Technologies of Seeing and Technologies of Corporeality: currents in nonfiction virtual reality
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In the late 1980s a number of entrepreneurs in San Francisco's Bay Area were working on the development of technology that could bring what we now call virtual reality to the commercial market. In a 1990 essay, John Perry Barlow - Grateful Dead lyricist and later founder of the Electronic Frontier Foundation – wrote an account of what it felt like to use one of those systems:

> Suddenly, I don't have a body anymore. All that remains of the aging shambles which usually constitutes my corporeal self is a glowing, golden hand floating before me like Macbeth's dagger. … In this pulsating new landscape, I've been reduced to a point of view… At least I know where I left my body. It's in a room called Cyberia in a building called Autodesk in a town called Sausalito, California. Planet Earth. Milky Way. So on and so forth. My body is cradled in its usual cozy node of space-time vectors… But I…or "I"… am in cyberspace, a universe churned up from computer code… [i]

Perry Barlow's description of this nascent media hinges on his surprising experience of corporeality. He finds himself feeling detached from his physical form, his senses contracted to the act of looking only. He sees in cyberspace, while his body resides elsewhere. That same year, Randal Walser, a member of the team that built the Cyberia virtual reality (VR) platform that Perry Barlow describes in this passage, published a paper which set out his own vision for VR that centers on a new experience of embodiment.

> Whereas film is used to show a reality to an audience, cyberspace is used to give a virtual body, and a role, to everyone in the audience. Print and radio tell, stage and film show, cyberspace embodies… A spacemaker sets up a world for an audience to act directly within, and not just so the audience can imagine they are experiencing an interesting reality, but so they can experience it directly. [ii]

These two passages appear to express deeply contradictory visions of VR. In Perry Barlow's experience, the move into a virtual world is based on a form of disembodiment. Meanwhile, Walser differentiates cyberspace from previous media forms precisely *through* reference to embodiment. For him, it is the virtual embodiment that VR provides that is the gateway to an experiential engagement with a new dimension. A quarter century later, after the false start of second wave VR in which Walser and Perry Barlow were key players, developments in hardware and software have made VR accessible as a mass market proposition, and the platform is emerging as a significant force in the cultural landscape. [iii] In an unanticipated development, this third wave of VR has been eagerly adopted by nonfiction media makers. A raft of documentary VR projects continue to appear at film festivals and the platform has been harnessed by both old and new journalism including the Guardian, New York Times, PBS Frontline, and Vice News.

Surveying the contemporary nonfiction work being developed within the framework

of VR, an opposition emerges between the promise of VR as Perry Barlow's escape from materiality and Walser's promise of corporeal engagement. In this article, I consider how this opposition between embodiment and disembodiment manifests in some recent projects. By grounding my analysis through reference to the imaginary of these VR pioneers, I explore how VR nonfiction reflects divergent currents, engaging "technologies of seeing" with a lineage going back to the Renaissance while introducing novel "technologies of corporeality" and ask what is at stake for documentary epistemology in these developments.[iv]

This new field where VR and non-fiction intersect demands analysis and theorisation, yet it presents a variety of challenges for documentary scholars. As an emergent medium in a process of rapid development, with producers experimenting with diverse platforms, divergent affordances and vocabularies, VR invites multiple avenues of enquiry. Scholarship on VR nonfiction is only just beginning, although critical work prompted by second wave VR in contexts including art history, cultural studies and feminist studies, provides a significant resource. At the same time, the forms of experiential engagement involved in VR challenge analytical tools of visual culture. A hermeneutic approach has limited value in addressing an experience which has more in common with a video game than a movie. Phenomenology and experience design may have more relevance than textual analysis to address these forms where storytelling gives way to what some are calling storyliving.[v] Scholarship in interactive documentary has begun the work of addressing these hybrid forms. Now, VR demands a next generation of research. Acknowledging this wider context, this article seeks to provide an initial mapping of the landscape of nonfiction VR through the ways these works engage the body. In addressing this arena of work, I am also signalling the need for the development of more agile critical frameworks for the analysis and critique of these technologically mediated encounters, ones that are equally responsive to textual effects and immersive engagement.

From seeing to presence
Documentary is a malleable form. From the birth of film sound through the invention of sync sound to the launch of the handicam, new technologies have been harnessed by documentarians for what they might offer the project of reflecting and critiquing our shared world. One of the drivers of experimentation in and uptake of new media technologies has been an interest in their capacity to provide ever more immersive, life-like experiences for audiences. The rapid embrace of 360° video, also known as spherical video and cinematic VR, originating with the launch of the Oculus Rift developer kit, can be situated within this context.

While the coming of sound and later the capacity to capture image and sound in sync on location deepened the immersive potential of cinema, VR brings about a novel relationship to the moving image as the audience sitting in the dark watching a movie is replaced with a lone participant in a headset interacting with a computer system.[vi] The use of the term VR today obscures what are in fact divergent platforms with distinct affordances. What they have in common is the nature of immersion produced within a headset. Where the experience of watching a movie or looking at a painting has been compared to looking through the Renaissance scholar Alberti's window, the experience of VR has been compared to falling through that window so that one feels as if one is situated within the frame.[vii] This feeling of being inside the events depicted in VR is known as presence – an optical illusion which can be seen as fitting

within the cinematic tradition that exploits "a peculiar ability of the human eye to deceive the mind."[viii] While cinema viewing is based on a series of still images which are interpreted as movement by the viewer due to the persistence of the optical image on the retina, VR rests on the illusion that – if a computer displays a panoramic 3D image which changes in a life-like way as the participant turns her head – her visual experience suggests that she is in the place she sees, even though her bodily sensation – proprioception - tells her that she is in situ where she put the headset on. The feeling of presence created by this illusion is the characteristic sensory experience of VR.[ix] YouTube videos began to appear in 2014 that showed people trying VR for the first time. Their reactions illustrate the impact of presence and the paradoxical nature of VR participant experience – the optical illusion of *being there* within events depicted while at the same time being fully aware of *not being there.*

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Spherical video - visual immersion

Within months of the 2014 Oculus Rift developer kit's release, nonfiction experiments with VR began to appear. That year, Chris Milk and Aaron Koblin, both award-winners for their innovative interactive work, formed a new entity, VRse.works (since rebranded as Within). They began to produce immersive nonfiction, quickly gaining partners including the New York Times, Vice News and NBC. VRse.works drew attention through a series of 360° video projects produced by Chris Milk with Gabo Arora, until recently the Creative Director at the United Nations. The series comprises portraits of a Syrian child in a Jordanian refugee camp, a Palestinian mother living in Gaza, and an Ebola survivor in Liberia. Produced within the remit of the UN's Millennium Campaign objectives, the credits explain that the works seek to "call attention to the world's most pressing challenges and bring citizens' voices into the decision making processes that affect their lives." These VR projects have premiered at major film festivals including Cannes, Sundance and Tribeca, were featured at the World Economic Forum in Davos, and have played a significant role in encouraging the uptake of 360° video for journalism, documentary and humanitarianism.

The third portrait in the series, *Waves of Grace*, portrays Decontee Davis, a survivor of the Ebola virus, who takes advantage of her immunity to work with the sick and with children orphaned by the disease.

[Embed] https://www.youtube.com/watch?v=0lwG6MfGvwI

Like all of the pieces produced by Milk / Arora in partnership with the UN, *Waves of Grace* involves a form of observational documentary with a voiceover from the subject's point of view. It was devised, a caption explains, from conversations with Davis and voiced by an actor. A series of long static shots reflect everyday scenes -- the market, the school, the burial grounds. Davis is shown in the hospital tending to a sick child, working with orphans, at a church service. The camera is mostly an unacknowledged observer, while the actor's voice, speaking in the first person, recounts the story of Davis' near death and recovery from Ebola.

Reviews of *Waves of Grace* are telling for their accounts of how presence is experienced in this 360° video . Erin Spens at Creators.Co describes her encounter with the project:

> On a sunny day in Venice, California I find myself in the Vrse.works offices with Samsung Gear, a virtual reality headset, strapped to my head and noise-cancelling headphones on. Within minutes I'm in Liberia listening to Decontee Davis, an Ebola survivor, offer up a prayer for her country…As the narrator of this virtual reality film, Decontee takes me to different parts of her village where I can see the aftermath and slow reconstruction of a society that's been devastated by the worst Ebola epidemic in history.[x]

John Jurgenson at The Wall Street Journal writes that "the new virtual reality film "Waves of Grace" gives viewers [a] jolt of proximity by essentially embedding them with an Ebola survivor in Liberia."[xi] The language of immediacy – of *meeting* Davis, of being *embedded in* Liberia – is common in reviews of this and other 360° video pieces. The accounts of these reviewers also show how the experience of presence brings with it an intense emotional involvement. Angela Watercutter reports, "It's a powerful message even when read on paper, but when heard while standing amongst the orphans themselves and the graves of some of the more than 4,800 lives Ebola has claimed in Liberia, it's downright heartbreaking …"[xii] Here, we can see how presence operates in the context of these non-fiction works as a sense that the participant is witness to unmediated reality; that they are at the scene "among" the documentary subjects rather than engaging critically with a creative documentary work.

It is also remarkable how, while reviewers talk of *being there*, at the scene of the filming, the body of the participant wearing the headset is ignored. While Perry Barlow's cyberspace adventure cited above involved an excursion into a world constructed from computer generated images, his experience and that of the reviewers of *Waves of Grace* are in other respects similar – involving being "reduced to a point of view"; "present" at the filmed scene through vision and hearing only. It is symptomatic of the primacy of seeing in Western culture that an experience involving the disembodied eye in which an inert body plays no role can be discussed so readily as an experience of the self.

William Uricchio has argued that to make sense of what's at play in the fast-moving field of VR, and to enable the development of the nascent medium, it is necessary to "disambiguate the concept and its underlying technologies." Only then, he suggests, "can we take the next step of developing new expressive vocabularies and techniques."[xiii] Uricchio contextualizes 360° video by situating it within a long history of immersive image making. He illustrates the longevity of that project by citing the wording of the 1787 patent for the Panorama, or "La nature a Coup D'oeil" – Nature at a glance - as it was originally known: "La nature a Coup D'Oeil," the patent reads, "is intended, by drawing and painting, and a proper disposition of the whole, to perfect an entire view of any country or situation…"[xiv] Uricchio points out how, in a remarkable pre-echo of the language now being used in relation to 360° video , the patent explains that the panorama is intended "so as to make observers feel….as if really on the very spot." As well as locating 360° video on a continuum with

experiences that have sought to immerse the viewer in a simulation of the historical world, Uricchio also points to another form of continuity, noting that 360° video extends a long trajectory as a recording technology. "As the photograph and painting are to their panoramic counterparts," he argues, "so is video to 360° video. Stereoscopic depth, immersion in a seamless world - the illusion is solid, and so are the assets ..."[xv] As in the case of the panorama, the participant in spherical video has a fixed position within a scene, and a fixed experience – the videos are "solid" – defined at the point of recording – and will play the same every time. Uricchio thus suggests how the technical characteristics of spherical video situate it within another historical continuity, as a form of optical media in a lineage with photography, cinema, television – those forms which Brian Winston has called, "technologies of seeing."

While recognizing that as a recording technology, 360° video resides within the lineage of optical media, and that as a wraparound visual experience, it has cultural precursors going back to the 18th century, it is still instructive to pay attention to the participant experience of 360° video as it suggests the significant ways in which the platform is nonetheless novel. Reflecting on *Waves of Grace* in relation to *Real Violence*, a piece with controversially brutal subject matter that was installed in the 2017 Whitney Biennal in New York, scholar Homay King notes the visceral response produced by 360° video and the way that presence plays out for the participant within a journalistic context:

"We follow [Decontee Davis] through these spaces where we truly feel in the middle of it, not observing from a safe distance. The possibility of any kind of masterful gaze genuinely feels somewhat undone by the fact that we're in a 360° space." [xvi]

Here, King draws out the implications of the frameless visual space that the format provides. Her reference to the "masterful gaze" invokes Laura Mulvey's 1970s analysis of the male gaze as a structuring principle in Hollywood film[xvii] and invites us to consider how 360° video breaks with the structuring of the gaze brought about through editing in linear documentary. In 360° video then, while the *point* of view (the place where the camera is set up) is pre-determined, the *direction* of view is open. Within the constraints of the selected shots and camera positions, the participant decides where to look. The openness of the image combined with the feeling of being there which presence produces is, King suggests, a new experience for the participant which, in this particular case, leads to an unfamiliar sense of vulnerability.

While this hybrid platform may reconfigure the documentary gaze, offering a novel experience to the audience / participant, it is worth considering what implications cinematic VR might have for the other parties in the documentary triad of producer, subject and audience. While the camera lens has been understood as a proxy for the human eye – approximating the human field of vision – the unbroken panorama produced by spherical video is that of a machine. This 360° vision has implications for the filming situation. As the filmmaker or camera person would inevitably be captured by a 360° view, the VR video camera is generally left to record unattended. It is a paradox that the immersive feeling created by 360° video in the participant is not mirrored by an equivalent immersion at the filming scene on the part of the producer / filmmaker. Just as the participant is disembodied in the experience of viewing VR, so, as Phillip Doyle has pointed out, the filmmaker is disembodied at the scene of the recording. [xviii]

This raises significant issues for documentary. The presence of the filmmaker in the social space of the recording, while not a universal fact, has been a central proposition for the ethical contract between producer, subject and audience. In the space of filming, the relationship between filmmaker and subject is negotiated (whether explicitly or tacitly), and whether the subjects are engaging with the filmmaker overtly while the camera rolls, or ignoring the camera and crew, the texture of that negotiation is, I would suggest, inscribed in the footage. When it comes to the work of representing human subjects, the quality and nuance of that interaction determines, consciously or not, the way that a documentary is judged by the viewer. Taking the filmmaker or their proxy, the cameraperson, out of that equation destabilises the contract between producer and subject, and between subject and audience. It is contradictory that a media technology being heralded for its prosocial potential should efface the social engagement between producer and subject that has historically been at the heart of documentary filming – following a logic of surveillance rather than one of dialogue.

Chris Milk, co-producer of *Waves of Grace*, influentially, if contentiously, argues that VR is an "empathy machine."[xix] To challenge this claim, Kate Nash interrogates the "belief in the connection between immersion, empathy and a moral orientation towards distant others,"[xx] which she suggests has driven VR video production in both humanitarian and journalistic contexts. To do that, she considers the ways that factual media have been understood as facilitating an attitude of moral responsibility within the audience, towards the events they witness, and asks what differentiates the nature of witness within VR. Nash argues that in any factual media "the experience of witness as moral response-ability is necessarily fragile."[xxi] In the case of VR, the simulated nature of the medium and the sense that presence produces of being involved in events rather than just observing them across space and time carries with it a risk of "improper distance." This pertinent concept is one which Nash draws from Chouliariki, who challenges "practices of communication that subordinate the voices of distant others to those of the West while distancing the Western spectator from their own position of privilege."[xxii] Improper distance, Nash argues, is a risk in relation to presence, with its tendency to elicit strong emotion in the participant. Proper distance, Nash argues, involves a sense of proximity combined with sufficient critical remove that the viewer can shift from their own affective response to an engagement with the reality of the subject. Nash's argument draws a useful distinction between experience and consciousness on the part of the participant in VR. Without a conscious awareness of being a viewer of VR material, the illusion of proximity that presence involves risks being a barrier to empathy rather than an open door.

Brian Winston asserts that the "basic illusionism" of technologies of seeing "disguises their artifice, their cultural formation and their ideological import."[xxiii] Over time, he suggests, they "bring us closer and closer to a sort of Borgesian map of reality – one which corresponds at all points with the external world – but as they do so, they do little to help us understand their own historical and social realities." Winston's argument is extremely pertinent to contemporary uses of cinematic VR which foster an impression of documentary material as unmediated reality, impeding a critical response in the viewer. Most of the 360° video pieces made to date have pursued this illusionistic agenda, enlisting presence and an observational style of filming to offer the participant a sense of unmediated access to locations and social worlds remote from the Global North.

However, it would be overly deterministic to suggest that a 360° camera leads inevitably to a particular kind of footage or audience response – that is, instead, a matter of directorial approach. While Felix and Paul's *Nomads* (2016) series reflects an interest in the exotic which is common within 360° video production, its aesthetic strategy provokes a different effect. Portraying everyday life among Borneo's Bajau "sea nomads", the Maasai, and Mongolian herders, through long takes and without commentary, the series encourages not intense emotion but thoughtful reflection in the viewer / participant on the act of observing the lives of distant others. *Collisions* (2015) is a 360° video documentary featuring Nyarri Morgan, an elder of the Martu tribe in Western Australia's Pilbara desert, who, in the 1950s, before the tribe had contact with Western culture, witnessed one of the British atomic tests. In the production process, the director, Lynette Walworth, enlisted Morgan as a co-creator, inviting him to engage with the 360° camera as he chose, and to include only content that he deemed appropriate to share. Morgan takes up the invitation to perform his story for the camera and the finished work moves backwards and forwards between past and present, between 360° video and CGI created visualisations of his account. Walworth's approach invokes an alternative tradition to that of the observational documentary. She turns instead to the tradition of cinema verité, of filmmaking as a Rouchian joint undertaking in which the subject influences the filmmaking process and outcome. In *Collisions*, performative engagement on the part of the documentary subject provides a strategy that takes advantage of presence, while also foregrounding the fact of filmmaking, producing a reflective position in the viewer – less a feeling of *being there*, more a close attention to the point of view of those who *are there*.

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If Walworth's reflexive approach evokes the *Cinéma-Vérité* of Jean Rouch, it is equally possible to be reminded of Direct Cinema's claims on the real by the illusionistic current within cinematic VR. As those two documentary movements tussled over the implications of handheld sync sound around 1960, so documentarians today bring divergent politics and philosophies to the potential of VR. While cinematic VR develops themes with a long history in documentary, other VR platforms open up new practices and debates. As documentary begins to intersect with technologies that allow multi-sensory engagement, new possibilities emerge for the documentary project of convening reflections on the historical world.

Multi-sensory Immersion

While producers of 360° video have harnessed this technology of seeing for bearing virtual witness to the social world, other non-fiction producers have been exploring how VR platforms might allow encounters with aspects of our shared world through forms of technologically mediated embodiment which engage beyond the audio-visual. Marshmallow Laser Feast are a British design studio whose commercial work for blue chip companies supports their artistic practice. Underpinned by environmental concerns, their VR trilogy-in-progress - *In the Eyes of the Animal*, *Treehugger* and a third piece in development - explore VR as a platform to engage multiple senses in order to provide a fresh encounter with aspects of the non-human world.

[Embed] https://vimeo.com/174734638

The first work in the trilogy, *In the Eyes of the Animal*, arose from a residency supported by the Abandon Normal Devices Festival in Grizedale Forest in the English Lake District. Marshmallow Laser Feast's Robin McNicholas explains how the team sought to, "explore the sensory perspectives of the animals that lived there … by taking physical samples for the headsets, sonic samples for the soundtrack, and a 360° lidar scan – a digital sample of the environment too."[xxiv] The resulting experience offers an expressive interpretation of the perspectives of four forest species – mosquito, dragonfly, owl, and frog. To experience the work, the participant dons a headset and a subpack – a device worn as a backpack which converts audio into tactile outputs. Particular vibrations, for example, produce the embodied sensations of a mosquito. While employing VR, *Through the Eyes of the Animal* is better described as a Mixed Reality (MR) experience, as it intermingles the virtual and the material world. Designed to be experienced in the forest at the conclusion of a nature walk, it is meant to simulate "the feeling of the forest under your feet, the additional sounds…the smell…it gives the physical elements to the virtual world, and that was important to us as well."[xxv]

As Randal Walser's 1990 account of VR makes clear, kinaesthetic experience was central to VR development at that time. While Perry Barlow's first reaction to the platform emphasises his visual experience, he also describes how he wears a so-called "DataGlove" that picks up his movements, so that, "the relationship between my hand and the eyephones is precisely measured by the two trackers so that my hand appears where I would expect it to. When I point or make a fist, the fiber optics sewn into the DataGlove convert kinesthetics into electronics. For a decisecond or so, my hand disappears and then reappears, glowing and toon-like, in the appropriate shape."[xxvi] While Perry Barlow's experience of virtual embodiment proves to be glitch-prone and limited, subsequent developments in optics, haptics and positional tracking now allow for systems which are subtly responsive to the movements of hands, eyes, and bodies. These technologies can facilitate modes of sensory engagement with documentary subject matter; both types of interactive engagement which are novel in the context of non-fiction and the reconfiguration of familiar sensory stimulation.

In other recent projects, it is the sonic dimension of experience that is finding new expression through uses of positional audio. *Into Darkness* (2016), is a VR experience linked to the award-winning feature documentary, *Notes on Blindness* (2016), about John Hull, a theologian, who, during the 1980s, kept a record of the process of going blind in the form of an audio diary. The VR work offers the participant visceral insight into the experience of the visually impaired through the use of extracts from Hull's diary entries, illustrated by computer generated animation and binaural audio sound effects. In one memorable sequence, Hull describes why windy and rainy weather have become welcome to him after his loss of sight, as those elements put contours and a horizon into his otherwise featureless world. As the sound of wind blows within the darkness of the headset, the participant turns towards the source of the sound, and outlines emerge out of the blackness indicating things heard in the physical world. Here, rather than being told about how blindness feels to Hull, VR allows an embodied impression of the experience being described.

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These contemporary explorations of VR go some way to answering critiques of the medium which were articulated in response to the kinds of experiences offered within the 2nd wave. In *Technologies of the Gendered Body* (1997), Ann Balsamo addressed second wave VR in the context of a feminist investigation of the way the female body was being re-configured and re-imagined through and with technology across a variety of sites and practices including cosmetic surgery, reproductive technology, body-building, and science fiction. While her account is historically specific, Balsamo's analysis of virtual reality as a "technology of corporeality" is highly relevant today. "In efforts to colonise the electronic frontier," she argues, "the material body is repressed and divorced from the locus of knowledge…the body, as a sense apparatus, is nothing more than excess baggage for the cyberspace traveller."[xxvii] While this claim certainly resonates with Perry Barlow's 1990 account of venturing into cyberspace by sloughing off the "aging shambles" of his body, it is still pertinent to today's cinematic VR experiences in which, despite the discourse of *being there*, the disembodied eye is the locus of knowledge while the body is redundant. However, in contemporary experiments like *In the Eyes of the Animals* and *Into Darkness* we can see contemporary VR technologies of corporeality reclaimed for their potential as routes to engage embodied knowledge.

Movement is, of course, a fundamental means through which we inhabit and explore the world around us. Positional tracking now allows for virtual environments to be mapped onto physical space, so that a participant can move around while in VR, and the virtual world will respond to their real world (RW) actions. Immersive journalism pioneer Nonny de la Pena has been experimenting for nearly a decade with the potential for fully embodied media experience – bringing participants into a relationship with a particular historical moment by putting them, virtually, in the middle of events in such a way that they don't just see a virtual world but feel as if they are moving around within it, as their surroundings respond to the movements they make in the RW. Typically, de la Pena's work is grounded in historical reality through vérité audio recordings which run uncut in real time, while her visuals are created in CGI. For de la Pena, the capacity of the participant to move within the work is critical to the form of embodied presence that she is seeking to engender.

> Importantly, these sensations of presence can only be achieved if the changes in the virtual environment happen in real time, that is, if the viewer participant is allowed to move freely while the digital environment changes visually and aurally in exact keeping with gaze, location and body position (jumping, squatting, bending etc)… By using both the body and the *kairos* of a real time delivery to create an empathetic connection, a new embodied digital rhetoric emerges for framing persuasive arguments.[xxviii]

In *Hunger in LA* (2010), the participant feels as if they are standing in line at a Los Angeles food bank. When one of the people queuing goes into a diabetic seizure, participants remark on the physicality of their reaction – it is common for people to reach out to help the CGI avatar, for example. Here, despite images which are not

life-like, the participant may experience a form of corporeal realism. The technologically mediated embodiment which is the experience of *Hunger in LA* stands in sharp contrast to the disembodiment which is the hallmark of participant experience in cinematic VR.

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Producers interested in VR for embodiment today can look to rich precedents in second wave VR. In the 1990s the artist Char Davies turned from painting to VR to make work that could provide an alternative to the Cartesian mind/body split that she saw as the dominant model within VR development at that time.

> As a realm ruled by mind, virtual reality – as conventionally constructed – is the epitome of Cartesian desire, in that it enables the construction of artificial worlds where there is the illusion of total control, where aging mortal flesh is absent, and where, to paraphrase Laurie Anderson, there is no "dirt." I believe such desire to escape the confines of the body and the physical world is symptomatic of an almost pathological denial of our embodied embeddedness in the living world.[xxix]

In two major works – *Osmose* (1995) and *Ephemere* (1998) - Davies integrated full body immersion, interactive 3D imagery and sound, with navigation controlled via a breathing interface. In these works, the participant – dubbed by Davies an "immersent" – navigates through her awareness and manipulation of her own breathing and balance. Inspired by the phenomenology of Merleau-Ponty, here Davies sought to facilitate, "a temporary release from our habitual perceptions and culturally-biased assumptions about being in the world, to enable us, however momentarily, to perceive ourselves and the world around us freshly."[xxx]

While contemporary producers are beginning to engage with the phenomenological potentialities of VR first explored in the second wave, the last half decade has also seen the emergence of a new generation of illusionistic image making which is finding its creative expression in VR. A variety of volumetric capture technologies are developing fast and moving into mainstream use, allowing the digital rendering of three-dimensional environments and living things. Like photography and film, these digital samples of real world (people and places) have an indexical relationship to the physical world, but, crucially with these new technologies, they aren't fixed at the moment of recording as photography and even 360° video are. Instead they can be rendered in response to the actions of participants within media experiences. These recording technologies include lidar scanning as used by Marshmallow Laser Feast in *Through the Eyes of the Animals*, holographic capture, and photogrammetry. In these recordings, as William Uricchio describes it:

> Clouds of fixed data points enable real-time rendering of visual artefacts that can be seen from any position: the virtual world responds to the gaze of the viewer … The modelling is based on rendering algorithms that can be designed to do just about anything, including mimicking the rules of everyday physics. [xxxi]

Documentary projects involving volumetric capture are just beginning to emerge. In *The Last Goodbye* (2017) the participant is invited to accompany Pinchas Gutter, a Holocaust survivor, on a virtual rendering of his final pilgrimage to Poland's Madjanek concentration camp, where he was incarcerated, and his family murdered by the Nazis, over seventy years ago.

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Uricchio suggests that with works in which algorithms drive three-dimensional renderings of RW people and places we enter uncharted ethical and epistemological waters. One response to the multiple unknowns involved in working with these emerging creative technologies is to see them as arenas of possibility that need to be explored in a dialogue between documentary producers, subjects and stakeholders. In a talk at the IDFA DocLab conference in Amsterdam November 2017, the producer Yasmin Elayat presented *The Racial Terror Project (working title)* - a VR work in development which seeks to address the lack of acknowledgement of the history of racial injustice in America by centring on the brutal "spectacle lynching" of Claude Neal in Marianna, Florida in 1934. This work, which will take the form of a room-scale VR installation, is being developed as a research project through MIT Open Documentary Lab's Co-Creation Studio.

Within the framework of what she called a magic realist aesthetic strategy, Elayat described how the production team are employing volumetric capture to render interviews as well as sites relating to Neal's torture and killing which are known to local people but have gone unmarked by any memorial. Imagining bringing participants into visceral encounters with 3D representations of these spaces of terror impressed on me the potential and also the responsibility relating to the use of these new technologies of documentation. Elayat and her collaborators are intensely conscious of the multiple questions around representation, ownership, and agency raised by their subject matter. They are approaching these ethical challenges by undertaking the project in a dialogic process with partners in Florida including descendants of Neal's, so that the work becomes a joint process of enquiry into both the representation of this difficult history and the application of these emerging technological capabilities.

Conclusion

VR today encompasses divergent platforms and experiences, extending visual practices – technologies of seeing – within a lineage going back to the Renaissance, and incubating multi-sensory practices – technologies of corporeality - which might be expected to become central cultural modes of the future. In the latter, we can begin to see forms of technologically mediated embodiment that can open up alternatives to a Cartesian model of knowledge, and which can allow new dimensions of engagement with social reality.

Meanwhile, the emergence of technologies of corporeality demands a shift within documentary scholarship from questions of representation to questions of embodiment. Research is needed to develop methods that can unpack the meaning of these experiences along with the creation of a shared critical vocabulary that addresses the ramifications, potentials and pitfalls of these embodied practices.

Where VR and nonfiction intersect, participants can expect to encounter both experiences of embodiment and its opposite. As technological innovation presents new affordances to documentarians, it's as ever not the technology in itself but the purpose and ethics of their use that matter.

The plethora of novel creative technologies referenced within this article reflects a context of perpetual innovation which is now the condition of the media landscape. In this setting, ethical considerations cannot be postponed while documentary makers get to grips with new creative media technology. *The Racial Terror Project* points towards a production model appropriate to this state of permanent innovation. Here, experimentation with a new technological platform provides the occasion for producer, subject and participants to work together, exploring a pressing contemporary theme while also interrogating how the new platform can contribute to the project of convening critical dialogue about our shared world.

[i] John Perry Barlow, "Being in Nothingness" (1990) accessed October 1, 2017 https://w2.eff.org/Misc/Publications/John_Perry_Barlow/HTML/being_in_nothingnes s.html

[ii] Randal Walser, "Elements of a Cyberspace Playhouse", quoted in Howard Rheingold, *Virtual Reality* (New York: Simon and Schuster 1991) p 192

[iii] There isn't yet an established mode for referring to the phases of VR development. By first wave VR I mean the era of Ivan Sutherland's invention of the head mounted display in 1968. Second wave VR can be seen as starting with Jaron Lanier's coining of the term virtual reality in 1989. The third wave dates from Palmer Luckey's development of the Oculus Rift in 2011.

[iv] Winston, Brian. *Technologies of Seeing: photography, cinematography and television* (London: BFI 1996)
Anne Balsamo, *Technologies of the Gendered Body: Reading Cyborg Women* (Durham and London: Duke University Press, 1996)

^v The notion of storyliving gained traction in 2017 among brand marketeers. In *From Storytelling To VR 'Storyliving': Future Marketing Communications,* a July 2017 article in forbes.com, Michelle Greenwald suggests that the term was coined by Google Zoo – Alphabet's think-tank - in the context of audience research on VR journalism, but it can be found more widely in discussions of brand management and immersive media. Accessed Jan 6 2018 https://www.forbes.com/sites/michellegreenwald/2017/07/31/from-storytelling-to-vr-storyliving-future-marketing-communications/#34ffa5b235e2

^{vi} As of yet there is no agreed name for the one audience member who engages with virtual reality. The term user is common, but I generally resist this, as, while it evokes an active mode, it has a dehumanizing quality. For the purposes of this article I'm adopting the term participant, which feels apt for experiences where there is significant interaction, although it might be argued that the word overstates the agency available within the experience of 360° video, where viewer might still be a more appropriate term.

^{vii} I draw the notion of *falling through* Alberti's window from Jay Bolter and Richard Grusin's *Remediation: Understanding New Media* (Cambridge, Mass. London, England: The MIT Press 1998)

^{viii} Laura Mulvey *Death 24x a second : stillness and the moving image*. (London: Reaktion 2006) p 30

^{ix} I am following Jonathan Steuer in identifying presence as the defining characteristic of VR. The experience of presence is common across a wide variety of VR technical platforms from Google cardboard to HTC Vive. Jonathan Steuer, "Defining Virtual Reality: Dimensions determining Telepresence" in *Journal of Communication* Autumn 1992: 73 - 93

^x Erin Spens, "The Virtual Reality Revolution: Will VR change how we watch movies?" accessed December 6 2017 https://moviepilot.com/posts/3847187

^{xi} John Jurgenson, "Visit an Ebola Hot Zone in the Virtual Reality Film, Waves of Grace", Wall Street Journal, accessed December 6 2017 http://dragons.org/844/visit-an-ebola-hot-zone-in-the-virtual-reality-film-waves-of-grace/

^{xii} Angela Watercutter, "This Ebola Documentary Shows VR Film's Radical Potential", Wired Magazine 09.01.15 accessed December 10 2017 https://www.wired.com/2015/09/vr-ebola-film/

^{xiii} William Uricchio, "VR is not a film. So what is it?" Immerse.news, 2016 accessed November 10 2017 https://immerse.news/vr-is-not-film-so-what-is-it-36d58e59c030

xiv William Uricchio, "Putting VR in Perspective", a keynote at the "Virtually There: Documentary meets Virtual Reality" conference at MIT May 6 2015 accessed December 6 2017
https://www.youtube.com/watch?v=SR5xRESAt98

xv William Uricchio, "VR is not a film. So what is it?" Immerse.news, 2016 accessed November 10 2017
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xvi Shari Frilot, Homay King, "Virtual Reality in Real Time: A Conversation" in Film Quarterly Fall 2017 Vol 71 Number 1

xvii Laura Mulvey, "Visual Pleasure and Narrative Cinema" *Screen*, Volume 16, Issue 3, 1 October 1975, Pages 6–18

xviii Phillip Doyle, "Embodied and Disembodied Voice: Characterizing Nonfiction Discourse in Cinematic-VR.: In: Nunes N., Oakley I., Nisi V. (eds) Interactive Storytelling. ICIDS 2017. Lecture Notes in Computer Science, vol 10690. Springer, Cham

xix Chris Milk, "How virtual reality can create the ultimate empathy machine." TED accessed December 10 2017
https://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine

xx Kate Nash "Virtual Reality Witness: exploring the ethics of mediated presence." Studies in Documentary Film 2017 p 2
http://www.tandfonline.com/doi/full/10.1080/17503280.2017.1340796

xxi Ibid p 6

xxii Ibid p 13

xxiii Winston p 118

xxiv Robin Mcnicholas, "ITEOTA Behind The Scenes Part 1: Into the Forest" accessed December 12 2017 **https://vimeo.com/174734638**

xxv Ibid

xxvi Perry Barlow

xxvii Anne Balsamo Technologies of the Gendered Body (Duke University Press, Durham and London 1996) p 125

xxviii Nonny de la Peña, 2017 "Towards behavioural realism: experiments in immersive journalism" in Judith Aston, Sandra Gaudenzi, and Mandy Rose, *i-Docs: the evolving practices of interactive documentar*y (New York and Chichester, West

Sussex: Columbia University Press) p 241

xxix Char Davies, "Virtual Space" in *Space: In Science, Art and Society* Francois Penz, Gregory Radick, Robert Howell, eds. (Cambridge, England: Cambridge University Press) 2004 p 3

xxx Ibid p 2

xxxi Uricchio Immerse.news