

QUEERING AND ENTANGLING OUR DANCING DIGITAL BODIES

A PAPER BY HARRY SILVERLOCK

IN PARTNERSHIP WITH BRISTOL AND BATH CREATIVE R&D

WELCOME

In the age of Covid, we can define the undefined and create new physical and emotional languages whilst understanding and fighting back against hegemonic ideologies that are beginning to define our digital culture. This paper is an outcome of The Expanded Performance Fellowship as part of Bristol & Bath Creative R&D. As a New Talent Fellow in this programme, I have collated a series of conversations with the industry and collected immersent experience audience data to explore dance related XR experiences in relation to movement capture techniques such as motion tracking and volumetric capture. By connecting themes and anecdotes from the contributors' practice and research, this paper hopes to act as a baseline guide for dance and movement XR creators seeking to explore a volumetric and data tracking practice. This paper highlights XR creator's duty of care and our need to understand and acknowledge our collective responsibilities for both audience and artist in creating shared live experiences. I hope that this paper prompts an understanding of the political undertones that technology-based culture inevitably provokes in our relationship with each other in digital spaces and how the architecture and infrastructure of these digital spaces dictate our decision-making and emotional experiences. By interweaving ideas around process in motion tracking techniques such as volumetric capture and motion sensor

tracking capture there is an intention to not only think about our dance artistry as an outcome but our art as a process. The consumption of our XR works is a contentious issue in that there have been multiple approaches to reaching wider audiences, but shooter games and toxic-masculine content still drives the XR market. This paper contextualises our relationship with dance XR in a queer framework as I prompt an understanding of the needs of queer audiences in digital spaces i.e. the need for safe spaces and self-identity.

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I am a producer working across a range of physical and digital mediums including installations, virtual / augmented reality and film. I trained as an impact producer in documentary filmmaking which has paved a way for my belief in changing the world through the power of queer culture. I produce Bristol's LGBTQ film festival and have opened an XR immersive strand to further tell LGBTQ stories in new ways. My creative projects have developed pathways for me in a producer capacity with a focus on queer identity politics and to better understand the use of new technologies to create immersive experiences beyond the affordances of film. Amongst the backdrop of the pandemic, Black Lives Matter protests in Bristol and my own queer housing project, I created *Gimme One*, a virtual reality LGBTQ documentary telling the story of safe spaces in Bristol's voguing dance community. I have used *Gimme One* as a baseline for this paper to begin to understand the conversations that are not taking place.

BRISTOL+BATH CREATIVE R+D: THE EXPANDED PERFORMANCE FELLOWSHIP

This paper was made in collaboration with Bristol+Bath Creative R+D as part of their Expanded Performance Fellowship in which I am a new talent fellow. Bristol+Bath Creative R+D is a new, £6.8 million collaboration that aims to raise the bar for the region's creative industries. The five-year programme seeks to forge connections and partnerships in Bristol and Bath, sharing knowledge, creating crossovers and even greater opportunities in what's already one of the most vibrant clusters in the UK. This first-of-a-kind collaboration between the region's four universities - UWE Bristol, Bath Spa, the University of Bath and the University of Bristol - and digital creativity centre Watershed, intends to break down the doors, connecting the worlds of university research and creative business to develop a shared vision for tomorrow's creative industries. Innovations in technology are changing every part of the performance landscape - from how shows are made and marketed to how they are captured and distributed. VR, AR, motion capture, 5G, spatialized audio and virtual worlds are just some of the technologies changing *where* a performance can take place, *who* the audience is, and *how* it is experienced. As part of the Expanded Performance fellowship, we are interested in the concept of liveness and togetherness in the context of these changes in technology. The Expanded Performance cohort connects the expertise and research facilities across the programme partners, exploring audience behaviour, intelligent visual technology (e.g. motion tracking), embodiment, immersion, narrative, storytelling, the promotion of emerging technologies, and commissioning world-leading performance. The fellowship has consisted of digital

meetups, project surgeries and a creative support network in a time of uncertainty for the arts and cultural industries. I, alongside seven other fellows have been meeting bi-weekly as part of our Zoom workshops, exchanging information, support networks and pathways of research out of which came this paper.

QUEERING OUR DIGITAL DANCING BODIES: AN INTRODUCTION AND SURVIVAL GUIDE

The overarching question that interweaves this paper is **How can digital techniques such as motion and volumetric capture in dance XR encourage self-identity and provide safe passage to LGBTQ immersents in live social VR spaces?** Throughout the Covid 19 pandemic, shifting patterns of consumption has significantly changed how both industry and audiences are thinking about performance and technology. As new immersents begin to logon to communication platforms to cry, laugh and reminisce with their loved ones, performance artists have been experimenting and creating new physical, emotional and digital languages that will certainly have a legacy in the post-pandemic world. To ensure the survival, safety and introduction of a wider spectrum of XR audiences, we need to begin to erode the patriarchal and hegemonic powers that have been placed in our digital spaces such as in the data tracking nature of capitalist platforms such as Zoom, or the erosion of self-identity and safeguarding in our social media platforms which will begin to define our digital identities in social VR spaces. Social VR spaces have seen a swift uptake in new immersents engaging with digital spaces and as these spaces become VR stages, where we stream our performances and culture into the metaverse, we must begin

to ask ourselves, how is the architecture and infrastructure being built for these spaces and who is the intended audiences? How can we ensure our self-identity is preserved and we do not feel the heteronormative smite of silicon valley's bro-culture infiltrating and dictating the very cultural spaces that will define our next generation's cultural consumption? To contextualise these questions and for the sake of this paper and my research, I have focused primarily on the medium of dance in XR and how avatars and 3D digital characters are used to self-represent the dance artists and/or audience with a focus on LGBTQ culture and audience engagement. To answer my overarching question, I have been deliberating the needs of the queer community in physical spaces and understanding how these needs can translate into digital spaces. For example, the agency to select an Avatar when entering a social VR space is instrumental in allowing the freedom for some members of the LGBTQ community to feel that they belong in the space. As an XR dance creator, how do we want our audiences to enter our digital spaces? We of course would like them to feel comfortable and belonging to a space and this duty of care to our audience can be translated from theatre hospitality culture, but the most noticeable difference is that the very physics and nature of the digital spaces that our audiences are entering are adjustable which is an opportunity as well as a threat. As part of this onboarding, I have been asking what are the barriers in reaching and engaging LGBTQ communities with XR works and wider technological innovations? We must begin to understand the immersents journey and how ideas such as presence and agency are integral to keeping the immersent engaged in the work that we do in XR, which in turn can be translated from

languages used in dance practices. As part of this paper, I wanted to mention that although there are multiple crossovers, the culture of digital character creation generally splits into two cultures. One culture is volumetric capture in XR works which encapsulates a more traditional filmmaking culture translated into 3D. The second culture is motion tracking capture and modelling of avatars as the other way of self-identifying in 3D spaces. These two techniques result in our own representations and likeness in social VR spaces as they are unequivocally different themes and conversations that often interweave each other, but out of these themes are emerging two cultures of representation.

METHODOLOGY

To answer my questions and to engage a wider discussion with the industry, the methodology I have chosen is to reach out to producers, creators, dance artists, choreographers, XR studios, inclusion producers and XR researchers and record my conversations in a podcast format found online at www.harrysilverlock.com. I chose this process as my intention was to create conversations in the industry that were not being asked. This podcast format was also compatible with the pandemic landscape and with remote recordings being the only viable option, my living room became my studio. Alongside these interviews I have been touring *Gimme One*, an LGBTQ dance XR project that I have created which was touring across the festival circuit at the time of writing this paper. My intention was to follow a dance XR piece on tour and gather on the ground audience data, however this data is somewhat limited due to the conditions the data was collected in. There will also be further research developed from this paper in that there is an Arts Council

England funded project in which I am creating workshops with three LGBTQ dance artists and a creative technologist where we are uncovering conversations and creating themes of interest. The result of these workshops will be a volumetric LGBTQ dance manifesto and volumetric prototypes which will accompany this research.

AUDIENCE DATA COLLECTION

The British Council supported a trip to Dok Leipzig to attend a physical XR exhibition where the work *Gimme One* was being exhibited as part of the Dok Neuland programme. This enabled a data collection process from the Dok Leipzig audience using feedback forms. Ana Levordashka, Research Associate at Bath Spa University, is researching audience experience in immersive technologies and worked with me to devise a survey that captured not just demographics but the emotional responses and UX journey regarding the use of volumetric and motion capture. The audiences were asked what kind of dance / LGBTQ XR works they would be inclined to engage further in, ideas regarding presence and more general's questions such as the uptake and accessibility of VR headsets. The intention was to investigate ways to connect performers and audience through new creative technology as well as to find barriers to LGBTQ audience engagement.

INDUSTRY INTERVIEWS

The qualitative information in this paper was collected during a global pandemic in which the intended approach and research methodology needed to be adapted to a Covid-safe environment. To gather insights, a series of interviews have taken place in a podcast format recorded online and unreliable internet connection aside, this has been an intimate journey of discovery in which personal, industry and academic insights have been collected. These conversations have been at times anecdotally, which has spurred spontaneous outcomes in moments of digital connections. The conversations have been organic, and this paper has connected and collated the crossovers in themes discussed by the different practitioners.

GIMME ONE: A CASE STUDY

Gimme One, a VR documentary project I produced with the support from Arts Council England and The University of the West of England, Bristol VR Lab and We The Curious. *Gimme One* is a 360 virtual reality experience showcasing five UK ballroom artists as they explore ideas around cultural appropriation, empowerment and safe space. Their self-expression is seen through dance using digital volumetric and motion capture techniques, visualising the unique voices of this vibrant subculture. The project premiered at BFI London Film Festival 2020 followed by its German premiere at Dok Leipzig as part of the Dok Neuland programme in October 2020. The British Council awarded a grant for the team to attend the festival where they collected audience sample data. The intention of using *Gimme One* as a case study in this paper is to shed light on different methodologies that can be used to measure volumetric and data tracking

technologies engagement with audiences as well as add to the current data and research into underrepresented audiences in XR. As part of our audience survey we were hoping to answer the questions: What are the barriers, in regard to the LGBTQ community, in accessing XR? Can we define the LGBTQ community as an underrepresented audience? Can we define the dance community as an underrepresented audience? Are these communities interested in XR stories? What are the emotional responses to the volumetric and motion capture techniques used? Do experiences with these techniques perpetuate feelings of being present? The dataset was small at 42 immersents, whom are entirely an exclusive festival audience; in this way the data is skewed and should not be considered representative of a wider general audience, but the results could show inclinations to wider statistical reports. From the dataset we asked how often do you experience XR? We found that 40% indicated that they never experience XR as opposed to sometimes and regularly. I note that this was a significant amount to be viewing XR work, possibly indicating the festival audience and the platform these events provide. Of those 40% we found that 35% identified their sexuality as LGBTQ, whilst 57% identified their gender as female; these statistics indicate that there is an audience that are skewed to the LGBTQ male demographic that are interested and open to viewing XR but are underrepresented. Of those that are of female identifying gender and LGBTQ sexuality, we asked if they had access to a VR headset; only 20% of our dataset answered that they did have access to a VR headset. Of those that did not have access; 46% were female and 17% were LGBTQ; a significant figure; indicating that although there is an interest in XR storytelling, but that

accessibility to VR headsets remains the largest barrier. We were interested in emotional and mood state responses to the volumetric and motion capture. We understand that the use of these techniques were inside the affordances and limitations of the way's stories can be experience within XR i.e. *Gimme One* is a 360 3DOF experience that only uses these techniques for visual effects. However, we hoped that some of the emotional responses explored in this paper will unveil themselves. We used 'Evaluating Immersive User Experience and Audience Impact' A report produced by Nesta and i2 Media Research for Digital Catapult as a guide. We found that positive engagement mood states such as interested, enthusiastic and excited indicated value and engagement in *Gimme One*, whilst there are little to no negative mood states indicated. We found that there was a lean towards those that agree that they lost track of time indicating to a feeling of presence; the data pool is too small and the questions too broad but the intention in further research would be to measure a sense of presence with photorealistic capture in relation to volumetric and motion tracking avatar rigging. However, 'the relationships between presence and emotion are complex, and others have found no significant differences between indicators of immersion.' (Lessiter, Mitchell, Ferrari, Borden,)

WHAT IS SOCIAL VR AND SOCIAL VR STAGES?

Social VR (or as I like to call it: Collective Digital

Audience Networks): *'Social Virtual Reality is a web-based social interaction paradigm, mediated by immersive technologies and taking place in predesigned three-dimensional virtual worlds where individuals, represented by an avatar, may engage in real-time interpersonal conversation and shared activities'* (Dzardanova E, Kasapakis V, Gavalas D, 2018)

Social VR Stage: *A social VR stage is a stage is a digital space in social VR where there is a cultural performance occurring. These stages can take place in certain rooms, on lookalike stages or digital theatre spaces. A social VR stage is where the context of the room is a performance and the audience are live and present in real-time with the ability to interact. Interestingly, I don't think that the performance has to necessarily be live but rather give the illusion or 'feeling of liveness'. (Amarasuriya, 2020)*

TOGETHERNESS: COLLECTIVE DIGITAL AUDIENCE NETWORKS OR SOCIAL VR

The Expanded Performance Fellowship has the themes of togetherness and liveness. In my industry conversation, questions arose that have motivated an understanding of how to contemplate formats and techniques for including audiences into an XR experience. How do we connect with each other in XR? Is a feeling of being connected enough for there to be a sense of togetherness? How do we begin to construct and build collective networks for digital audiences? How will our audiences present themselves in digital spaces in relation to their environment? Nick Fellingham talks about

the 'feeling of connectivity' in that 'VR has an ability to make you feel that you are connected, even if the representation is just an avatar'. Understanding the limits of being collectively present in XR will influence the ways in which we can build audience representations. However, we must remember our responsibility to give audiences agency over their bodies and interactions. Finding ways to connect audiences remotely will become more streamlined in the post-pandemic world. As mass user uptake of headsets had been disappointing, it is unlikely for every home to have their own VR headset anytime soon. However, Tessa Ratuszynska, immersive PhD researcher and Expanded Performance fellow, does state 'the international lockdown and Covid crisis may be causing further uptake of VR use in the home' and recent reports indicate a %350 uptake during the pandemic. We should also not overlook look more DIY and accessible solutions such as our mobile phones. 'There are potentially two billion AR users in the world right now (through phones)' and it is important not to underestimate the network available through a smartphone (Eagle, 2020). Companies such as Condense Reality are seeking ways to live stream AR content directly to our smartphones and this technology is being increasingly used across multiple industries. Keiken Collective are exploring the idea of the Metaverse in which they intend to create an infinite network through worldbuilding; this network is built by audiences to become the universe in which they tell and allow audiences to experience and interact with their stories. In summary, there are a plethora of different methods to connect audiences together to bring them into the same world or space, each within their own context, limitations, affordances and emerging culture. In this paper I attempt to

answer some of these questions within the context of social VR spaces.

OUR APPROACH + INTENTIONS

How do we acknowledge and process intentions in relation to our social VR spaces and the stories and cultures taking place in these spaces? In conversation with Gayatri Parameswaran, a XR creator from a journalistic background, we focussed on an idea of approach and intentions in response to using volumetric capture in our stories. If we are to access new audiences, we must question what the audience needs are and how they respond to our intentions. Gayatri approaches her projects ‘through a journalistic lens’ enabling her practice to contemplate social impact goals and work processes around co-creation with her collaborators (Parameswaran, 2020). Gayatri’s intentions of using volumetric capture in her work *Kusunda* was to create a sense of intimacy with her subjects which in turn is intended to empower the community she has worked with to enrich their own local culture. ‘Even if you have great intentions, you may put something out of balance which you end up acknowledging’. We must remember that unintended consequences will likely occur and that we must remain responsible for these consequences. Forecasting unintended consequences means looking beyond our industry and taking an anthropological approach to how systems and infrastructures can be modelled and used by immersents. Michelle Cortese, Facebook Reality Labs researcher says ‘it is our job, (those) who work at the helm of creative technology to get ahead of the problems’. The actions we take now define our social and cultural use of digital spaces and there must be an acute awareness of the repercussions

of installed infrastructures that reflect oppressive ideologies IRL. We must begin to forecast the outcome of our intentions, whether it is the safety of our immersents during our performances or the data that we collect from the bodies that we work with. Through these conversations with Gayatri and Michelle, I found myself to be more distrusting Big Tech's intentions than ever and have come to a self-realisation that it will be up to the DIY communities to ensure our own safety and security in social VR spaces and that we cannot allow our culture to be commandeered.

How can we be inclusive of our audiences and partners in relation to creating and developing our ideas? Our process is as important as the result. Understanding your intentions and shared responsibilities will saturate into your process. Gayatri Parameswaran has been adopting cocreational methodology and she advises to 'design your workflow around a community rather than impose your way' and in this way 'you lend your voice, they share their stories'. Creative technologist and cultural practitioners working alongside each other need to understand ways to not only provide accessible language in their creative process but also to build spaces and relationships with our collaborators and audience. Jan Lee, somatic dance practitioner, says 'whether it's the performance or the creative process, there must be spaces where people feel where they can trust each other...and this will bring richer collaboration' Understanding your audience will also impact the way you create your work and co-creating with audiences will allow them access to your work, which is of particular importance as accessibility to XR experiences remains low. Understanding and thinking about the platform or types of creative technology at an early

stage will help to reach and access wider underrepresented audiences. Thinking about Jan's and Gayatri's approach to co-creating and developing ideas together with your partners, story subjects and audiences is vital for XR to not repeat the mistakes of theatre and film in that stories are often made about communities and not for them or by them.

MY MARMITE RELATIONSHIP TO TECHNOLOGY

When I bring up technology as my area of interest, I am often snubbed in the LGBTQ community, I believe that I can attune this sneering of technology because the technology industries are a placeholder as a capitalist ideology system created for and sustained by heteronormative patriarchal power structures that rely on technological addiction and technology-based solutions to global problems such as poverty and the climate crisis. Big Tech have undermined our very democracy and allowed patriarchal and neo-liberal and far right values to seep into our digital spaces and infrastructures. My response to the allegations is that if we do not start engaging with and taking ownership of our digital space, our future digital selves and identity will be owned by and used as capital without our permission and without legislation in place to protect our digital self-identity and experiences. As a silver lining, Big Tech's recent actions have taught us to question the intention of corporations and in turn questions our own intentions as creators. So, the question, I am asking myself is **why are we using creative technology in our work?** Somatic dance artist, Jan Lee, mentions that 'people have limits and to be clear about what the function is' of creative technology within dance. When we introduce creative technology into our practice, we must question what the intention might be, as the use of creative

technology can push audiences past their comfort levels and this can damage our work and audience relationships. In response to her work as co-founder of XR studio NowHere Media, Gayatri Parameswaran makes the inspiring statement that we should 'let the technology work the story and let the story take the front seat' (Parameswaran,2020). Technology is to be used as a tool and a facilitator rather than a solution for our creative and social issues. How responsible can we be for unintended consequences when the intentions were short-sighted? My answer is ultimately responsible.

'Technology needs to be clear about how it is helping us to survive' – Jan Lee, Dance Artist

SHARING OUR RESPONSIBILITIES

Throughout these conversations with the industry, there emerged various key questions and statements regarding our audience's immersive experience journeys and our responsibilities for our audiences and digital culture as creators. Anca Salagean, PHD Researcher, mentions that 'the rules that govern these (social VR) platforms are not very well established at the moment'. We must begin to think about our etiquette, safeguarding, code of conduct, data management and obligations. With these we should begin to create not just individual responsibilities but collective responsibilities as there is an obligation on our part as creators and an unsaid expectation from our audiences. Below are two different categories of responsibilities in relation to audience responsibilities and our cultural responsibilities as creators.

CULTURAL RESPONSIBILITIES

- Ensuring awareness of ownership of our movements and experiences in social VR spaces: 'Everyone should own their own data, whether it's your biometric or semi biometric data' (Cortese, 2020)
- Unintended Consequences and using anthropology to guide our processes: 'we can always look at human nature to forecast problems' (Cortese, 2020)
- Co-creating with our partners: 'We must make sure that the cultural property of our contributors remains with them' (Parameswaran, 2020)
- Reaching underrepresented audiences outside of the gallery and festival: 'We need to rethink radical distribution models in how we share our work' (Eagle, 2020)
- The collective vs the individual experience: 'Technology often takes us away from our bodies and isolates us' (Lee, 2020)
- Avoiding novel technology as the lead: 'We let the technology work the story and let the story take the front seat' (Parameswaran, 2020)

OUR AUDIENCE RESPONSIBILITIES

- Ensuring awareness of ownership: 'Everyone should own their own data, whether it's your biometric or semi biometric data' (Cortese, 2020)
- 'We have an obligation to make online spaces safe to those that are currently excluding which is everyone except straight white men' (Ratuszynska, 2020)
- Thinking of non-normative bodies and unique needs of our audiences will affect how we integrate different infrastructures and models, :

- ‘How do we design these digital spaces with a different user in mind’ (Ratuszynska, 2020)
- Making audiences aware that they are identifiable not recorded without full consent: ‘Your motion capture data is uniquely identifiable as you; what happens to this data?’ - (Salagean, 2020)
- Acknowledging our safeguarding responsibilities: ‘We should give the user time and space to acclimatise to an experience’ (Lynch, 2020) • Thinking about the physical accessibility in tech: ‘The HoloLens was the most accessible (two years ago) for different body types and head shapes’ (Eagle, 2020)
- Understanding and forecasting the psychological impact: ‘Memories: the things you experience in VR can leave you with real memories’ (Salagean, 2020)

‘Take it outside of the gallery space and festival audiences’ – Rob Eagle, XR Creator

CODE OF CONDUCT AND SAFE SPACES IN SOCIAL VR

As we begin to build avatars, capture volumetric bodies and invite audiences into digital spaces to interact with us, in whatever form this may take, we must ensure the welfare and safety of those entering and creating in our spaces. This goes without saying for our physical theatre spaces, so why should it be any different for digital spaces? This is poignant for underrepresented groups who will be relying on XR creators to design, define and shape our future digital worlds for them and their accessibility and inclusive needs. Tessa Ratuszynska, immersive PhD researcher and Expanded Performance fellow says that we must start to think about ‘our responsibility to make these online spaces, safe spaces

(for those) that have been excluded IRL' (Ratuszynska,2020). The embodiment of avatars in digital spaces provides a sense of freedom and exploration, as Keiken Collective frames it: 'the ethics of avatar culture can be emancipatory as users access safe and new spaces' (Keiken Collective, 2020). This is particularly relevant to gender politics as Tessa signposts to Sherie Turkle's idea 'that inhabiting a certain character allows you to realise something about your own gender performance', a theory known as gender swapping which I mention later in this paper (Ratuszynska,2020. **How are code of conducts created as soon as we enter a space?** One answer is through interactions and the feelings of a sense of presence as the space changes due to our being there. For example, Tessa Ratuszynska brings up the example of watching a pre-recorded 360 film in which she is sat around a table with men talking about sport in which, if she was present in that situation IRL, the conversation would not have happened in the same way. Tessa says, 'your presence affects the spaces that you go into ... and the way that you interact with a space can affirm cultural notions in a space' (Ratuszynska,2020). Does the space have a purpose to it? Is it a queer space? Or a space for discussing gardening tips? Michelle Cortese, Facebook Reality Labs Researcher says that 'when you have a space gathered around a purpose, there is a culture to that space' (Cortese,2020). How audiences access the space that has their same shared intention is vital in that the gatekeeping mechanisms need to be put in place ensure that all immersents are there knowingly. As cultures emerge in digital spaces, we must remain aware of our collective responsibilities to ensure that the immersent is safe; Michelle Cortese says, 'every

communal space on the internet needs to have structures of understanding of what is acceptable and what is unacceptable'(Cortese,2020). We can do this by beginning 'consent acquisition paradigms' in which we are 'ensuring that every single person entering a social VR experience has had the opportunity to set all of their social interaction paradigms before they go in' (Cortese,2020). The reason for this is to allow the immersent to have full agency over their interactions and control over what Michelle Cortese has signposted towards Anthropologist Edward T Hall's calls 'zones of interpersonal space' (Hall, 1969)

'How can we use the language and ideology of body sovereignty and consent to design safer virtual spaces?'
'- Michelle Cortese, Facebook Reality Labs

...As a digital space architect, does this then mean that we are responsible for all actions that take place in that space? As part of my discussions with the industry there emerged ideas around how immersents interaction with each other rely not just on the context of a room, or the tools available to the immersent but also on the actual visuality and representation of the immersent...

PHOTOREALISTIC CAPTURE: A MIRROR OR A CAN OF WORMS?

Photorealistic capture is often what practitioners are aiming for when using digital motion capture techniques. However, video realistic movement and photorealism should be considered under the same discourse. Jack Norris, Managing Director of XR studio Zubr says 'A broken ankle in motion capture is enough to ruin a dance performance'(Norris,2020). When using motion capture RAM suits in real-time there arises issues such as 'joints are approximated' meaning that without post production or a sophisticated game engine design the realtime motion capture may break the immersion of believing this motion capture dancer is real – which opens problems with UX and the state of immersion. The medium that we are using also affects how we are responding and feeling present with digital identities. Josh Pawlowski says 'AR makes it feel like you are more in the moment' indicating different affordances in the spectrum of XR we begin to understand the physical language that allow ourselves to interact and engage in similar ways to IRL (Pawlowski,2020). Volumetric capture may come with its own aesthetical baggage in that it has a certain digital aesthetic, but 'the volumetric 3D form that you get, although sometimes low quality, it is true'; what Marta Di Francesco calls a 'transcendental quality' (Norris, 2020) (Di Francesco, 2020). Volumetric capture retains: the soul; our aura; essence of movement and depiction of our physical world in what Jack Norris calls 'a more humble and traditional capture method than the uncanny avatars...and depicted more real by the angular triangles and low poly models', the factual nature of the point cloud technology, although can sometime be fragmented, there is an emotional response

concerted from the technique that you do not receive from avatar building (Norris, 2020). We can only expect photorealism to get further sophisticated in terms of avatar building and as volumetric capture processes becomes more accessible, we must remain observant and responsible as to how our audiences are reacting socially and psychologically to these capturing processes. People can no longer distinguish the difference between VR and IRL and deep fakes are becoming increasingly common. Nick Fellingham, CEO of volumetric broadcast studio Condensed Reality says, 'being surrounded by models' of 90s versions of sims, it doesn't feel like you're as connected as you get with photorealistic volumetric video' indicating towards a 'feeling of connectivity'(Fellingham, 2020). Anca Salagean, PhD researcher exploring avatar culture mentions that 'we'll see a lot of more photorealistic avatars on platforms for communication and collaboration' (Salagean, 2020). Both Anca and Nick share the idea that with more photorealism comes with perpetuated connection between users, whilst Michelle Cortese, says that 'where there is more photorealism, real identity and real ability to cling to a person, whether that's in live photographic form or an embodied avatar form, you have generally less random harassment'(Cortese, 2020). Michele indicates towards a positive outcome of photorealistic capture in regards to safeguarding safe spaces and a hints that stronger connections and emotional recognition could promote wellbeing amongst users in shared digital spaces. In summary, photorealistic capture will result in a wider plethora of social, psychological, emotional and physical outcomes and we must begin to forecast these responses into our treatments and ideas to ensure the safety of our immersents

digital bodies and psychological wellbeing. However, with photorealism there is no longer as much opportunity in a more fluid digital identity which may be a chance to disassemble the patriarchal political and social structures mentioned earlier in this paper.

‘even if they’re rendered as star dust, you can clearly tell they’re a real person’ – Jack Norris, Director of Zubr

...when creating dance XR experiences, we must not just think about the avatars that our artists will be embodying but also the avatars our live audiences will be embodying...

EMBODIMENT X DISEMBODIMENT

Rob eagle, queer XR creator, asks a poignant question: ‘how do we, as the immersent, acknowledge our bodies in a virtual space and how should stories be presented that engage with the immersents own bodies?’

Interaction allows us to feel closer attached to our physical world and ‘without interaction, the sense of embodiment is less’ (Di Francesco, 2020). Finding ways to interact with audiences during our performances and allow them to be a part of our creational process allows immersents to feel a sense of embodiment and presence within that body. ‘The best way to be present is to be in connection with one’s body’ and we can do this by extending our senses as opposed to what XR creator, Lauren Moffatt, describes as a ‘passive experience’ (Di Francesco, 2020) (Moffatt,2020). Anca Salagean asks ‘does having a photorealistic avatar make you feel that this is more a part of your body than a less photorealistic version?’ The way that other immersents engage with you in a space may make you feel embodied

and photorealism has a profound effect on immersants interaction (Salagean,2020). Anca goes onto describe 'how embodiment can change your mind, not just your self-expression' alluding to creating memories when in your avatar's body which can then be translated IRL (Salagean,2020). 'Virtual embodiment can be helpful for people to understand the different weight and aspects of their identity'; the contemplative nature of experiencing perspective and entwined relationships with the immersants in XR should not be underestimated (Ratuszynska, 2020). This can be compared to 360 filmmaking as '360 film is one of the few chances you get to see from a perspective that is not your own' in the context of a pre-recorded space, your interaction and presence doesn't influence the narrative or performance whilst your presence in real-time will change the narrative (Ratuszynska, 2020). Dance artist Jan Lee has questioned the intention of embodiment, she says, 'embodiment is more about disembodiment' and that 'disembodiment is not an action, it's a reversal' (Lee,2020). We should consider the reasons why we want our immersants to feel a sense of embodiment (or disembodiment) as problems begin to arise in race and gender discourse in regards to body ownership. Keiken collective, who have worked on projects such as *My Metaverse Womb* and *Feel My Metaverse* in which embodiment propels the narrative says 'we have colonised the earth, imagine what damage can be done if we start colonising people's bodies through technology' reinforcing the stark message that we must remain aware and responsible of socio-political factors when enacting practices regarding embodiment (Keiken Collective, 2020).

‘Embodying avatars brings into question, what are our identity points?’ - Tessa Ratuszynska, Expanded Performance Fellow

AVATAR CULTURE AND GENDER SWAPPING IN SOCIAL V

As we find new ways to represent our bodies and our audiences’ selves in digital spaces, we must also think about agency in our selfidentity and what this means to the way that we interact and represent ourselves in multi-immersent spaces. Anca Salagean talks about ‘the protease effect: you present with the associated characteristic that you expect from the avatar’ indicating to a performative nature of being, and hyper-performance of gender when embodying avatars (Salagean, 2020). Tessa Ratuszynska mentions Sherie Turkle’s gender swapping effect and ‘the culture of guessing people’s real-life gender as opposed to their avatar’ (Turkle, 1995). Michelle Cortese mentioned an experiment that she undertook in which she performed a live inquisition in a multi immersent online digital space as to the use of avatars in relation to persons gender IRL; she found that there was an exploration of identity and not necessarily power dynamic against a certain identity. Sherie Turkle’s theory continues as ‘going online and gender swapping allows relief to their IRL gender performance’ and in relation to popular online multiuser game Second Life, Tessa states that ‘the culture of Second Life is a space to explore and express yourself’ (Ratuszynska, 2020) (Turkle, 1995). If we imagine building a digital space that allows our audiences to see our work; we also must imagine the playfulness that our audience may experience with their own digital identity. The idea of embodying animals such as hippos and butterflies are a

reality and that our unique identity is still signified using gestural motions that are unique to our own way of movement. There is a playfulness in our digital identities and whom we may choose to be temporarily identify as Tessa illustrates that ‘in an attempt to move beyond the binary references of the space, a hippo will still sit on a chair in a male or female way’ (Ratuszynska, 2020). By allowing immersents to find their new identities in our performances, there should be a clarity that although they seem anonymous, they are identifiable through their gestural and cognitive motions. It is up to us to find our own way to reinvent ours and our immersents identity in digital spaces and attempt not to recreate patriarchal ideologies as Tessa mentions whilst paraphrasing Turkle’s idea that ‘avatar culture and the exploration and playfulness of a multi-faceted identity can be read as an educational tool or a way of seeing social structures in our world’ (Ratuszynska, 2020).

...Throughout my conversations I came across how our represented identities in digital space are not just based on visuality and sound design, but also on interactivity and not just in relation to each other but also to the space around us. I began to think about these conversations within a dance framework and understanding spatial dynamics from a dance artists perspective...

DANCING THROUGH CODE: FEELING PRESENCE AND AGENCY IN XR

When talking to dance artist Prentice Whitlow, they asked me the question ‘**what are the boundaries that we place between the audience and dancer?**’ (Whitlow, 2020).

Similar to the narrative regarding safe spaces and consent-

based interaction models that Michelle Cortese's research defines, we must also begin to think about the spatial relationships between immersents in the context of dance experiences – are our audiences allowed to be up close with the dancers? Should we set boundaries in social VR spaces? What does this mean for the work if we are attempting to give the immersent an embodied dance experience? Lisa May Thomas, somatic XR dance creator, says that 'we need to tune our bodies into the space and the other bodies that we move with' and this can be done thorough 'learning to shift our sensory system' (Thomas, 2021). In my conversation with Lisa we both agreed on feeling uncomfortable in VR which Lisa attunes to a feeling of being 'troubled' and Lisa's way of overcoming this troubled VR experience is to 'stay with the trouble and feel the tension in her body' whilst I often attune this feeling of troubled by the sensory overload, or the chaos in VR (Thomas, 2021). However, this chaos and lack of physicality can be seen as a queer experience, particularly as VR often defies physics but we are often grounded by our body's relationship with our physical gravity. What I interpreted from Lisa's statement is that through our sensorial experiences in VR, we must also acknowledge and understand our own space IRL and we are constantly reminded of that physical space due to the physics and senses remaining in our world such as gravity, sense of smell and touch. As a dance artist in VR, this is a process and a technique of how to be present in two spaces simultaneously and understanding that we have the agency to swap and align your senses to the physical and virtual space when wanted. Jan Lee defines presence as 'an act of perceiving', whilst Lauren Moffatt, XR creator describes presence as 'the belief that we are there' (Lee, 2020)

(Moffatt,2020). Presence is a theme that is all encompassing and has a theoretical discourse in dance, theatre and just about every other creative medium. The insights gathered from my industry conversations draw attention to crossovers with (self) embodiment, wherein being hyperaware and conscious of our own bodies allows us to feel in the here and now; what Jan Lee calls the 'felt sense' (Lee,2020). There is an expectation of XR to change our self-identity, but the interactions and way that we are engaging with each other in XR may have a more attainable research pathway to self-exploration: 'in XR, you don't have to be someone else, you can be yourself' (Eagle, 2020). Is being a passive audience the limit in a dance XR experience? Or can they crossover to be a participatory audience member in which they co-create a space and language culture with the dance artist? What is important is that we 'allow audiences to play and respond' and XR creator Marta Di Francesco mentions, in response to her dance VR piece *Janus*, that 'in a gallery space, the user will naturally mimic the movements of the dancers, even without prompts' indicating a heightened sense of presence and playfulness (Lee, 2020) (Di Francesco,2020). Jan, through her works *Movement Alphabet* and *This Floating World*, which both explore and prompt a relationship between audience, dancer and technology, provokes ideas around reimagining and reclaiming the role of audiences as more participatory and collective; she does this by asking audiences to feel present with a dancer through intimacy and mindfulness. In conversations with Ana Levordashka, we uncovered a question as part of Evaluating Immersive User Experience and Audience Impact Report in which you can measure presence in XR by asking the immersent 'did you lose track of time?'; time again being an indicator of a sense

of self and a means of perceiving (this question was fed into the *Gimme One* case study explored in this paper). Lisa frames the glitches that we see in XR experiences and chaos as a way of 'opening up glitches and peering inside' as we allow our 'attention to be available to the different senses in our body' (Thomas, 2021). Lisa contextualises her dance somatic XR practice as a way to not be consumed by the visual, but to experience dance in VR as a way to connect with other senses than sight. 'How do humans mediate themselves in spaces?' and how do we choreograph and mediate a dance artist's body in virtual spaces? (Cortese, 2020). Prentice Whitlow answers this question in the framework of gaming architecture 'The programming of a game is organising how different options present and interact with themselves in a virtual space; there is a similarity with choreography' when regarding our virtual bodies (Whitlow, 2020). When Jan Lee was asked how she choreographed her work alongside her creative technologist, she mentioned a 'continuous adaptation that became immersive, but entwined and entangled' as there were adjustments to in her movements that adapted to the code; almost as though the code is the choreographer that entwines the dance artist and the creative technologist. Keiken Collective mention that 'there is an inherent inhumanity to the technology we use'; so, it could not be right to personify and humanise a machine as the role of choreographer which in turn provokes dystopian ideas machineries ownership of our human bodies and embodying human and emotional connections.

'The mesh of volumetric are the digital threads that pulse through our bodies' - Marta Di Francesco, Volumetric Artist

‘Those that meditate and have a deep sense of consciousness in one’s body are most able to be present’ – Marta Di Francesco, XR Creator

Presence can be found in both individual and collective experiences. AR affords presence in that we remain in our physical bodies as we enter the ‘third space’. Rob Eagle, XR creator asks, ‘what does it mean to be in AR and to be physically present in your environment?’

....As part of my research I have been exploring Valencia James’s Toolbox for volumetric capture in which she has been developing an open source process to make a live stream volumetric capture dance into Mozilla Hubs, a social VR platform. As part of my own research I have been noting some key information for those that wish to explore their own volumetric live stream...

STRENGTHS

- ‘The limitations that volumetric has, is part of its appeal’ (Di Francesco, 2020)
- ‘For documentary and fiction volumetric provides meaningful storytelling ‘ (Moffatt, 2020)
- ‘Volumetric allows for a new vocabulary and a new exploration of different layers’ (Di Francesco, 2020)
- ‘when you are in a 3D space and meet someone who is not volumetric, the immersion is broken’ (Parameswaran, 2020)

- ‘Giving the user the ability to move around a space is part of the evolution of this technology and create a sense of presence, scale and spatial relationships’ (Lynch, 2020)
- ‘We can capture larger areas and stream them in real-time’ (Fellingham, 2020)

WEAKNESSES

- ‘For high quality: you’re restricted to a studio, a day in the studio could cost you upwards of 30K and its not real-time’ (Fellingham, 2020)
- ‘Volumetric video (for broadcast) needs high bandwidth’ (Fellingham, 2020)
- ‘The speed in which dancers move needs a high refresh rate to capture in real time accurate’ (Pawlowski, 2020)
- ‘With volumetric capture it is impossible to capture two dancers at the same time’ (Di Francesco, 2020) • ‘Expensive and you need a large team of creative technologists’ (Keiken Collective, 2020)

OPPORTUNITIES

- ‘5g enables edge rendering meaning you don’t have to have a high-grade gaming pc to view the volumetric capture’ (Fellingham, 2020)
- ‘Using machine learning to smooth out the edges (edge cutting)’ (Pawlowski, 2020)
- 5G integration with high bandwidth transfer of data through broadcast
- ‘Rendering volumetric capture on a smart phone in real-time’ (Norris, 2020)
- ‘Opening up interactive integrations with volumetric video’ (Fellingham, 2020)

- ‘Coronavirus has been an enabler as musicians and theatres get in touch with us to access audiences’ (Fellingham, 2020)
- ‘With VR, it’s harder for audiences to reach so if you put it online it reaches a wider audience’ (Di Francesco, 2020)
- ‘5G will inevitable change the XR landscape which will result in rich media experiences including collective experiences’ (Norris, 2020)
- ‘Live real-time table top AR’ (Fellingham, 2020)

THREATS

- ‘The more you capture, the larger the bandwidth’ (Fellingham, 2020)
- ‘We’re at the VHS of volumetric video and we’re working towards the 4k, 5g is a technology in the mix which will allow us to get there’ (Fellingham, 2020)
- ‘Integrating into game engines is really important’ (Fellingham, 2020)

CONCLUSION

Contemplating and processing queer ideas and creative processes means finding new ways that are not necessarily clear, clean or practical. If we are to begin dismantling the patriarchal hold of digital spaces, we must begin to, as Jan Lee puts it ‘accept the glitches’ (Lee,2020). We must begin using technology for not its intended use and submit our own intentions onto the hardware and software. We must be able to communicate our ideas and Marta Di Francesco proposes to ‘creating a vocabulary for a new way of telling stories’ (Di Francesco, 2020). We do not need the highest specifications or the latest hardware as the tools are already available for

us to begin using as DIY creators. As the volumetric high-grade Intel Centre is closed in Los Angeles, 'there is a pivot to low cost hardware such as our mobile phones which has LIDAR volumetric ready hardware enabled' (Norris, 2020). By entering developer mode and beginning to confront the boundaries placed on our hardware we are in a moment of stirring and 'it's exciting to be able to hack the technology and not have to wait for the next best thing' (Eagle, 2020). To be able to 'hack' our intentions and responsibilities into our creative technology performances, we must think about finding new ways and frameworks of working with our creative technologies. We must 'change and adapt open structures to adapt to technology' and 'work within limitations of the technology' (Lee, 2020) (Di Francesco, 2020).

The intersection and definition of identifying and separating LGBTQ audiences and underrepresented audiences has been somewhat provided as an insight in relation to the *Gimme One* XR uptake rates reported from Dok Leipzig. Further research into segmented audiences would need to be provided to align LGBTQ audiences as underrepresented. However, what this paper has done is touch on various questions, discourses and topics that are only just beginning to be explored as part of a wider cultural conversation as to how we use technology to connect our art to our audiences. As creative technologists and cultural practitioners are increasingly collaborating and creating work together, we must begin thinking about shared and accessible language around inclusion. Harshadha Balasubramanian, PHD researched into inclusivity in XR says 'rather than inviting creators to help audio describe their work when completed, I've introduced the practice at the beginning of the design

process and throughout by working with VR designers to identify the individual visual elements of their project' and I think this practice can be expanded past Harsha research of audio described VR, and extended as to XR immersents experiences (Balasubramanian, 2021). By using accessibility and inclusion as a tool to enhance our immersents experiences in XR past the visuality, there are opportunities to shift the paradigm of our digital spaces to allow different audience voices to shape our culture.

Contemplating self-identity for our immersents and our collaborators in social VR spaces will remain a contentious issue as front-line market leaders strive for photorealism for our immersents. We should find freedom in our pink hippo avatars and non-normative bodies. Through my conversation with Harshadha, she defines non-normative as 'non-normative signals a challenge to the need for a norm, it can refer to experiences that demonstrate that there are multiple ways of being and therefore experiences that disrupt the normalising forces that work in society' (Balasubramanian, 2021). I am interpreting this statement beyond the inclusion of non-normative bodies in social VR spaces, but extending this to justify why we should allow new ways of representing ourselves in social VR as we enhance our physical identities in a way that allows us to fight against these 'normalising forces that work in our societies IRL' (Balasubramanian, 2021). This remains paramount to the LGBTQ community and their feelings of belonging, body ownership and safety in our digital spaces.

Understanding the crossovers of emotional and physical languages in response to a dance artists practice and

programming is important for a cross-collaboration and understanding ideas around presence and agency, in particular through a somatic lens will help to 'ground' our audiences and immersents when experience live dance in XR. The opportunities given by motion capture systems are wide regarding accessing new audiences and creating new bodies of work that cross multiple platforms and practices. However, we must learn from Big Tech's mistakes of not forecasting our consequences and formulating our intentions in response to these consequences. Collective responsibility is crucial to taking ownership of the imbalance caused by these consequences. We must all take action and remain accountable for the interactions and identities explored in our digital worlds that we create for our artists and our audiences to connect in. Finding processes and collaborators that will co-create with us and think about our actions through a journalistic lens will enable us to safeguard and empower new audiences. The tools are available now, we no longer have to wait for new machinery; it may not always be pretty, it may be glitchy but there is an honesty and humbleness in DIY digital art.

'It's a queer habit to hack things' – Rob Eagle, XR Creator

'There is queer value in low-tech solutions' – Rob Eagle, XR Creator

FRAMING THE CONCLUSION

Thinking about these components and contraptions of making a live XR performance for underrepresented audience can only be framed amongst the current global pandemic. As we all reminisce and feel nostalgic about being in shared collective spaces watching live performances; we must think about the needs of a post pandemic world and as creative technologist performance artists Chagall says 'performing in a local and intimate way is more important now more than ever'; finding small spaces and creating a unique intimate crowd appreciate the art of dance has to be scaled to reach wider audiences or we risk alienating large swathes of our culture-starved society (Chagall, 2020). We must remember our emotional languages and connection to culture and find new ways to explore these connections through technology. Technology being 'inherently inhumane' we have to explore beyond the reaches of software and code as 'it's hard to put emotion into pressing a button' (Chagall, 2020).

FINAL WORD

Note from the author: *This fellowship has been a lifeline in a time of turbulent political and social crises. It has allowed me to adapt and to continue exploring the world through a technological social impact lens and I want to thank the producers, fellow fellows and all partners as part of this programme. I look forward to connecting and finding my own emotional language when we (finally) meet IRL. xoxo*

BIBLIOGRAPHY

Amarasuriya T. (2020). *Live(ness) thinking,* Bristol + Bath Creative R+D Expanded Performance', Available at <https://bristolbathcreative.org/article/liveness-thinking>

Bhabha, Homi K. (2004). *Immersive User Experience and Audience Impact.* [https://www.immerseuk.org/wpcontent/uploads/2018/07/Evaluating Immersive User Experience and Audience Impact.pdf](https://www.immerseuk.org/wpcontent/uploads/2018/07/Evaluating%20Immersive%20User%20Experience%20and%20Audience%20Impact.pdf) *The Location of Culture.* Abingdon: Routledge. p. 55.

Balasubramanian H and Silverlock H. (2020). *Harsha Balasubramanian,* Harry Silverlock's Expanded Performance Podcast, 25th August 2020, Available at: <https://www.harrysilverlock.com/expanded-performance-podcast>

Chagall and Silverlock H. (2020). *Chagall,* Harry Silverlock's Expanded Performance Podcast, 13th January 2021, Available at: <https://www.harrysilverlock.com/expanded-performance-podcast>

Cortese M and Silverlock H. (2020), *Michelle Cortese,* Harry Silverlock's Expanded Performance Podcast, 11th January 2021, Available at: <https://www.harrysilverlock.com/expanded-performance-podcast>

Corts, A. (2016). *(Un)limited: Virtual Performance Spaces and Digital Identity*, Theatre Symposium, Volume 24, 2016, pp. 113-128 (Article)

Di Francesco M and Silverlock H. (2020). *Marta Di Francesco*, Harry Silverlock's Expanded Performance Podcast, 04th August 2020, Available at: <https://www.harrysilverlock.com/expanded-performance-podcast>

Dzardanova E., Kasapakis V., Gavalas D. (2018). [Social Virtual Reality](#). In: Lee N. (eds) Encyclopedia of Computer Graphics and Games. Springer, Cham.

Eagle R and Silverlock H. (2020). *Rob Eagle*, Harry Silverlock's Expanded Performance Podcast, 20th November 2020, Available at: <https://www.harrysilverlock.com/expanded-performance-podcast>

Fellingham N and Silverlock H. (2020). *Nick Fellingham*, Harry Silverlock's Expanded Performance Podcast, 20th July 2020, Available at: <https://www.harrysilverlock.com/expanded-performance-podcast>

Ferrari, E., Borden, P., Bakhshi, H., & Freeman, J. (2018). *Evaluating*

Hall, E. T. (1969). *The hidden dimension*. Garden City, N.Y: Anchor Books.

Keiken Collective and Silverlock H. (2020) *Keiken Collective*, Harry Silverlock's Expanded Performance Podcast, 8th January 2021, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>

Lynch S and Silverlock H. (2020) *Scott Lynch*, Harry Silverlock's Expanded Performance Podcast, 8th January 2021, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>

Moffatt L and Silverlock H. (2020). *Lauren Moffatt*, Harry Silverlock's Expanded Performance Podcast, 2nd December 2020, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>

Nesta, *I2 Media Group*, Innovate UK, Digital Catapult, Lessiter, J., Mitchell, S.,

Norris J and Silverlock H. (2020). *Jack Norris*, Harry Silverlock's Expanded Performance Podcast, 25th November 2020, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>

Parameswaran G and Silverlock H. (2020). *Gayatri Parameswaran*, Harry Silverlock's Expanded Performance Podcast, 7th December 2020,

Available at: <https://www.harrysilverlock.com/expanded-performance-podcast>

Pawlowski J and Silverlock H. (2020). *Joshua Pawlowski*, Harry Silverlock's Expanded Performance Podcast, 27th July 2020, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>

Ratuszynska T and Silverlock H. (2020). *Tessa Ratuszynska*, Harry Silverlock's Expanded Performance Podcast, 25th August 2020, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>

Salagean A and Silverlock H. (2020). *Anca Salagean*, Harry Silverlock's Expanded Performance Podcast, 8th December 2020, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>

Thomas L and Silverlock H. (2020). *Lisa May Thomas*, Harry Silverlock's Expanded Performance Podcast, 27th March 2021, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>

Turkle, S (1995) *Life on Screen: Identity in the Age of the Internet*, Touchstone: New York

Unity. (2021). *What Is AR, VR, MR, XR, 360?* - Unity. [online] Available at: <<https://unity3d.com/what-is-xr-glossary>>

[Accessed 19 January

2021]. Bukimi no tani [the uncanny valley] M Mori Energy 7, 33-35

Whitlow P and Silverlock H. (2020). *Prentice Whitlow*, Harry Silverlock's Expanded Performance Podcast, 25th August 2020, Available at:

<https://www.harrysilverlock.com/expanded-performance-podcast>