, large-scale mixed reality experiences where the immersant touches physical objects and walls, those are given digital skins that blend into the visual schema of the virtual world.

Headset AR, by contrast, affords a *porous* diegetic bubble. The ability to see physical surroundings allows for the immersant to engage with multisensory stimuli more easily than in VR. The smell, touch, sounds and other qualities of the physical environment outside the headset can be more easily integrated into the experience. Bolter et al (2021, p.20) call this integration of multiple senses in AR 'polyaesthetics' – that is, the intertwinement of senses contributes to the hybrid experience. In the HoloLens, a 3D animation might appear in the middle of the room, but I am conscious that I am still in my room. There is no place illusion like that which contributes to the sense of presence in VR.

The 'goal' of AR, if there could be one, is to enhance or transform the immersant's experience of their environment. As Azuma (1997, p.9) postulated, an AR interface adds or removes virtual elements *within* the physical environment. AR has its own landmark applications from Krueger's *Videoplace* in the 1970s and 1980s to industry applications, such as manufacturing at Boeing in the 1990s, that helped distinguish it as a medium distinct from VR. Virtual objects always exist alongside and in relation to physical objects to create the blended experience. While AR audio melds into (or might even drown out) some ambient sound, it always exists *in an inter-relationship with* the audio of the physical world. Overall, AR requires working with and within the physical world. In fact, it *requires* the physical world technologically (through anchors) and as references for the content (such as images, objects or landmarks). AR can facilitate multiple perspectives of a place *in* the place, through location and object recognition (Uricchio, 2019). In AR, the diegetic bubble becomes porous. Understanding the multisensory porousness of headset AR opens up an opportunity for exploring the roles of the content in an experience.

The flexibility of headset AR's porous diegetic bubble is illustrated in the HoloLens-enabled piece *Elephants Can Remember* (2017)[28] by Scott Fletcher. Taking place within the Devon home-turned-museum of the late writer Agatha Christie, the experience makes use of historic domestic objects in situ. This allows the immersant to walk through the writer's bedroom with decades-old archival material (audio and flat 2D video) in the headset appearing to animate on furniture, including the

---

[28] https://www.agathachristie.com/en/news/2017/agatha-christie-hololens-experience

mirror and wardrobe. The design brings fragments of archive into the present, creating a relationship between the story of the writer and the objects of her everyday domestic space.

Whereas *The Chorus* treats the gallery space and plinths as a blank canvas for the digital elements experienced through the headset, *Elephants Can Remember* makes use of the significance of the place. The physical object is not separate from the digital but is enmeshed in the significance for the immersant. The context of the physical space plays a significant role for the immersant to make meaning of the work as it provides the context and literal surface onto which the archival material appears in the headset.

Elephants Can Remember does more than bring together physical and virtual elements. The creak of the floorboards under the immersant's feet combines with the archival voice of Christie herself, playing in the headset. The author's dressing table provides a platform for 3D animations and archival video to appear, as seen in the headset. The smell of century-old furniture mixes with the fresh-cut flower in a vase, scents tied to objects that comprise the physical setting for the experience. The intertwining of physical objects and digitalised archive within the space allows the immersant to create meaning in the connection between physical and virtual elements. What results is a multisensory, spatial experience as the immersant moves through the bedroom to activate the virtual elements.

As discussed thus far in this chapter, existing literature helps us to understand the technological, 'real' affordances of AR (Cipresso et al, 2018; Steffen et al, 2019) and the hybrid nature of the medium (Heemsbergen et al, 2021). I have identified where the literature lacks a comprehensive analysis of the bodily and multisensory experience of the immersant, and I have proposed a way for understanding an affordance of immersive media as a diegetic bubble. The remainder of this chapter will set forth a proposal for the potential of the medium in facilitating a Thirdspace.

2.2 Using headset AR to facilitate a Thirdspace

2.2.1 Thirdspace
Geographer Edward Soja (1996) was instrumental in the postmodern 'spatial turn' of the 1990s. He examined urban phenomena through power relations and the relationship between the physical, observable city and the representations or imaginary of what a city should be, especially how urban planners *intend* for urban spaces to be used. It is this relationship between the real and imagined in Soja's work that can help us to understand the potential of headset AR.

For Soja, lived space (the physically 'real') represents what he calls a Firstspace: 'the concrete materiality of spatial forms, on things that can be empirically mapped' (p.10). This is the literal, physical space we can measure and feel. But this world is not static. In the built environment, it is shaped by human creativity and imagination. This space of representation and imagination, as seen in art and media, is what Soja terms Secondspace: 'conceived in ideas about space, in thoughtful re-presentations of human spatiality' (p.10). The emergent combination of 'material and mental spaces', 'simultaneously real and imagined and more' in the built environment is what Soja defines as a Thirdspace:

> *Everything* comes together in Thirdspace: subjectivity and objectivity, the abstract and the concrete, the real and the imagined, the knowable and the unimaginable, the repetitive and the differential, structure and agency, mind and body, consciousness and the unconscious, the disciplined and the transdisciplinary, everyday life and unending history. (pp. 56-7)

Soja draws from and builds on the work of Henri Lefebvre, Michel Foucault and feminist and postcolonial studies. I shall summarise his engagement with the two French critical theorists and other two subject areas to examine the main schools of thought Soja brings together to form his model of Thirdspace. First it is necessary to clarify that Soja resists a totalising theory ('grand narratives') and envisions Thirdspace as an *other* space – the process of 'thirding-as-Othering' (Soja, 1996, p.60). To be an Other in this case is to exist beyond a binary of either/or and instead both/and also, as illustrated in the excerpt above. Thirding also implies 'not just a simple combination or an "in between" position along some all-inclusive continuum' (p.60). For Soja, postcolonial theory exemplifies how forging a hybrid identity reveals the possibility of being more than a sum of two parts or contained within a spectrum.[29]

Soja derives the core of his theory from Lefebvre's *The Production of Space* (1991) in which the French geographer builds a model for understanding the relationship between physical and social spaces (what Soja interprets as Firstspace) and of representations of space (Secondspace). Lefebvre posits that we can understand space as a complex interweaving of the social, the psychological and material. Soja adopts Lefebvre's desire to move away from classic Hegelian or Marxist models of dialectics: thesis-antithesis-synthesis. Dialectical synthesis, according to Soja, assumes that there is a way for binary or opposing positions to combine, such as subject-object, local-global, centre-periphery. 'Thirding introduces a critical "other-than" choice that speaks and critiques through its otherness' (Soja, 1996, p.61). Thirding resists the possibility of a tidy or linear synthesis.

---

[29] Homi Bhabha (1994) developed his own concept of a 'third space', referring to a postcolonial hybrid identity. In fusing elements of the coloniser and colonised, a new, third identity emerges.

Soja (1996, p.81) argues that Firstspace and Secondspace have become both opposed to each other and intertwined; what is needed now is a 'deconstruction' of this duality and a 'heuristic reconstitution'. For Soja, Thirdspace is more than a mixing of the physical and representational. It is a potentially radical space where multiple voices ('polyvocality') and representations of traditionally marginalised voices that exist beyond dominant cultures of power can be expressed. Thirdspaces in which conflicting and disparate voices co-mingle allow the people within it to question social structures, such as race, class, gender and sexuality. As social spaces reflect and perpetuate social relations, we must see them as 'filled not only with authoritarian perils but with possibilities for community, resistance, and emancipatory change' (p.87). Through the co-mingling of marginalised, disparate voices, meaning is emergent: 'radically open and openly radicalizable […] never completely knowable but whose knowledge none the less guides our search for emancipatory change and freedom from domination' (p.70).

Reflecting on feminist and postcolonial studies, Soja traces examples that seek to complicate the patriarchal and colonialist narratives that are historically dominant in academia. He points to case studies of women living around the US-Mexico border as a space where two cultures meet, conflict and overlap. These spaces create dynamic 'borderlands' of identity (p.127), formed of the flows of people between the two countries and creating a distinct hybrid subjectivity that incorporates multiplicity and opposition. What results is not an either/or (American/Mexican) but a both, encapsulated in labels that of hybridity like *mestiza* and *chicana* that transcend the binary of a border – even when those borders are strictly patrolled, as constituted in the enforcement of a border divide. The borderlands constitute both a metaphorical space for overlapping and intersecting identities (e.g. race, gender, sexuality) and a position of resistance to dominant power structures.

For Soja, Thirdspace is inherently political. Such a space is created or inhabited by marginalised voices that do not fit within dominant positions of power. Institutionally marginalised voices highlight how spaces are inhabited differently - that is, how spaces are racialised, gendered and create, reflect and perpetuate structures of power (Rose, 1993; hooks, 1990). Thirdspaces, according to Soja, are those that embrace multiple voices, question power structures and hierarchies (patriarchy, capitalism, colonialism) and facilitate the potential for something new or alternative to the dominant culture.

In highlighting the work of black American scholar bell hooks, Soja also emphasises the *choice* to be marginal. As hooks (1990) contends, it can be a political choice (and necessity) not to adopt the mainstream. Writing from her own experience, hooks describes how there is a radical openness for

a black woman in embracing a subaltern[30] position in society and within the overwhelmingly white spaces of academia, rather than striving for assimilation into the primarily white male hegemonic order. She celebrates the potential of a 'counter-hegemonic marginal space where radical black subjectivity is *seen*' (emphasis in original text, p.22). Practices from these spaces can then challenge the hegemonic order through refusing its standards. hooks gives the example of delivering academic talks in a style that is unapologetically black in tone and delivery, pulling from a heritage of black storytelling. Soja (1996, p.96) adopts hooks's assertion that *choosing* to remain marginal is essential for enabling a group to practise 'radical openness', unrestricted by the rules of mainstream respectability (i.e. for hooks, that means white academia with its enforcement of standards steeped in colonialism).

Soja's model of Thirdspace also draws heavily on Foucault's concept of heterotopia outlined in 'Of Other Spaces'. Foucault (1986, p.22) writes, 'We are in an epoch of simultaneity: we are in the epoch of juxtaposition, the epoch of the near and far, of the side-by-side'. Foucault divides the (post)modern world into 'realistic space', defined and limited by the empirical observations of objects (akin to Firstspace), and 'conceived space', represented as a dematerialised mental space (Soja's Secondspace). Beyond these two spaces of our everyday lives, there are 'other spaces'. Actual utopias – idealistic and impossible in reality – are defined as 'sites with no real place' that 'present society itself in a perfected form' (1986, p.24). But what happens when a utopia is enacted in the real world is a *hetero*topia where elements of society are simultaneously represented, contested and inverted. Foucault provides a broad range of examples of these spaces both large and small, including: American motel rooms (spaces of personal and sexual freedom), museums and libraries (places where all forms of ideas and cultures accumulate indefinitely) and seventeenth century colonies in the New World (places where religious beliefs of the Old World could be practised without oppression[31]). The heterotopia *par excellence* is the boat – a contained 'place without a place', transcending borders, capable of carrying a variety of people, ideas and treasures, a space of potential adventure and freedom on the high seas (p.27).

Soja (1996, p.147) remarks how 'a comprehensive and critical understanding of spatiality was at the center of all of [Foucault's] writings'. Foucault, of course, most famously theorised on the role of particular institutional spaces, such as prisons or psychiatric hospitals, in helping to enforce the order of society. These are spaces where those who in one way or another transgress society's

---

[30] Soja positions subaltern in binary opposition to hegemon, 'directly comparable to the relation between core (center) and periphery (or margin)' (p.90). The difference between the two poles is socially constructed and maintained through societal structures of power, including institutions and geographical space.
[31] What Foucault views as liberation for European colonial settlers in the New World, of course, cannot be viewed a liberatory for *all*. Very quickly, these 'free' settlers concocted new forms of oppression over the indigenous people whose lands they now occupied.

norms and are gazed upon, analysed, catalogued and often sequestered against their will. According to Foucault, such spaces function to help regulate society. Heterotopias, by contrast, are spaces where members of society (those not normally considered transgressors) can go *to* transgress the norms of the outside, everyday world. Considered as 'counter-hegemonic' sites, heterotopias are locations of resistance to mainstream culture, providing a space for escape and potential for enacting an alternative lifestyle (Hetherington, 1997). Ultimately, they are inhabited temporarily, not to be lived in permanently. They are by their very nature playful and experimental spaces (Johnson, 2006, p.87).

One key difference between Foucault's heterotopia and Soja's Thirdspace is in the notion of walls and barriers. For Foucault, cultures and identities mix in a heterotopia, and yet such a space is to be delineated from the outside world (the public space) with a border. There is an entrance and an exit, often with its set of rules of ritual, such as religious purification practices in Muslim hammams (Foucault, 1986, p.26). Walls and boundaries (whether physical or metaphorical) are maintained to separate inside from outside and to isolate and restrict access. The heterotopia is not freely accessible to all but requires permission or membership to enter – as in a hammam, with rules of exclusion and separation based on religion and gender. This contrasts with Soja's more amorphous Thirdspace. Whereas Foucault's heterotopia is enclosed, making it both contained and penetrable, Soja's Thirdspace is marked by its inherent openness and lack of defined boundaries.

Soja conceptualised Thirdspaces in the mid-1990s as specific geographical sites, whether the borderlands between the US and Mexico or urban developments in Los Angeles. These are places where people live and communities gather and contest the use of the space. Unlike Foucault's heterotopia's Soja's Thirdspace is not necessarily confined by walls, but it does require a mixture of the physical built environment with the representations (e.g. media and art) that reflect the imaginative worlds of the people who occupy that space.

2.2.2 Expanding the application of Thirdspace

Theorists and practitioners since have taken up Soja's Thirdspace and applied it in both media studies and urban studies. Thirdspace appears in theories of social media networks (Edirisinghe et al, 2011), an analysis of post-war Baghdad (Murrani, 2016), film studies (Rascaroli, 2013) and a study on the use of gay dating apps in Tokyo (Baudinette, 2019). Urban studies scholars have maintained Soja's ambiguity of Secondspace as a space of representation and imagination, as in Sana Murrani's (2016) examination of post-war Baghdad. For Murrani, Soja's Secondspace is seen in the planning of Baghdad's post-war reconstruction through maps and architectural renderings of the past and future

city. When combined with the lived reality of the city currently, these past and future (sometimes contentious) representations and imaginings creates a Thirdspace for inhabitants.

Media studies applications of Thirdspace tend to frame Secondspace as a lens for understanding the affordances of particular types of media, such as mobile apps. Thirdspace, therefore, is technologically enabled through engaging with technologies in the landscape. Thomas Baudinette (2019), for example, undertook long-term ethnographic research to observe the impact of dating apps and Twitter on gay culture in the gay district of Ni-chōme in Tokyo. Baudinette critiques how most studies of urban gay villages tend to blame digital technologies (in the form of dating and hook-up apps) for the loss of physical queer community spaces (e.g. Ghaziani, 2014). Baudinette asserts that, in the case of Ni-chōme, apps in fact help create community by allowing gay men to plan events and meet up, whether for a drink or for casual sex. Virtual space is no less real in forging community than physical space. What young gay men experience is a 'queer thirdspace' in which the virtual imagination functions alongside and not in place of or in competition with the physical. Far from ruining the experience of face-to-face interaction, digital apps have helped to draw gay men into the district, thereby revitalising some previously flagging venues and facilitating new interactions amongst men. What results is 'a revolutionary spatial epistemology that recognized that space and place, the real and the imagined, can simultaneously coexist' (Baudinette, 2019, p.102). Baudinette concludes that the Secondspace (social media and geolocative gay dating apps) works *with* the Firstspace (physical places) in creating a hybrid physical-virtual Thirdspace in Ni-chōme.

This study is not alone as an examination of how users of geolocative apps understand their space as both physical and virtual (Edirisinghe et al, 2011). Other theorists have sought to assert that all simultaneous imagined-and-real experiences that involve a digital interface for a virtual space within a physical space, such as mobile AR game Pokémon GO, are Thirdspace (Kosari and Amoori, 2018). However, applying Soja's model to describe *all* hybrid virtual-and-physical experiences misappropriates it through depoliticising the radical potential of Thirdspace. They turn it into an affordance that centres technology in which Secondspace is simplified to interaction with a device. This leaves Thirdspace as merely the hybrid experience of digital technology in physical space. As I shall argue in the next section, Thirdspace in AR is *not* an affordance of the medium. A Thirdspace results from the bringing together of digital content that contains voices of society's 'borderlands' within a physical space. It requires a director, contributors and immersants.

2.2.3 Thirdspace through Headset AR
Soja's Thirdspace provides a rich model for understanding how headset AR could potentially be used. He describes his model as: 'not just a simple combination or an "in between" position along

some all-inclusive continuum' (Soja, 1996, p.60). Likewise, my adoption of Thirdspace to understand headset AR asserts that the medium is more than a sum of two constituent parts (physical/virtual) or contained within a spectrum, as Milgram and Kishino (1994) attempted to do. The technology itself does not create a Thirdspace; the body of the visitor engaging with physical objects and the multisensory stimuli of the environment, engaging with the documentary stories in the headset, is what creates a Thirdspace. In centring the agency of the immersant, allowing for emergent narratives and meanings, we can consider AR beyond 'digital dualism' of the physical and virtual.

A key aspect of Thirdspace is the radical potential for contesting the use of space through centring marginalised, diverse, even conflicting voices that stand outside of hegemonic societal discourse. Polyvocality of the marginalised (as seen in Soja's examination of both bell hooks and the mestiza/chicana borderlands) asserts a separate use of space that does not strive to assimilate into the mainstream; resistance to hegemony is key to a Thirdspace. Equally, there may not be a unified vision for how to resist; there is no monolithic chicana or queer experience. What results is polyvocality within the marginalised group that occupies the Thirdspace.

Soja does not cite Barthes's notion of dialogue or Bakhtin's polyphony[32], but, in applying Thirdspace to my use of headset AR for interactive documentary, it is worth briefly bringing these theorists into dialogue. Soja's (p.70) assertion that, in Thirdspace, meaning is 'never completely knowable' resonates with Bakhtin's openness of a text, where meaning is emergent, always shifting and reconstituted, depending on the context of the reader. Soja aligns more with Barthes when it comes to deprioritising and turning away from any 'authorial' (or any top-down) voice in a Thirdspace. While there may be a literal architect or planner who designs what *becomes* a Thirdspace – he gives the example of a mixed-use urban complex in Los Angeles (pp.195-204) – for Soja, a Thirdspace must be directed by the people who inhabit it. The original architect's vision and intentions are far less important that the lived reality of a diverse group of people claiming it and making it their own. For Barthes, the author is dead; for Soja, the architect is dead.

In focusing only on the users of space, both Soja in his model of Thirdspace and Foucault in his conceptualisation of the heterotopia neglect the hidden (sometimes hierarchical or class-based) labour that operate, clean and maintain the order of these spaces. A hammam does not run itself – it must have managers, decorators and cleaners to maintain it. The colonies of the New World who fled persecution in Europe were not entirely egalitarian or anarchic – they had governors and their own religious orders. A boat, Foucault's heterotopia *par excellence*, does not drift endlessly – it has a

---

[32] Soja almost exclusively draws on fellow geographers and spatial theorists, including those from neighbouring disciplines concerned with space and power (e.g. Foucault and hooks).

captain. Even within what is meant to be a 'counter-hegemonic' space with its own rules that challenge the larger norms of society, there is still order. My application of Thirdspace aligns more with the *realities* of Foucault's heterotopias when it comes to authorial control. Using headset AR to facilitate a Thirdspace requires curators (director, programmers, designers) and, if occurring in public spaces, as will be illustrated in Chapter 4, an invigilator who guides immersants from the outside world, into the installation space, giving instructions and fitting the headset.

The dialogue of voices, as examined in the previous chapter, requires a director (or, 'author') to bring them together. Any interactive documentary requires that authorial vision for coherence. That vision is often informed by a multi-skilled collaborative team (e.g. creative director, coder, producer, animator and more), potentially with the input of the contributors themselves, as demonstrated in the early interactive documentary *Marital Fractures*, produced by an ethnographer/film-maker and programmer with the input of the two main contributors. The practice of collaborative production team bringing together multiple voices can be seen in interactive documentary in more recent examples, like *Fort McMoney*. Specifically within headset AR, an experience like *Chorus* allows for a polyphony of voices through the 3D-scanned objects that help tell their stories.

The porous diegetic bubble, described earlier in this chapter, is an affordance of the medium that the director can harness to when facilitating a Thirdspace. The director brings together virtual elements via the headset within a physical environment, and it is the presence of the immersant that activates this Thirdspace. The immersant must move within the Firstspace of the physical space – be it a room or an outdoor location – simultaneously as within the Secondspace of the digital elements. The use of headset AR does not exist as a Thirdspace on its own, like an AR cloud waiting to be entered. Rather, an AR Thirdspace is brought into being through the immersant's actions. What results is an experience unique for each immersant with variations, depending on which physical and virtual materials they choose to engage.

Headset AR can become a Thirdspace when the marginalised speak with and through the medium. To allow for, in the words of Soja (1996, p.87), 'possibilities for community, resistance, and emancipatory change', a Thirdspace for AR must question systems of race, class, gender and sexuality. We can begin to see how headset AR can be used to enable such spaces in the examples of *Terminal 3* and *The Chorus*. Both works use the medium to platform voices of the marginalised or oppressed. *Terminal 3* highlights the systematic prejudice and Islamophobia of the American immigration system. The work places the immersant in the role of an immigration who wields enormous power over young Muslim immigrants as they attempt to return to America from visits abroad. The script for the immersant treats the immigrant with suspicion, using questions that

immigration officers have asked the documentary contributors, such as 'Were you in contact with the Taliban while you were in Pakistan?' Directed by a young Pakistani artist, *Terminal 3* is based on his first-hand experience of returning to America, where he now lives. By prompting the immersant to enact a potentially uncomfortable scenario, they are confronted with the processes of an oppressive system.

The Chorus highlights the voices (through the 3D scanned objects) of those forced to leave their homes in the borderlands between the Czech Republic and Poland. Former residents of the village of Srbská provide testimonies of wartime ethnic cleansing as they were forced out of their homes. Little remains of their community, other than the stories of the few remaining survivors, the objects they brought with them and the ruins of what was once their village. *The Chorus* features fragments of their oral histories and 3D scanned objects that appear on the physical plinths in the installation.

In both *Terminal 3* and *The Chorus*, the immersant must make choices and interact within a physical environment to progress the narrative in the headset. Their bodies navigate the Firstspace of the installation simultaneously with the Secondspace of virtual content in the headset, interacting with 3D animations, activating digital elements with their gaze and movement accompanied by spatial audio. But the Thirdspace that results is more than a technological mixture of physical and virtual. This goes beyond a digital divide where the two spaces are interdependent for the narrative progression of each work. The embodied choices of the immersant, led by their engagement with the content of the work, activates the Thirdspace.

As interactive documentary makers, how do we facilitate Thirdspaces with the medium in which the voices of the marginalised are heard, whilst steering clear of the Griersonian trope of the social victim, discussed in Chapter 1? The next chapter provides one model that offers a solution: collaborative production with the communities about whom we make work.

Conclusion

For people who engage with AR on a daily basis in the form of Zoom and social media face filters, e-commerce or gaming, the medium is well and truly integrated into their lives. The expanding variety of today's mobile AR applications extends the way that smartphones are enmeshed in many people's lives into spatial media. Hence, a revised, multidisciplinary model of AR (both as it is used now and its potential for storytelling) is needed to conceptualise the immersant's experience of the medium.

More than a virtual layer sitting on top of the physical world, the two are enmeshed and interdependent for the immersant inside the porous diegetic bubble of AR.

What does that mean for practitioners making work in the medium – specifically, in the case of this thesis, interactive documentary? Informed by the theoretical understanding of the medium and my own practice with the HoloLens, the second part of this chapter laid out a model for conceptualising the marriage between the affordances of headset AR and the radical potential deployment of content that shapes how the immersant experiences their body in relation within the diegetic bubble and the world beyond. The porosity of the medium affords this fluidity of barriers and boundaries. We can see the role of headset AR in facilitating a Thirdspace, a space in which multiple elements come together in a potentially radical form of storytelling. Thirdspace through headset AR allows us to embrace what Soja calls 'thirding as othering' – what does not fit within one binary or another, embraces the position on the outside, as a third. This third status is important for those, for example, who argue for recognition of nonbinary as a third gender option – neither male nor female but something other. The next chapter will build on this thirding in an exploration of the content of *Through the Wardrobe* and the production framework for working with the four contributors.

Chapter 3 – Nonbinary stories

Representation and collaboration

Chapter 1 offered an overview of trans and nonbinary representation in British nonfiction media. I explored the tropes of the 'social victim', medical transition and the optics of aesthetically passing from one side of the gender binary to the other. These 'born in the wrong body' conventions in British documentaries on trans lives reinforce assumptions of narratives as a binary journey from unhappy to happy, from birth-assigned gender to a supposedly 'true' gender.

My practice instead highlights the emergent possibilities of gender *eu*phoria in nonbinary subjectivities. Feelings of dysphoria – that is, where one's identity does not match one's body – are often part of this process, but so too is euphoria. Over the past decade or so, discourse within trans and nonbinary communities has focused on the moments, strategies and conditions necessary for fostering gender euphoria, resilience and self-confidence (Benestad, 2010; Lester, 2017; Dale, 2021). My nonbinary and genderqueer participants reveal an often ambiguous and 'messy' journey with gender. Rather than a settled sense of gender, my four main contributors acknowledge their gender as a process, emergent, negotiated and renegotiated frequently – a becoming.

This chapter addresses my second research sub-question:

> How can a collaborative approach with contributors allow for representations of the complexities in the expression of genderqueerness as a gender identity beyond the binary? What is the potential of collaboration with headset AR when employed in an interactive documentary installation?

This chapter examines how I began my production process employing ethnographic methods, leading to collaborative methods. Reflecting on my ethnographic research methods, I weave through key theoretical themes from gender theory and studies of trans and nonbinary people that inform *Through the Wardrobe*. In four ethnographic vignettes, my encounters with my research participants demonstrate how the identity and expression of nonbinary genders can combine or reject masculine or feminine elements whilst still not existing on a tidy spectrum of gender.[33]

Finally, in the process of developing my praxis, the emergent nature of nonbinary subjectivities (the lack of fixity, coupled with multiple potentialities) challenged me to employ a multisequential media

---

[33] All quotes in these vignettes can be found in the transcripts in Appendix 1 of this thesis.

format that afforded multiple, open physical and narrative possibilities. My contributors demonstrate how nonbinary genders are analogous to the medium of headset AR: as AR allows for an experience not located on a spectrum of physical to virtual whilst incorporating elements of both (as discussed in Chapter 2), so too does nonbinary exist beyond a spectrum yet incorporating or rejecting elements of those supposed binary categories. Rejecting binary classification (male/female; virtual/physical) opens up a multiplicity of possibilities for both gender and headset AR. This rejection of binaries echoes how the *Through the Wardrobe* facilitates a Thirdspace in which the virtual/imaginary and the physical are enmeshed and interdependent.

3.1 Ethnographic production methods and theoretical underpinnings

3.1.1 Ethnographic methods

My praxis relies upon ethnographic methods in the production process. These methods require the ethnographer to immerse themselves in the field balancing participation and direct observation – known as 'participant-observation' in anthropology (DeWalt and DeWalt, 2011). I employed ethnographic methods in the form of spending time with my contributors, including hours of listening and engaging in our shared social circles and then creating work that has involved their participation at different stages. 'Participation' went two ways: me participating in their activities (more on this in the vignettes below) and them participating in the process of recording and production process of my work. The classic ethnographic research model involves the researcher preparing, then going into the field, building up research data through encounters with participants (or 'informants', the term used traditionally in anthropology), then coming back and analysing that data and producing new knowledge through written text (or through visual material, like films or photographs, in the case of visual anthropologists).

However, my research is ethnography from within – that is, an ethnography of one's own world. As anthropologist Devika Chawla (2006) argues, an ethnography of one's own community offers immediate intimacy but also requires navigating 'shifting selves' between insider (a member of the community) and outsider (as a researcher). According to Chawla (p.15), what results is a hybrid scholar, finding 'ourselves in fields of ambiguity—being and becoming insiders, outsiders, or partial insiders'; our personal and professional selves mingle in such research. My insider-outsider position shapes my ethnographic approach to my research. When I moved to Bristol from London in 2017 to begin my PhD research, I was coming into the local queer scene as an outsider. In the process of living, working and researching in the city, my contributors' communities have become my own. I as a researcher am both insider and outsider.

Interspersed through this chapter, I provide four vignettes that draw out my observations of my contributors, describing them in social contexts, to illustrate the ethnographic methods at the core of my practice. Why build relationships over time and employ ethnographic methods of participant-observation and then collaboration? I illustrate in section 3.1 how getting to know my contributors helped shape the content of my main practice output, *Through the Wardrobe*. I use vignettes to explore the meaning and gender theory underpinning the work. Section 3.2 traces how, in learning from models of collaboration from historic ethnographic film-makers, I forged my own form of collaboration using headset AR with physical objects in an installation. Ethnographic methods allowed me to explore over time (what grew from hours to days, months to now four years) the rich forms that genderqueer and nonbinary gender expressions can take with my contributors.

3.1.2 Contributor recruitment from call to action to audio interviews

Even before a recording device mediates the encounter between the two parties, the producer sets out the terms of engagement – a process Mandy Rose (2014, p.208) identifies as 'the framing of the call to action'. When potential participants see or hear an appeal for involvement, it is an opportunity for them to understand the 'political attitude' and 'agenda' of the project and its producers (p.208). The invitation may be to 'help make the world better by getting stories like yours heard so that the situation can change' and to 'contribute to the public good by making your experience or knowledge a learning resource for other people' (Dovey 2014, p.24). Often, the invitation to take part is framed in the language of educating the public and the implication that such education can contribute to a greater societal acceptance.

In autumn 2018, upon UWE Ethics Committee approval, I put out a 'Call for Contributors' on social media and through emails to LGBT community groups. In my call, I invited potential genderqueer/nonbinary contributors to record their stories in audio interviews and to donate any old clothing from their wardrobe. This is the text used to engage with potential contributors:

Calling all enbies, agenders, genderfluids or however you identify your genderqueerness!
We're looking for people to interview and take part in a genderqueer wardrobe. Do you wear
clothes? Do you fall outside gender binaries? Do you live outside London? Then we need
YOU👏🏻

We are building a travelling wardrobe with objects and items of clothing from genderqueer
people. Visitors will choose an item, put on a HoloLens mixed reality headset and move
around the room, listening to the voices of genderqueer people.

With all the sensationalist media attention on trans stories lately, we need an alternative made
by and with our community. That's why we're creating an interactive, immersive experience
that will travel to festivals and schools around the country. This celebrates gender diversity
and the range of expression and presentation.

Participants must be 18 years or older. You can give your audio testimony, donate your item
(or we'll find a close replica) and test the interactive experience as we develop it. We want to
include anyone outside the binary.

CONTACT US BY 26 OCTOBER!
Email Rob at Robert2.Eagle@live.uwe.ac.uk
Twitter: https://twitter.com/GQWardrobe
(Note: this art-documentary project has been approved by the faculty Ethics Committee at the
University of the West of England)

Fig. 4 – Call for contributors text shared via social media and email

I received a few positive responses and visited one Bristol-based LGBTQ+ social group for those aged 19–25. After weeks of posts on social media, emails and follow-up phone calls, four contributors committed to taking part: Rex, Jamie, Micah and Sammy.[34] Rex was the first contributor. Although we had already met at UWE, we had not talked extensively about gender, but they saw my call for participants and wanted to take part. I was introduced to Jamie through mutual friends. We did not know each other before they took part in the project, but we quickly became friends as we met up socially. They also helped with user testing, production, design and installation from 2018 to 2020. Both Sammy and Micah I knew before the project. This familiarity allowed us to feel at ease with each other quickly when audio recording and allowed for follow-up conversations and updates on the project to blend into drinks and general social catch-ups. I valued the time they gave me when recording the audio, and the relationships built with them allowed for them to offer their critical feedback, a collaborative process described in more detail later in this chapter.

For the audio recording process, I prepared semi-structured interview questions and prompts to steer the conversation. Below I present four vignettes – focusing on each contributor – from which to offer an ethnographic and theoretical analysis and to highlight key themes in *Through the Wardrobe*.

---

[34] I conducted initial pre-interviews through email and phone calls before the audio recordings. These gave them a chance to ask questions before consenting to take part. Then, in line with UWE ethics protocol, they read through the Participant Information Sheet and signed the release form with the option to withdraw their contribution for six months after. I outline this process of ensuring their informed consent to illustrate how both they and I both agreed formally on their contribution and relationship to the research at the start.

3.1.3 Sparking euphoria: clothing and nonbinary/genderqueer gender expression

Vignette 1: Micah

'If I do get gender dysphoria, it's usually something to do with my "woman bits", or so they would say. I usually go with really baggy shirts and really big hoodies, which literally hide away my fucking hourglass shape that I hate. If I do get dysphoric in the lower bits, I– if I do have time for it – put a strap-on on and just walk around, and it feels a little bit less intense. Like, maybe that's why I walk around with camo pants all the time because it makes a bulge on me, and I just go through it.'

When I first met Micah in December 2017, they identified as female. Though generally embracing a gender nonconforming (at the time what they called 'tomboyish') style, they would also dress up in hyper-feminine clothes on occasion, approaching it more as drag than as everyday attire. Micah, their then-partner, a trans woman, and I bonded over dressing up and going out together. But Micah recalled seeing the euphoria that their partner had found in realising she was trans and the subsequent transition. Micah wanted to feel that same way about their body, too, but they felt neither female nor male. In early 2018, after they did some research and reading around gender theory, they began to embrace the term agender.

At the time, Micah worked on the boats in Bristol Harbour. They were acquiring skills in commercial boat piloting and customer service, but their true passion was for sailing on open water. Working on the boats on the harbour allowed them to save up for courses to pursue the licences necessary for piloting large sailboats. The dress code for the harbour boats also allowed them to wear cargo shorts that gave them the appearance of a bulge.

As they humorously discuss in the quote above, one way to overcome the feeling of bodily dysphoria at home is to embrace the hyper-masculine sexual symbol of the phallus in the form of a strap-on. This helps to balance the sense of femininity they feel in their body. While their presentation in what they put on may help to draw out elements of femininity or masculinity, they feel fundamentally aligned with neither. For Micah, clothing is a 'game', whether it is combat boots and cargo shorts or a frilly dress.

According to Joanne Entwhistle (2015), clothing constitutes a 'situated bodily practice' that locates an individual within wider society. Clothing both projects and helps create one's place in society.

And yet, as Entwhistle argues, there is a danger in scholars attempting to read too much into the semiotics of fashion as people wear it in the world. Clothing choices can be limited by a number of restrictions: access to money, situation/occasion (such as the necessity to wear a work uniform) or social punishment for infractions of gender conformity. What I found in discussions with my contributors was a desire to wear particular items of clothing but sometimes not having the money to purchase particular garments or fear of street harassment or social rejection. What Micah problematises in the vignette above is the limit to which clothing can conceal or express one's gender identity. For someone agender, nearly no clothing expresses that gender. There have been some unisex lines of clothing (Jenkinson, 2010) often within boutique or online shops, but un-gendered clothing is difficult to find on the high street. Likewise, there are no standards of androgyny or even gender nonconformity for genderqueer and nonbinary people. Most of the time, they must choose from what is labelled 'male' or 'female'.

According to sociologist Ben Vincent (2020), gender dysphoria can take two forms. The first is *embodied*, which refers to 'negative feelings that transgender people may experience specifically related to their body itself – such as the presence or absence of primary or secondary sexual characteristics' (p.99). This is the form of dysphoria Micah describes in the vignette above. In order to better align their bodies with their gender, many trans people might pursue hormones, surgery, clothing, accessories and cosmetics as well as voice training to sound more feminine or masculine (Benestad, 2010). While some genderqueer and nonbinary people may seek medical intervention to overcome embodied dysphoria, others reject such major bodily alterations all together. Not every trans or nonbinary person feels embodied dysphoria; many do not feel that their primary or secondary sexual characteristics influence their gender.

The second form of dysphoria is *social*, which occurs when the body is gendered (or misgendered) in social situations and causes distress to the person. Sammy (see transcript in Appendix I) describes instances like this when she is stopped and forced to leave toilets, either male or female. The harm of these social situations causes anxiety each time she is out and needs to use the washroom. Rex describes a situation in Vignette 3 below where, as a child, they were pressured by their mother and peers to conform to certain gendered forms of dressing.

Stories of dysphoria are often used in 'born in the wrong body' narratives in documentaries, as argued in Chapter 1, and when seeking medical treatment. As writer Laura Kate Dale (2021) observes in her discussions with non-cisgender people (and their stories in the anthology *Gender Euphoria*), it is as if dysphoria is a necessary requirement in legitimising one's trans identity. And yet, as Dale (2021, p.3) argues, 'euphoria is an equally valid reason to decide who you are'. She and other

trans writers, such as CN Lester (2017), in recent years have focused on moments, situations and strategies that inspire euphoria.

This focus on euphoria, rather than dysphoria, became a starting point when working with my contributors. In each interview, I asked them about clothing. In wanting to avoid centring narratives of trauma, I asked questions focused on the use of clothing to feel positive about one's body and one's gender as expressed through that body.

Each contributor focuses on at least one item of clothing. For Rex it is a check shirt that gave them a feeling of ruggedness and an ability to tackle any sort of outdoor task, from rock climbing to sheep shearing. Jamie speaks of 'power dressing', where clothing helps them to feel more confident in a work environment. They single out their admiration for how Meryl Streep's character Miranda Priestly dresses in the film *The Devil Wears Prada* (2006). Priestly's power dressing (mostly stylish monochrome trouser suit ensembles) accompanies her no-nonsense leadership style and her incisive observational remarks. Micah loves combat boots, viewed as sensible footwear that allows them to work on Bristol ferry boats and to 'smash the patriarchy'. In fact, all four contributors shared an affinity for sturdy boots that can be worn with anything from a ballgown to cargo shorts. Sammy speaks of how her accessories give her a sense of feminine strength, allowing her to 'see' herself again in the mirror. Cosmetics and accessories are not a superficial augmentation or layering on the body; they help to draw out her femininity from within.

On pre-pandemic nights when getting ready to go out with Micah and their then-partner, we would start the night feeling tired and scraggly, and after a bit of gin, a 'costume change' and some makeup, we were *trans*formed and ready to emerge into the world. We devoted a lot of discussion to different modes of presentation: the clothing for out in the world during the day, often in a work context; clothes at home that were *just for you*; and dressing to go out as a bolder version of yourself. What you wore and in what context was key to feeling confident and/or sexy at certain times, and anonymous or simply free from queer-phobic harassment other times. We all had experiences of street harassment for our gender presentation. For both Sammy and Micah, who discuss their dysphoria in *Through the Wardrobe*, changing into clothes at home or for the sake of going out becomes a point of empowerment. The clothing helps them present, embody and feel as comfortable as possible as nonbinary. While clothing should not be the criteria to looking or feeling nonbinary, it can help psychologically.

3.1.4 Everydayness of trans experiences

Vignette 2: Sammy

<u>Old Market Assembly, Bristol – 3 February, 2018</u>

I sheepishly entered the Old Market Assembly. The event was a 'takeover' by a queer club night called Don't Tell Your Mother (DTYM), hosted by two wildly inappropriate drag queens. The multicoloured disco light on the stage shot beams of light around the high ceiling, off the spinning disco ball and onto revellers packed in from the mezzanine upstairs to the glittery dancefloor below. I had been in Bristol for less than 6 months and did not know many people – mostly fellow PhD researchers in my cohort – and only a few queers. I grabbed a pint at the bar to help overcome my shyness around so many intimidatingly beautiful dancing queens.

And then I spotted Sammy. We had met in September on a dating app but soon decided just to be friends. Often fuelled by a few too many dirty martinis in my small one-bed flat, we bonded over discussions of installation art, gender theory and nineteenth-century German philosophy (and the 'bullshit pretensions' of academia that made Sammy leave a PhD track). We would find ourselves often at the same Spike Island gallery openings, experimental performance art nights at the Brunswick Club or queer club nights like DTYM.

Sammy at first presented in what I interpreted to be a queer yet overall masculine way. Over the next two years, I watched Sammy present increasingly confidently in a genderqueer style. She often wore dungarees or an effortlessly cool retro 90s-style cycling jacket and vibrant jumpers. Though once she would only wear eyeliner or colourful makeup for special occasions, like DTYM club nights, eventually she started incorporating these into her everyday attire – that is, outside of her day job in which she could not wear anything other than her uniform.

At some point, I never saw Sammy without large silver hoop earrings, pink lipstick, blusher on her cheeks and an oversized bow perched on her shaved head. At the time, she was transitioning from using male pronouns (he/him) to the nonbinary pronouns they/them. No matter how Sammy presented, I always saw her as nonbinary - as possessing a simultaneous maleness and a femaleness. I admired her presentation for not fitting into normative gendered fashions.

This evening in February 2018, it was Sammy who saved me from standing awkwardly alone when she invited me to join her group of fabulously arty queers – one twirling around in a Chinese silk kimono and another next to the speaker sniffing poppers (a legal liquid drug in a small bottle that induces a short-lived light-headedness). Sammy gave me a hug and then jumped in the middle of the group, merrily flailing her limbs to the rhythm.

While for eight hours a day she had to wear a uniform for work, Sammy turned to cosmetics and accessories like blusher, a bow and earrings to feel more comfortable in her body and appearance in the evenings and on days off. This daily post-work act helped her to 'unmale' herself, taking away the emphasis from her five o'clock shadow. Putting these on, in her words, is 'a moment of recognition. Like, oh, I can see myself again'. These acts of augmentation through cosmetics and accessories helped her to feel more relaxed in her body and more comfortably nonbinary.

When conducting the semi-structured audio interviews with each contributor, I asked questions about the quotidian and mundane related to daily routines, profession, interests/hobbies and regular acts of self-care. These elicited thoughtful anecdotes that tended to focus on everydayness, loving relationships, health and wellbeing. This is in stark contrast to the tropes of trans trauma and Otherness at the centre of many mainstream nonfiction representations. Rex, for example, spoke of the 'empowering' ability to look after themself through foraging and distilling flowers and herbs for medicinal purposes. This reflects their anti-establishment and DIY sensibility, celebrated in queer and trans communities who have traditionally been subject to neglect or prejudice by medical institutions through homophobia and transphobia (Latham, 2016). Rex offers an alternative approach in the form of queer and community-led healthcare.

What my four contributors also embody is four widely different ways of living outside the binary categories of male/female. Sammy and Jamie both use the term nonbinary to describe themselves, Micah is agender and Rex uses genderqueer. Even though the terminology around gender diversity has rapidly changed in the past three decades for the English-speaking Western world, the concepts of 'third gender', two-spirit or 'Other' category beyond the binary of male/female have existed across societies for millennia (Herdt, 1994; Stryker, 2017). *Genderqueer* appeared as a term for the first time in print in 1995 (Wilchins, 1995; 2002), employed as a label for all those outside of binary and heteronormative forms of gender. Genderqueer was originally intended as an umbrella term for non-normative gender expression *and* identity, including: 'diesel dykes and stone butches, leatherqueens and radical fairies, nelly fags, crossdressers, intersexed, transsexuals, transvestites, transgendered, transgressively gendered, intersexed, and those of us whose gender expressions are so complex they haven't even been named yet' (Wilchins, 1995, p.4). New terminology in the 1990s both informed and was inspired by debates in the emerging fields of queer theory and gender studies, dominated then by Judith Butler's model of gender performativity (Ekins and King, 2010). *Non-binary* also first emerged in 1995 as a term applied to those not adhering to male or female, although it did not gain popularity as a term until the 2010s and only entered the Oxford English Dictionary in 2018 (Watkins, 2019). In the past twenty years, a number of terms to describe gender

diversity, including agender (genderless, neither male nor female), have emerged into mainstream parlance (Bergner, 2019; see also Glossary at the end of this thesis). While older queer people tend to use the term genderqueer to incorporate all the labels outside of male/female, younger generations are embracing nonbinary as an umbrella term that includes forms of gender like agender (Stryker, 2017, p.24).

Genderqueer and nonbinary people in Britain have in recent years fought (and failed) to gain recognition in a variety of legal forms, such as the fight for government-issued documents to have the gender 'X' instead of M or F (Vincent, 2020). Some institutions have recognised the gender-neutral address of Mx and some venues have chosen to de-gender their toilet facilities to 'Unisex', delineated by containing either urinals or cubicles. These are all ways in which British institutions (even if not the government) can recognise the legitimacy of gender diversity beyond the binary.

3.1.5 Gender euphoria: agency and collective enactment

Vignette 3: Rex

'I can remember around the age of 12, my mum buying a load of girls' clothes for me and it being the most awful thing in a kind of pastel yellow and off-the-shoulder and shorts and things and it was just this quite dehumanising experience. I remember wearing them to go along with it and just not knowing until that point just how uncomfortable that made me. So I feel like if somebody had said to that kid: "It's all right. You'll be able to choose", I think I'd have been a happier 12-year-old.'

Now in their late 40s, Rex has always seemed to me so self-assuredly cool and level-headed – neither gregarious nor shy, but calmly confident. Always in jeans with a t-shirt and check shirt over that, wearing boots and sporting long greying hair. When I would see them at queer club nights, in a sea of angsty, glittery, rainbow-coloured 20-some-year-old queers, Rex seemed to me like an island of serenity and poise.

Assigned female at birth but resistant to any form of 'feminine' clothing, in *Through the Wardrobe* Rex describes how as a child they attracted disapproving comments from peers for their eclectic style. But these clothes helped Rex distinguish themself in relation to girls their age. Forging their own genderqueer fashion sense, they were rejecting the standards of the gender rules in which nearly everyone is steeped:

'I remember not having any style as a kid and that being potentially kind of an issue. One outfit I wore to school for a while was a kilt, some kind of jumper and a bodywarmer – and not really thinking that was strange and then getting feedback from other people that my style was kind of odd…Kilts have always been all right. They're sort of somehow cross-gender.'

After they tried wearing the pastel yellow dress to appease their mother, they grew into a more confident teenager, rejecting peer and parental pressure to conform to gender or fashion standards. They accepted that their fashion sense seemed unconventional by their peers' standards. They were happier not to conform to normative fashion standards than to wear the yellow dress their mum bought them.

While Rex spoke more self-assuredly of their identity (as genderqueer but resisting labels of 'butch' or 'femme'), they also expressed a more recent curiosity to try on dresses, like ball gowns. Now that dresses were no longer forced on them, they could wear them as a form of playing with gender. For someone who has spent their childhood resisting 'conventionally female clothing', dresses could now be part of childlike dressing up. As a form of drag, a dress in a playful setting would no longer undermine Rex's sense of self, as they had felt at the age of 12.

According to gender theorist Judith Butler (1990; 2015), gender can be understood as being inscribed on the body from birth and then enacted through repetition via that body. Gender is performatively 'real' in that, as it is inscribed and enacted, it is recognised socially and legally, as with a performative speech act like 'I do'. As gender is assigned at birth and norms are learnt, enforced and reinforced through social institutions, disobedience of gender conformity becomes subversive.

Where does this leave those who are genderqueer and nonbinary, whose gender is not recognised legally in the UK and only tenuously recognised by larger society? The gender socially inscribed on their bodies – and enforced through institutional documents – seems to allow no space for the recognition of their nonbinary identities (Hines, 2020). According to Sammy, who describes in *Through the Wardrobe* her dilemmas of choosing a toilet when out in public, this lack of acceptance induces gender dysphoria. Sammy talks about being confronted by others and pressured to leave when using either female or male toilets. Dysphoria can even happen in the home when gender norms are enforced by family members. Jamie recounts a time in childhood when they bought lip gloss for their cousin and felt disappointment when they realised they were not allowed to have lip gloss themself. In their recollection featured in *Through the Wardrobe*, their father commented that

he hoped Jamie would not grow up to be 'a fucking queer' – to which Jamie defiantly adds, 'And now I'm a fucking queer.'

Acts of inducing *euphoria* to feel good in and about one's body require a combination of individual active choices and reliance on support from like-minded and fellow queer/trans people, especially those referred to as 'chosen family'. Rex, in the vignette above, demonstrates this agency at a young age by rejecting an item of clothing that conforms to the gender they were assigned at birth. Clothing held the power to make them deeply unhappy and, conversely, to make them feel comfortable in tackling any number of physical tasks. Their check shirt symbolises for them practicality and labour and therefore empowers them in performing those tasks. Wearing an item of clothing becomes a performative act: by putting on a 'rugged' shirt, it enables the execution of such actions.

Sammy and Rex both describe how choosing to wear certain items help them to feel 'good' or 'strong'. These may be individual acts of choice, but they occur within social contexts. Just as some public or social situations can induce dysphoria (e.g. toilets or wearing something that does not align with their gender), others foster euphoria. For Sammy, one such instance is dancing with friends: 'Dancing is specifically the time when I feel a deep relaxed exuberance. There's just immediate joy to it. I feel a real lightness. I love to flail my limbs around the place. So there's a real freeness to it for me.' For Sammy, euphoria is felt in the body, both induced and expressed through movement. Actions, situations and clothing that help spark euphoria are all part of asserting one's body in the world as unashamedly queer and genderqueer. And experiencing euphoria, according to Laura Kate Dale (2021), is a valid route in discovering and affirming one's gender as trans and nonbinary.

3.1.6 Thirdspace to be(come) queer: an emergent medium and gender identity

The previous chapter explored the affordances of the medium and how the immersant can experience a Thirdspace in which their body activates the digital elements in the headset and engages with the physical environment. The immersant is never engaging only with the Firstspace or Secondspace; their simultaneous blending of the two in an experience like *Through the Wardrobe* creates a temporary Thirdspace. As the mind and the body simultaneously navigate the two spaces, the process illustrates how Firstspace is not separable from Secondspace in headset AR; the two spaces are intertwined.

AR is more than a superficial cloud of data applied on top of physical reality; the medium, as activated by the immersant, can extract and present stories of a place or object. In *Elephants Can Remember*, for example, the virtual elements in the headset (3D animations, archive video and audio)

transform the immersant's experience of Agatha Christie's bedroom. Without the Secondspace manifested through the headset, the visitor to the house is confronted with a quiet bedroom filled with the static furniture and objects of the writer's life; they are curated to appear frozen in time and place just as Christie left them. The AR elements provide an interactive visual and auditory perception of these physical objects for the immersant in a way impossible without the headset. AR evokes the voice and dynamism of the person whose belongings these once were.

In how Sammy describes her use of accessories, we see an analogous process. Cosmetics, her bow and hoop earrings transform her perception of her body in the world. The visible helps draw out what she feels beneath. Outward expressions with clothing and accessories also sometimes provided a balance one's body felt to be too masculine or too feminine. Sammy described her process of physical augmentation as a 'un-male'-ing herself. Micah's reaction to their dysphoria involved wearing a strap-on phallus. For Jamie, bringing together traditionally feminine elements, such as nail varnish and eye makeup, with their moustache provided the ideal androgynous power dressing. Augmenting the body through accessories and clothing helps to draw out, enhance and transform the perception of self. We can see a parallel here with AR, as creators can use it to draw out stories, enhance and transform the immersant's perception of their physical environment.

All four contributors had methods for sparking a sense of euphoria for themselves and, in the process, undermining societal gender normativity. The audio production process helped clarify for me how the radical potential of genders outside the binary mirrors the potential of Thirdspace in headset AR. Soja proposed that Thirdspace, in its most ideal form, should provide a space to question or uproot assumptions of power and aesthetics, a space of subversion and inspiration.

A number of queer studies scholars endorse a similar position to what bell hooks (1990) described as the 'radical openness' of black feminist groups, as summarised in the previous chapter. Rather than striving for acceptance within cisgender, heteronormative institutions, many trans/nonbinary individuals and groups embrace a position of marginality that stands for difference and not for assimilation allows for more radical ways of living and forming relations with others (Halberstam, 2018). José Esteban Muñoz (2009), for example, looks at spaces of radical queer sex – such as public toilets, saunas and other explicitly queer spaces – and how these physical spaces constitute sites of resistance to the assimilation of queerness into the mainstream. According to Muñoz, queerness works to challenge and critique the mainstream from the margins. This operates socially and politically but also, as in the case of explicitly queer sexual spaces, requires a physical location. A queer space that resists acceptability or blending in to the norms of wider society constitutes what Muñoz considers a failure to fit in; this 'failure' is a conscious choice. I suggest, much like Soja

incorporated hooks's theorising of 'choosing marginality' as social/political/spatial, Thirdspace can also be expanded through incorporating the radical potential of queerness when considering space.

Here both Muñoz and Soja complement each other. Muñoz (2009, p.1) emphasises that queerness 'is not yet here'; that is, a complete model or conception of queerness does not exist. Queerness is a constant process, and any attempts to define or constrict the potential forms of queerness become futile. Likewise, Soja is adamant that Thirdspace is a flexible, dynamic concept, never fixed and always open to absorbing and opening up to other theories in which political and physical marginalisation create potential for change and non-conformity. In fact, Soja (1996, p.89) argues that Thirdspace's nuanced (and absorbent) position allows for a space that is not merely hegemony versus counter-hegemony, for such polarised models only reinforce social and political binaries. Rather, a Thirdspace allows for actions and imaginations beyond that binary.

3.2 Collaboration in production

The vignettes and research discussed thus far in this chapter help to give context to the content of my main practice output, *Through the Wardrobe*, and to demonstrate the nature of my relationship with them. As self-reflexive vignettes, they illustrate how our encounters extended beyond the audio recording sessions, reflecting my insider-outsider position as a researcher and member of Bristol queer communities. The vignettes are discussed within the context of wider related research in the humanities and social sciences. The previous section also lays the foundation for a discussion of the collaborative framework developed in the production process.

If the previous chapter was concerned with the agency of the immersant in headset AR, the second half of this chapter is concerned with the agency of the contributors – specifically, how the four contributors of *Through the Wardrobe* shaped the content, design, production and exhibition of the project. To varying degrees, each collaborated on the production process. Over the course of the production, we negotiated and renegotiated their terms of engagement in the project. In the pre-interviews and then the audio recorded interviews, the four contributors offered their time and stories. I also asked if they would want to donate any old clothing and to user test. Jamie twice joined the project as assistant producer for the installation and exhibition process.

This section first explores models of questioning and sharing power in the production of documentary representation. It examines how documentary subjects can participate in the process of representation, whilst also illustrating the limits of such models: offering contributors roles in the

production process does not always result in egalitarian hierarchies or ethical representation. This section examines both historic and more recent models of collaboration that shaped my methodologies as I negotiated practices from traditional documentary production to a more collaborative framework.

<u>3.2.1 Questioning producer/contributor power relations</u>

Section 2 of Chapter 1 examined how trans narratives in nonfiction media are often told within the paradigm of the Griersonian tradition of documentary. The tropes employed in media perpetuate the 'binary axis of the testimony of victim and filmmaker as voice-giver' (Munro, 2017, para 1). The orthodox hierarchy in documentary production also reinforces power dynamics between the film-makers as auteur storytellers and the contributor(s) as the subject matter to be examined and investigated. However, the binary of victim and voice-giver is not always obvious or clear-cut (Nash, 2011). The contributors may have their own motives for taking part, whether that is a desire to tell their story to effect social or policy change (Rose, 2014) or even in search of fame, fortune or notoriety (Dovey, 2000). Observational styles of documentary production require a certain amount of collaboration between the producers and the subjects. When those who appear onscreen allow the producers to record intimate stories or moments of their lives, they are actively participating in the creation of documentary representation (Nash, 2011). Documentary contributors need not always be victims of society or the film-maker's gaze, particularly if they feel some equity in the telling of their story to a (presumed) future audience.

Documentary has a long history of methods of involving contributors in a number of ways in the production process. One form is that of semi-staged or constructed action in which the contributors participate in the planning, scripting, shooting and reviewing of scenarios. In the production of *Nanook of the North* (1922), director Robert Flaherty staged a number of sequences in which the contributors improvised their actions, such as hunting a seal and sleeping in an igloo (Henley, 2020). Filming from August 1920 to August 1921, Flaherty brought no crew members with him. As he wrote in his diaries, 'My crew were Eskimos. Nanook himself helped me in the hut which was converted into a laboratory to develop and print the picture' (quoted in Christopher, 2005, p.336). The film-maker then screened the rushes back to his Inuit crew to generate their input for planning future sequences. Far from an observational documentary, the film's intimate access to seemingly everyday Inuit life stems in part from the active participation of the Inuit themselves.

It would be a mistake, however, to assume that merely sharing some of the creative roles in the production process makes such a hybrid documentary-drama film as *Nanook* a shared endeavour. While the contributors took part in the devising, planning and location production, that did not

prevent Flaherty from representing them as racist, colonial stereotypes.[35] While Flaherty represented the Inuit as primitive, their involvement in the production process opened the possibility of questioning the hierarchy between film-maker and subject.

Flaherty would inspire the production methods of Jean Rouch, who termed the participation of protagonists in his films 'shared anthropology' (Rouch, 2003). Their feedback and suggestions informed the ongoing filming process. As an admirer of Flaherty since childhood, Rouch adopted this method in his films in West Africa (Henley, 2009). Collaborative works, such as *Jaguar* and *The Lion Hunters*, resulted from these continued relationships and building of trust. Collaboration and exchange were a two-way relationship. For Rouch, taking material back to the community as a form of accountability, and in his words, 'a stimulant for mutual understanding' (Rouch, 1995, p.96).

For Rouch, the ethnographic Other was more than the subject matter of a film; they were friends, colleagues and fellow creative producers from devising scenarios to editing the footage. Unlike Flaherty, Rouch had trained as an anthropologist, so his approach to filming with communities was based in a long-term, scholarly interest in the cultural context. Whereas Flaherty portrayed his Inuk protagonist as childlike and incapable of complex emotions (Raheja, 2007), Rouch developed long-lasting personal and professional relationships with his collaborators from the Songhay in West Africa.

In the production of *Jaguar* (1967), one of Rouch's best known films, ideas and scenarios were 'concocted in discussion with the three principal protagonists' (Henley, 2009, p.73). This occurred over 17 years from their reconnaissance road trip across the Gold Coast (now Ghana) in 1950 to filming in 1955-6 to voice-over recording and editing in 1967. The film follows three young Nigerien men as they travel through the countryside and sneak across the border into the Gold Coast. They then split up and work to save up for goods that they take home to their villages in Niger at the end. The film is a reflection on the hardships of seasonal economic migration without portraying the protagonists as victims; rather, they are brave 'heroes', as Rouch calls them in voice-over commentary at the end of the film.

Forming a collaborative team, the three main protagonists, Damouré Zika, Lam and Illo, helped shape the film from jointly planning scenarios to audio recording and improvising onscreen. Rouch and his collaborators felt this method of staged improvisation would reflect the realities of migration

---

[35] Critics and scholars have long emphasised how the film perpetuates tropes of salvage ethnography, wherein the character of Nanook fulfils a Colonialist fantasy of a noble savage (Nichols, 2001; Raheja, 2007; Henley, 2020). Nanook's apparent naivete turns into the butt of a joke as he bites a gramophone record. His (and his culture's) supposed purity are what make it deserving of capturing on-camera (Ginsburg, 2002).

more deeply than an observational film (Henley, 2009, p.73). As visual anthropologist and Rouch scholar Paul Henley (p.254) explains, 'his subjects became active stakeholders in the realization of his projects'. In the case of Damouré Zika, the collaboration extended over more than fifty years. From their recce for *Jaguar* in 1950 to their final film together in 1997, Rouch and Zika worked together on more than 80 films. Depending on the requirements of the film, Zika could help steer the script, secure locations and contributors, act onscreen or contribute to the editing process.

While involving protagonists and local communities in the planning and production of *Nanook* and *Jaguar*, Flaherty and Rouch, respectively, still maintained their roles as directors and cinematographers. This would help to ensure their over-arching artistic control and vision while incorporating the creative input from their collaborators. However, until the late 1960s and early 1970s, the involvement of documentary contributors in the production process remained rare. Projects involving training marginalised communities to film themselves began in earnest in the Challenge for Change project (1967-80) in Canada (Rose, 2014, pp. 201-2). Challenge for Change pioneered social change-oriented media, training members of local communities to shoot footage from their unique perspectives, which would then be edited by producers at the National Film Board (NFB) (Baker et al, 2010). The first documentary output, *You Are on Indian Land* (1969), was shot by members of the Mohawk, as they protested Canadian customs charges imposed on a bridge that had been built on their land. The film provides a platform to highlight how they have been excluded from and oppressed by over 200 years of colonial treaties and border agreements between Canada and the US.

Since Challenge for Change, participatory media practices – that is, non-professionals involved in the production process – have grown, particularly in North America, Australia and the UK. Sharing authorship in the production process amplifies the voices of those who otherwise might not have access or power over the way they might be represented by nonfiction media (Daniel et al, 2018). The understanding that documentary production between producer and subject can be two-way echoes Kate Nash's assertion that the 'documentary relationship is contested; the filmmaker and participant exercise power within the context of their relationship with a view to influencing the documentary' (2011, p.10). Power is 'relational' (Nash, 2010), requiring the producer to build trust with the participant and, in the process, often building a strong bond. Some film-makers even compare this bond to falling in love, whilst also needing to maintain critical and professional distance with the subjects (Nash, 2011, pp. 5-6). Referencing her own empirical research, Nash describes the relationship between producer and subject as contested and emergent in the process of film-making, often transcending a model of film-maker exploiting the vulnerable, as seen in the Griersonian

tradition. Rather, the documentary subject is often able to maintain some amount of agency through agreeing to take part and choosing what to reveal to the film-maker.

Another way of looking at these relationships in digital collaborative documentary projects is what Elizabeth Coffman (2014) calls a 'collaborative web'. At the heart of the collaborative web is the relationship between producers and subjects. Convincing potential subjects to take part in a project 'is a two-way relationship involving ethical questions of legitimacy, authenticity and potluck dinners' (Coffman, 2014, pp. 118-9) – meaning, formal and informal agreements and understanding where both sides offer something to the other. Participatory and interactive media production involve multiple contributors/authors and stakeholders, such as media platforms and funders. Understanding the complex 'web' of interactions of these elements reveals the power structures inherent in any collaborative project.

The early interactive documentary project at MIT involved the subjects in the planning and editing processes. Rosalyn Gerstein involved the subjects, Judy and Alan, in the making process, as they reviewed archival footage with her and participated in a long-term conversation with the film-maker. Gerstein (1986) describes herself as 'the artist/ethnographer' and Judy and Alan as 'collaborators', as they participated in the experimental production and post-production processes. Through the cultivation of their relationship over a number of years, 'The artist and the subject in collaboration contribute to the meaning of the work' (Gerstein, 1986, p.123). Gerstein (p.115) writes that Judy and Alan agreed to take part because 'they hoped to learn something from the video material' and understood that the final work would present both sides of their stories.

More recent interactive documentaries have also allowed contributors to take part in a variety of ways. *18 Days in Egypt*[36] (2011), for example, invited witnesses of the 2011 Egyptian Revolution to upload their own footage to an interactive storytelling platform, GroupStream. The journalist Jigar Mehta and developer Yasmin Elayat then grouped and curated that material under different topic categories so that site visitors could gain different perspectives. Such a collaborative project required contributors with access to digital cameras (or camera phones) and internet. Not all contributors may be able to participate in a project in the technical production side. There may be a significant difference in skills between the producer and the communities engaged in media-making – what Henry Jenkins et al (2006, p.23) term the 'participation gap'. The authors highlight how, despite the proliferation of digital technologies and devices, not everyone has equal access or knowledge of how to operate, record and construct their own media.

---

[36] https://docubase.mit.edu/project/18-days-in-egypt

In the *Quipu Project*[37] (2015), the producers were working with indigenous contributors who mostly had no access to the internet. The project invites the women who had been subjected to Peru's forced sterilisation programme to give their testimonies. The producers created a free phoneline for the women to call, and that audio material was combined with video, text and images in an interactive website. However, even in a context in which contributors might have access to internet and the tools to record themselves, as Kat Cizek, producer of the documentary project *Highrise*[38] found, not all might want to take part in the technical side of the production. *Highrise* was produced 2009–15 with five different interactive documentary outputs. The collaborative project invited residents of highrise buildings first in Toronto and then worldwide to take part in sharing their stories. While the first instalment, *The Thousandth Tower* (2010), involved training participants to shoot their homes over six months, the final instalment *Universe Within: Digital Lives in the Global Highrise*[39] (2015) employed sophisticated volumetric capture equipment that rendered 3D avatars. This process required specialists to operate, edit and develop. According to Cizek, some contributors 'want to be involved in the creation of media, but have absolutely no interest in picking up a camera, recording or editing' (Wiehl, 2017, p.39). Cizek is also adamant in maintaining editorial control as a producer (p.47). While participants may be invited to contribute to an interactive project, the producer's critical expertise and storytelling skills – honed over years of professional experience – still have a role in shaping the material.

The collaborative methods employed by Flaherty and expanded over decades by Rouch have now become established documentary practice. Once observational cinema championed the auteur film-maker who sat quietly with his camera (yes, *his*, usually a male gaze), and this contributed to the hierarchies and power dynamics of producer and subject, explored in Chapter 1. Social victims were on display for the world to pity. As directors have increasingly negotiated power with their contributors over the past century, collaboration has become standard practice for a number of documentary-makers, including within interactive documentary, such as *18 Days in Egypt*, *Quipu* and *Highrise*. Collaborative methods often must stretch across each stage of production in working both with contributors and creative technical teams with disparate skillsets, as seen in projects from *Marital Fractures* (a film-maker and programmer team) to the docugame *Fort McMoney* (a collaboration of a film director and a game designer).

3.2.2 Collaboration in action

---

[37] https://interactive.quipu-project.com
[38] http://highrise.nfb.ca
[39] http://universewithin.nfb.ca

What we can see in both historic and more recent models of collaboration is how producers have grappled with and found their own solutions to sharing power in the production of documentary representation. The examples provide complex, nuanced forms of avoiding the Griersonian trope of the social victim examined in Chapter 1. In employing a dialogic process in working with contributors, producers create a 'collaborative web'. We can also see the limits of some examples: offering contributors roles in the production process does not always result in egalitarian hierarchies or ethical representation.

My own framework for collaborative production methods with my contributors builds on theorists and practitioners past and present. In following Barthes, I view my practice as a potential space for dialogue, a confluence of voices – what Bakhtin would call polyphony. *Through the Wardrobe* centres the voices of four nonbinary contributors, each with their own views and forms of gender expression. According to Soja, Thirdspaces bring together marginalised voices in dialogue, creating radically open spaces that challenge the dominant order – counter-hegemonic sites, according to Foucault. But the author is not dead. I take the view, as argued in the previous chapter, that any heterotopia – or, in this case, a temporary Thirdspace in which a digital device is used – still requires some direction and facilitation. This is where the methods of Rouch and the interactive documentary practitioners discussed in the previous section are so useful in building my own framework for collaborative production.

Through the Wardrobe is an interactive documentary in headset AR. Its production requires a collaborative web in all stages. As discussed earlier in this chapter, I negotiated roles and forms of representation with the contributors. Each person participated in different ways throughout the production. To illustrate the involvement of one contributor, Jamie, I turn to the fourth and final vignette.

Vignette 4: Jamie

When I first saw Jamie in 2018, they were working the door at Don't Tell Your Mother and turning heads with their eyeliner, chipped nail varnish and brightly coloured hair. I think it was purple at the time.

I have seen Jamie perform onstage (one time, as an exaggerated version of the cartoon character Lisa Simpson), and we have had a number of discussions about their work in the corporate world. They have an eccentric, artistic sensibility with strong opinions and astute judgments. Indeed, they are Miranda Priestly in the making. It is this balance of bold, artistic expression and honest,

---

constructive feedback that prompted me to invite them to engage in the creative and production process beyond their audio interview contribution.

When they agreed to take part in *Through the Wardrobe*, we discussed what kind of contribution they could make. Along with their audio interview, they offered to donate some striking salmon-coloured culottes – in the mode of the colourful but assertive power dressing they described. When I put on a public engagement event as part of a festival in November 2018, I presented a proof-of-concept of the installation with the clothes and the stories in the HoloLens. Jamie not only attended but also helped with onboarding visitors. I could not have run the installation without their help.

In May 2019 they helped with user testing in the VR Lab where I had built a mock space for the installation ahead of our upcoming premiere at Sheffield Doc/Fest in June. Jamie went through the stories in the HoloLens and gave me detailed feedback on visuals and the user interface design. Then in January 2020, in the last public exhibition of *Through the Wardrobe* before the pandemic, Jamie stepped in as an assistant producer in installing the work at the Barbican Centre in London. Together we arranged the furniture and clothing and set up the AR elements in the HoloLens within the space. Jamie's contribution to my research has been more than an audio interview; they have actively help shape the project throughout the production and exhibition process.

Jamie's involvement in *Through the Wardrobe* demonstrates how I employed Rouch-inspired production methods throughout my practice. Just as Zika collaborated with Rouch throughout the production of *Jaguar*, including reconnaissance, scripting, on-screen contribution, post-production audio recording and editing, so too has Jamie collaborated with me on content, design and exhibition of *Through the Wardrobe*. While both Rouch and I might take the title of 'Director' and lead on the artistic vision of a project, the input of our contributors help shape the creative content and help in the logistics of production. Our contributors are more than sources of stories that we mine; they are vital creative and production collaborators.

With all four contributors, while the terms of engagement were formalised at the start with Participant Information Sheets and signed release forms, their input was negotiated and renegotiated throughout the production, installation design and exhibition processes. For the semi-structured interviews, I was leading the process as an audio producer. The power relation was clear in that I had written the questions and was directing the project – and yet questions and topics arose out of previous discussions and pre-interview process. These were topics that were meaningful and relevant to my contributors. While I felt it was necessary for me to maintain the role of 'Lead Artist'

or 'Director' on *Through the Wardrobe* to provide coherence of the project's artistic vision, I wanted to present their stories in a manner that they would be happy with, incorporating their feedback, input and approval at different stages.

All four contributors shaped different stages of the process:

i.   *Content collaboration*

The first half of this chapter explored the themes and content of the audio interviews in each story of *Through the Wardrobe*. Each contributor spoke openly of their journeys through understanding their gender and finding the ways to express it through words, actions and clothing. In sitting down for the interview, they provided the audio content. And in pre- and post-interview discussions, they helped steer the focus of the project on elements that reflect their everyday realities, such as self-care, family/friends and moments of euphoria.

As for the animations, Sammy describes in her interview what she was drawing at the time – fantastical images of spaceships and noses. She had been reading about viruses and other materials penetrating earth's atmosphere from around the solar system. For her, this is related to thinking of the world as not an isolated bubble but permeable and interconnected with other possible organisms in the universe. To illustrate this part of her audio interview, she contributed her drawings of spaceships, which we then animated in the HoloLens to appear as if emerging from the walls and into the room. Her contribution helps to tell her story visually and offers a glimpse of her art style.

Jamie also talks of their art: photography. They had recently done a series of black and white photographs on the subject of the body, gender and the domestic space. The images appear in *Through the Wardrobe* as framed photographs hanging in the middle of the room. As with Sammy's contribution, these provide a sample of how Jamie interprets the world around them through artistic expression.

ii.   *Objects*

I asked each contributor about their favourite items of clothing or accessories that helped them to feel most happy. After audio recording with each of my contributors, I invited them to donate any old clothing. If they did not want to donate an actual item, I endeavoured to find something similar in their style or something that related to part of their story. Rex did not want to part with their beloved check shirt, so I found a similar pattern shirt of the same make and size from a second-hand retailer online. Jamie donated the trousers that they would most like to wear to their office job, the salmon-coloured culottes. Sammy spoke of her cosmetics and bow, so I included cosmetics on the

dressing table and made a bow out of a bandana. Micah focused on boots, so I found a number of different-sized pairs of second-hand boots for immersants who might want to wear them around the space whilst listening to Micah's story.

I also consulted them when choosing items that would represent them. When I asked Rex about whether a purple scarf could be added to a potential ensemble, the answer was a definitive 'no'. I welcomed my contributors' opinions and their power to veto items that would misrepresent them.

iii.   *User experience design and play testing*

Some of the most valuable contributions from Rex and Jamie came in the form of feedback in early testing. Rex experienced a rough iteration in the testing space I set up in the VR Lab. I asked their opinion about the instructions I provided in the headset to signpost key actions for the immersant. Rex was experienced in technology and design, so I respected and welcomed their feedback. Jamie also experienced different iterations from the first proof-of-concept in November 2018 to play testing in May 2019 to the Barbican installation in January 2020. Of all creative contributors, they experienced the full evolution of the installation, and their feedback helped shape those iterations.

Conclusion

Through intertwining ethnographic vignettes and descriptions of the involvement of contributors in the production process with wider related literature, the first half of this chapter explores the main topics of the audio content of *Through the Wardrobe*. This content provides an alternative to the focus on trans dysphoria as described in the tropes of the documentary social victim in the first chapter. The concepts of the content of the nonbinary and genderqueer contributors mirrors the medium of headset AR: negotiating two supposed binaries (physical/digital; female/male) and in fact demonstrating that there are states beyond the binaries. Just as the immersant must grapple with both the physical environment and virtual elements as described in the previous chapter, so too are nonbinary and genderqueer bodies navigating what might be considered male or female traits and forms of expression. We see in the medium and the content a complexity of lives that defy binary classification.

The second half of this chapter demonstrates how those relationships with my contributors formed the basis of the collaborative framework in my practice-as-research. My contributors helped shape the user experience design in the headset as well as informing the physical layout and the clothing used. Sammy and Jamie supplied visuals that feature in their stories, and Jamie acted as assistant

producer for installing the work. They became, as Henley (2009, p.254) describes those involved in Rouch's films, 'active stakeholders' in the realisation of the project.

I also considered them friends, acquaintances and colleagues *more than* contributors or 'research participants', as labelled in my university ethics form. Building relationships with them before and after audio interviewing them meant also building more trust – and a sense of accountability I felt to represent them in a way that they would want to be understood by a mostly non-queer, cisgender audience. I could incorporate their input and feedback as I was prototyping and iterating. If Rex did not like the purple scarf or Jamie thought in-headset navigation was not clear, I would evaluate the issue and carry out the necessary changes.

This chapter has also provided the foundation for a more in-depth description of the praxis of this thesis through the iterative exhibition process of staging *Through the Wardrobe*. The next chapter will demonstrate how I turned from collaborative methods with my contributors to incorporating the feedback of user testers and visitors at film festivals and in art galleries.

Chapter 4 – Thirdspace in practice

Iteration as methodology

As I argued in Chapter 2, headset AR can be understood as a medium wherein the immersant constitutes a key component. More than a layer or a cloud waiting for an immersant to walk into it, the medium is activated by the immersant. I outlined what I called the 'diegetic bubble' - that is, the physical and virtual storyworld in which the immersant participates when they don an immersive headset. I explored how the porousness of AR's diegetic bubble allows for the immersant, the device, the virtual content and the physical stimuli to comingle in constituting a Thirdspace. The immersant is an active agent in the unfolding of the work, as they simultaneously experience the physical with the virtual. There is not an *either/or* binary but a *both/and* thirding of the physical or virtual content. Each immersant experiences variations on the stories, depending on with which physical and virtual materials they choose to engage.

According to Soja, a Thirdspace forms out of a dialogic process between the physical and the imaginary, a space of radical openness with a polyphony of voices. The four genderqueer/nonbinary contributors provided their voices and more in creating *Through the Wardrobe* in a production process that proved dialogic at every stage. *Through the Wardrobe* demonstrates how the interrelationship of the immersant, device, content and multisensory stimuli of the physical environment in headset AR can facilitate a temporary Thirdspace. The immersant activates a Thirdspace through their simultaneous engagement with the Firstspace of the physical objects and environment with the Secondspace of the virtual media in the HoloLens. This Thirdspace is dynamic, adaptive, responsive and temporary, lasting as long as an immersant remains in the headset. The media in the headset unfolds only through the actions of the immersant moving, looking, sitting or lying down.

Chapter 3 examined how my ethnographic method – an ethnography from within – framed my relationships with my four contributors. Producing work within my own community in Bristol, I felt the responsibility to build relationships. This set the tone for a collaborative approach in which my four contributors helped shape the content, interaction design and installation design of *Through the Wardrobe*.

This chapter builds on the theoretical understanding of headset AR explored in Chapter 2 and extends the collaborative process to the iterations of exhibiting *Through the Wardrobe*. The creation

of this installation served as a methodology through which to investigate my research questions. In employing headset AR for interactive documentary storytelling, I draw together the input of my four contributors, my creative team (producer, developer, sound designer and 3D animator) and festival and gallery visitors. While the previous chapter analysed the role of my contributors in the research and production process, this chapter explores how the combination of theory, art/documentary practice and the lessons learnt from the immersant feedback shaped the iterative process of my practice. This chapter addresses my third research sub-question:

> How can feedback from user testing and audience studies contribute to the design of a headset AR installation?

To answer this research sub-question, I conducted user testing sessions at multiple stages in the design and iteration process. These testers included my contributors and festival and gallery visitors. Through prioritising the experience of the audience and listening to their feedback, I learned more about the nature of my practice, of the work and of the medium itself. It was immersants who demonstrated for me just how headset AR can facilitate a Thirdspace in practice. In this chapter I set out how the imbricated development of theory and practice detailed in previous chapters led to new insights into and forms of practice as demonstrated in the iterations of *Through the Wardrobe* 2018-20.

Through the Wardrobe

When you approach *Through the Wardrobe*, the first things you see are rails of colourful clothing – a green tie, purple trousers, a red shirt, a bright yellow dress. On the hanger of each item is a tag with the name and an icon of four people: Micah, Jamie, Bec (now known as Rex) and Sammy. A docent instructs you to choose an item of clothing that intrigues you and to try it on in the dressing room. You might choose something that either you think matches closest with your daily presentation and gender identity, or perhaps you might want something entirely different from how you normally dress. You try it on, examining the signs of previous wear (a tear, a smudge, a fingerprint) and smell the fragrance of the owner that has remained in the fabric. You gaze at yourself in the mirror, pondering how you look and feel in a stranger's clothing. You emerge from the dressing area and the docent fits you with a HoloLens. An instruction appears onscreen in the headset: 'Match up the circle with the icon on the tag'. When you do so, the experience in the headset begins.

As you stand just outside the dressing area, looking in at a bedroom set (a bed, lamp, dressing table, chest of drawers and chair), an audio introduction from the person begins in the headset. Then a virtual wardrobe appears in the middle of the room. You walk through that wardrobe and see five fuchsia orbs appear on each item of furniture. In any order, you go through each chapter, sitting or lying down, walking, moving and touching. Each chapter gives you little windows into that person's life – how they first chose their own clothes, what their hair or clothes mean to them now, how they practise self-care to help themself feel more comfortable in their body. You learn that they are genderqueer, nonbinary or agender, and what that means to them. When you have finished all five chapters, you return the headset and clothing.

Fig. 5: Walkthrough video – https://vimeo.com/476684655

Through the Wardrobe is a multisensory room-scale installation that uses an AR headset, the Microsoft HoloLens, to overlay the physical world with holographic-like animations and spatial audio for nonfiction storytelling. Directional audio and 3D animations appear around the room and prompt the visitor to engage physically with the furniture to reveal more of the story. Even though the immersant is wearing someone else's clothes and listening to their voice, the immersant is never playing a role or pretending to be anyone other than themself. The HoloLens also allows the user to view their physical environment with the addition of digital animations. Through the combination of virtual story elements with physical clothing and furniture, *Through the Wardrobe* is intended to resemble an encounter with a friend in their bedroom to understand more about both the other person and oneself.

4.1 Practice from know-that to know-what

4.1.1 A framework for practice: audience feedback as part of know-what research

Robin Nelson (2013, p.5) defines 'praxis' as 'theory imbricated in practice'. The theory (in my case, the understanding of headset AR facilitating a Thirdspace) is intertwined with the practice (e.g. audio recording/editing, AR development, exhibition design and installation). My praxis is a dialogic process; the two are interdependent within this research. Nelson (pp. 41–47) provides a model for understanding this imbricating process of practice and theory in identifying three key forms of practitioner-researcher knowledge:

1) Know-how – embodied knowledge and intuitive skills, those that the artist expresses through work, developed over time

2) Know-what – what can be understood from critical reflection on practice, including the language that explicitly describes and draws out themes, methods and meanings of a work

3) Know-that – the critical theory and frameworks that provide the foundation for critical arts practice

Chapter 1 contains mainly research in know-that, providing the context and framework in which my praxis resides. Chapter 2, in exploring the affordances of headset AR, combines the theoretical know-that with the know-what that resulting from reflecting on my developing practice, leading to my adoption of Soja's Thirdspace to frame the potential of the medium for interactive nonfiction. Chapter 3 combines know-that (e.g. the framework for collaborative documentary production) with know-what (a description of that process in practice). The know-how contribution of my research is demonstrated in the practice itself and documented through photographs, videos and audio found in the appendices of this thesis. My understanding of headset AR as a porous diegetic bubble and its potential to facilitate a Thirdspace emerged out of a combination of theoretical know-that and the know-what that emerged in the iterative practice process. This chapter will focus mainly on that process of know-what, illustrating how audience feedback shaped my approach to *Through the Wardrobe* and helped me understand the work as a Thirdspace.

As described in the Introduction, I began my research with what Nelson might define as artistic practice know-how: the embodied and intuitive forms of documentary-making that have guided my practice since my first documentaries in 2005. As a practitioner, I also understood that my own know-how was not enough for producing work for a public audience. A critical documentary-making practice for me requires the know-what process of standing back, reflecting and articulating methods involved in constructing a work. An integral part of this process has always been screening or

exhibiting my works-in-progress with an audience, gathering their feedback and then considering how to integrate that information into a revised version.

It is useful here to return to the discussion of Bakhtin and Barthes in Chapter 1. Whereas Bakhtin (1986) had considered the *openness* of a text to continue after the author has written the text, I consider my dialogue with my audience as a continuous process before, during and after I exhibit a work. My relationship with my audience begins when I start to imagine their *future* reactions to the work. How will they respond? Will they laugh, cry or see qualities of themselves in this person's story? Regardless of what I believe the meaning of my film or installation is (or what it means to me as a maker), I am mindful that my future audience will always read their own meaning into their encounter with my work. For documentary film-makers creating work, visual anthropologist Stephen Hughes (2011) calls this process the Bakhtinian 'dialogical anticipation' of an imagined future audience; film-makers make work expecting the future audience to watch and react to it. I am already in anticipatory dialogue with my audience before I have met them.

Chapter 1 explored how, within interactive documentary, the expectation that an audience will effect some impact over the direction or pace of the narrative is essential within the format (Gaudenzi, 2013). From videodisc storage of the 1980s to CD-ROM of the 1990s to database and webdocs of the 2000s, evolving digital technologies have afforded makers with a variety of structures for interactive narratives. In the case of an early work like *Marital Fracture* or the more recent *Terminal 3*, the audience is presented with multiple story routes they can select. Glorianna Davenport et al (2000, p.256) anticipated that 'future narratives can be dynamic, morphogenic entities whose form and content emerge on-the-fly as authors, audience, and machinery engage in the collaborative co-construction of meaning and experience'. This sentiment echoes how Bakhtin saw the relationship between author and reader: a dialogic process wherein meaning is open.

Once a work is exhibited, as I continue to engage in dialogue with my audience, multiple potential meanings to emerge. The context in which a work is initially created (in a VR lab in Bristol) may be far removed from that of the audience – a film festival, an art gallery or a train station, for example. The openness of meaning allows for audiences in each location over time to find new resonances and relevance. Following Bakhtin, I see how my own past meanings of my own work, 'can never be stable (finalized, ended once and for-all) – they will always change (be renewed) in the process of subsequent, future development of the dialogue' (p.170). After I have carefully selected elements (virtual and physical), crafted the audio elements and arranged the set and lighting, it is up to the immersants to make their own connections in this, as Oscar Raby articulated it, 'constellation' of story elements (Tortum, 2016).

My approach to my practice also draws on Allan Kaprow's indeterminacy in his Happenings pieces and Kruger's *Videoplace*, described in Chapter 1. Both Kaprow and Krueger understood that actions of the audience contained multiple possibilities and outcomes. The work was shaped by the actions of the audience in dynamic response to the artist's guidelines and the space of the encounter. Rather than a pre-determined or scripted outcome, the events were emergent. This provides a model for understanding an immersant's experience within my work, *Through the Wardrobe*. The narrative affordances of the medium are co-perceived and shaped dynamically by the immersant and me as researcher/artist/designer. If I create work with open-ended meanings that allowed the immersant to construct their own version of the experience through their own choices, the 'meaning' of the work becomes more dialogic between my intentions and the immersant's interpretation. Included within the work are also the intentions of my contributors in voicing their experiences as well as the intentions of my creative team (e.g. composer, 3D artist and developer). Each of us experiences a work from our own viewpoint, transcending a singular meaning. Such an approach opens up the creative potential of the medium for the immersant to build their own experience within an environment that allows them to feel comfortable enough to take risks, play with objects and try something new. The HoloLens for most first-time immersants is an alien, futuristic-looking device (as immersants would tell me in user-testing sessions).

For Bakhtin, the dialogue between author and reader exists after the former has completed the work. Bakhtin (1986, p.152) gives the example of Dostoevsky, where the complexity of characters can be debated and continuously re-examined in new contexts long after the author has died in an 'unfinalized and infinite dialogue'. For me as author, however, my dialogue with immersants is key to my iterative process; the collaborative approach central to my relationship with my four contributors extends to my immersants. The visitors who experienced the work and offered feedback that contributed to subsequent iterations were participants in the creative process. I consider them collaborators in the production of the work, just as Gaudenzi's (2017) respondents viewed their audience in the UX research process of interactive documentary, described in Chapter 1.

In inviting immersant feedback, I employed mixed qualitative research methods. In the first iteration – what I consider the 'proof-of-concept' phase – I conducted semi-structured interviews with 19 immersants. They provided insights into their experiences of the space, their impression of the HoloLens and their reflections on the content. With their consent, I took photographs and videos (included in the Appendix) to document my interpretation of their experience. Thus, feedback sessions were a combination of their verbal reactions and analysis with my own observation of their

interactions within the work. This dialogic process of know-what research methods between my immersants and me informed my know-how in iterating *Through the Wardrobe*. This collaborative and iterative method helped me answer my third research sub-question on how feedback from user testing and audience studies can contribute to design of an installation.

4.1.2 First iteration: 'End of Gender?' (October-November 2018)

In autumn 2018, I was awarded a small grant[40] for staging a public engagement event to share university research with new audiences. I used the event, titled 'End of Gender?', as an opportunity to test installation layout and to understand better how audiences engage with the design and content. With six weeks to develop the proof-of-concept, 1 October-16 November 2018, I enlisted the help of a Unity developer and a 3D illustrator. I had already recorded and edited the audio content recorded with my contributors, as discussed in the previous chapter. Now our challenge in those six weeks was to bring the virtual content in the headset together with the physical objects and space of the installation. We all had created work for VR before, but this was our first time designing an experience in headset AR.

The animator created large-scale semi-abstract 3D illustrations in Oculus Quill (3D painting software), which the developer then imported into Unity to view on the HoloLens. I then designed three symbols (one for each character), that would be placed on tags on the clothing. The HoloLens would recognise the icons on the tags to launch the story of that person. There were five chapters per character, which would appear at randomly generated locations around the room, one at a time.
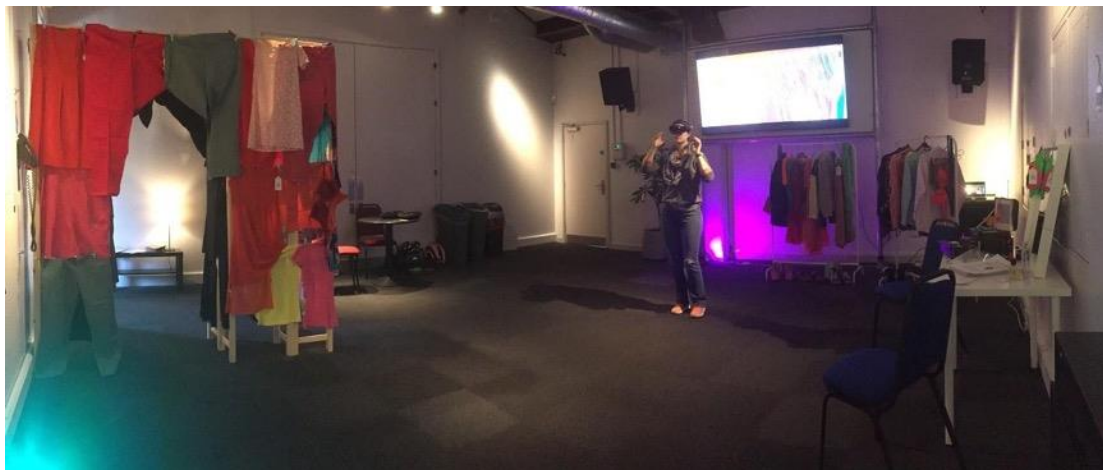

Fig. 6 – Icons designed to launch each character story in the HoloLens

---

Fig. 7 – Jamie user-testing Rex's story

Fig. 8 – Installation view, Watershed, November 2018

'End of Gender?' was staged in a meeting room in the Watershed in Bristol, 17-18 November. Over the two days, there were approximately 60 visitors with about 25 of them able to try the experience in the headset. The other 35 had the option to listen to the audio-only version and engage with the clothing and physical objects in the room. I conducted 19 semi-structured feedback interviews to gauge overall impressions, recurring themes and broader qualitative data. None of the interviewees had tried an augmented reality headset before. While that gave the event some novelty attraction, according to visitors, the primary draw was the content – an installation that presented stories of gender non-conforming and nonbinary people in a fun, tactile way that encouraged dressing up. Some people wanted to attend to learn more about nonbinary experiences. Others for whom the

content was directly relevant enjoyed the opportunity to see their identities represented in an interactive exhibition for the first time in Bristol. One interviewee in their mid-20s, who grew up in Bristol, had never felt comfortable to enter the cinema and arts venue (the Watershed); 'End of Gender?' was the first event that 'spoke' to them to visit.

Of my 19 recorded feedback interviews, every respondent used the words 'interesting' and/or 'fascinating' to describe the experience. Almost everyone used the word 'fun' as well; even though they knew they were participating in a dynamic research project, it felt more like a playful space to explore, try something new and learn about other people's lives (see Appendix II).

Some visitors had deeply moving experiences, engaging with the content and the headset visuals in the immersive installation format. For most people, it was their first exposure to this emerging medium, facilitated in a safe and open-minded space, illustrated in one reaction: 'I like the idea that it's a layered reality, so you're stepping out of a physical space and you're viewing possibilities beyond that, and then the content is all about stepping beyond gender binaries.'

A few people said they would now feel intrigued and less intimidated to do augmented/virtual reality in the future. Others said it had given them a lot to consider about gender identity versus gender expression – and how that resonates in their own daily lives. Even for most cisgender people who were settled in their gender identity, they felt the content was relatable enough in regards to questioning societal expectations of gender expression. Some felt inspired to take greater risks in expressing themselves through clothes.

I asked all visitors the general opening question, 'What did you think of the experience?' One visitor responded very negatively that he did not like the 'political correctness gone mad' content, as he described it. However, most negative or critical feedback was in response to the HoloLens, not the content. A number of people found the headset uncomfortable (often too heavy on the nose) or the field of view so limited that it hindered their ability to relax and feel fully present in the experience. These critiques were useful in demonstrating how these headsets need to be designed for different people, ages and physical abilities, so I would need to find solutions for this discomfort.

What I was most interested in was how immersants perceived the experience of being in a headset, responding to virtual 3D illustrations and spatial audio, whilst still seeing the physical room. I was relieved to hear many enjoyed the simultaneous experience of the different tactile, visual and audio components: 'To have the physical objects with the audio, I thought that was really engaging – to have something tangible there, and then through the extra-layered illustration to give you something

to look at and think about with the audio throughout.' While I was worried that the immersant would be overwhelmed or feel distracted by room noise beyond the headset, in fact this helped create both a sense of 'safety' (i.e. not feeling sealed off from the outside world) and added to the auditory perception that the voice of the person was here in the room, not speaking from another time or place. The speakers on the HoloLens headset created this illusion so that, as one immersant reflected, 'you still get the ambient noise. You've not got headphones on. You can still interact with the environment.' Having that permeability between room noise and story audio was important, creating a blending of the two types of audio for the listener, just as the AR visuals integrated within the physical space.

I asked about the sensation of movement in the space, that the immersant does not remain in one location but is prompted to move. One person responded: 'The fact that it forces you to walk around the space makes it feel much more immersive.' For them, the feeling of immersivity was not just visual or audio – it was spatial and embodied through movement. The more that immersants reflected on space, the more I realised that the experience of space should be the focus of my research with AR, specifically the way in which the physical and virtual are intertwined in the medium. Movement through simultaneous physical and virtual space, combining 3D imagery and directional audio, enhanced the feeling of immersion in a story. Immersants commented on their experiences of combining multiple sensory, spatial, physical and virtual elements that coexisted simultaneously and constituted the storyworld. Their descriptions of their experience helped me to conceptualise headset AR as a porous diegetic bubble and led to understanding the potential of the medium for facilitating a Thirdspace.

Fig. 9 and 10 –Installation views, Watershed, November 2018

<u>4.1.3 Lessons</u>

With the feedback from immersants, I started a list of the things I learned and wanted to improve upon for the next iteration. Firstly, the static 3D illustrations in the headset were not adequately engaging or dynamic. We would need to switch to an animation software more compatible with HoloLens that would allow for movement of the 3D objects. I had also over-estimated the scale; the models were too large. I would need to vary object sizes between large and small. The headset itself froze and crashed a few times, and the battery ran out more quickly than anticipated. With the headset, I could not improve the limited field of view, but I could look at modifying the hard nosepiece to make it more comfortable.

As for the physical clothing and furniture, I would need to think through the purpose and use of each item for the next iteration. I wrote a number of notes and challenges to myself in my practice diary, including:

- What role can a dressing table with jewellery and fragrance play in the progression of the narrative? What purpose does it serve and what can the immersant do there?
- What can a lamp do or become that is more than a lamp?
- How can a chair work with each story and provide a stopping point for the immersant to experience a chapter whilst sat down?

Through the proof-of-concept user testing, I came to see the potential of physical objects as agents, triggering a response in the headset and provoking the immersant to engage with them. The HoloLens could read the symbol on the clothing tag to begin the story, but the headset otherwise did not respond to physical objects in the space. I wanted to improve and better intertwine the relationship between physical and virtual objects to better exploit the real affordances of the headset and the narrative affordances of the medium. To achieve a better integration of the physical and virtual, I would need to break down each story and each chapter and understand 1) what I wanted the immersant to do and feel at that point, and 2) what the HoloLens and the physical environment were capable of providing. I would continue to explore and refine these hardware, software and story design questions over each iteration of *Through the Wardrobe*.

The proof-of-concept I staged as part of 'End of Gender?' revealed to me how much further I could push the HoloLens headset within an installation. As explored in Chapter 2, AR is defined by porousness between media and material worlds. All the noise, sensory messiness and distractions of the real world are visible, audible, touchable, smellable. I needed to find more sophisticated ways of integrating these multisensory elements into the technical capabilities of the headset. I would need to

work with my developer to make the app more responsive to the physical space, and the physical set more integrated with the virtual elements.

Most importantly, immersants' descriptions of their experience helped me to understand the potential of the medium beyond my know-that framework described in Chapter 1. Immersants reflected on how they moved through physical and virtual space concurrently, combining 3D imagery and directional audio with clothing and furniture. As they commented on their experiences of grappling with simultaneous multiple sensory, spatial, physical and virtual elements that coexisted and constituted the storyworld, I was challenged to form my own framework to understand the medium. My theoretical knowledge combined with immersant feedback, brought together through the design and exhibition process, led me to conceptualise headset AR as a porous diegetic bubble and to understand the potential of the medium for facilitating a Thirdspace. Once I saw *Through the Wardrobe* as a Thirdspace, I began to grasp its potential and power for creating a space of radical openness in which immersants could be confronted with voices and experiences that would make them reflect on their own lived experience. Just as the production process grew out of encounters with my contributors (captured in the vignettes of Chapter 3), *Through the Wardrobe* could simulate those encounters for immersants: they would be challenged to play, question and try on clothing that is tied to a real person for whom that item might be significant in sparking gender euphoria.

4.2 Spring 2019

4.2.1 Developing the prototype (1 April–31 May 2019)
In March 2019, to develop *Through the Wardrobe*, I was awarded R&D funding through CreativeXR, an 'accelerator' scheme run by Digital Catapult and Arts Council England to help companies build prototypes of immersive media projects. I had a deadline for which to produce and exhibit my prototype: Sheffield Doc/Fest in June. I would exhibit the prototype in a 3.5 x 5-meter space in the newly refurbished Site Gallery in Sheffield. With a small team of a producer, developer, 3D animator and composer, on 1 April we began developing the next iteration of *Through the Wardrobe*. We had a strict timeframe of eight weeks to develop and test our prototype.

Within this time, I wanted to design an experience where there would be no predetermined order of chapters. This would build on the idea of a 'constellation' of elements in which the immersant could explore to form connections and meanings. The immersant's gaze and movements would need to prompt narrative progression. This would activate the spatial audio (music and voices) with the 3D animated visuals and keep the immersant's hands free to engage with items in the

environment. The clearest way to break down this process is to explain the design choices behind my work with each member of my team: interaction design (with the developer); spatial audio (with the sound designer); 3D animation (with the animator); and set design (with the producer).
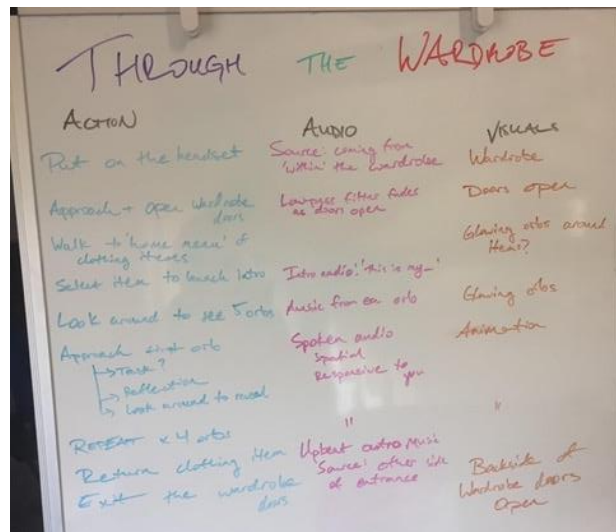

Fig. 11 – Whiteboard, planning for the user journey

Interaction design
Following Donald Norman's principles of design of everyday objects (discussed in Chapter 2), I wanted to keep the interaction with the digital interface, such as an onscreen menu or instructions, as minimal as possible. According to Norman (1986), a well-designed object affords its use to the user. A chair affords sitting, and an ideal door handle affords whether the door ought to be pushed or pulled. *Bad* design for Norman is that which requires copious instructions or training (e.g. a door that needs to make explicit whether to push or pull). While the HoloLens is far from an everyday object for most people, I wanted to adopt Norman's principles for the interaction design with as few explicit instructions as necessary.

Once inside the bedroom space, in the absence of a selection menu, the immersant would select the chapters of each character story by moving their body. This creates a room-scale spatial digital interface on x-, y- and z-axes–rather than a flat x/y-axis menu–to select chapters. The cursor of 2D computer interaction becomes the body and the direction of the gaze. This provides the function that is usually provided by buttons on handheld controllers when making selections. By walking through or into zones, I wanted to encourage physical engagement within each chapter in that area of the installation. As mentioned in Chapter 2, Mueller et al (2018) propose thinking of the immersant's lived body (*Leib*) as containing memories and emotions. The *Leib* does not merely make selections as a game controller but *feels* its way through the navigation. I wanted to centre this

concept of spatially feeling one's way through a story, having digital elements triggered through walking or looking (gaze activation).

In April, we set up a test area in the Bristol VR Lab, based on the dimensions of what we would have at the Site Gallery in Sheffield. I arranged a mock set of furniture and invited over a dozen people to help with interaction and playtesting. To understand what sort of instructions and text would be needed, rather than assume, I provided no spoken or written guidance upfront. For each tester, I would observe and offer advice only if they asked or appeared confused. Then, after they completed a story, I asked: 'What do you wish you had known before you went in? What instructions would you have wanted?' Using one of Norman's key user-design principles, I wanted to see just what were the absolute necessary instructions. When would interactions appear obvious to the immersant, and when would instructions be necessary? Just as a 'well designed' door handle indicates push/pull through its appearance, and a poorly designed one needs text and signs, I wanted to understand when (and what) signs would be essential, without overwhelming the immersant with information. Too many instructions run the risk of confusing the immersant with information-overload; too few risk leaving the immersant feeling lost and frustrated.

Consequently, I wanted all instructions and narrative options in the headset to feel as intuitive as possible for the immersant, so we took advantage of gaze activation in Unity to allow for subtle moments of agency for the audience. In Micah's story, for example, when they speak about wearing a strap-on phallus to help overcome gender dysphoria, a forest of knee-high dildos appears around the space in the headset. When the immersant looks at each one, it flicks in a playful manner. In a story about Micah gaining control of their body, I wanted the audience also to have some agency in affecting the digital environment, whilst reflecting Micah's humorous tone in describing their dysphoria.

Fig. 12 – Test area in the VR Lab, 9 May 2019

Spatial audio

I chose the composer and sound designer based on two criteria: 1) their style of music fit the atmosphere I wanted to establish through audio and 2) their understanding of placing music spatially in Unity so that the audio would play as dynamic and directional in the HoloLens. When it came to the style of music, the composer matched the pitch of each speaker's voice to an electronic instrument (e.g. synth or tremolo). Each of the four motifs could play on their own over an ambient drone, as well as all play together at the same time. So, for example, for the intro music, before the immersant has selected a name, all four themes play over the drone. But when in Sam's story, there is an instrument, pitch and style to match Sam's voice and subject matter.

In Unity, we positioned the source of the music as if it is coming from 2 metres above the immersant's head, so the effect feels as if there is a speaker playing from a high corner and not as a stereo mix coming through headphones. This helps create the audio illusion of music playing from within the room and blurs the binary perception of out/inside the headset. Additionally, in Unity, we placed the source of the speaker's audio at eye-level in the direction of the furniture in each chapter. So, for example, in Sam's chapter at the chest of drawers when they talk about dancing, the music appears to be coming from above and Sam's voice appears to be coming from the chest of drawers. If the immersant moves further away, the music and Sam's voice grow quieter, mimicking the sonic physics of the real world. I wanted the ambisonic and directional audio to be subtle and subliminal enough to create the intimate sense of the person in the room speaking at eye-level with 'mood music' to set the tone.

3D animation

With five chapters per story and four characters plus the introduction and exit credits, we drew up a list of 22 assets to be animated. These animations would have to: 1) represent the content of the audio clip, 2) work on or with the physical set and 3) be made with a low enough resolution (known as polygon count, or 'poly count') so as not to overwhelm and crash the limited processing capabilities of the headset. My first instruction for the 3D artist was to give each animation a hand-drawn quality, as if they had been made in the VR programmes Quill or Tilt Brush. We had learned from the 'End of Gender?' testing that Quill outputs have too high a poly count. So the animator had to replicate the style of free-flowing brushstrokes, whilst outputting as a low-poly 3D object.

I wanted the hand drawn-style animation to unfurl, grow and then fade away in each chapter. These would animate on or around the furniture, appearing to transform each physical object into something else. The lamp becomes a tree in Rex's story and a mini spinning Earth in Sam's, for example. I also wanted to play with colour and abstraction in addition to figuration to represent an object or scene. In Jamie's story, the chest of drawers becomes the source of a fountain of diverging pink and blue waves of colour that then mix as purple in the middle of the room around the immersant. It resembles Jamie's audio about understanding the orthodox binary of male (blue) and female (pink) and rejecting socially assumed gender roles and stereotypes.

The visual style of the animations – semi-abstract, colourful – references, rather than replicates, physical reality. I opted for the expressiveness and ambiguity of a hand-drawn style to allow for the immersant to interpret their own meaning of the experience. I am building on Sutherland's vision for headset AR to provide a Wonderland when he wrote: 'There is no reason why the objects displayed by a computer have to follow the ordinary rules of physical reality with which we are familiar' (Sutherland, 1965, p.508).

My directions for the 3D artist were often to make something 'more magical' and to play with scale, such as the giant nail varnish applicator that flicks paint around the space in Jamie's story. Animated objects become oversized virtual sculptures, absurd and/or poetic in their subject matter and scale. The choice in bold colours across animations and clothing in *Through the Wardrobe* is intentional; bright colours are a celebration, a nod to the joy of gender euphoria.

Set design

In the 'End of Gender?' proof-of-concept, I felt the biggest limitation was the lack of integration of the HoloLens with the furniture and space. I was approaching headset AR too much like VR – as a self-contained diegetic bubble for the immersant. What I learned from the feedback was how much

visitors enjoyed interacting with the physical environment whilst in the headset and how much they felt 'safe' and less vulnerable than in a VR headset. I was determined in *Through the Wardrobe* to integrate the physical world better into the interaction design and prompts for the immersant's action, such as 'Come closer' or 'Sit down', that would trigger the next element of the story.

The Sheffield venue would be an orthodox white cube gallery. These types of spaces are intentionally designed as aesthetically 'neutral', devoid of distracting stimuli, such as scents (Drobnick, 2005). I decided on five key items of bedroom furniture that would act as technical anchors for the AR elements and would provide a surface on which a 3D object would animate or with which the immersant should interact: chair, lamp, chest of drawers, dressing table and bed. This set would provide a domestic narrative context and an implied sense of intimacy. Even before putting on the headset and experiencing the digital media, the immersant would get a sense of tone and place from the set's combination of furniture, carpet and lighting. In understanding headset AR as an interrelationship of device, content, multisensory environment and immersant, I would need to integrate these elements.

Fig. 13 – Set design concept sketch for Site Gallery, April 2019

I first visited the Site Gallery in April 2019. I had been emailed some architectural drawings beforehand, but I needed to see the space for myself - no, *feel* the space for myself. What would the surface of the floor feel like under my feet? How high would the ceiling feel to me? What would the acoustics be like? How could I use the light rails to give my installation depth? These were questions

important to the experience of my piece that no drawings or photographs could convey. For installation art, this is the practitioner's method of 'know-how', as Robin Nelson (2013) terms it: an embodied method of understanding practice.

As I walked into the gallery room, I clicked my fingers to check acoustic bounce. Conclusion: we would need headphones. I knelt down and touched the hard, cold glazed concrete floor; we would need carpet for the entire space, not just a rug. The lights? We would need more. The ceiling? Perfect. I walked into the middle of what would be my installation space and imagined where furniture would sit, how the audience would walk through and how they might feel in this space. In my creative practice, I had to imagine my future installation and my future immersants. This Bakhtinian 'dialogical anticipation' was the first part of considering immersants as collaborators in the creative process.

Fig. 14 – Visiting the exhibition space, Site Gallery, 24 April 2019

My next task was to scour the secondhand shops of Sheffield in search of just the right items of furniture, an act combining serendipity (whatever is available in the shop that day) with my own design sensibility to choose one chair or table over another. I rejected anything that was too new, too chintzy or ornate. Just like my physical and intuitive reaction to the gallery space, each item of furniture I judged based visually on its aesthetics, the touch and weight of the material and other sensory quirks, like the creak of the chair and the smell of the dressing table drawers. These gave each item a complex character and history, worthy of the complexity of my four contributors' identities and worldviews.

Through the Wardrobe brings together material and media cultures through an emphasis on the multisensory and design of virtual elements. Rejecting the sterility of the scent-free museum atmosphere, the work accepts fingerprints, smudges, tears, gouges – all of the wear-and-tear that

indicates for the user of an object some clues to the secrets of its past. Each item of clothing acquires a variety of smells: a mixture of perfume, bodies that have worn it and venues where it has been exhibited. Each item of secondhand furniture hints at past lives in the scratches, peeling varnish and cracks, asking what made previous owners abandon it. It also implicitly asks: where to after this exhibition? The journeys of these items do not begin or end in this installation. Just as personal identities, including the gender of my contributors, are dynamic and shifting, so too is the concept and delivery of *Through the Wardrobe* changing. The work demonstrates the emergent potential of Thirdspace wherein the components are never static – even the virtual elements respond to each immersant.

4.3 Installation iterations (June 2019–January 2020)

4.3.1 Sheffield Doc/Fest: nominated for the Best Digital Storytelling Award

6 June, 2019: the first ticket booked for Alternate Realities at Sheffield Doc/Fest 2019 was for *Through the Wardrobe*. A woman from Sheffield, who had heard about the immersive programme of the festival, came through the door. Like most visitors, she had never worn a VR headset before, let alone a HoloLens. I fitted the headset for her, gave her instructions and watched as the installation came to life. Over the six days of Doc/Fest, I watched dozens of people come into the space, perform and activate the work. The ways in which people dressed up, sat or laid down, laughed or quietly took in the stories far exceeded what I had anticipated.

It delighted me when visitors would enter the gallery room for the first time and utter 'Oh, wow', as they orientated themselves in an unfamiliar, surprising environment. It was an Alice in Wonderland moment of stumbling into a surreal world. In the Site Gallery, many visitors may not have been expecting a bedroom inside, so they needed to reorientate themselves in a new sensory-environment.

Visitors were instructed first to leave shoes, bags, coats and phones in the cupboard before beginning the experience. This was intended to help them transition from the outside world – that of a busy city and film festival – into a playful yet introspective space. I intended for the shedding of outer layers to help them to engage with the headset and clothing more freely.

Fig. 15 – Installation view, Sheffield Doc/Fest 2019
(Photo credit: James Clarkson)

4.3.2 Further iterations: Manchester, IDFA, Barbican and Beijing

I learnt a number of lessons from the iteration in Sheffield that we were able to apply to subsequent iterations. There had been technical glitches and minor animation problems in the headset that emerged through repeated use over the six days. From October 2019, we spent another four weeks with the Unity developer adjusting 3D model sizes, animation speeds, transitions and story flow.

The main variation in iterations post-Doc/Fest was the context in which it was exhibited. The curator at HOME MCR, an art gallery in Manchester, invited the work as part of a group show in November 2019. These visitors tended to be younger and of more varied demographics, as the exhibition was billed as immersive art show for the public, as opposed to the media industry-focused crowd in Sheffield. Because we also had twice the amount of space as in Site Gallery, we set up a 2x2m changing area and three rails of clothing outside the bedroom. We then spread out the furniture within the bedroom area. The most significant feedback I received at Doc/Fest was that immersants felt exposed and onstage, like they were performing for other visitors. This inhibited some. The best way of correcting this was to prioritise greater privacy in all subsequent iterations. Therefore, between the public area and the bedroom set, we hung a semi-transparent white curtain that gave each immersant more privacy to explore at their own pace.

In addition to the AR version in the HoloLens, we provided an audio-only version for vision-impaired and text transcriptions for hearing-impaired visitors. We endeavoured to make the installation as accessible as possible.

Fig. 16 – Installation views, HOME MCR, November 2019

We then exhibited at International Documentary Festival Amsterdam (IDFA) in November 2019, where we were nominated for the Best Digital Experience Award. The curator had offered me an empty shop in an arcade of Centraal Station. About half of our visitors were commuters or tourists who had been ambling through the station. Most knew nothing about the documentary film festival or the HoloLens. Because we had curated the windows to look like a boutique vintage clothing shop, many visitors simply wanted to buy the clothes. Only upon closer inspection of the labels on the clothes could they see that there was a name and an icon, no price tag. Some people walked away disappointed that nothing was for sale. Others took up the offer to try on the clothes and headset and explore the installation. There were different types of engagement in the installation: those who wanted to wear something far outside their comfort zone (perhaps heels or a necktie), those who wanted to feel more 'fabulous' (through sequins or a bold colour in contrast to their usual grey) and those who wanted something close to their own style to feel more directly connected to the person. There was no right or wrong way of beginning the experience, but I wanted people to question why they chose what they chose and how they felt in those clothes. In the dressing area, there was a mirror with lights around it. When the visitor entered the space and turned on the lights, music played and soon after a recording of my voice spoke from behind the mirror. It asked, 'How do you feel in the clothes you're wearing?'

Some people emerged at the end confounded either by the technology or by the content of the stories. Others wanted to sit down after they had been through the AR experience to discuss what clothing meant for them, the way they see themselves and how they want others to view them.

Fig. 17 and 18 – Installation views, IDFA, November 2019

The final iteration before the pandemic was for a week at the Barbican Centre in London as part of the Sheffield Doc/Fest touring programme. The cinema curators wanted the work to feel open to the public in the cinema annex, not in the main gallery space. Their intention was to entice new audiences, those who were going to see a film or were having a drink in the cinema l. Like IDFA, this strategy meant many visitors were casually moving through the venue, not necessarily people who had travelled there for an art exhibition.

We erected white exhibition walls around the space to give the bedroom a secluded environment. This lent an element of Wonderland surrealism: the incongruity of a bedroom and AR headset in the middle of a l and cinema foyer.

Fig. 19 – Installation view, Barbican Centre, London, January 2020
(Photo credit: Suzanne Zhang/Barbican Centre)

The final iteration of *Through the Wardrobe* 2018-20 was for the Goethe-Institut China in Beijing as one of six immersive works presented in a group show, Negotiable Matter. According to the

curators at the Institut, this was the first public work using the HoloLens exhibited in China. To adapt the work for a local audience, we translated the transcripts to Mandarin and then had those voiced by local queer artists in Beijing. The four speakers Alexwood (Micah), Benhe/Kacchan (Sam), Xiaomi (Jamie) and Man (Rex) interpreted the emotion and intention of the original audio in a way that could connect with a Chinese audience. This act of intercultural (not just linguistic) translation, interpretation and dialogue, for me, took the work in an exciting new direction. The Chinese version constituted a collaborative act in handing over of that material to other artists who interpreted it in a way that spoke to their social context and community.

Fig. 20 – Installation view, Goethe-Institut China, Beijing, November 2020
(Photo credit: Goethe-Institut China)

4.3.3 A collaborative process with the audience, curators and venues
Chapters 1 and 2 provided examples of participatory and interactive art in which the works are brought to life by the audience, from Myron Krueger's *Videoplace* to the three HoloLens works. Chapter 2 offered a model for understanding the medium as experienced by the immersant in my adaptation of Edward Soja's Thirdspace. This chapter has demonstrated how visitor feedback combined with my own observations and artistic praxis know-how shaped each iteration of *Through the Wardrobe* 2018-20. My collaborative and dialogic approach to production, seen in my relationships with my four contributors in the previous chapter, extended to my iterative approach to exhibiting the work. As I learned from feedback from immersants, the installation experience was improved upon in its design in each subsequent iteration.

After 15 years of making film, audio and interactive documentaries (web-based and immersive), I have honed the know-how of my craft to develop my own storytelling style. I have come to trust my instinct as an artist for projects, including *Through the Wardrobe*, where I directed partly by emotions and feeling – often intangible bodily senses that cannot be quantified but can be intuitively harnessed. I built on experience and instinct to direct my team on the audio design and tone, the design of the 3D visual animations and how those worked with the clothing and furniture. However, my own artist and maker skills and instinct alone are not enough. I can direct a team, but I do not have the skillset to deliver many of the technical components. Immersive media production is often highly collaborative and requires re-negotiating roles we may be tempted to carry over from traditional media production (Gaudenzi, 2017). Consequently, I often called myself 'Creative Director' or 'Lead Artist' for *Through the Wardrobe* in an attempt to distance myself from the film production connotations of the lone auteur Director.

The immersants have also been my collaborators In the work, starting from dialogical anticipation. As I was recording with my four contributors, designing the AR components and planning the set with my creative production team, the hypothetical future immersant was always present. While I tested the work with three of the contributors, I did so in wondering how it would feel for various audiences in different cities, of different backgrounds and with different abilities or impairments. Then, I learned from immersants in each iteration exhibited. From concept testing of 'End of Gender?' in November 2018 to the user testing of May 2019, I changed animations, instructions on-screen, spoken voice-over instructions and the set layout in accordance with feedback. Many user-testers did not know how to interact with the large orbs that appear on the furniture, so we added simple text, such as 'Come closer' and 'Take a seat'. I let my user-testers tell me how they wanted the interaction design, rather than me prescribing all instructions for them.

I wanted to make a work in which the immersant could choose a story path to pursue (in this case, four stories) and then experience it in a variety of ways that allowed them freedom also to create their own connections and meanings. Through touching and moving at their own pace in any order they wanted, the immersant could ponder the varieties of ways in which gender (whether genderqueerness or gender nonconformity) can be felt in and expressed through the body. *Through the Wardrobe* is a space to reflect on the social construction of gender and its bodily expression. Reflecting on Butler's (1990) definition of performativity in the previous chapter, just as a Thirdspace in headset AR is performatively constructed, so too is gender. This is not to say either is 'false' or 'artificial'. On the contrary – because the Thirdspace in headset AR and gender are both enacted through the body, they are made real. Gender comes into being through an ongoing process of

actions in the body; Thirdspace comes into being through actions simultaneously with physical objects and digital elements.

In the iterations from Sheffield to Manchester, Amsterdam to London and Beijing, *Through the Wardrobe* was brought to life by thousands of immersants. As in the tradition of participatory art and Happenings, the materials and headset are inert and lifeless until there is an audience. They create a temporary Thirdspace through their actions, demonstrating how Thirdspace in headset AR is inherently active, participatory and reliant on the movement and choices of the immersant. The relationship between my artistic intentions, the HoloLens and the multisensory environment facilitated, as Glorianna Davenport et al (2000, p.256) phrased it, a 'collaborative co-construction of meaning and experience'. The dialogic process involving their engagement and their feedback has had a lasting effect In each subsequent iteration.

Finally, it is worth noting the collaborative input and impact of curators, venue technicians and venue contexts. Far from prefabricated and rigid, *Through the Wardrobe* is an adaptable and responsive work. As surprising or incongruent as it might seem to the unsuspecting visitor in a gallery, train station or cinema foyer, each iteration responded to the needs of each venue. The Barbican was the smallest space, so the developer adjusted the size of the 3D models in Unity. For Beijing, my developer and I adapted the app with all text and audio the Goethe-Institut organisers had translated for a Chinese audience. The curators in each venue, along with their teams of technicians, also helped with designing and installing the lighting, assisted with choosing furniture and carpets, painted walls and waited patiently for me to rotate beds or chairs in minuscule degrees left or right until it all 'felt right'. It required dozens of people in every iteration.

Conclusion

Exhibiting *Through the Wardrobe* iteratively demonstrated how Thirdspace in headset AR can facilitate a radical open space for the immersant. This is a space in which some norms can be subverted, the real and the imagined come together. There is multitudinous potential for story exploration, for physical interaction, for personal exploration and for gender expression. This is a space that in its queerness exists on the margins of the mainstream – the mainstream of society, of media, of technology – even if it physically takes place in the middle of an Amsterdam train station or London cinema foyer.

The work is adaptive and has potential to be adapted to different cultural contexts. Through its multiple iterations, the piece demonstrates the dynamic potential for a nonfiction AR installation. In each venue, there was slightly different lighting, furniture, carpet and walls, so the app had to be adaptive enough to respond to changing conditions. Technologically, AR may need anchors in the physical environment, such as a chair, a bed or a lamp. But these physical objects can be replaced from one iteration to the next, as long as the digital and story content elements are programmed to adapt. As a responsive, interactive medium, AR is inherently liquid and malleable to changing physical conditions.

While I approached headset AR in autumn 2018 with a know-that theoretical understanding, it was the feedback from immersants that prompted me to search for and construct new frameworks for working with the medium. My dialogic iterative process with my immersants led to more than superficial UX design changes; listening to my immersants deepened my understanding of and practice with the medium. Their feedback helped me to better intertwine physical and virtual objects in subsequent iterations to better exploit the real affordances of the headset and the narrative affordances of the medium.

In returning to my research sub-question, how *can* feedback from user testing and audience studies contribute to design of an installation consisting of physical objects and digital elements in an AR headset? This chapter has addressed this through examining my iterative process in dialogue with my creative team and immersants. The 'meaning and experience' of the work was a collaborative co-construction between me (plus my creative team), the immersant and the media in the HoloLens within the multisensory stimuli of the installation space. The iterative process of developing this work demonstrated how the porous diegetic bubble of the medium works in practice and the expansive potential of a Thirdspace in headset AR, leading to a number of findings and recommendations I shall lay out next in the final concluding chapter.

Conclusions

Findings, reflections and futures

I return to my original research question:

> Within a practice-led research framework, how can an immersive media installation (incorporating methods from immersive theatre, interactive digital art installations and audio documentaries) present the experiences of genderqueer contributors and how they physically express their identities through clothing and the body?

Both this thesis and the installation *Through the Wardrobe* were driven by this research question, answered through a nearly five-year practice-based research journey. In my first year of the PhD, I began to establish a theoretical framework to understand the affordances of immersive media and interactive documentary, as explored in Chapters 1 and 2. Concurrently, as I was developing my artistic practice in VR and AR, my discussions with prospective contributors prompted me to question the best form of immersive media to employ. Headset AR offered the most appropriate affordances to examine gender expression by bringing together the virtual and the physical.

My four primary project contributors were an active part of my creative practice from the beginning in 2018 until the final exhibition in Britain in January 2020. With research taking place within Bristol, my home was the field, and the field was my home. As an insider-outsider researcher-practitioner, I also used places in Bristol as my studio: where I put the components of my installation together (Bristol VR Lab), where I initially tested the installation (the Watershed) and in the venues where I involved my research participants in the design process.

My understanding of theory and practice of headset AR grew dialogically. I established my theoretical understanding of the medium and interactive documentary at the same time I was developing my practice. Understanding the disciplinary background and context informed the process of my practice. And as my practice matured through exploring the physical and interactive narrative affordances of the HoloLens in late 2018, I searched for an appropriate conceptual model to describe the potential of the medium for interactive nonfiction. In surveying the literature on the medium, I could not find a conceptual framework that reflected how my user-tester immersants were describing their experience in 'End of Gender?' This proved a watershed moment: through practice (specifically, my iterative exhibition approach), I was challenged to develop a framework for

myself that reflected how my immersants experienced the medium and how I could employ the medium for interactive documentary.

Both my know-how deepened and my theoretical framework (know-that) expanded through reflection and listening to my audience (the process of know-what) (Nelson, 2013). What resulted was an understanding of headset AR as a *porous* diegetic bubble. Chapter 2 explored how immersive media facilitates diegetic bubbles in which the experience consists of various multisensory elements. Defining diegesis as the elements that pertain to a storyworld, I applied the term to the sense of the schema, logic and aesthetics of an immersive work. I employed the term 'bubble' as a model for the boundaries of that world, technologically (e.g. within the headset and headphones), physically (in the space of an immersive installation) and virtually. The inherent audio and visual porousness of the AR diegetic bubble affords a fluidity of barriers and boundaries.

This affordance of the medium opens up opportunities for a hybrid experience that can integrate multisensory stimuli, including touch and smell. The immersant activates a blended, hybrid experience in the simultaneity of the physical and virtual in headset AR. For this physical/virtual space to be considered a Thirdspace, following Soja, this borderland must be one in which the voices of the marginalised speak. Thirdspace is more than technological hybridity. The 'radical openness' – as bell hooks (1990) referred to spaces that prioritised marginalised voices – of a Thirdspace presents a forum for polyvocality in which voices might present different perspectives that challenge the hegemonic order. Herein we can see 'possibilities for community, resistance, and emancipatory change' (Soja, 1996, p.87). This is the radical potential of Thirdspace.

Through the Wardrobe facilitates such a Thirdspace of four voices from outside the cisgender majority of society. The genderqueer/nonbinary body challenges the values and aesthetic categories inherent in the material restrictions of clothing and cosmetics or spaces, as seen in the stories from the contributors. As binary gender is encoded in these materials and spaces, *Through the Wardrobe* provides an alternative 'safe space' (as one immersant at 'End of Gender?' called it) in the guise of a bedroom in which to question and subvert norms.

Chapter 1 offered an overview of trans and nonbinary representation in British nonfiction media. I explored the tropes of the 'social victim', medical transition and the optics of aesthetically passing from one side of the gender binary to the other. These 'born in the wrong body' conventions in British documentaries on trans lives reinforce assumptions of narratives as a binary journey from unhappy to happy, from birth-assigned gender to a medically assisted one.

Chapter 3 presented an alternative model for documentary representation of nonbinary stories through collaborative immersive media production. My four contributors participated in the recording and creation of audio and visual content, donating or giving directions on the objects that would represent them, user testing the experience and one working as assistant producer. In bringing together their contributions, we could begin to design a Thirdspace for our – at that point – imagined future immersants. We created an installation that – while for us was a space of polyvocality and radical openness to discuss genderqueerness – we hoped would challenge visitors to festivals, art galleries and wherever else we could exhibit the work.

I conducted user testing sessions at multiple stages in the design and iteration process. These testers included my contributors and festival and gallery visitors. Through prioritising the experience of the immersant and listening to their feedback, I discovered more about the potential of the work, of my practice and of the medium itself. It was immersants who demonstrated for me just how headset AR can facilitate a Thirdspace in practice. In Chapter 4, I set out how the imbricated development of theory and practice led to new insights into and forms of practice as demonstrated in the iterations of *Through the Wardrobe* 2018-20.

Through the Wardrobe was a constantly evolving work, starting from planning and recording in autumn 2018 to the last public exhibition at the Goethe-Institut China in November 2020. As headset AR was a new creative platform for interactive documentary, the iterative method was an appropriate approach to the challenge of exploring and grasping the possibilities of the medium. While I learned from three works (*Terminal 3*, *Chorus* and *Elephants Can Remember*), there are few conventions in this field for interactive nonfiction in an AR headset that incorporates multisensory stimuli. This research has involved an exploration of those storytelling affordances through an iterative process that relied on dialogue with my creative team, contributors and immersants.

Chapter 3 examined how bodies and genders (especially nonbinary ones) are emergent, always in a state of change. The instability of bodies and identities was mirrored and mimicked in both the iterative making process and the physical materials of the installation. For a piece representing the endless becoming and lack of fixity of gender, *Through the Wardrobe* demonstrates how an installation, a work of physical and digital art, can be dynamic and responsive. The form mimics the content and the gender theory that inform it. The visitor is required to touch (and smell and move and listen to) objects within the work. With each visitor and exhibition, the clothing and the furniture have acquired more and more traces.

Fully rejecting the sterility of the scent-free museum atmosphere, *Through the Wardrobe* accepts fingerprints, smudges, tears, gouges, the wear-and-tear that indicates for the user of an object some clues to the secrets of its past. Each item of clothing smells like a mixture of perfume, bodies that have worn it and venues where it has been exhibited. Each item of secondhand furniture hints at past lives in the scratches, peeling varnish and cracks, asking what made previous owners abandon it. It also implicitly asks: where to after *this* exhibition? The journeys of these items do not begin or end in this installation. Just as personal identities, including the gender of my contributors, are dynamic and shifting, so too is the concept and delivery of *Through the Wardrobe* changing.

The piece demonstrates the dynamic potential of a nonfiction AR installation. In each iteration, there was slightly different lighting, furniture, carpet and walls, so the design of the installation had to be adaptive enough to work in each new venue. While, technologically, AR needs anchors in the physical environment, such as a chair, a bed or a lamp, these physical objects can be replaced from one iteration to the next, as long as the digital and story content elements are programmed to adapt. As a responsive, interactive medium, AR is inherently fluid and malleable to changing physical conditions. The work has proven adaptive to different cultural contexts as well, demonstrated in the iteration at the Goethe-Institut China. The Chinese version of the work illustrated the potential for collaboration and interpretation across cultures.

Through the Wardrobe facilitates a temporary Thirdspace for the immersant. This is a space in which some norms of gender can be subverted, the real and the imagined come together. There is significant potential for story exploration, for physical interaction, for personal exploration and for gender expression. This is a space that in its queerness exists on the margins of the mainstream – the mainstream of society, of media, of technology – even if it physically takes place in the middle of an Amsterdam train station or London cinema foyer.

My research has yielded new work, contributions to the field of interactive and immersive documentary and new insights into the potential of headset AR (see Appendix III). The dialogic relationship between theory and practice has resulted in conclusions that could not have been reached through theoretical study alone. Getting my hands dirty through building and making *Through the Wardrobe* – quite literally when it came to laying carpet in Sheffield or rigging my own lights in Amsterdam – has led to new learnings in the relationship between headset AR as a medium and its phenomenological, multisensory potential. The theory in the practice has led to greater understanding about the theory, while these findings of practice and theory are demonstrated through the practice.

My research has been conducted in relation to British (and world) culture and politics 2017-2022. The practice elements were developed mostly pre-pandemic, with the writing up mostly occurring under lockdowns. Research and writing do not happen in a vacuum. There is a cultural, geographic and temporal specificity that grounds this research and *Through the Wardrobe*. I am making work that is not about 'politics' but is undoubtedly political in an era where trans rights and representation are a daily 'debate' in British broadcast media and major newspapers. I do not know whether I was able to change any hearts or minds of those who might have been transphobic to begin with, but one can only hope. My goal with *Through the Wardrobe*, simply, was to present the stories of four people whose gender is often misunderstood. I wanted immersants to engage with them through this encounter and, importantly, reflect on their own feelings of gender and experience of clothing. I hope that nonfiction representations of nonbinary and trans lives continue to evolve and fight transphobia through the power of art.

Through the Wardrobe presents a demonstration of a nonfiction AR experience that extends a collaborative framework from contributors to immersants. I hope that immersive producers using AR glasses will be able to learn from and build on the foundations of *Through the Wardrobe*, just as I benefited from experiencing previous nonfiction works in the HoloLens.

Expanding on the lessons of this research

My original research question included immersive theatre, which I quickly turned away from in my practice as part of this research. I did incorporate some elements of theatricality, such as the set of furniture, the carefully controlled stage lighting and a framing the immersant as a performer (mentioned briefly in the Introduction). My practice took some inspiration from Allan Kaprow and the Happenings in giving the audience instructions to perform a work (Chapter 1). But I did not expand within this research into performance studies.

In my final year, however, in the process of writing up, I applied the lessons of *Through the Wardrobe* to work with dancers. In Spring 2020, just before the first pandemic lockdown in the UK, I worked with National Dance Company Wales on an R&D project, *Moving Layers*, using AR headsets in contemporary dance. With the company artistic director and four dancers over two weeks, we were able to experiment with the HoloLens as a tool for collaboration between dancers and as a way for the audience to engage with the performance in the studio space. The skills I honed from iterating *Through the Wardrobe* I applied to working with a multidisciplinary team (choreographer, dancers and developer) and listening to and incorporating feedback from audiences. We then took

the lessons of that research into a residency with Studio Light Moves at Dance Limerick in the west of Ireland in 2021. There we created an interactive scratch performance using Instagram AR filters for the audience to reveal parts of the performance.

What I realised from *Through the Wardrobe* and *Moving Layers* using the HoloLens at National Dance Company Wales was that audiences are not quite ready for AR headsets. The audience feedback confirmed that, while the graphics might be beautiful and there is a sense of awe and wonder using AR as part of a performance, the HoloLens itself is clunky and uncomfortable. Using mobile phones to augment the space and the bodies of the performer, as we did at Studio Light Moves, felt more accessible; the tech could melt into the performance more easily through its familiarity. This echoed for me what Judith Aston (2017, p.234) wrote about keeping 'technology in its place' in an interactive experience in which an audience must engage with digital technology; the device ought not to get in the way of the audience feeling immersed in the story or performance.

The lessons of the accessibility of AR have also informed my postdoctoral research. In the process of conducting this research, I have witnessed the rapid, widespread adoption of AR from novelty or limited applications in 2017 (such as Pokémon GO) to mainstream uses across multiple platforms in 2022. AR as used on smartphones and devices with webcams has crept into many people's daily lives in applications as face and environment filters on video conferencing platforms and social media. The pandemic quickened the pace of AR development with the widespread use of platforms like Zoom and Microsoft Teams in which users have explored the options to filter their appearance or their background environment in real-time.

In creating *Through the Wardrobe*, I needed the specialist skills of a Unity developer to help me create the content with the HoloLens. But creating – albeit less sophisticated – filters in platforms like Instagram, Snap and TikTok is far more accessible for artists than the current AR headsets. Before researchers, such as myself, place too many hopes on the arrival of AR glasses, we ought to be studying the everyday mundanity of AR in the form of face filters and games with which millions of people worldwide engage. My postdoctoral research through the BFI and University of York will examine exactly this amongst a cohort of young people in Yorkshire. By understanding how these young people already engage with AR and asking them how they want the medium to be part of their lives in future, we as researcher-practitioners can design better experiences in the form of entertainment or utilitarian applications.

What next: An AR glasses tipping point?

If we can include young people in the discussion now of how to design AR apps for current devices like mobile phones, we ought to be able apply that research to AR 'smart' glasses when – or if – they arrive for a mass market. AR headsets, such as HoloLens and Magic Leap, have seen limited applications in enterprise, aerospace and military training. But the promise of everyday AR glasses has been several decades in the making. Myron Kruger in 1991 described his vision for 'reality glasses' that 'must be made to be visually indistinguishable from eyeglasses […] graphic objects and creatures could be displayed as though they existed in the real world' (Krueger, 1991, p.78).

Three decades later, Krueger's vision is possibly becoming a reality. In 2016 Snap first released their Spectacles with cameras that sync with a smartphone to be filtered and augmented in the app. Their latest version of Spectacles[41] offers a strong indication of the live augmentation of the world this first generation of AR glasses can offer. Spectacles are lightweight (134g), operable in outdoor light and display real-time AR filters. Several major tech companies – such as Apple, Google and Meta – have established patents for AR glasses and are teasing the release of products in the next few years. These glasses, in contrast to the existing bulky headsets, will be slimmer, presumably cheaper and more oriented towards everyday use, including integration with popular social media apps (Peddie, 2017; Pesce, 2021).

But the novelty of new electronic devices is not enough to guarantee widespread adoption. As Apple technologist Tim Oren (1990) wrote, the inventors of computer technologies are often unlikely to envision the potential of a medium. It is usually artists and storytellers 'who find that the new medium offers them a way to say it for the first time' (p.479). Oren's sentiment was echoed in 2019 by Ronald T Azuma, one of the computer scientists who had helped to define AR in the 90s. Azuma reflected on the state of AR and what it would require to become ubiquitous. Azuma suggests that AR glasses are 'the next logical platform to supplant smartphones' (p.31). He believes this development will propel AR forward to become a ubiquitous medium.

In observing that the medium had taken on a number of uses from e-commerce and enterprise to gaming and face filters, he issued a challenge:

> we must develop AR as a new form of media that provides novel approaches for telling stories and generating experiences where the combination of real and virtual is crucial and

---

[41] https://www.spectacles.com/uk/new-spectacles

where the virtual content is connected to reality in compelling and meaningful ways. (Azuma, 2019, p.29)

My research, through my practice and this thesis, has offered one response to Azuma's challenge in addressing potential methods for 'novel approaches for telling stories' and a model for 'the combination of real and virtual' where the two are connected in 'compelling and meaningful ways'. My research demonstrates some of the potential of using AR HMDs for interactive documentary.

For a company like Meta, AR is part of a larger project to build what they term the 'metaverse'. According to the keynote talk between CEO Mark Zuckerberg and colleagues in October 2021[42], the company's metaverse will span VR and AR in the form of headset devices. Meta is developing AR glasses (currently known as Project Aria) to recognise objects and the environment around the wearer, operating an assistant and everyday tool. In the keynote, the company's engineers demonstrated these glasses as a responsive AI-powered assistant, resembling Amazon's Alexa system, but one that scans and registers everything the viewer sees through computer vision. Along with Meta, major entertainment companies like Disney and ITV are building their own ecosystems of immersive content in what they also term metaverses. The current R&D in hardware, software and content points to a number of potential experiences in AR and VR including art, live gigs and sports, gaming, storytelling and social interactions. There is tremendous creative potential in these devices for the convergence of technologies, such as 5G combined with AI systems (like Microsoft's Azure) and eye-tracking and biometric capture sensors, all working with real-time responsive AR in head-mounted displays.

A major concern that has emerged over the time I have conducted this research is the threat of – what Shoshana Zuboff (2019) has called – 'surveillance capitalism' in immersive HMDs (discussed in Chapter 1). The companies developing AR glasses with capabilities to capture a large amount of personal data, such as location and face recognition. How that data will be used is at the core of privacy concerns flagged by an increasing number of computer scientists, media watchdogs and XR advisory groups (Heller, 2020; XRSI, 2020). As seen in the failure of Google Glass in 2014, these corporate-driven innovations may, at best, not consider the full potential of ethical implications of their technologies and, at worst, intentionally harvest data of users as part of the growth of surveillance capitalism (Zuboff, 2019; Pesce, 2021).

While *Through the Wardrobe* facilitated a short-lived Thirdspace, might these potential everyday AR spaces become Thirdspaces with more longevity and a sense of community? In Soja's examples of

---

the US-Mexico borderlands or in urban cites in Los Angeles, spaces might be originally designed by architects but become Thirdspaces through the people that inhabit them. If people spend more time in hybrid AR spaces, how could immersants organically grow their own Thirdspaces? One clue might be in the global Pokémon GO gaming community. The game still maintains millions of active players. In cities worldwide, once a month, players can participate in Pokémon GO Community Days that physically bring them together for six hours of collective gameplay. These days present an experience of AR that is both shared and on individual devices, local and global, physical and virtual. The main problem is, as Zuboff highlights in her examination of the game, players' data is being harvested by the developer, Niantic. The vast amount of player behaviour and movement collected turns Pokémon GO into gamified personal tracking software.

If AR continues to grow in social media and entertainment applications, where is the opportunity for radical openness that centres the voices of the marginalised? I expect to see immersive storytellers and artists using the first generation of AR glasses to create thoughtful, engaging experiences. The potential for site-specific 3D visual and spatial audio content is enormous. If we want to facilitate spaces of radical openness, where immersants are free to explore, connect with other people and their environment, we need our own methods for dialogue in the process of iteration and distribution. The potential Thirdspaces we can build provide an alternative to the surveillance capitalist metaverses particular corporations are building. While they collect personal data about the bodies, habits, likes/dislikes and physical environments of users, building business models that profit from this information, we as the content creators, the storytellers, have the opportunity to invite immersants into entertaining, subversive Thirdspaces in which they can safely confront vulnerability. We must be mindful of the privacy of our immersants and how the devices and software we use collect their data. There are promising alternatives to the software and devices developed by the large corporate players[43]; artists are not limited to the domains of Meta and Google. This is where this research leaves off, and an area where I would suggest that further future work could be undertaken.

---

[43] AR/VR platforms like 8th Wall and A-Frame, for example, are compatible with a variety of devices and ecosystems that operate with a variety of software and hardware. There are also independent AR headsets, such as Lynx, that operate outside of major corporate ecosystems.

Glossary

__Medium-specific and technological terms__

Audience - Depending on the context, I use different terms for the person known conventionally in film and theatre as the 'audience'. For the agent engaging with an interactive documentary, I use '**interactant**' (Gaudenzi, 2013). For the person operating a digital device, regardless of medium, in line with many computer scientists, I employ '**user**'. And for someone in an immersive environment, I most often use '**immersant**' (Davies, 2005) (see entry below).

Augmented reality (**AR**) – an interactive medium in which a device provides computer-generated graphics that obey three characteristics: combine the real and virtual, interactive in real-time and registered in 3D (Azuma, 1997). This research takes a wide view of AR as incorporating multiple sensory modalities beyond vision, including audio, touch and smell.

Head-mounted display (HMD) – display device worn on the head, such as an AR or VR headset

Immersant - the agent in an immersive experience as an 'immersant'. The term was coined by Char Davies in the mid-1990s as a more nuanced alternative to 'user' in an immersive virtual environment (Davies, 2005). While Davies intended the term for virtual and mixed reality, I am applying it to immersive experiences more generally.

Immersive media – a format that requires the audience or user to move their perspective or body through space to reveal the narrative.

Interactive media – loosely defined as a format in which the audience or interactant have some element of choice in the elements that make up an experience. Janet Murray (2012) offers the term 'multisequential' for formats that may involve hyperlinks or other media segments on which the audience can effect some sort of impact (see Chapter 1). Multisequential stands in contrast to 'unisequential' (often referred to a linear), in which an audience experiences media in a form that contains a beginning, middle and end as pre-determined by the director/author. Multisequential offers more complexity in the flow or outcome of the narrative.

Virtual reality (**VR**) – a visually immersive experience in which an immersant wears a headset that displays a stereoscopic image. There are two main forms of VR: 3 degrees of freedom (3DOF) in which the content is displayed in 360 degrees but does not move in the X or Y axes of the image;

and 6 degrees of freedom (6DOF) in which the immersant may move around in the virtual environment and possibly see elements of their body as an avatar (e.g. hands).

Gender terms

I do not assume the reader to know the complexities of (trans)gender terms, so I have supplied a list for reference. My PhD thesis explores these terms in the context of my ethnographic research. These definitions are generally in line with global LGBT+ rights groups and (trans)gender education charities, such as Gendered Intelligence and the Gender Identity Research & Education Society. One of the clearest and most comprehensive recent overviews of trans rights, terminology and academic theory is ambitiously summarised by sociologist Sally Hines (2020) in 'Sex wars and (trans) gender panics: Identity and body politics in contemporary UK feminism'.

Cisgender – a person whose gender identity and gender expression align with their sex assigned at birth.

Dysphoria and **euphoria** - Gender dysphoria is when someone's gender identity does not match with aspects of their body and/or the social gender role assigned to them at birth. One of the key themes explored in *Through the Wardrobe* is ways of experiencing euphoria as a nonbinary person in a highly binary world.

Gender expression - an individual's presentation, including physical appearance, clothing and accessories and behaviours that express aspects of gender. Gender expression may or may not conform to a person's gender identity.

Everyone is assigned a gender identity at birth, usually assumed based on biological sex. And yet one's true gender identity can be deeply personal and sometimes latent or even suppressed for many years. External augmentation of the body – including clothes, makeup and jewellery - can help express what is felt inside. *Through the Wardrobe* explores how to express genderqueer and nonbinary identities in clothing and the body. Many forms of gender expression are often a choice, unlike gender identity. A person can be nonbinary and still dress and express themselves in a way that may be perceived as 'male' or 'female'. Equally, a person can wholly identify as cisgender male or female and express themselves in a gender non-conforming manner (e.g. cisgender men who wear dresses or women with 'men's haircuts').

Gender identity – a person's deeply-felt, inherent sense of male, female or an alternative (e.g., genderqueer, nonbinary, agender) that may or may not correspond to a person's sex assigned at

birth. 'Since gender identity is internal, a person's gender identity is not necessarily visible to others' (APA, 2015). Historically, many cultures across time have had language and conceptual categories for those beyond the male/female binary (Herdt 1993). For those who identify as the gender they were assigned at birth, they are considered cisgender. Nonbinary and genderqueer identities sit under the umbrella of transgender.

The language is rapidly changing as scholarship and societal boundaries shift. As trans and nonbinary labels are increasingly recognised and protected under British law (including the right to use the toilet that matches your identity), more people are finding the language to articulate their identities. According to the Government Equalities Office (2018), roughly 200,000-500,000 people identify as transgender (including nonbinary/genderqueer) in the UK.

Genderqueer – gender identity that falls outside of the gender binary (i.e. the person identifies with neither or both male/female). Some genderqueers also use the terms 'gender fluid' if they switch or vary between maleness or femaleness, 'nonbinary' if they are neither exclusively male or female in gender identity and sometimes 'trans' to denote part of the wider category of non-cisgender identities.

Nonbinary – like genderqueer, the term nonbinary has been in use since the mid-1990s (Wilchins, 1995). It has recently overtaken genderqueer in popular usage to describe those outside the male/female binary (Stryker, 2017). In line with recent examples from trans scholars like Susan Stryker (2017) and Eris Young (2019), I have made the linguistic decision in this thesis to drop the hyphen of the 1990s 'non-binary' in favour of the unified compound noun 'nonbinary'. Non-binary implies an opposition or an otherness to the gender binary – that is not binary, which in itself creates a new binary in opposition to the binary genders. Nonbinary, on the other hand, employs 'non' as a prefix whilst claiming the legitimacy of a category that does not wish to be constrained relationally to what it is *not*. Nonbinary exists as its own legitimate label, term and gender category – that is, until a better term or terms for describing gender beyond the binary come into English linguistic use.

Pronouns – three of my four contributors to *Through the Wardrobe* mainly use the pronouns 'they/them' to avoid male/female binary pronouns. Since recording the audio, Sammy has used 'she/her'.

Sex – a category assigned to people at birth, mainly based on long-held medical assumptions of genitalia and chromosomes, typically categorised as male, female or intersex. Thanks to options for

medical interventions in Britain (such as hormone replacement therapy and surgeries), trans people can, after a long process, ensure that their sex matches their identity. The waitlists for clinics that provide gender affirmation support/procedures often last for several months to years; this is not a rapid or trivial process. Not all trans, including nonbinary, people will elect for any kind of medical intervention. It is also possible to be intersex and yet identify as binary male or female, as gender is not restricted to physical bodily attributes.

Transgender or **trans** – many in the British queer community take a liberal view on using trans as all-encompassing of non-cisgender identities. This thesis adopts such a broad use of the label. For some, however, 'transgender' requires a change from one binary gender to the other, including a medical transition, and would exclude nonbinary or genderqueer.

List of figures

Mediography

18 Days in Egypt (2011) [Online interactive documentary]. Directed by Jigar Mehta and Yasmin Elayat. USA: PBS.

A City in Transition: New Orleans (1988) [Videodisc interactive documentary]. Directed by Glorianna Davenport, Richard Leacock and Brian Bradley. USA: MIT.

A Mile in My Shoes (2015–ongoing) [Interactive audio installation]. Conceived by Clare Patey. UK: Empathy Museum.

Aspen Movie-Map (1978-80) [Videodisc interactive documentary]. Directed by Peter Clay with Bob Mohl and Michael Naimark. USA: MIT

Assent (2014) [Interactive VR]. Directed by Oscar Raby. Australia: VRTOV.

Authentically Us (2018) [360 VR]. Directed by Jesse Ayala. USA: FOVRTH.

Born in the Wrong Body (2015) [3 x 60' TV documentary series], Channel Four.

Domesday Project (1986) [Videodisc interactive documentary]. Directed by Peter Armstrong. UK: BBC and Acorn Interactive Video.

Ecodisc (1985) [Videodisc interactive documentary]. Directed by Peter Bratt and Sophie McCormick. UK: BBC Enterprises.

Elephants Can Remember: Scene One (2017) [HoloLens installation]. Directed by Scott Fletcher. UK: Agatha Christie Museum.

Fort McMoney (2013) [Online interactive documentary]. Directed by David Dufresne. Canada: National Film Board of Canada.

Girls to Men (2015) [TV documentary]. Directed by Nick Sweeney. UK: Channel Four.

Highrise (2009) [Online interactive documentary]. Directed by Kat Cizek. Canada: National Film Board of Canada. Available from: http://highrise.nfb.ca/ [Accessed 2 February 2022].

Hunger in Los Angeles (2012) [Interactive VR]. Directed by Nonny de la Peña. USA: Emblematic.

Industrial Britain (1922) [Documentary film]. Directed by Robert Flaherty. UK: Empire Marketing Board Film Unit.

Jaguar (1967) [Film]. Directed by Jean Rouch. France: Icarus Films.

Jerome B. Wiesner: A Random Walk through the Twentieth Century (1996) [Online interactive documentary]. Directed by Glorianna Davenport. USA: MIT.

Made this Way: Redefining Masculinity (2018) [Interactive VR]. Directed by Elli Raynai and Irem Harnak. UK/Turkey.

Marital Fracture: A Moral Tale (1986) [Videodisc interactive documentary]. Directed by Rosalyn Gerstein and Russell Mayo Sasnett. USA: MIT.

Spacewar! (1962) [Computer game] Developed by Steve Russell. USA: MIT.

Terminal 3 (2018) [HoloLens installation]. Directed by Asad J. Malick. USA: 1RIC.

The Devil Wears Prada (2006) [Film]. Directed by David Frankel. USA: 20th Century Fox.

Through the Wardrobe (2019) [HoloLens installation]. Directed by Rob Eagle. UK: University of the West of England.

The Chorus (2017) [HoloLens installation]. Directed by Sophie Dixon. UK / Netherlands: Netherlands Film Academy.

The Machine to be Another (2014) [VR experience]. Developed by BeAnotherLab. Spain: Espronceda Institute of Art & Culture.

Transformation Street (2018) [3x 60' TV documentary series]. UK: ITV.

Videoplace (1974) [Interactive digital art installation]. Developed by Myron W. Krueger. USA.

Virtual Reality Before it Had That Name (1996) [online] Computer History Museum. USA. Available from: https://youtu.be/Y2AlDHjylMI [Accessed 18 June 2019].

What Makes A Woman? (2018) [TV documentary]. Directed by Karen McGann. Channel 4, 16 May.

You Are on Indian Land (1969) [Documentary]. Directed by Michael Kanentakeron Mitchell. Canada: National Film Board of Canada.

Bibliography

Aarseth, E.J. (1997) *Cybertext: Perspectives on Ergodic Literature*. Baltimore, MD: Johns Hopkins University Press.

Aston, J. (2017) Interactive Documentary and Live Performance: From embodied to emplaced interaction. In: Aston, J., Gaudenzi, S. and Rose, M., eds. (2017) *I-Docs: The Evolving Practices of Interactive Documentary*. New York, Chichester, West Sussex: Wallflower, Columbia University Press.

Aston, J. and Gaudenzi, S. (2012) Interactive documentary: setting the field. *Studies in documentary film*. 6 (2), pp. 125–139.

Aston, J., Gaudenzi, S. and Rose, M. (2017) Introduction. In: Aston, J., Gaudenzi, S. and Rose, M., eds. (2017) *I-Docs: The Evolving Practices of Interactive Documentary*. New York, Chichester, West Sussex: Wallflower, Columbia University Press.

Aston, J., and Odorico, S. (2018) The Poetics and Politics of Polyphony: Towards a Research Method for Interactive Documentary. *Alphaville: Journal of Film and Screen Media*. (15), pp. 63–93.

Avram, H. (2016) *The Visual Regime of Augmented Reality Art: Space, Body, Technology, and the Real-Virtual Convergence*. PhD thesis, McGill University. Available from: https://escholarship.mcgill.ca/downloads/dr26z097w [Accessed 13 February 2022].

Azuma, R.T. (1997) A Survey of Augmented Reality. *Presence: Teleoperators and Virtual Environments*, 6 (4), pp. 355–385.

Azuma, R.T. (2019) The road to ubiquitous consumer augmented reality systems. *Hum Behav & Emerg Tech* [online]. 1 (1), pp. 26–32. [Accessed 13 February 2022].

Azuma, R., Baillot, Y., Behringer, R., Feiner, S., Julier, S. and MacIntyre, B. (2001) Recent advances in augmented reality. *IEEE Comput. Grap. Appl.* 21 (6), pp. 34–47.

Baker, M.B., Waugh, T. and Winton, E. (2010) Introduction: Forty Years Later… a Space for Challenge for Change/Société nouvelle. In Waugh, T., Baker, M.B., and Winton, E., eds. (2010) *Challenge for Change Activist Documentary at the National Film Board of Canada*. Montreal: McGill Queen University Press.

Bakhtin, M.M. (1986) *Speech Genres and Other Late Essays*. Translated from the Russian by Vern W. McGee. Emerson, C. and Holquist, M., (eds). Austin, TX: University of Texas Press.

Bajura, M., Fuchs, H. and Ohbuchi, R. (1992) Merging Virtual Objects with the Real World: Seeing Ultrasound Imagery within the Patient. *Proceedings of SIGGRAPH '92*. New York: ACM Press, pp. 203–210.

Balsamo, A. (1996) *Technologies of the Gendered Body: Reading Cyborg Women*. Durham, NC: Duke University Press.

Barlow, J.P. (1990) Being in Nothingness. Essay republished by Electronic Frontier Foundation. https://www.eff.org/pages/being-nothingness [Accessed 5 March 2018].

Barthes, R. (1977) The death of the author. In: *Image, music, text*. Translated from the French by Stephen Heath. London: HarperCollins UK. pp. 142–148.

Baudinette, T. (2019) Gay dating applications and the production/reinforcement of queer space in Tokyo. *Continuum*. 33 (1), pp. 93–104.

Benestad, E.E.P. (2010) From gender dysphoria to gender euphoria: An assisted journey. *Sexologies*. 19(4), pp. 225–231.

Benford, S. and Giannachi, G. (2011) *Performing mixed reality*. Cambridge, MA: MIT Press.

Bertrand, P., González Franco, D., Pointeau, A., and Cherene, C. (2014) The Machine to be Another - Embodied Telepresence using human performers. *TEI 2014*, Munich, Germany.

Bergner, D. (2019) The struggles of rejecting the gender binary. *The New York Times*. https://www.nytimes.com/2019/06/04/magazine/gender-nonbinary.html [Accessed 15 May 2020].

Bhabha, H. (1994) *The location of culture*. London: Routledge.

Bolter, J.D., Engberg, M. and MacIntyre, B. (2021) *Reality Media: Augmented and Virtual Reality*. Cambridge, MA: MIT Press.

Bolter, J.D. and Grusin, R. (1999) *Remediation: Understanding New Media*. Cambridge, MA: MIT Press.

Bordwell, D., Thompson, K. and Smith, J. (2016) *Film Art: An Introduction*. New York, NY: McGraw-Hill Education.

Branigan, E. (1992) *Narrative comprehension and film*. London: Psychology Press.

Bruce, C. (2015) *I'm Not Happy About My Appearance In Ch4's "Girls To Men" Trans Docuseries*. Available from: https://www.autostraddle.com/im-not-happy-that-ch4-included-me-in-their-girls-to-men-trans-docuseries-311683/ [Accessed 13 October 2018].

Butler, J. (1990) *Gender Trouble: Feminism and the Subversion of Identity*. London: Routledge.

Butler, J. (2015) *Notes toward a performative theory of assembly*. Cambridge, MA: Harvard University Press.

Candy, L. (2006) *Practice based research: A guide*. University of Technology, Sydney. CCS Report: 2006-V1.0 November. pp. 1–19.

Capuzza, J.C. (2014) Who Defines Gender Diversity? Sourcing Routines and Representation in Mainstream U.S. News Stories About Transgenderism. *International Journal of Transgenderism* [online]. 15 (3–4), pp. 115–128. [Accessed 13 February 2022].

Castells, M. (2010) *The Rise of the Network Society*. Chichester, West Sussex: Wiley-Blackwell.

Caudell, T.P. and Mizell, D.W. (1992) Augmented reality: an application of heads-up display technology to manual manufacturing processes. *Proceedings of the Twenty-Fifth Hawaii International Conference on System Sciences*. Vol 2. pp. 659-669.

Cavalcante, A. (2018) *Struggling for ordinary: Media and transgender belonging in everyday life*. New York: New York University Press.

Chawla, D. (2006) Subjectivity and the "Native" Ethnographer: Researcher Eligibility in an Ethnographic Study of Urban Indian Women in Hindu Arranged Marriages. *International Journal of Qualitative Methods* [online]. 5 (4), pp. 13–29. [Accessed 13 February 2022].

Christopher, R.J. (2005) *Robert and Frances Flaherty: a documentary life*. Montreal: McGill-Queen's Press.

Cipresso, P., Giglioli, I.A.C., Raya, M.A. and Riva, G. (2018) The Past, Present, and Future of Virtual and Augmented Reality Research: A Network and Cluster Analysis of the Literature. *Front. Psychol.* [online]. 9. [Accessed 13 February 2022].

Coffman, E. (2014) Spinning a collaborative web: documentary projects in the digital arena. In: Nash, K., Hight, C., and Summerhayes, C., eds. 2014) *New Documentary Ecologies: emerging platforms, practices and discourses*. London: Palgrave Macmillan.

Crogan, P. (2011) *Gameplay Mode: War, Simulation, and Technoculture*. Minneapolis, MN: University of Minnesota Press.

Dale, L.K. (2021) *Gender Euphoria*. London: Unbound Publishing.

Daniel, S., Aston, J. and Odorico, S. (2018) Polyphony in practice: an interview with Sharon Daniel. *Alphaville* [online]. (15), pp. 94–105. [Accessed 14 February 2022].

Davenport, G. (1988) Interactive multimedia on a single screen. *Current Applications of Videotechnology in Computer Graphics Systems*, National Computer Graphics Association Conference 1988 [online]. [Accessed 13 February 2022].

Davenport, G. (1996) Dexter and the evolving documentary. *MULTIMEDIA '96: Proceedings of the fourth ACM international conference on Multimedia* [online]. [Accessed 13 February 2022].

Davenport, G., Agamanolis, S., Barry, B., Bradley, B. and Brooks, K. (2000) Synergistic storyscapes and constructionist cinematic sharing. *IBM Syst. J.* [online]. 39 (3.4), pp. 456–469. [Accessed 23 February 2022].

Davies, C. (2005) *Landscapes of ephemeral embrace: a painter's exploration of immersive virtual space as a medium for transforming perception*. PhD Thesis, University of Plymouth. Available from: https://pearl.plymouth.ac.uk/handle/10026.1/353 [Accessed 13 February 2022].

DeWalt, K.M. and DeWalt, B.R. (2011) *Participant Observation: A Guide for Fieldworkers*. Plymouth: Rowman Altamira.

Dinkla, S. (1994) *The History of the Interface in Interactive Art*. International Symposium on Electronic Art (ISEA) [online]. Available from: https://www.kenfeingold.com/dinkla_history.html [Accessed 21 October 2021].

Dinkla, S. (1996) From Participation to Interaction: Toward the origins of interactive art. In: Hershman-Leeson, L., ed. (1996) *Clicking in: hot links to a digital culture*. Seattle: Bay Press.

Dixon, S. (2021) Hidden histories: giving presence to the past. In: Kampe, G. and Kampe, T., eds. 2021) *Beyond Forgetting: persecution/exile/memory*. Goettingen: Cuvillier Verlag. pp. 150–161.

Domesday86 (2022) Available from: https://www.domesday86.com [Accessed 11 July 2022].

Dovey, J. (2014) Documentary ecosystems: Collaboration and exploitation. In: Nash, K., Hight, C. and Summerhayes, C., eds. (2014) *New Documentary Ecologies: Emerging Platforms, Practices and Discourses*. London: Palgrave Macmillan.

Dovey, J. (2000) *Freakshow: First Person Media and Factual Television*. London: Pluto Press.

Drakopoulou, S. (2013) Pixels, bits and urban space: Observing the intersection of the space of information with actual physical space in augmented reality smartphone applications and peripheral vision displays. *First Monday*. 18(11).

Drobnick, J. (2005) Volatile effects: olfactory dimensions of art and architecture. In: Howes, D., ed. (2005) *Empire of the senses: the sensual culture reader*. Oxford: Bloomsbury.

Eagle, R. (Forthcoming) Multisensory ethnography through emplaced augmented reality. *AnthroVision*. 8(1).

Edirisinghe, C., Nakatsu, R., Cheok, A. and Widodo, J. (2011) *Exploring the Concept of Third Space within Networked Social Media* [online]. pp. 399–402. [Accessed 14 February 2022].

Ekins, R. and King, D. (2010) The emergence of new transgendering identities in the age of the Internet. In: Hines, S. and Sanger, T., eds. (2010) *Transgender Identities: Towards a Social Analysis of Gender Diversity*. New York: Routledge. pp. 25–42.

Engberg, M. and Bolter, J.D. (2014) Cultural expression in augmented and mixed reality. *Convergence* [online]. 20 (1), pp. 3–9. [Accessed 24 February 2022].

Engelbart, D.C. (1962) *Augmenting Human Intellect: A Conceptual Framework*. SRI Summary Report AFOSR-3223.

Entwistle, J. (2015) *The Fashioned Body: Fashion, Dress and Social Theory, 2nd Edition*. London: Polity.

Ewens, H.R. (2015) Trans participants call out Channel 4's 'Girls to Men' doc. *Dazed* [online]. Available from: https://www.dazeddigital.com/artsandculture/article/26994/1/trans-participants-call-out-channel-4s-girls-to-men-doc [Accessed 8 June 2018].

Facebook Reality Labs (2021) *Update: A Year Of Progress With Project Aria*. Available from: https://tech.fb.com/update-a-year-of-progress-with-project-aria/ [Accessed 23 November 2021].

Feiner, S., Macintyre, B. and Seligmann, D. (1993) Knowledge-based augmented reality. *Commun. ACM* [online]. 36 (7), pp. 53–62. [Accessed 3 March 2021].

Feiner, S., Macintyre, B., Höllerer, T. and Webster, A. (1997) A Touring Machine: Prototyping 3D Mobile Augmented Reality Systems for Exploring the Urban Environment. *Personal Technologies*. 1(4), pp. 208-217.

Flanagan, M. (2009) *Bakhtin and the Movies*. London: Palgrave Macmillan.

Foucault, M. (1986) Of Other Spaces. *Diacritics*. 16 (1), pp. 22–27.

Fuchs, H., Sutherland, I.E., Sproull, R.F., Seitz, C.L., Brooks, F.P. and Foster, H.Q. (2018) VR@50: celebrating Ivan Sutherland's 1968 head-mounted 3D display system. SIGGRAPH '18: ACM SIGGRAPH 2018 Panels [online]. [Accessed 2 March 2021].

Galloway, D., McAlpine, K.B. and Harris, P. (2007) From Michael Moore to JFK Reloaded: Towards a working model of interactive documentary. *Journal of Media Practice* [online]. 8 (3), pp. 325–339. [Accessed 23 February 2022].

Gaudenzi, S. (2013) *The Living Documentary: from representing reality to co-creating reality in digital interactive documentary*. PhD thesis, Goldsmiths, University of London. Available from: https://research.gold.ac.uk/id/eprint/7997/ [Accessed 12 March 2021].

Gaudenzi, S. (2017) User experience versus author experience: lessons learned from the UX Series. In: Aston, J., Gaudenzi, S. and Rose, M., eds. (2017) *I-Docs: The Evolving Practices of Interactive Documentary*. New York, Chichester, West Sussex: Wallflower, Columbia University Press.

Genette, G. (1997) *Paratexts: Thresholds of Interpretation*. Cambridge: Cambridge University Press.

Gerstein, R. (1986) *Interpreting the female voice: an application of art and media technology*. PhD thesis, MIT. Available from: https://mf.media.mit.edu/pubs/thesis/gersteinPHD.pdf [Accessed 23 February 2022].

Ghaziani, A. (2014) *There goes the gayborhood*. Princeton, NJ: Princeton University Press.

Gibson, J.J. (1966) *The senses considered as perceptual systems*. Westport, Conn: Praeger.

Gibson, J.J. (1979) The Theory of Affordances. In: *The Ecological Approach To Visual Perception*. Boston: Houghton Mifflin, pp. 127–137.

Ginsburg, F. D., (2002) Screen Memories: Resignifying the Traditional in Indigenous Media. In. Ginsburg, F. D., Abu-Lughod, L., and Larkin, B., eds (2002) *Media Worlds: Anthropology on New Terrain* (pp. 39–57). University of California Press.

Grau, O. (2003) *Virtual Art: From Illusion to Immersion*. Cambridge, MA: MIT Press.

Greenfield, A. (2017) *Radical Technologies: The Design of Everyday Life*. New York, NY: Verso.

Grierson, J. (1934) Propaganda: a problem for educational theory and for cinema. *Sight and Sound*. (Winter 1933-34), pp. 119–121.

Grierson, J. (1946) *Grierson on documentary*. Hardy, F., ed. Harcourt, Brace: New York.

Haimson, O.L., Dame-Griff, A., Capello, E. and Richter, Z. (2019) Tumblr was a trans technology: the meaning, importance, history, and future of trans technologies. *Feminist Media Studies* [online]. pp. 1–17. [Accessed 2 March 2021].

Halberstam, J. (2011) *The queer art of failure*. Durham, NC: Duke University Press.

Halberstam, J. (2018) *Trans*: A Quick and Quirky Account of Gender Variability*. Oakland, CA: University of California Press.

Hales, C. (2005) Cinematic interaction: From kinoautomat to cause and effect. *Digital Creativity* [online]. 16 (1), pp. 54–64. [Accessed 23 February 2022].

Harnois, C. (2008) Re-presenting feminisms: Past, present, and future. *NWSA Journal*. 20 (1).

Harris, B.J. (2019) *The History of the Future: Oculus, Facebook, and the Revolution That Swept Virtual Reality*. New York, NY: Dey Street Books.

Healey, K. and Stephens, N. (2017) Augmenting justice: Google glass, body cameras, and the politics of wearable technology. *JICES* [online]. 15 (4), pp. 370–384. [Accessed 23 February 2022].

Heath, T. (2018) Saving space: strategies of space reclamation at early women's film festivals and queer film festivals today. *Studies in European Cinema* [online]. 15 (1), pp. 41–54. [Accessed 2 March 2021].

Heemsbergen, L., Bowtell, G. and Vincent, J. (2021) Conceptualising Augmented Reality: From virtual divides to mediated dynamics. *Convergence* [online]. 27 (3), pp. 830–846. [Accessed 2 February 2022].

Heller, B. (2020) Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law. *Vanderbilt Law Review*. 23 (1). [Accessed 13 February 2022].

Hemment, D. (2006) Locative Arts. *Leonardo* [online]. 39 (4), pp. 348–355. [Accessed 14 February 2022].

Henley, P. (2009) *The Adventure of the Real: Jean Rouch and the Craft of Ethnographic Cinema*. Chicago: University of Chicago Press.

Henley, P. (2020) *Beyond Observation: A History of Authorship in Ethnographic Film*. Manchester: Manchester University Press.

Herdt, G.H. (ed.) (1996) *Third sex, third gender: Beyond sexual dimorphism in culture and history*. New York: Zone.

Hetherington, K. (1997) *The Badlands of Modernity: Heterotopia and Social Ordering*. London: Routledge.

Hines, S. (2020) *Sex wars and (trans) gender panics: Identity and body politics in contemporary UK feminism*. 68 (4), pp. 699–717. [Accessed 23 February 2022].

hooks, b. (1990) *Yearning: Race, Gender, and Cultural Politics*. London: Routledge.

Hughes, S.P. (2011) Anthropology and the Problem of Audience Reception. In: Banks, M. and Ruby, J., eds. (2011) *Made to be seen: Perspectives on the History of Visual Anthropology*. Chicago: University of Chicago Press.

Humphrey, R. (2016) "I think journalists sometimes forget that we're just people": Analysing the Effects of UK Trans Media Representation on Trans Audiences. *Gender Forum: An Internet Journal for Gender Studies*. (56).

Inbar, O. (2017) *ARKit And ARCore Will Not Usher Massive Adoption Of Mobile AR*. Available from: https://medium.com/super-ventures-blog/arkit-and-arcore-will-not-usher-massive-adoption-of-mobile-ar-da3d87f7e5ad [Accessed 10 September 2021].

Jenkins, H., Clinton, K., Purushotma, R., Robison, A.J. and Weigel, M. (2006) *Confronting the Challenges of Participatory Culture: Media Education of the 21st Century*. Chicago: The MacArthur Foundation.

Jenkinson, J. (2010) Unisex Fashion. In Eicher, J.B. and Tortora, P.G. ed. (2010) *Berg Encyclopedia of World Dress and Fashion: Global Perspectives* [online]. Oxford: Berg. [Accessed 21 September 2021].

Johnson, P. (2006) Unravelling Foucault's 'different spaces'. *History of the Human Sciences*. 19(4), pp. 75–90.

Jurgenson, N. (2012) When Atoms Meet Bits: Social Media, the Mobile Web and Augmented Revolution. *Future Internet* [online]. 4 (1), pp. 83–91. [Accessed 14 February 2022].

Jurgenson, N. (2019) *Social Photo: On Photography and Social Media*. London: Verso Books.

Kaprow, A. (2003) *Essays on the blurring of art and life*. Berkeley, CA: Univ of California Press.

Keegan, C. (2022) On the Necessity of Bad Trans Objects. *Film Quarterly*, 75 (3), pp. 26–37.

King, G. (2021) Towards a culture of care for ethical review: connections and frictions in institutional and individual practices of social research ethics. *Social & Cultural Geography* [online]. pp. 1–17. [Accessed 24 February 2022].

Kooper, R. and MacIntyre, B. (2003) Browsing the Real-World Wide Web: Maintaining Awareness of Virtual Information in an AR Information Space. *International Journal of Human-Computer Interaction* [online]. 16 (3), pp. 425–446. [Accessed 23 February 2022].

Kosari, M. and Amoori, A. (2018) Thirdspace: The Trialectics of the Real, Virtual and Blended Spaces. *Journal of Cyberspace Studies* [online]. 2 (2). [Accessed 24 February 2022].

Krueger, M.W. (1977) Responsive environments. *AFIPS '77: Proceedings of the June 13-16, 1977, National Computer Conference* [online]. [Accessed 23 February 2022].

Krueger, M.W. (1983) *Artificial Reality*. London: Addison-Wesley.

Krueger, M.W. (1991) Artificial Reality: Past and Future. In: Helsel, S.K. and Roth, J.P., eds. (1991) *Virtual Reality: theory, practice, and promise*. London: Meckler.

Krueger, M.W. (1993) The Artistic Origins of Virtual Reality. *Machine Culture*. pp. 148–9.

Landow, G.P. (1992) *Hypertext: The Convergence of Contemporary Critical Theory and Technology*. Baltimore, MD: Johns Hopkins University Press.

Lanier, J. (2017) *Dawn of the New Everything: A Journey Through Virtual Reality*. London: Bodley Head.

Latham, J.R. (2016) Trans men's sexual narrative-practices: Introducing STS to trans and sexuality studies. *Sexualities* [online]. 19 (3), pp. 347–368. [Accessed 24 February 2022].

Laurel, B. (1991) Virtual Reality Design: A Personal View. In: Helsel, S.K. and Roth, J.P., eds. (1991) *Virtual Reality: theory, practice, and promise*. London: Meckler.

Lees, P. (2017) Trans People Already Face A Hostile World. Now The Media Is Making It Worse. *The Guardian*. Available from: https://www.theguardian.com/global/commentisfree/2017/nov/17/trans-people-children-suicide-bullying-rightwing-media [Accessed 2 March 2021].

Lefebvre, H. (1991) *The production of space*. Oxford: Wiley-Blackwell.

Lester, C. (2017) *Trans Like Me: A Journey for All of Us*. London: Virago Press.

Liberati, N. (2018) Phenomenology, Pokémon Go, and Other Augmented Reality Games. *Hum Stud* [online]. 41 (2), pp. 211–232. [Accessed 2 March 2021].

Lippman, A. (1980) Movie-maps: An application of the optical videodisc to computer graphics. *SIGGRAPH Comput. Graph*. 14, 3 (July 1980), pp. 32–42.

Luckey, P. (2012) *Oculus "Rift": An open-source HMD for Kickstarter*. Available from: https://www.mtbs3d.com/phpbb/viewtopic.php?t=14777 [Accessed 10 February 2021].

Lyotard, J.-F. (1984) *The Postmodern Condition: A Report on Knowledge*. Manchester: Manchester University Press.

Macintyre, B., Bolter, J., Moreno, E. and Hannigan, B. (2001) Augmented Reality as a New Media Experience. In: *4th International Symposium on Augmented Reality (ISAR 2001), 29-30 October 2001, New York, NY, USA*. [Accessed 23 February 2022].

Manovich, L. (2001) *The Language Of New Media*. Cambridge, MA: MIT Press.

Manovich, L. (2006) The poetics of augmented space. *Visual Communication* [online]. 5 (2), pp. 219–240. [Accessed 23 February 2022].

McCormick, S. (1987) Ecodisc — an ecological visual simulation. *Journal of Biological Education*, 21(3), 175–180.

Milgram, P. and Kishino, F. (1994) A Taxonomy of Mixed Reality Visual Displays. *IEICE Transactions on Information Systems*. E77-D (12), pp. 1321–1329.

Miller, M.R., Herrera, F., Jun, H., Landay, J.A. and Bailenson, J.N. (2020) Personal identifiability of user tracking data during observation of 360-degree VR video. *Sci Rep* [online]. 10 (1). [Accessed 23 February 2022].

Miller, M.R., Jun, H., Herrera, F., Yu Villa, J., Welch, G. and Bailenson, J.N. (2019) Social interaction in augmented reality. *PLoS ONE* [online]. 14 (5). [Accessed 2 March 2021].

Moulthrop, S. (1997) Pushing Back: Living and Writing in Broken Space. *MFS Modern Fiction Studies* [online]. 43 (3), pp. 651–674. [Accessed 2 March 2021].

Mueller, F. 'Floyd', Byrne, R., Andres, J. and Patibanda, R. (2018) *Experiencing the Body as Play*. [Accessed 24 February 2022].

Muñoz, J.E. (2009) *Cruising Utopia*. New York: NYU Press.

Munro, K. (2017) Rethinking first-person testimony through a vitalist account of documentary participation. *Frames Cinema Journal.* (12), pp. 1–15. [Accessed 24 February 2021].

Murrani, S. (2016) Baghdad's thirdspace: Between liminality, anti-structures and territorial mappings. *Cultural Dynamics* [online]. 28 (2), pp. 189–210. [Accessed 24 June 2021].

Murray, J.H. (1997) *Hamlet on the holodeck*. New York: Simon and Schuster.

Murray, J.H. (2003) Inventing the medium. In Wardrip-Fruin, N. and Montfort, N., eds. (2003) *The New Media Reader*. Cambridge, Mass: MIT Press.

Murray, J.H. (2012) *Inventing the medium: principles of interaction design as a cultural practice*. Cambridge, Mass: MIT Press.

Nash, K. (2010) Exploring power and trust in documentary: A study of Tom Zubrycki's Molly and Mobarak. *Studies in Documentary Film* [online]. 4 (1), pp. 21–33. [Accessed 24 October 2021].

Nash, K. (2011) Beyond the frame: researching documentary ethics. *TEXT: Journal of Writing and Writing Programs.* 15 (1), pp. 1–13.

Nash, K. (2022) *Interactive Documentary: Theory and Debate*. London: Routledge.

Nelson, R. (2013) *Practice as Research in the Arts*. London: Springer.

Nelson, T.H. (1965) A file structure for the complex, the changing and the indeterminate. In: *ACM '65: proceedings of the 20th national conference*. 1965 New York: Association for Computing Machinery. pp. 84–100.

Nelson, T.H. (1982) *Literary machines*. Sausalito, CA: Mindful Press.

Nichols, B. (2001) Introduction to Documentary. Bloomington, IN: Indiana University Press.

Noll, A.M. (1972) Man-machine tactile communication. *SID Journal*. (July/August 1972).

Noll, A.M. (1994) The Beginnings of Computer Art in the United States: A Memoir. *Leonardo*. 27 (1), pp. 39.

Norman, D.A. (1988) *The psychology of everyday things (First edition)*. New York: Basic Books.

Norman, D.A. (1999) Affordance, conventions, and design. *Interactions* [online]. 6 (3), pp. 38–43. [Accessed 24 November 2021].

Norman, D.A. (2013) *The Design of Everyday Things*. Cambridge, MA: The MIT Press.

Oren, T. (1990) Designing a new medium. In: Laurel, B., ed. (1990) *The Art of Human-Computer Interface Design*. Boston, MA: Addison-Wesley Professional.

Peddie, J. (2017) *Augmented Reality: Where We Will All Live*. London: Springer.

Pesce, M. (2021) *Augmented Reality: Unboxing Tech's Next Big Thing*. Cambridge: Polity.

Pink, S. (2009) *Doing sensory ethnography*. London: SAGE Publications.

Polan, D. B. (1981). Roland Barthes and the Moving Image. *October*, *18*, pp. 41–46.

Raheja, M. (2007) Reading Nanook's Smile: Visual Sovereignty, Indigenous Revisions of Ethnography, and Atanarjuat (The Fast Runner). *American Quarterly*. 59 (4), pp. 1159–1185.

Rascaroli, L. (2013) A common European home? Filming the urban Thirdspace in Marc Isaacs's Lift (2001). *Studies in documentary film*. 7 (1), pp. 3–15.

Rich, B.R. (2013) *New Queer Cinema*. Durham, NC: Duke University Press.

Riggs, D.W., Colton, C., Due, C. and Bartholomaeus, C. (2016) Mundane transphobia in Celebrity Big Brother UK. *Gender Forum: An Internet Journal for Gender Studies*. (56).

Rose, B. (1969) *Claes Oldenburg*. New York: Museum of Modern Art.

Rose, G. (1993) *Feminism and geography*. Cambridge: Polity.

Rose, M. (2014) Making publics: Documentary as do-it-with-others citizenship. In: Ratto, M. and Boler, M., eds. (2014) *DIY Citizenship: Critical Making and Social Media*. Cambridge, MA: MIT Press.

Rose, M. (2018a) Technologies of seeing and technologies of corporeality: Currents in nonfiction virtual reality. *World Records*. 1 pp. 1–11. [Accessed 23 February 2022].

Rose, M. (2018b) The immersive turn: hype and hope in the emergence of virtual reality as a nonfiction platform. *Studies in Documentary Film* [online]. 12 (2), pp. 132–149. [Accessed 2 March 2021].

Rouch, J. (1978) On the Vicissitudes of the Self: The Possessed Dancer, the Magician, the Sorcerer, the Filmmaker, and the Ethnographer. *Studies in Visual Communication*. 5 (1), pp. 2-8.

Rouch, J. (1995) The camera and man. In: Hockings, P., ed. (1995) *Principles of visual anthropology*. Berlin: Walter de Gruyter.

Rouch, J. (2003) *Ciné-ethnography*. Feld, S., ed. (2003) Minneapolis, MN: University of Minnesota Press.

Rubin, H.S. (1998) *Phenomenology as Method in Trans Studies*. 4 (2), pp. 263–281.

Ryan, J. (2017) Grimes' Fairy Tales: A 1960s Story Generator. *10th International Conference on Interactive Digital Storytelling* [online]. pp. 89–103. [Accessed 23 February 2022].

Ryan, M.-L. (2014) Story/Worlds/Media: Tuning the Instruments of a Media- Conscious Narratology. In: Ryan, M-L. and Thon, J-N., eds. (2014) *Storyworlds across media*. Lincoln: University of Nebraska Press.

Sabbah, F. (1985) The New Media. In: Castells, M., ed. (1985) *High Technology, Space and Society*. Beverly Hills, CA: Sage Publications. pp. 210–224.

Salomoni, P., Prandi, C., Roccetti, M., Casanova, L. and Marchetti, L. (2016) *Assessing the efficacy of a diegetic game interface with Oculus Rift*. [Accessed 14 February 2022].

Sasnett, R.M. (1986) *Reconfigurable Video*. MSc, MIT. Available from: https://dspace.mit.edu/bitstream/handle/1721.1/15100/15805825-MIT.pdf. [Accessed 13 February 2022].

Scott-Stevenson, J. (2020) Virtual Futures: A Manifesto for Immersive Experiences. In: Morie, J.F. and McCallum, K., eds. (2020) *Handbook of Research on the Global Impacts and Roles of Immersive Media*. Hershey, PA: Information Science Reference.

Slater, M., Lotto, B., Arnold, M.M. and Sanchez-Vives, M.V. (2009) How we experience immersive virtual environments: The concept of presence and its measurement. *Anuario de Psicología*. 40 (2), pp. 193–210.

Soja, E.W. (1996) *Thirdspace: Journeys to Los Angeles and Other Real-and-imagined Places*. Cambridge, MA: Wiley-Blackwell.

Steffen, J.H., Gaskin, J.E., Meservy, T.O., Jenkins, J.L. and Wolman, I. (2019) Framework of Affordances for Virtual Reality and Augmented Reality. *Journal of Management Information Systems*. 36 (3), pp. 683–729.

Steinmetz, K. (2014) *The Transgender Tipping Point*. Available from: https://time.com/135480/transgender-tipping-point/ [Accessed 21 January 2018].

Stephano, O. (2019) Irreducibility and (Trans) Sexual Difference. *Hypatia*. 34 (1), pp. 141–154.

Stryker, S. (2017) *Transgender History (Second Edition): The Roots of Today's Revolution*. New York, NY: Seal Press.

Suh, A. and Prophet, J. (2018) The state of immersive technology research: A literature analysis. *Computers in Human Behavior*. 86 pp. 77–90.

Sutherland, A. (2015) *Staged Empathy: Empathy and Visual Perception in Virtual Reality Systems*. Cambridge, Mass: MIT.

Sutherland, I.E. (1963) Sketchpad: A man-machine graphical communication system. *Proceedings of the AFIPS Spring Joint Computer Conference*, Detroit, Michigan, May 21-23, 1963, pp. 329-346.

Sutherland, I.E. (1965) The Ultimate Display. *Proceedings of the IFIP Congress*. pp. 506–508.

Sutherland, I.E. (1968) *A head-mounted three dimensional display*. In: 1968 Association for Computing Machinery.

Tortum, D. (2014) *Interview With Oscar Raby*. Available from: https://docubase.mit.edu/lab/interviews/oscar-raby-interview/ [Accessed 3 March 2021].

Turkle, S. (1995) *Life on the Screen*. New York, NY: Simon & Schuster.

Uricchio, W. (2011) The algorithmic turn: photosynth, augmented reality and the changing implications of the image. *Visual Studies*. 26 (1), pp. 25–35.

Uricchio, W. (2012) A Palimpsest of Place and Past. *Performance Research*. 17 (3), pp. 45–49.

Uricchio, W. (2019) Augmenting Reality: The Markers, Memories, and Meanings Behind Today's AR. *Leonardo Electronic Almanac*. 22 (4).

Vincent, B. (2020) *Non-Binary Genders: Navigating Communities, Identities, and Healthcare*. Bristol: Policy Press.

Watkins, S. (2019) *Gender And Genre: Students, Researchers, And The OED | Oxford English Dictionary*. Available from: https://public.oed.com/blog/gender-and-genre-students-researchers-and-the-oed/# [Accessed 2 March 2021].

Weizenbaum, J. (1966) ELIZA—a computer program for the study of natural language communication between man and machine. *Commun. ACM*. 9 (1), pp. 36–45.

Wiehl, A. (2017) Documentary as co-creative practice: From Challenge for Change to Highrise – Kat Cizek in conversation with Mandy Rose. In: Aston, J., Gaudenzi, S. and Rose, M., eds. (2017) *I-Docs: The Evolving Practices of Interactive Documentary*. New York, Chichester, West Sussex: Wallflower, Columbia University Press.

Wilchins, R.A. (1995) *In Your Face: Political Activism Against Gender Oppression*. 1.

Wilchins, R.A. (2002) Introduction. In: Wilchins, R.A., Howell, C. and Nestle, J., eds. (2002) *Genderqueer - Voices from Beyond the Sexual Binary*. New York, NY: Alyson Books.

Winston, B. (1988) The tradition of the victim in Griersonian documentary. In: Rosenthal, A., ed. (1988). *New challenges for documentary*. Berkeley, CA: University of California Press. pp. 269–287.

Winston, B. (1995) *Claiming the Real: The Documentary Film Revisited*. London: British Film Institute.

Winston, B. (2000) *Lies, Damn Lies and Documentaries*. London: British Film Institute.

Wu, J. (2021) From Researcher to Human Being: Fieldwork as Moral Laboratories. *Anthropology & Education Quarterly*. 52 (1), pp. 106–115.

XR Safety Initiative (XRSI) (2020) *The XRSI Privacy Framework*. Available from: https://xrsi.org/publication/the-xrsi-privacy-framework [Accessed 23 January 2022].

Young, E. (2019) *They/Them/Their: A Guide to Nonbinary and Genderqueer Identities*. London: Jessica Kingsley Publishers.

Zuboff, S. (2019) *The Age of Surveillance Capitalism*. London: Profile Books.

Appendix I: Transcripts

These are the transcripts for all the audio content of *Through the Wardrobe*. There are four voices: Rex, Jamie, Micah and Sammy.

The audio files can be listened to here on Soundcloud:
https://soundcloud.com/rob-eagle-documentary/sets/through-the-wardrobe-audio-version/s-WL4TvKFqgHW?si=280dc5102c6b475a9baed6d4162cd4ac

---

Rex (who refers to themself in *Through the Wardrobe* by their former name, 'Bec')

Intro
My name's Bec. I'm 46. I guess genderqueer fits quite well because cis doesn't totally describe the picture for me. I'm a technician. I've just finished a design MA.

It's funny – when I look at my wardrobe, I've hardly got any items of clothing in there that would be seen as traditionally female clothing. So I've always been a bit out of place in clothes shops, kind of like, well which bit do I go into? Ok, I can go into that bit, but all those clothes are going to be an awful lot bigger and broad on the shoulders or whatever.

1.
I've always been drawn to check shirts. In a strange way, they sort of convey some kind of capability or something. Maybe it's the kind of cliché of the lumberjack or something, but they're kind of like – it's like a shirt that sort of, you're like ready for action. Being out in the mountains and that sort of thing, which I guess the sort of lumberjack vibe goes with.

I think boots have been an important one for me since I was about – well, at least about 16, sort of feeling a sense of being planted in the world with boots. As a teenager in the 1980s, I can't help but noticing some of my choices of clothes were almost kind of forms of defence or whatever – a kind of arse-kicking pair of boots.

Because at school, you had to be able to stand up for yourself. I guess there's that kind of extra layer of armour or whatever to what you're wearing.

2.
I remember not having any style as a kid and that being potentially kind of an issue. One outfit I wore to school for a while was a kilt, some kind of jumper and a bodywarmer – and not really thinking that was strange and then getting feedback from other people that that my style was kind of odd.

I had two brothers, so I would always want to wear stuff that would allow me to climb trees and run around and do stuff and I found skirts pretty limiting generally. Kilts have always been all right. They're sort of somehow cross-gender.

I can remember around the age of 12, my mum buying a load of girls' clothes for me and it being the most awful thing in a kind of pastel yellow and off-the-shoulder and shorts and things and it was just this quite dehumanising experience.

I remember wearing them to go along with it and just not knowing until that point just how uncomfortable that made me. So I feel like if somebody had said to that kid: it's all right. You'll be able to choose. I think, yeah, I'd be a happier 12-year-old.

3.

There's this whole meadow that around the middle of the summer becomes a meadowsweet meadow. So you just have these high, beautiful creamy coloured flowers. And meadowsweet is one of the places they first found salicylic acid, which is the basis for aspirin. So meadowsweet is really great for headaches and hangovers and all that sort of stuff.

The brilliant things about herbs is that the more they're neglected, the more potent the medicine is. Yeah, I can get behind that. If you fertilise herbs, they're potentially not going to have as good medicine as if they have to fight through a crack and do their thing.

I started becoming more interested in herbs and how you could use them. I guess it's kind of a really empowering way to look after yourself. I can go outside. I can find some herbs growing wild. I can make them into a tincture or a tea or a balm or whatever and I can look after myself.

I don't need to go and buy medicines from whatever pharmaceutical company. I own my own ability to heal myself in many respects.

4.
I split up with my partner a couple years ago and just wanted to get out of the city for a little bit and went and lived out at Stanton Drew for a year. And most nights I would go for a nighttime walk, sometimes end up at the stone circle or walk out into the countryside. It's not that well known, but it's huge, and it's quite a special place.

There's a flat one that you can lie on and it's just a very comfortable place to be. I would just sit and just start to feel quite grounded and relaxed in the world. And sometimes I'd meditate on there or just sunbathe and enjoy the view.

It would seem very different every time I went there. So sometimes the stones would seem huge and sometimes they would seem small. But if it does have some effect on your mood or energy, then it's kind of a reciprocal relationship.

5.
I use my body in so many physical ways in the world generally: climbing, riding a motorbike, all that sort of stuff. It's all pretty physical and then your body is doing different things for you in the world. It's not just sitting at a desk.

I think climbing did make a big difference to how I felt in the world. But I think also in the last year or so, doing strength training gives you a very very different sense of your body.

Where, say, in the past, if you put on a bit of weight, you might think 'Oh, I've put on a bit of weight. I'm noticing things are a bit tighter.' If you're doing strength training, you're kind of like HMMM, that means I'm going to get STRONGER.

Update:
Bec is now Rex. They now have short hair but still wear check shirts.

Jamie

Intro
My name is Jamie. I'm 25 years old. How I identify has changed quite a lot in the last four years – very much outside of the binary.

I wear chipped nail polish pretty much all of the time. I guess my normal presentation would be trousers, t-shirts and bad makeup.

1.
Growing up in an all-boys school, I think I've always known that I was not male. I knew what a trans woman was and that narrative, and it just didn't feel right for me. And it wasn't until I did reading around non-binary identities that that's where I knew I fit.

My identity – as much as I feel very much outside of the binary, I feel more comfortable in clothes which happen to be assigned to what people assume I am – maybe apart from the fact that I wear chipped nail polish pretty much all the time. I guess my normal presentation would be trousers, t-shirt and bad makeup.

I definitely had dysphoric thoughts. I still do, mainly because it's taken me so long to understand that in-between is a valid conclusion, that I don't have to wear a skirt to be non-binary.

2.
My cousins dressed me and my brother up as the Spice Girls, and I was Baby Spice because I was the youngest. I couldn't have been older than about 4 or 5. My dad turned around to my mum and was like: 'If he turns out to be a fucking queer, it's all your family's fault.' Which I now find really funny… because I'm a fucking queer.

I remember always being very jealous because we spent Christmas with my cousins a lot. And my youngest cousin would always ask for lip gloss, and we'd always go and get her one for Christmas – me and my brother because we did joint presents. And I was always like: I want one. But I can't have one.

3.
I've always liked men with long hair, not necessarily in a sexual way, though that can be cute. But I've always thought it's really pretty. And I was like, well, I want to know what I look like with that. So I grew it out.

I enjoyed having long hair. I think I was relating a lot of my identity to having longer hair. I was thinking that, like: oh, I look more femme now. This is great. I'm more comfortable in how people were reading me as more androgynous. And it felt really good. But then I was having such a weird hang-up about it, and it didn't feel right. June this year – I shaved it.

The moment he cut it all off, that was the best feeling I've ever had, the feeling of it all being gone. And looking in the mirror and feeling like that's still the same person, that's still – taking away the hair, and having more of a boy cut hasn't taken it away in any form. Which is like such an affirming feeling for me.

And now I'm just kind of growing it out a bit. And I've gone purple and pink because I can. I do really like the pink.

4.
When I was 16, I did a lot of self-portraiture. All of my stuff was about identity and about explorations of stereotypes. A lot of photo manipulation, a lot of layering and a lot of obstruction of the image. My art teacher got really upset that I didn't apply to go do fine art. And I wish I had. But I didn't. So, no regrets, right?

I recently did something which was exploring gender identity, which felt nice. It felt like the first piece of work which I have actually created since I feel like I came out as non-binary to myself about

4 years ago. And I felt like this is the first piece of artwork which I've created about that subject. And felt proud of it. It was a long time coming.

I wanted this project to be so stripped back and be as raw to how I felt. I'd made a conscious effort to, apart from making them black & white, have no editing at all. As lame as it sounds, it felt like my art style had grown with me.

5.
I don't like ironed shirts and I don't like perfect nails. I had somebody tell me on Sunday morning when they were really drunk, being like: you really need to sort out your nails. She was just like, it's disgusting. If you're going to do this thing – implying not presenting as male – you need to do it right.

And I was like, no, I don't! I just don't. And I feel like chipped nail polish is a really easy way to be like, yes, you're interpreting that this is female. But you're interpreting it as this boxed idea of what a female should be.

Update:
Jamie is still breaking the rules of gender-conformity. They perform as the drag king BooHoo Mann. By performing the masculinity they are assumed to have (as a person who was assigned male at birth), they have come to feel even more secure in their nonbinary identity.

Micah

Intro
I'm Micah. I'm 23 years old, living in Bristol for about 3 years now. Came here to fulfil my dream of becoming a sailor, which is so far going well. Also working on local Bristol harbour on the ferries, which is probably the best job I ever had.

I am agender and asexual. Assigning gender roles to pieces of fabric is just so stupid and so pointless. Every single piece of clothing I have is agender as I am. So if I go one day dressed in skirts and tights and heels, and I'm addressed as 'her', and the other day I dress up in my classic combat boots and camo pants and some big shirt and dressed up as 'him', it's like, eh, well, whatever.

I'm not going to bother explaining. But you know that deep down that that's not how I am and these clothes that I'm wearing – I'm wearing them because I like them.

1.
One thing that always has a place in whatever I wear is combat boots. I think that's one of very very few items of clothing that are actually viewed as neither of the binary genders. So, I definitely wear combat boots everywhere, not only because they are functional, and they can take you far away. And your feet don't hurt like they would in sneakers. And I walk a lot.

I feel ready to go and smash the world, smash the system, smash the government, smash anything I need, any obstacle that I can have in the world, and I can walk, I can because I've got steel-toe caps. Definitely something that might be tangled also back into my teenage years because I had to be taking care of myself since like 15.

So I feel like I kinda have to be ready all the time. So wearing combat boots – not only can it be really fashionable and really pretty and really empowering, but it's also definitely given me the feeling that I can go through the everyday shit. And there's a lot of it. And the worst things that can happen, I can always get ready and defend myself, you know?

2.

In Czech, everything is gendered. Every single thing–life or death, stone or cat–has a gender. If I probably never moved to the UK, I would never find the word agender for myself as it is. It's something that is possible in this language but not in my first language.

I think I was still in Czech, I would end up being the classic depressed teenager forever. And I can't really imagine what it would be like there now.

And I'm really scared to go back and talk with my friends in Czech because there's no way for me not to out myself as one or the other gender, you know, within the binary. And that's nothing like me. I'm non-binary. And if I want to say something – I don't know. I don't even want to think about it.

Finally I understand who I am, and I know it for myself. I don't have the need to prove it to anyone else around me. I generally don't care about people or what they think about me. I know my truth.

3.

As a kid, I didn't really have much freedom in expressing how I wanted to be. My mum always wanted me to be the long-haired blond princess of the family in a pristine, pretty dress. And that was never me, so I kinda went with that image for a few years.

In my puberty, I went completely against and went the completely opposite direction and tried to steal all my brother's clothes, which was me crying out to delete what was read about me as a girl.

Pretty powerful – like really encouraging, empowering and definitely an amazing amount of happiness on the inside which was inherently crushed straightaway by not-agreeing parents and laughing kids or siblings at me, but you still go for it anyway because you've got so much power in you that, yes, this is who I am and you can't shut me down, which still prevails to this day.

4.

If I do get gender dysphoria, it's usually something to do with my "woman bits", or so they would say. So, yeah, my tits are small, but sometimes they are too big. And you know you wish that you could just rip them away and throw them in the bin.

So I usually go with really baggy shirts and really big hoodies, which literally hides away my fucking hourglass shape that I hate. So even now I'm not aware of it if I just have a glance of myself in the mirror. I can't see a single curve.

If I do get dysphoric in the lower bits, I either go – if I do have time for it, put a strap-on on and just walk around and it feels a little bit less intense. Like, maybe that's why I walk around with camo pants all the time because it makes a bulge on me and I just go through it.

You walk out of the house completely ready, dressed in a way that five minutes later turns out to be, oh my God, I want to kill myself. I can't walk down the street and just hating every minute of it. And then, another time, you end up so dysphoric, hiding everything and walking down the street, and a minute later you're like, oh, this is completely unnecessary. You're just like – God knows what it depends on. But it's not nice.

5.

Unfortunately, as an agender person, it's really difficult to find clothes that people view as neither. It's still so binary and everybody's got it deep down in them that there's literally nothing I could wear.

I could go dressed up in a bin bag if I wanted to express agender. But anything else I wear, I will always get something assigned straightaway, according to how I dress. So I gave up on the idea of being able to express my identity through clothing. So I know my identity, but my expression is very fluid.

I always used to overthink how I'm dressing. And only now when I'm not thinking about it at all, just put whatever – yeah this feels okay. This feels great. Oh my God I love this stuff, and just put it somehow together naturally in a way. It's a game for me. So yeah that's actually great, like woohoo. Fuck you, world.

Update:
Micah moved back the Czech Republic after they were made redundant from their job in the pandemic in 2020. They have found a bit more, in their words, 'self-love and self-acceptance' since recording this interview. They are now 'more peaceful, satisfied and happy'.

Sammy

Intro
I'm Sam. Depending on the context, I prefer they/them pronouns. I'm an artist.

I have clothes that reshape my body or de-shape my body. Both of those things. When I put them on and I'm like – I don't have a male body anymore. Cool! This is great!

1.
How would I describe my style? To begin with, I went really crazy with the makeup. I was pretty into big, heavy, very colourful eye shadow; colourful, unusual lipsticks. It's a second teenagehood. And it took me a while to find some kind of balance there. It took me a while to actually hone in on the fact that my facial hair was a big issue for me.

And I think that kind of encouraged me to go further out – like that I was working against it with the makeup. And then clothing again is also finding clothing that actually suited my body, things that I felt genuinely comfortable in in terms of clothes to wear every day.

I've learnt about small accessories to kind of un-male myself, which are like my bow, or like, earrings, or blusher. Blusher is kind of the main makeup that I use now. It sort of takes the emphasis away from my 5 o'clock shadow, but it's quite a simple way to kind of accentuate your cheeks, which gives them a kind of femininity. Maybe.

2.
I get myself ready and I feel good. And then I go to a bar with some friends, and there comes a point when I need to use the toilet. And at that point, it's like, shit. Now I feel dysphoric.

I was out with a good friend on Friday night. So that moment came when she was like 'Oh, I'm going to go to the toilet.' And I was like, 'Ah, yeah, going to the toilet. I might do that later.' And she was like, 'Fuck that. Come with me.' Pulled me into the women's toilets and was avowedly like, 'This is as much your space as it's mine.' Because she's been with me in many instances when I've been kicked out of toilets. Of both sexes.

I don't relate to the notion that I was born in the wrong body because I don't have some consistent story throughout my life where I'm like, just experiencing constant, 100% gender dysphoria from the moment that I was born to the moment that I am now. It ebbs and flows.

I think that I wasn't a gender until I was like a teenage boy and I feel like I started to undergo quite intense male socialisation so tried really hard to fit into that box. For sure, I experienced gender dysphoria. And like, I don't feel like a man.

3.
I came out to my mum last year. I think we were looking through some photos. She was like, 'It's really funny. It was actually always your brother that really played with gender a lot more. He would wear the dresses and was really into makeup', and I was like, huh, that's funny, isn't it?

And then we were going through some photos a couple of weeks ago because my dad died. We had this moment where we were like, trying to find some happy memories in there somewhere. And I noticed the stories changing because we started to come across these photos of me also being really into dress-up – photos of me in heels and dresses and just being a lot more free with my body.

And I noticed the story started to change because she's seeing me differently now. It's just kind of interesting how she's recalling this stuff that was hidden before. There was this one version of this notion of who I was, and then she saw a different person in front of her, and she was like, oh, there's a different story there that I'd been hiding and hadn't been telling about this person one – like, the story's a lot more complicated.

4.
The earth is not a closed entity. It is in fact receiving information all the time, like radiation or whatever, like stuff coming in through the atmosphere. Millions of stuff comes through the atmosphere every day.

As humans or as animals in general, we're like, a lot less closed as organisms than we maybe we imagine ourselves to be, that stuff's coming in to us from psychic realms or whatever, like we're influencing each other. Trees are influencing us. Like, I don't know. This sort of thing.

So, I'm drawing aliens. I was drawing alien spaceships that had noses on them that had colds that were kind of like these big carriers for the common cold going through the universe.

I think there's something in there to do with trans identities that I haven't quite worked out. Perhaps it like a hope, a hope for – for the body. Cuz I'm not trying to get from one gender to another. I'm definitely trying to get away from one gender. But, like, it's not as precise as that I'm trying to then just hotfoot it into another. So maybe there's something I find quite hopeful about drawing aliens with noses giving us colds that we're… evolving. Hopefully.

5.
Dancing is specifically the time when I feel – I feel a deep relaxed exuberance. There's just immediate joy to it. I feel a real lightness. I love to flail my limbs around the place. So there's a real freeness to it for me.

So I do it on my own. There's a kind of meditativeness to that when I'm at home on my own.

But there's also something about being in a club and letting go in a space with people. That's when I then need my queer family around me. Being with good friends who also love dancing, there's then a kind of even more special kind of thing. It's the exact opposite of checking yourself. You're egging each other on. It's like, oh, you're doing that? Well, I'm gonna to this! There's something that's super special about a dance off.

Update:
Since recording this interview in 2019, Sammy now uses she/her pronouns. She's still an artist.

Appendix II: Through the Wardrobe documentation

Public-facing website: http://throughthewardrobe.net

End of Gender? (proof-of-concept)
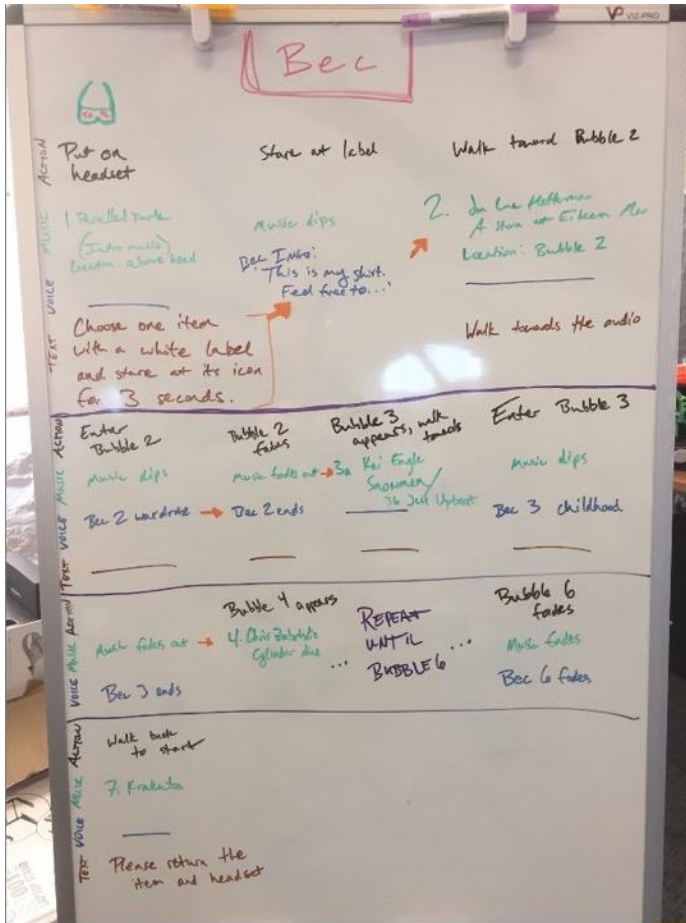## October–November 2018
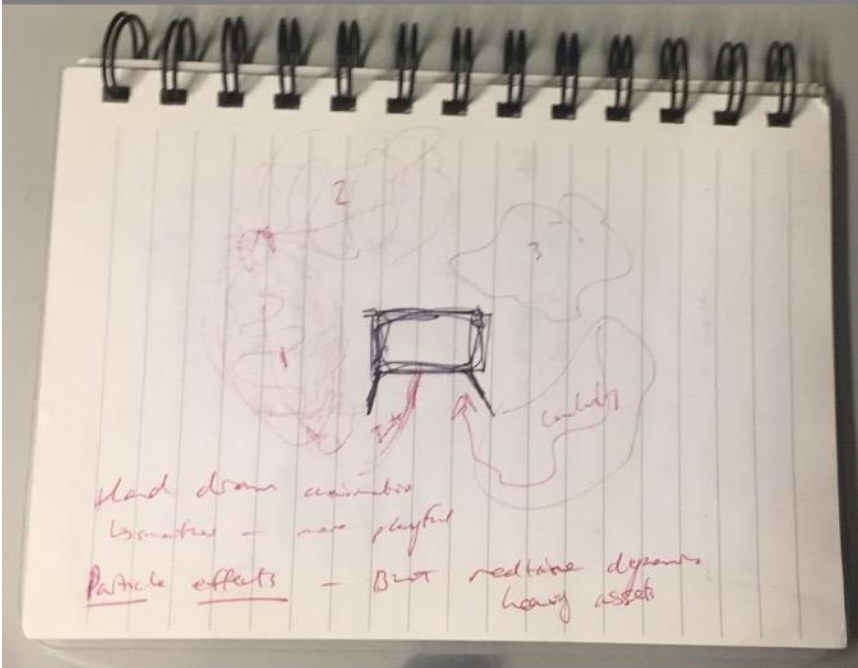
First sketches for virtual wardrobe (black)
with story chapters spawning in the
environment (red) – October 2018



Development process: Unity and
HoloLens – November 2018

Story - how do I still make it fun and playful? Sense of discovery, wonder, dressing up…
and how can that be branching or nodal? How do I make my audience WANT to learn
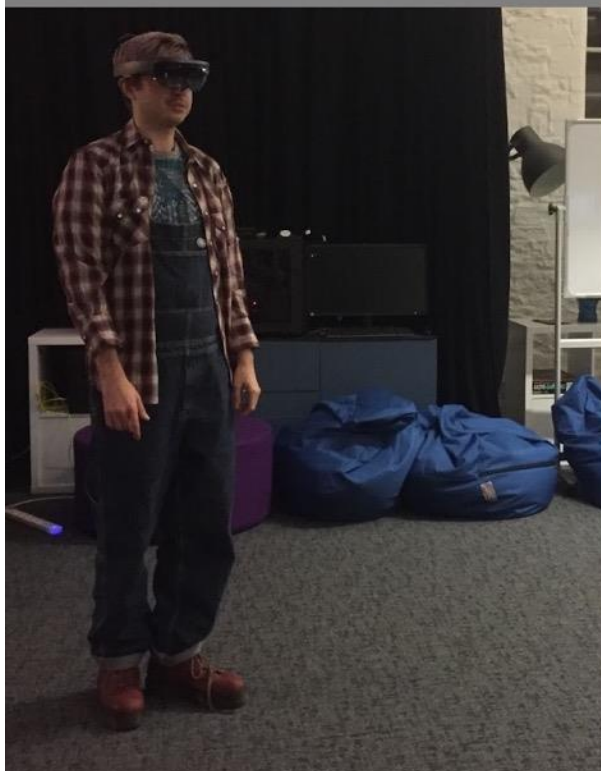more and follow more?

Practice diary entry – October 2018 – reflection on format of story in the HoloLens

Story board for Bec, separated into
'Action', 'Music', 'Voice' and 'Text' –
October 2018
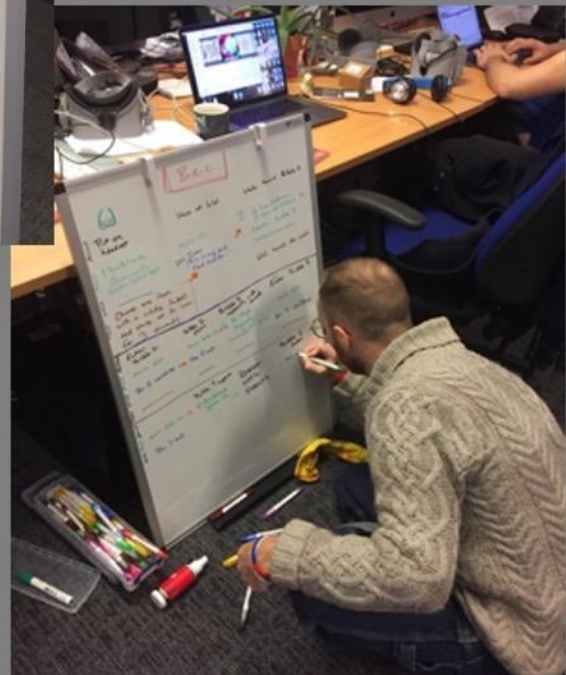
Me mapping out flow for Bec's
story, like a story board for my
developer to follow – October
2018

Jamie user-testing Bec's story – November 2018

'End of Gender?' was staged in a meeting room in the Watershed in Bristol, 17-18 November, 2018. I created an event on Facebook, promoted it through Twitter and the listing was featured on the Watershed website and in-venue screens. Over the two days, we had about 60 visitors with about 25 of them able to try the experience in the headset. Most people came through the event on Facebook, which had been shared amongst local networks. Additionally, about five people came because they were already in the venue and saw the signage so decided to drop in out of curiosity. Others came via word of mouth or were 'dragged along by friends', as it seemed an interesting 'social' thing to do at the weekend.

Suddenly, the quiet, peaceful installation I had envisioned became a bustling social space of friends trying on clothes and talking with each other. I was surprised. I would need to rethink my design to allow for a space for groups to congregate whilst allowing one person in the headset at a time to enjoy the peaceful solitude I had intended. This was the first of many aspects I would have to rethink and redesign after observing visitors and immersants and collecting their feedback.

Some reactions included:
- 'I love the use of the VR. I think that's a lovely way to draw people in' [to the subject matter]
- 'It's an immersive experience. It's immersing you in questions.'
- 'It resonated quite deeply with things I've long suspected about my own journey and myself but never really gave myself space to think about it until very recently. I feel that this is a very freeing and very joyful experience and an opportunity to learn and a meditation on what gender is.'
- 'You created a mini-safe space where people can question things and hear stories of people.'
- 'I wish I had had an experience like this when I was a teenager. It would have helped my process of coming out.'
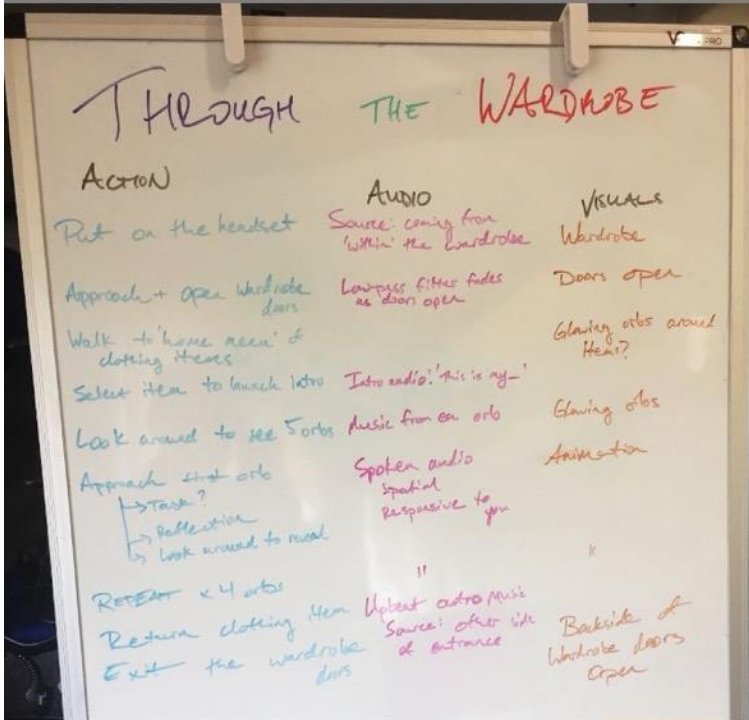
Installation views, 'End of Gender?' – November 2018

Sheffield Doc/Fest

April–June 2019

In Spring 2019 *Through the Wardrobe* received R&D funding from CreativeXR, an immersive prototype accelerator scheme from Digital Catapult and Arts Council. This allowed me to take the piece to Sheffield Doc/Fest, where it was nominated for the Digital Storytelling Award.

Rethinking structure of the narrative flow, new story board divided into ACTION, AUDIO and VISUALS – April 2019
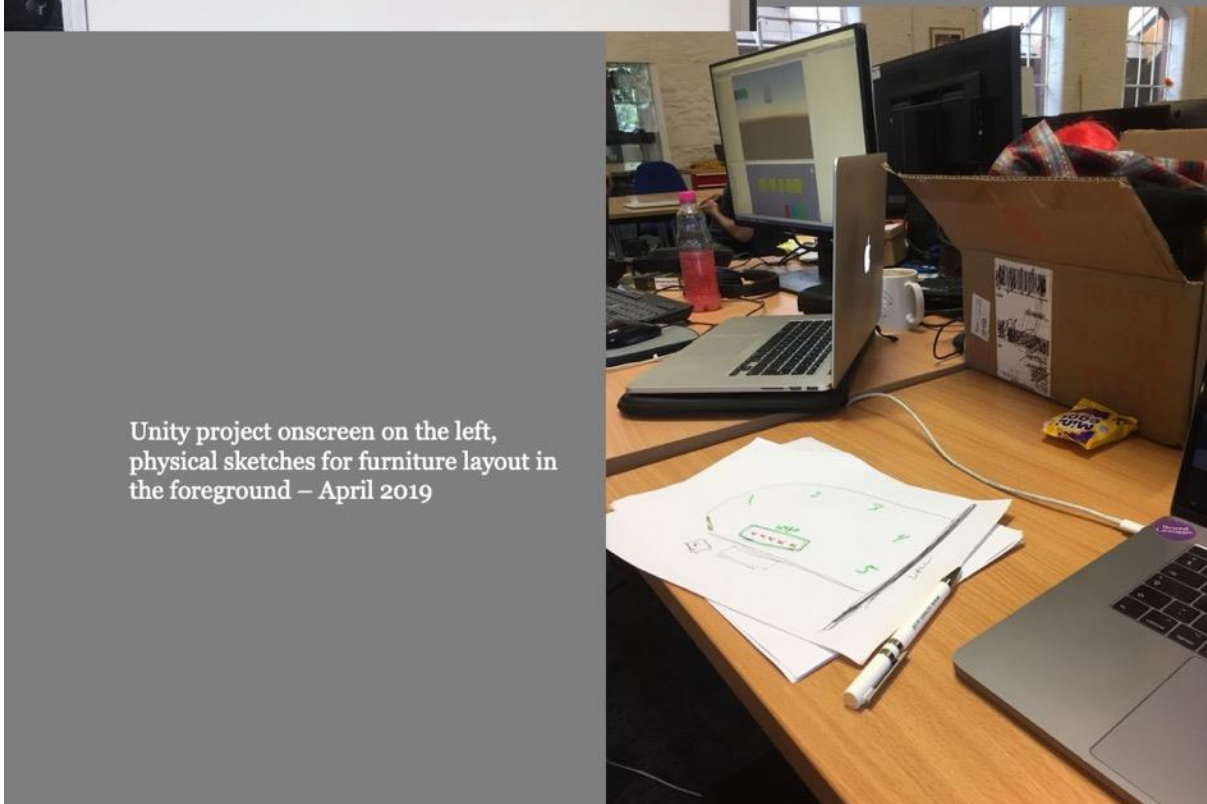
Unity project onscreen on the left, physical sketches for furniture layout in the foreground – April 2019

User-testing space in the Bristol VR Lab, May 2019

Installation views, Sheffield Doc/Fest – June 2019
Photo credit: James Clarkson

Installation views, Sheffield Doc/Fest – June 2019
Photo credit: James Clarkson

Home MCR, Manchester
November 2019

Through the Wardrobe was invited to join group exhibitions, funded by Arts Council England, for eight days at HOME MCR in Manchester (9–17 November 2019)

Installation views, HOME MCR
November 2019

International Documentary Festival Amsterdam (IDFA)
November 2019

Th*rough the Wardrobe* was selected for IDFA and was nominated for the Immersive Storytelling Award. The piece was given a prominent display in the middle of the bustling Centraal Station, where thousands of people passed by it and hundreds were able to experience it.

Shop front from the arcade

Installing lights

Installation view, IDFA– November 2019

Barbican Centre, London
January 2020

In the cinema foyer of the Barbican Centre in London (January 2020).
There were further invitations to exhibit internationally, including festivals in Kyiv and
Melbourne, but the Covid-19 pandemic prevented us from doing so.

Transforming Barbican Centre cinema
foyer for *Through the Wardrobe*

Installation view, Barbican Centre – January 2020
Photo credit: Suzanne Zhang/Barbican Centre

Goethe-Institut China, Beijing
November 2020

The piece was translated into Mandarin for a local audience and exhibited for a week at Goethe-Institut China in Beijing. The curators said it was the first time the HoloLens had been used for a public exhibition.

Installation views, Goethe-Institut China – November 2020

Photo credit: Goethe-Institut China

Installation views, Goethe-Institut China
November 2020

Photo credit: Goethe-Institut China

Appendix III: Research outputs and impact 2017–2022

A contribution to immersive and interactive documentary practice and theory

Through the Wardrobe can be experienced on its own and does not need the text of this thesis to be understood. The practice demonstrates the theory and the four years of research in such a way that complements the written output.

Through the Wardrobe constitutes an original contribution to the practice and application of immersive and interactive documentary, recognised by gallery and festival curators who programmed it, fellow practitioners who have experienced it and journalists who have covered it in the press. The work brings together the craft of documentary storytelling within an emerging media format. Both the content and methods in production offer a contribution to the discourse of interactive documentary, especially the use of headset AR.

Through the Wardrobe has been recognised as a contribution to the field of immersive and interactive art and documentary. I was able to take the work from proof-of-concept ('End of Gender?', November 2018) to prototype (CreativeXR 2019) to touring installation, invited for international exhibitions. According to the curators at the Goethe-Institut in Beijing, it is the first experience using a HoloLens to be exhibited in China. I delivered a video introduction for the exhibition opening, and excerpts were featured on English-language Chinese state TV news channel CGTN.

I have sought to share and discuss my research findings amongst academic and industry audiences. I have presented my research findings at eight academic conferences since 2018 and have written one peer-reviewed article with more planned (Eagle, forthcoming). And through a handful of artist's talks, festival Q&As and public engagement events, I have articulated the theory, research methods and practice to non-academic audiences.

Exhibitions of *Through the Wardrobe*

Being Human Festival of the Humanities, 'End of Gender?' (proof-of-concept), Bristol – November 2018

Sheffield Doc/Fest 2019, Alternate Realities exhibition (premiere) – June 2019

HOME MCR, Manchester – November 2019
https://homemcr.org/exhibition/alternate-realities-tour-2019/

International Documentary Festival Amsterdam – November 2019
https://www.idfa.nl/en/film/0e0d7085-e285-4a2a-bff3-b2f5eddbb186/through-the-wardrobe

Global Human Rights Film Festival, London – December 2019

Barbican Centre, London – January 2020
https://www.barbican.org.uk/whats-on/2020/event/through-the-wardrobe

Goethe-Institut China, Beijing – November 2020

Peer-reviewed article

Eagle, R. (Forthcoming) Multisensory ethnography through emplaced augmented reality. *AnthroVision*. 8(1). Available from: https://journals.openedition.org/anthrovision

Academic presentations

'Augmented reality as a Thirdspace: Simultaneous experience of the physical and virtual', paper, IMG Learning Conference, Milan. November 2021.
http://www.img-network.it/conference-2021

'Immersive shared anthropology: possibilities and limitations', paper, Royal Anthropological Institute Film Festival conference, online. March 2021. https://festival.raifilm.org.uk/film/p12b-immersive-ethnography

'Augmented reality headsets for emplaced storytelling', poster presentation, BEYOND Conference, UKRI, online. December 2020.
https://beyondconference.org/posters/rob-eagle

'Dancing with Sam: using augmented reality for embodied storytelling', paper, Crafting the Future of the Visual Essay symposium, University of Antwerp and VANEASA (Visual Anthropology Network, European Association of Social Anthropologists). September 2019.

'Building genderqueer bodies through play in mixed reality', paper, PLAY/PAUSE symposium, University of Birmingham. May 2019. https://playpauseuob.wordpress.com/2019/04/16/symposium-schedule-immersiondissonance

'Audience as Collaborator', paper, Royal Anthropological Institute Film Festival conference, Bristol. March 2019.
https://raifilm.org.uk/programme-2019/panel-07-from-the-field-to-the-screen-part-ii

'Emplaced Interaction from Audio Installation to Extended Reality', paper, Creative Image symposium 2018, University of Manchester. September 2018.
http://www.visualresearchnetwork.co.uk/conferencepresentations.html

'Virtually genderqueer', poster presentation, i-Docs 2018, Bristol. March 2018.
https://idocs2018.dcrc.org.uk/sessions/immerse-yourself-a-showcase

Press coverage

At Sheffield Doc/Fest, it was the top pick of the Alternate Realities programme in the exhibition review in *VR Focus*, an online industry website. The installation in Amsterdam attracted recognition from international industry-leading press, including *Variety Magazine*, an extended interview with me on the *Voices of VR* podcast and inclusion in the 'Top 35 XR Installations of 2019' in *Forbes Magazine*.

Vada Magazine – November 2018
https://vadamagazine.com/listings/events/being-human-a-festival-of-humanities

GMW3 (formerly *VR Focus*) – June 2019
https://www.gmw3.com/2019/06/highlights-from-sheffields-alternate-realities-exhibition-2019/

Variety Magazine – November 2019
https://variety.com/2019/film/global/idfa-doclab-1203418695/

The Voices of VR podcast – December 2019
One of leading podcasts for those in the immersive media industry, featuring immersive artists, storytellers, and technologists: https://voicesofvr.com/852-doclab-using-ar-to-explore-gender-identity-at-a-pop-up-clothes-store-with-rob-eagles-through-the-wardrobe/

Forbes Magazine – February 2020
https://www.forbes.com/sites/jessedamiani/2020/02/19/the-top-35-xr-installations-of-2019/

China's English-language state TV, CGTN – November 2020
https://news.cgtn.com/news/2020-11-26/Goethe-Institut-holds-XR-exhibition-exploring-themes-of-identity-VJI1uZ49zO/index.html

Public and artist talks
UK House at SXSW (Austin, Texas), 'Meet the Researchers' talk – March 2021

'Making Through Failing', Pervasive Media Studio lunchtime talk – February 2021
https://www.youtube.com/watch?v=edZn3xhSpkM

Artists' talk, Barbican Centre, London – January 2020
https://www.barbican.org.uk/whats-on/2020/event/alternate-realities-members-talk

Industry presentation, VRSW: BBC's Digital Cities Cardiff 2019 – April 2019
https://creativecardiff.org.uk/vrsw-4

Panel discussion on practice, Sheffield Doc/Fest Alternate Realities Summit – June 2019

Artist's talk, HOME MCR, Manchester – November 2019
https://cog-home.ams3.digitaloceanspaces.com/app/uploads/2019/10/FINAL-Alternate-Realities-at-HOME.pdf