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Immersive Attunement: Consciously Capturing Cultural Geo-Heritage Sites in Cinematic Virtual Reality

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Abstract

This paper seeks to unpack the social, environmental and cultural impact that virtual reality (VR) photographic documentation has on sacred geo-heritage sites. Artistic and creative researchers have consciously or unconsciously practiced immersive attunement when visiting and creating digital art. Several of these sacred geo-heritage sites are protected for their geological, historical or cultural significance.

Immersive attunement is the concept of immersing oneself in a foreign environment and being culturally conscious of the impact that the filmmaker's physical presence and the audience's virtual presence imposes on a given space. Cinematic virtual reality is a form of immersive media that creates a digitised cinematic experience using 360-degree cameras, designed to project a spherical image through a head-mounted display. This allows the audience to screen the VR film from inside the picture. Immersive media technology such as virtual reality cameras and photogrammetry drones are currently mapping geological sites around the world, for a myriad of scientific and artistic research. These projects offer the possibility of advancements in scientific understanding and artistic awakening. What social, cultural, and environmental impact do the researchers or artists photographing the site have on those specific environments?

This paper aims to investigate ways in which immersive media artists can sustainably and consciously compose and photograph cultural geo-heritage sites for cinematic virtual reality experiences. What choices can immersive media artists make to consciously photograph these significant places using VR technology, without harming the environment? What are the ethical responsibilities of using these technologies in places that are not only culturally protected but sacred?

Keywords

Virtual reality, geographic heritage site, creative research, digital art, Africa, South Africa, sacred site, photogrammetry, Inzalo Ye Langa, Lalibela, immersive attunement, virtual presences.

Introduction: The Act of Seeing

The act of *actively looking* is the primary action a person is engaging in when screening a cinematic virtual reality (VR) experience. VR is a form of immersive media that creates a digitised cinematic experience using 360-degree cameras, designed to project a spherical image through a head-mounted display (HMD). This allows the audience to screen the VR film from inside the picture. Conventional two-dimensional cinema relies on one lens to capture the action. A VR professional camera is the shape of a miniature basketball with multiple lenses pointed in different directions. Each experience of screening VR is unique, as it is self-guided and self-curated. Audiences screening a VR experience guide their own gaze, thus taking over a portion of the role that the film editor once occupied. The audience replaces the camera when engaging with a virtual experience. The act of looking at an image through a head-mounted display significantly alters and transforms the conventional cinematic experience.

Virtual reality HMDs are the shape of pilot goggles and two-dimensional film screens are rectangular. The distinct difference between both viewing experiences is illustrated by the shape of the screening apparatus. Virtual reality is a participatory medium. An immersive artist cannot underrate the nature of the medium of VR, which is designed to cognitively transport. Similar to a pilot's ability to navigate the unpredictable nature of the sky, an immersive VR artist requires a well-crafted plan when photographically documenting a sacred geo-heritage site. Unesco states that geological heritage sites encompass 'artefacts, monuments, a group of buildings and sites, museums that have a diversity of values including symbolic, historic, artistic, aesthetic, ethnological or anthropological, scientific and social significance.'[1] Sacred geo-heritage sites are often revered by the inhabitants that are native to the land and hold ancestral ties to the area. A place is sacred not simply because of its location but 'what is known as a sacred site carries with it a whole range of rules and regulations regarding people's behaviour in relation to it and implies a set of beliefs to do with the non-empirical world, often in relation to the spirits of the ancestors, as well as more remote or powerful gods or spirits'.[2]

I became acutely aware of the gravity of photographing a sacred geo-heritage site in VR when writing a screenplay for an interactive virtual reality experience that highlighted the significance of the African new year. Religions and nations around the world use their own unique calendars to mark the passing of time. Most calendar calculations use the moon phases and the earth's proximity to the sun as instruments of measurement. The African calendar applies the same methodology, with one additional apparatus: Inzalo Ye Langa (the birthplace of the sun). Inzalo Ye Langa (Figure 1) is the oldest stone calendar in the world, and it is located in Mpumalanga, South

1 UNESCO Institute for Statistics, 2023. *Cultural heritage*. Available at: https://uis.unesco.org/en/glossary-term/cultural-heritage (Accessed 17 October 2024).

2 D.L. Carmichael, J. Hubert, B. Reeves and A. Schanche, *Sacred Sites, Sacred Places. A Report for The Gaia Foundation* (London: Calverts and Routledge, 2008), 7.

Figure 1: Inzalo Ye Langa: Two dolomite stones. Dladla, personal photograph, 2022.

Africa. Stonehenge is one of the most widely known geo-heritage site stone calendars. Inzalo Ye Langa surpasses Stonehenge in age.

The African new year falls on the first day of the spring equinox, when the southern hemisphere experiences equal amounts of day and night. The stone calendar naturally and majestically marks the exact timing of the spring equinox and the African new year because the sun passes through the gap between the two dolomite rocks on September 22 or 23 every year. The sun casts a vibrant light through the centre of the two dolomite stones ('A' and 'B' in Figure 1). The dolomite stones of Inzalo Ye Langa chart the movement of the sun from spring equinox all the way through to the winter solstice. This geo-heritage site is not only known for its historical significance, but it is considered by some as one of the most healing and spiritual sites in South Africa. During the spring equinox, communities take spiritual pilgrimages and travel to the site to bask in the healing energy of the sun and the magnetic frequencies released by the dolomite stones. Inzalo Ye Langa is a sacred and holy site for many South African spiritual healers. The stone calendar was the initiation site of a revered South African spiritual healer, Vusamazulu Credo Mutwa.

A common utterance amongst entertainment industry producers is, 'location, location, location'. This epizeuxis is emphasised to stress the importance of finding the best physical location for a film or photography shoot. The place sets the tone.

Location plays a more pivotal role in the immersive medium of VR than in two-dimensional cinema. In VR, the place is the lead character, while the actors play a supporting role. When visiting and creating a virtual reality project with a film crew in this historic and spiritual space, I wrestled with our presence there. As we released photogrammetry drones above the circle, to take three-dimensional images of the site, a pulse of unease filled my body. The magnetic pull of the dolomite stones interfered with the drone's signal, pulling the drone down as it mapped the site in the air. As the stone circle tackled the photography equipment, an internal war was waged inside me. What does it mean to be an artist and a person of Africa heritage? An artist believes in the power of art and the lasting impact that a moving artistic creation can have on an audience. As a South African of Basotho heritage, I have been taught through my language and cultural practices to take pride in my home and the land of my ancestors. What impact was the virtual reality crew's presence having on this sacred geo-heritage site? Given the site's cultural and spiritual significance, what effect would the virtual presence of an audience have on the integrity of the site? These questions led me to the awareness of the importance of immersive attunement in the creation of virtual experiences.

Immersive attunement is the concept of immersing oneself in a foreign environment and being culturally conscious of the impact that the filmmaker's physical presence and the audience's virtual presence has on a given space. Attunement is a concept often referenced in the process of art making. Nélio Rodrigues Conceiçâo describes attunement in relation to the practice of photography, as the tension that exists between a photographer and the world:

> In its intersubjective complexity – implying a tension with the world and others – the gesture of photographing is also, or perhaps above all, a gesture of attunement. This means that neither the photographer, nor the photographed subject, nor the viewers of the scene can be seen as abstract, immobile, unchanging subjects or objects. In a certain sense … the gestures of the photographer reveal this movement of becoming attuned to the world and to the photographed subject, which necessarily presupposes the technical mediation of the photographic apparatus. To photograph a situation is also to manipulate it, and this occurs not only because the photographer controls – however intuitive this 'controlling' may be – exposure times, filters, framing, point of view and post-production, but also, as a result of attunement, the incessant attempt to find the 'privileged moments' in each still image.[3]

The need for attunement in photography is directly relational to the social, political or ethical implications of photographing the site. Virtual reality is a cinematic

3 N.R. Conceição, 'Gestures, Attunements and Atmospheres: On Photography and Urban Space', *Journal of Aesthetics and Phenomenology,* 8, 2, 2021, 135–153.

medium that evolved from stereo photography. Stereoscopic images are created through a technique that uses two photographs to produce an image with three-dimensionality.[4] The exploration of attunement in this study recognises virtual reality as a cinematic medium that has evolved from still photography to stereoscopic motion-pictures. Attunement is a concept that photographers have grappled with for decades. Still photography, like two-dimensional cinema, is consumed by an audience from outside of the frame. Virtual reality further complicates the relationship between the image and the audience by placing the audience inside the frame. Researchers have found that the psychological phenomena of body transference[5] takes place when a virtual reality participant, known in VR as 'the visitor', witnesses the virtual environment projected through a head-mounted display. Audiences engaging with the virtual experience (VR-visitor), arrest their senses and surrender to the experience of virtually inhabiting another environment. Although the audience is virtually occupying the space, the experience can feel very real. Depending on the subjectivity of the observer, certain images can illicit strong emotional responses to the material displayed.

Geo-heritage sites are places that have been marked as culturally significant by nations and communities. The historical and spiritual relevance of the physical landmark holds value to the community, and a photographer must consider this when photographing images of the sacred site. In creating the VR experience at Inzalo Ye Langa, I contemplated the implications of producing VR imagery of the site. How would I, in a virtual medium, convey the surreal and inexplicable feeling that I physically felt at the stone calendar? The challenge of attunement for the artistic researcher is to photographically render the physical site and to imbue the virtual experiences with a sense of the non-material essence that constitute its reverence. Immersive attunement is a method of contextualising and conscientising the audience about the significance of virtual visitation at the geo-heritage site. Without immersive attunement, an ancient mathematically and astrologically calibrated stone calendar can appear to be simply a man-made sculpture garden. The immersive artist must aim to cerebrally baptise the virtual audience by creating an experience that allows the audience to contextualise the cultural and spiritual relevance of the sacred geographic heritage site. This is a lofty but necessary task. Falling short of the intention renders the magnitude of the VR experience mundane. This research aims to investigate ways in which artists and researchers working with immersive media such as VR can sustainably and consciously photograph sacred geo-heritage sites for cinematic virtual reality experiences.

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4 Dictionary of Archivists and Archives. (n.d.) *Stereoscopic photography*. Available at: https://dictionary.archivists.org/entry/stereoscopic-photography.html#:~:text=(often%20stereo%20photography)%2C%20n,the%20appearance%20of%20three%20dimensions. Retrieved 14 November 2024.

5 M. Slater, B. Spanlang, M.V. Sanchez-Vives and O. Blanke, 'First Person Experience of Body Transfer in Virtual Reality', PLOS ONE 5, 5, 2010, e10564. https://doi.org/10.1371/journal.pone.0010564.

Photogrammetry in Virtual Reality Experiences

Photogrammetry is a type of photography that employs drones with cameras that use structure from motion (SfM) technology. SfM technology renders a three-dimensional image of a geographic site that allows spectators to explore the image from a 360-degree vantage point. The VR-visitors can move around and through the three-dimensional image at scale, using the virtual reality HMDs and controllers. Virtual reality is a medium that marries the traditions of cinema with the attributes of gaming. The virtual reality HMD is the screen that the images are projected onto, and the controllers allow for movement within the frame, in a similar manner to moving an avatar around a video game.

Additionally, photogrammetry is used to allow VR-visitors to engage with interactive assets that are digitally created and placed within the virtual image. For example, in the VR experience that was created at Inzalo Ye Langa, the participant screening the VR film is physically offered a seed to plant in the ground by Asar, the green deity of spring. The seed is a physical asset that is symbolic of setting an intention or new year's resolution for the African new year. While creating the VR film at Inzalo Ye Langa, it became apparent to me that digitally recreating a sacred geo-heritage site using photogrammetry, as well as introducing additional virtual assets or objects into the scene, has ethical implications. This is particularly the case when the environment photographed holds cultural, spiritual and historical importance. The digital assets that are created to allow for interactivity in the VR storytelling must be accurate representations of objects and artefacts that are indigenous to the geo-heritage site. The seed Asar hands to the VR-visitor in the experience needed to be a digital replica of a seed from a regionally indigenous tree. Offering the *visitor* an exotic seed would taint the viewing experience and create colonial narrative implications to the storytelling. In two-dimensional film, filmmakers go through great lengths to use realistic props and set décor in scenes to maintain the integrity and believability of the story. Virtual reality films require the same, if not more, effort to create a realistic representation of a place because the virtual medium increases an audience's reluctance to temporarily arrest their sense of disbelief.

A virtual reality documentary that primarily uses photogrammetry in its design is *Home After War (2019)* by Gayatri Parameswaran. The sacred site photographed in this virtual experience is the home of Ahmaied, the subject of the documentary. Ahmaied's home was destroyed by improvised explosive devices (IED) during the war in Iraq. In the VR experience, VR-visitors use the HMD controllers to manoeuvre around the virtual recreation of Ahmaied's home, as Ahmaied life-size volumetric video image narrates the significance of each room in his house. Volumetric images are three-dimensional videos of people or moving objects. Both photogrammetry and volumetric images are produced by taking hundreds of images to digitally recreate objects, individuals or environments. Volumetric videos digitally create the illusion of volume in the scanned image but are not completely three-dimensional.

Drones and aerial photography are agents of mass surveillance and destruction in military operations. The presence of these menacing aerial instruments can be

psychologically triggering for populations of people who encountered drones regularly in times of war. While immersive VR artists 'may not think of their work as surveillance or espionage, the potential ramifications of using aerial or spaceborne imaging systems to photograph people's home and property do require careful thought, especially when the bounds of an investigation involve culturally sensitive areas or communities that have historically been exploited by colonialist/imperialist agendas'.[6] The use of photogrammetry has become common practice for artists creating immersive works for extended reality (XR). The photogrammetry photographer is as implicated as a still photographer in the politics of producing 'the privileged moment in each still image'.[7] Immersive attunement can be applied in this instance by the VR artistic team recognising the choice of photographic equipment and the potential impact that using the equipment could have on a community previously affected by war.

The director of *Home After War* applied immersive attunement in the design of the virtual reality documentary by using VR technology to aid her in the depiction of the impact that war weaponry has on families during and after a war. Photogrammetry was used to immerse the audience in a virtually recreated physical space that no longer exists in the same condition it was in prior to the war. The artists used photogrammetry as a reparative tool instead of an exploitative one. Ahmaied's home is a site that physically reflects the extent of the damage that war weaponry has on a community impacted by war. The immersive artists chose to empower, rather than to extract from the community and their collective trauma. The immersive artists who worked on the VR documentary spent many hours photographing what remains of the site. The documentarians collected primary research through interviews of Ahmaied and his neighbours to reconstruct the house in VR, via memories of what it looked like in the collective imagination of all interviewed. Although Ahmaied's home is not classified as a Unesco geographical heritage site, it houses similar value and sentiment to Ahmaied, his family and the larger community.

A home is a space where memories are created and held sacred by its occupants. Lessons in working with sacred spaces can be learnt from virtual reality documentaries like *Home After War.* Parameswaran attunes herself to Fallujah, Iraq and its people by making the decision to capture the site in person and not from a remote 'safe' distance. The documentary crew of *Home After War* went through great lengths to travel to Iraq and capture a voluminous number of images to digitally and accurately represent an area of the world that few will have the opportunity to visit in person. The weight of responsibility for accuracy in representation was not dismissed by these documentarians. When a virtual visitor encounters this place and community through the HMD, there is an immediate awareness of the precision that the documentarians took in recreating every inch of Ahmaied's home and sacred space. Every room that was digitally recreated is accurate to the scale of what remains

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6 D.S. Davis, D. Buffa, T. Rasolondrain, and E. Creswell, 'The Aerial Panopticon and the Ethics of Archaeological Remote Sensing in Sacred Cultural Spaces', *Archaeological Prospection*, 28, 3, 2021, 305–320. doi: 10.1002/arp.1819.

7 M. Slater, B. Spanlang, MV Sanchez-Vives, and O. Blanke O, 'First Person Experience of Body Transfer in Virtual Reality', PLOS ONE 5, 5, 2010: e10564. https://doi.org/10.1371/journal.pone.0010564.

of the home. The smaller rooms feel small, and the family rooms feel lived in and true to life.

Throughout the documentary, the sole voice narrating the significance of the site is the owner of the home himself. The documentarian is not heard or physically felt. The virtual experience's integrity is amplified by the lengths the documentarian took to document the experience. The documentarian's point of view and narrative direction cannot be removed from the work. Presence is a key and defining component of VR experiences and it is defined as the feeling of 'being there' in a virtual experience.[8] Presence in VR is described as an experience where 'the participant ceases to think of himself as interacting with a computer and starts to interact directly with the three dimensional environment'.[9] This foundational principle of VR is a relevant factor in what sets VR apart from other visual media. The computer reproduces the real world by trapping the participant in the spherical image that evokes a proteus effect. The proteus effect was coined by researchers Yee and Bailenson who uncovered the phenomenon when observing participants in virtual reality, transforming self-representation of themselves in the virtual environments.[10] In VR, presence means the ability to feel as if you are within the storytelling as an active participant. In two-dimensional cinema, the choices in narrative direction and the pacing of the storytelling remain in the hands of the creatives designing the work. In *Home After War,* the virtual visitor is given agency to teleport to any point within the virtual environment by using the HMD controller to move through the three-dimensional image. The choice to give the VR-visitor agency to move around the virtual environment is an example of immersive attunement. The virtual visitor is granted the freedom of movement that occupants of war-torn regions who are restricted by law and circumstance do not have in their own country and land. This choice by the VR director attunes the VR-visitor to contextualise the privilege of having autonomy and freedom. Virtual reality directors make cinematic choices that influence the tone, theme, mood and style of the storytelling. The choice to create a virtual reality experience using photogrammetry is an expensive and extensive task. This choice is similar in scope to photographing a motion-picture with an iMax camera. Most virtual reality productions are made using 360-degree stereoscopic video footage, which allows the virtual visitor to use their own eyes to screen the image. Photogrammetry takes images of an environment that are digital and stitches them together using advanced software, which creates sufficient detail of the virtual environment. Photogrammetry images do not distort when moving within the frame using VR controllers.

In the cinematic VR experience created at Inzalo Ye Langa, I adapted the lessons in immersive attunement learnt from engaging in the storytelling of *Home After War*. The VR-visitor was guided by the narration of the voice of a South African male

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8 Interaction Design Foundation, 'Presence', *Interaction Design Foundation*, n.d. https://www.interaction-design.org/literature/topics/presence. (Retrieved 20 October 2024).

9 C. Coelho, J. Tichon, T.J. Hine, G. Wallis and G. Riva, 'Media Presence and Inner Presence: The Sense of Presence in Virtual Reality Technologies. In *From Communication to Presence: Cognition, Emotions and Culture Towards the Ultimate Communicative Experience*, 11, 2006, 25–45.

10 N. Yee and J. Bailenson, 'The Proteus Effect: The Effect of Transformed Self-representation on Behavior,' *Human Communication Research*, 33, 3, 2007, 271–290.

voice-over artist who embodied the voice of the primary narrator, Langa (the sun). Langa narrates the entire VR experience, speaking to the virtual visitor in IsiZulu with English subtitles. An indigenous South African language was used in the VR experience as an agent of immersive attunement. The tone of the virtual reality experience is further enhanced by using an indigenous southern African language. The virtual visitor is also given agency of movement around the photogrammetry-recreated, three-dimensional image of Inzalo Ye Langa. This freedom of movement borrows from the first nation of southern Africa, the Khoisan people's, cultural ideology that the land has no sole owner.[11] The land and the sacred geographic historical site belongs to all.

Photogrammetry of Lalibela: 'Place Blesses Humans and Humans Bless Place'

For several decades, geo-heritage sites have been photographed using film and digital still photography for archive collections. Currently, a growing trend in the image-banking industry is taking three-dimensional spatial images of culturally significant heritage sites. The Zamani Project is an institution based at the University of Cape Town with the primary purpose of photographing African heritage sites and creating a database of these images. The database consists of over 250 structures, rock-art sites and statues of heritage sites in Africa, the Middle East and southeast Asia.

Estelle Blaschke's reflection on the mass production of images banks states:

> The history of photography is the history of the use of technology to render the world visible on different image carriers and in different formats and to reproduce images and enable their pooling, diffusion, and forms of use. The study of images as representations must be extended to the systems they set in motion and the economics of the production and circulation of visual material.[12]

The production of images at an excessive scale and the archiving of these images is linked to the capitalist standard of mass production. The banking of photogrammetry images of culturally significant geo-heritage sites is a direct result of the economic principle of supply and demand. Demand for these types of images has increased due to technological advancement in the extended reality (XR) industry. XR is an umbrella term for augmented reality (AR); virtual reality (VR); and mixed reality (MR). Augmented reality allows for a digital asset or image to be displayed through a tablet, smartphone or virtual head-mounted display in any environment, in real time. Mixed Reality allows for the digital image to be brought into any space in real time, with the added value of the ability to touch, interact with and

11 J.N. Amanze, 'Land and the Spirituality of Indigenous People in Africa: A Case Study of the Basarwa of the Central Kalagari Game Reserve in Botswana', *BOLESWA Journal of Theology, Religion and Philosophy,* 1, 3, 2007, 97–115.
12 E. Blaschke, 'From Microform to the Drawing Bot: The Photographic Image as Data', *Grey Room,* 75, 75, 2019, 60–83.

Figure 2: Lalibela[13]

manipulate the digital image. Scientists, educators, artists, historians, and a myriad of other professionals use these images for XR-produced training simulations and XR educational experiences. In the establishment of these large digital image banking systems with 'extremely fine spatio-temporal resolutions and virtually unlimited spatial coverage, issues of power and surveillance must be confronted head-on to ensure that future research is equitable and avoids repeating the many injustices of colonial era research'.[14]

In exploring the definition of immersive attunement, the idea of conserving and protecting heritage through digital technology is paradoxical. The reasons given by most digital humanities (DM) institutions for the growing industry of image banks is for the purpose of documenting and safeguarding sites from damage due to war and natural disasters. Blaschke calls for the study of the rapid production of photography to include the study of 'the systems they set in motion and the economics of the production.'[15] The primary purpose of the production of three-dimensional images of cultural heritage sites seems to be to capture the image of a geo-heritage site digitally for further scientific or cultural studies. An absence of indigenous knowledge around the significance of these images is an oversight by image-banking systems. A holistic conservation practice must encompass the protection of the physical structure of the

13 Shutterstock, *Ethiopia, Lalibela, Monolithic Church of Saint George*, 2018, https://www.shutterstock.com/image-photo/ethiopia-lalibela-monolithic-church-saint-george-1172654314. (Retrieved 15 November 2024.)

14 D.S. Davis, D. Buffa, T. Rasolondrain, and E. Creswell, 'The Aerial Panopticon and the Ethics of Archaeological Remote Sensing in Sacred Cultural Spaces', *Archaeological Prospection*, 28, 3, 2021, 305–320. doi: 10.1002/arp.1819.

15 E. Blaschke, 'From Microform to the Drawing Bot', 60–83.

site, as well as the cultural, spiritual, social and historical aspects of the site. Image banking of sacred heritage sites have reinforced colonialist agendas that in many instances have severely negative consequences.[16] The colonial signature of being the first to discover an archaeological or ecologically significant place has evolved into a race to photograph the site using the latest technology.

The Zamani Project has created an image database of several African geo-heritage sites using photogrammetry technology. An example of a cultural heritage site that the Zamani Project has photographed using 3D documentation methods for digital cultural heritage (DCH) is Lalibela in the Amhara region of Ethiopia. Lalibela is a sacred geo-heritage site in Ethiopia of eleven medieval monolithic rock-carved churches that were constructed by King Lalibela in the 12th century (Figure 2).

In his research on the spiritual genealogy of Lalibela, Yirga Gelaw Woldeyes writes:

> Lalibela's churches are places embodied with spiritual meaning and identity. The Ge'ez saying "መካን ይቀድሶ ለሰብእ፤ ወሰብእ ይቀድሶ ለመካን", (place blesses humans and humans bless place) indicates a view of place suffused with values, personalities and actions that complicates the dualism.[17]

This quote refers to the ethos that Ethiopians and many other African cultures possess about sacred spaces having their own agency. The Ge'ez saying highlights a cultural understanding of the symbiotic relationship between humans and sacred geo-heritage sites. The agency that each possess is the ability to have a profound impact on the other. When exploring the concept of immersive attunement, the intangible ethereal impact of sacred geo-heritage sites on the artist and virtual audiences is an integral concept of exploration. An example of how the ethereal quality of sites is captured in virtual reality is through sound. Sacred geo-heritage sites are often places that exist in rural surroundings. The sound of the sacred site is often coloured by the distinct sounds of indigenous birds, wildlife and the rustle of the wind through flora and fauna at the site. Virtual reality uniquely records sound using spatialised binaural sound recorders. Binaural sound refers to methods of 'recording and reproducing sound with the intent to construct an immersive auditory sensation'.[18] This recreates the sound of being at the site for the human ear. Binaural sound recorders are the shape of the human head and are often recorded using technology that uses a mannequin head with microphones on opposite sides, within the earlobes. The sound of the geo-heritage site is the voice of the site. Humans are autonomous beings with agency and the Ge'ez belief bestows the same ethos to the geo-heritage site. Immersive attunement shows recognition of the sacred site's agency, and the virtual experience

16 D.S. Davis, D. Buffa, T. Rasolondrain and E. Creswell 'The Aerial Panopticon', 305–320.

17 Y.G. Woldeyes, 'Lalibela: Spiritual Genealogy Beyond Epistemic Violence in Ethiopia,' *Genealogy* (Basel), 3, 4, 2019, 66.

18 M. Geronazzo, A. Rosenkvist, D.S. Eriksen, C.K. Markmann-Hansen, J. Køhlert, M. Valimaa, M.B. Vittrup, and S. Serafin, 'Creating an Audio Story with Interactive Binaural Rendering in Virtual Reality'. *Wireless Communications and Mobile Computing*, 2019,1, 1463204.

created should not betray this postulation. When a human subject is photographed, consent is often the first step taken before the camera and sound are turned on. Immersive attunement operates as a contract between the artistic researcher and the sacred site. It is an agreement undertaken before producing the virtual recreation of the site to honour the geo-heritage site's autonomy and sanctity.

An artist cannot assume that the images created by the 360-degree camera will encompass the beauty of the site, as well as the distinctive qualities that hold its value. Photographed alone, the rock churches are a marvellous feat of architecture. It is the immersive artist's task to communicate and cinematically translate into the VR experience the spectral elements that set the site apart and constitute its sanctity. Sound plays a significant role in evoking the intangible attributes of the sacred heritage sites that are unique to that specific environment.

Ciraj Rassool describes the historical chronology of debates around the protection of sacred African heritage sites as follows:

> In the African context, Great Zimbabwe has been the site of a significant body of research on the meanings and symbolic significance of its architectural features. One component of this research has shown how this site has been protected because of its spiritual significance and meanings long before its protection under colonial and postcolonial conservation systems. The work of Ndoro (2005), Sinamai (2003), and Fontein (2006), among others, has made a case for an African precolonial system of 'protection' and indeed conservation of the site as a sacred shrine by spirit mediums long before the intervention and indeed dispossession by the organised systems of national and world heritage.[19]

The spiritual history of Lalibela is an integral aspect of the identity of the site. The custodians of knowledge about the social and cultural significance of the site are the people with ancestral ties to the land it sits on. Digital archives on websites and image banks rarely place emphasis on the spiritual significance of the sacred geo-heritage site or source indigenous knowledge from its native occupants with ancestral linkage and relationships to geo-heritage site. To attune oneself to an environment with knowledge system outside the academy requires that an artistic researcher not fall prey to 'native colonialism'. An artistic researcher may be a native of the country but cannot assume that such proximity equates to ownership and understanding of the cultural context of the geo-heritage site.

Jürg Schneider and Paul Weinberg craft an intriguing argument about the relationship between digitisation and the African photographic archive:

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19 C. Rassool, 'Toward a Critical Heritage Studies', *Material Religion,* 9, 3, 2013, 403–404.

> The meeting point between African photographic archives and the digital age therefore simultaneously offers considerable challenges and genuinely exciting possibilities. There could be a complete re-imagining, repurposing and democratisation of previously inaccessible archives. There is an opportunity for agency and the curating and re-curating of material that can question staid ideas of what 'Africa' is.[20]

What does the three-dimensional image of Lalibela produced for a web-based catalogue offer? Although the digitisation of photographic images brought with it a democracy in access, it simultaneously watered down the porous medium of photography. Sacred geo-heritage sites are stripped of their spiritual and cultural importance through the industrialised act of mass digital reproduction. The commodification of the sacred site's image produces the commerciality of a place that holds deeper cultural importance. Immersive attunement is an important concept to consider when creating image banks. The Ge'ez saying of 'place blesses humans and humans bless place' is an important litmus test in the application of immersive attunement. The impact of mass production of these types of images begs the question: what could be the implications and consequences of using the images outside of their social, historical, spiritual and cultural context for the sanctity and integrity of the heritage site. To photograph using virtual reality tools is comparable to producing a virtual clone of the site. Attunement is an act by photographers recognising their privilege in the exchange between humans and sites. The language of photography alludes to a recognition of the extractive history of the medium, which often 'captures,' 'shoots' and 'takes' from its photographed subjects. Immersive attunement thus has the potential to operate as reparative practice.

Lessons from Eco-museology Theory

The answers to the questions of how artistic researchers can sustainably and consciously compose and capture cultural geo-heritage sites for cinematic virtual reality experiences can be unearthed in the practice of eco-museology. Screening a virtual reality experience created at a cultural geo-heritage site can be compared with the experience of visiting a museum. Eco-museology is a practice in which industry specialists and the local community of the heritage site or museum work together to display their culture and heritage through the museum. The public use the museum as a 'mirror that the local population holds up to its visitors so that it may be better understood and so that its industry, customs, and identity may command respect'.[21]

As an expert in the field of ecomuseology, Amareswar Galla, concludes that the framework of eco-museology brings people and their environment together into a holistic conservation ethic. World heritage values recognise that the tangible

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20 J. Schneider and P. Weinberg, 'No Way Back – Reflections on the Future of the African Photographic Archive', *History in Africa*, 47, 2020, 167–194.

21 G.H. Rivière, 'The Ecomuseum – An Evolutive Definition', *Museum International*, 37, 4, 1985,182–183. doi:10.1111/j.1468-0033.1985.tb00581.x.

hierarchical authentication of power relations should be grounded in an intangible heritage of the primary stakeholder community.[22] An immersive artist benefits from the application of this definition in the understanding of the value and interpretation of what it means to be attuned. The 'primary stakeholder community' are the people with indigenous knowledge of the historical and cultural significance of the geo-heritage site. When adapting the theories of eco-museology to immersive attunement, the secondary stakeholders include the artist, the virtual audience of the work, and the art created. The tangible and intangible resources in developing a holistic approach to eco-museology can be easily replicated in the creation of a cinematic VR experience that is attuned. When narrating the significance of the geo-heritage site through interviews, voice-over, sound, or music, an immersive artist must consider the value of the intangible assets tied to the choice of who narrates the oral history of the site. This can be applied to the VR experience by including aspects such as languages, distinctiveness, folklife, values and voices.

Creating an attuned virtual experience of a cultural geo-heritage site requires a thoughtful and considered representation of the living heritage of the geo-heritage site: the local and indigenous people. In most cases, the local community has ancestral ties to the geo-heritage site and their input and validation of the work is essential. The movable and immovable tangible assets that are photographed or digitally composed in the construction of the virtual experience must be accurate representations of indigenous knowledge systems.

When applying concepts from research about holistic representations of cultural heritage, immersive artists must additionally consider the spiritual sanctity of the site. What are the spiritual canons that govern the sanctity of the geo-heritage site? Attunement calls for an artistic researcher to honour such canons in creating the virtual experience. A virtual reality documentary that consciously undertook the act of sourcing local knowledge within the documenting of a local historical landmark site is *Traveling While Black (2019),* directed by Roger Ross Williams. *Traveling While Black* is a virtual-reality documentary that narrates the story of the cultural, historical and political relevance of the Washington DC-based restaurant, Ben's Chili Bowl. Both the documentary director and the production house that created the VR documentary are Canadian. Although the creators of the work are foreigners to the country where the historical landmark is located, the artistic researchers did their due diligence in research. *Traveling While Black* is an immersive and attuned work of digital art because the virtual reality filmmakers centred the historical accuracy of the narrative around interviews of Washington DC locals, with firsthand experiences of the site.

Virginia Ali is the co-owner with her husband Ben Ali, of Ben's Chili Bowl. In the virtual reality documentary, Ali's recollections of the history of the restaurant during the civil rights movement in America was a vital perspective that the documentarians did not overlook. She has been a resident of Washington DC and

22 A. Galla, 'Cultural Diversity in Ecomuseum Development in Viet Nam', *Museum International*, 57, 3, 2005, 101–109, DOI: 10.1111/j.1468-0033.2005.00535.x.

co-owner of the historical landmark site for decades of her life and has been a witness to what the restaurant means to the local community. Recognising the living heritage of a historical landmark within the framework of an immersive experience's design enhances the storytelling and coats the virtual experience with legitimacy.

African people have often been disregarded in the documentation of the relevance of African historical heritage sites. An example of blatant disregard of indigenous knowledge is evident in the historical and academic documentation of Inzalo Ye Langa. The local community use the name 'Inzalo Ye Langa' for the sacred geo-heritage site. The name for the stone calendar that is often documented and used is Adam's Calendar. Adam's Calendar is the name given to the historical landmark by the Australian and South African researchers who claim to have discovered the site. *Adam's Calendar: Discovering the Oldest Man-made Structure on Earth* is a book by Michael Tellinger and Johan Heine about Inzalo Ye Langa. When conducting secondary research on the site, this book is often the sole academic resource available. Immersive attunement calls for the immersive artists to question the repercussions of perpetuating colonial patterns of bypassing indigenous knowledge and culture. Diversifying the range of sources collected about a sacred geo-heritage site is a critical step for developing an understanding of what constitutes the relevance of a site both within and outside of the academy.

The cinematic virtual reality experience created at the stone calendar was intentionally named *Inzalo Ye Langa* to reclaim the name of the site. Furthermore, the VR experience was centred on the cultural and spiritual relevance of the sun and moon as astrological and spiritual symbols of southern African spirituality and ritual. The lesson of attunement that was applied from unpacking the design of *Traveling While Black* was that of researching a site by gathering insights from people with ancestral ties to the place. Southern African spiritual healers travel to the site during seasons and occasions of significant lunar/solar activity, such as the spring equinox. To attune the structure of the storytelling around indigenous knowing meant leaning into the folklore of the sacred geo-heritage site, as inspiration for the 360-degree cinematic experience.

The Impact of Social, Environmental and Cultural Disharmony

When conducting research or creating artistic representations of sacred geo-heritage sites, artists benefit from the implementation of immersive attunement because the integrity of the art and geo-heritage site are less likely to be compromised. When a holistic, focused approach is not implemented, the virtual experience feels disingenuous and risks alienating its intended audience. The virtual depiction of the cinematic VR experience is impacted by the environmental, social, and cultural choices that the immersive media artist makes in compositional aspects of creating the work.

The concept of sustainability plays a distinct role in preserving a holistic approach to photographic documentation of geological heritage sites. The choice of equipment and the impact of the use of the technology at the site plays a major role

in environmental considerations around VR photography and its impact on geo-heritage sites. Most virtual reality equipment is less invasive than equipment used on traditional two-dimensional film shoots. The benefit of the photogrammetry drones includes the compact size of the technology and the reduced carbon footprint that the drone uses in comparison to other photographic equipment with similar compatibility. Virtual reality cameras are smaller than most professional video cameras and can be operated remotely at a distance from where the camera is placed.

Photography is an intrusive artform as it suspends the organic flow of life in its effort to digitally recreate the majesty of the ordinary. Photogrammetry drones intrude upon the integrity of the sacred geo-heritage site by the noise pollution of the drone propellers. The aerial mapping of the site restricts the natural movement of animals and birds and impinges on the spiritual sanctity of the site for its human inhabitants. This is an example of environmental disharmony that can be remedied by studying the site before principal photography. Such an immersive attunement strategy can aid the artistic researcher in selecting the appropriate time of day to use the drone, namely when the environment is naturally still and more receptive.

The choices made by the artistic researcher in portraying a geo-heritage site within the cinematic VR experience can have beneficial or detrimental effects on the location. These decisions have social and cultural ramifications. Social and cultural disharmony can occur as a direct result of an inaccurate depiction of the site. The artistic researcher has an ethical responsibility to document the geo-heritage site with integrity, and from a lens that is shaped by a holistic grasp of indigenous knowledge. For example, both Inzalo Ye Langa in South Africa and Stonehenge in the United Kingdom are stone calendars. There are distinct physical and cultural aspects of the sites that set each apart. Inzalo Ye Langa is older than Stonehenge and the significance of the formation of the stones is unique to that site alone. It is critical that the portrayal of Inzalo Ye Langa should represent its unique qualities from a southern African perspective and incorporate the traditions of inhabitants with ancestral ties to the site. When the artistic researcher creates a virtual reality experience that is not attuned to the predominant culture and social context of the geo-heritage site, the artist creates a disingenuous virtual experience.

Conclusion: Immersive Attunement

The definition of attunement is to acclimatise or make harmonious. Harmony is achieved when competing ideas or ideologies find a resting place within compromise or coexistence. Photographs are often edited in the post-production phase of their production. This action is taken to optimise aesthetic value and to remove blemishes from the image. Attunement can be understood as a form of self-editing that a photographer undergoes before venturing into taking images of places or subjects that require a nuanced and culturally sensitive approach. Immersive artists enhance the storytelling behind the virtual depiction of the sacred space by researching what makes the site sacred and to whom the site is the most culturally significant. Colonial exploitation of a people or places by a foreign group does not only occur through

political conquest. A virtual reality experience has the ability reproduce colonial and imperial tropes, that is if the immersive artist behind the creation of the work distorts the cultural representation of the site photographed. The language of virtual reality differs from the jargon of two-dimensional cinema by replacing the terms 'audience' with visitor and 'screen/watch'. The evolution of the cinematic medium into a participatory practice refers to a need for the introduction of new sets of agreements around custodianship and attuned cinematic practice.

Photographers are always in the images they create. An immersive VR artist is engaging in the art of 360-degree photography. The definition of 'attune' is to make receptive or aware. The application of that definition to immersive attunement is to be both receptive and aware of the privilege of presence, whether virtual or physical. Virtual reality is a medium that brings the feeling of physical and cerebral embodiment to the experience of engaging with a stereoscopic image. Due to the spherical illusion of being surrounded by the image, the audience feels less detached from what they are looking at. In the case of immersive attunement at a cultural geo-heritage site, the immersive artist and the VR-visitor must both take on the archetype of the guest. The immersive artist takes on the role of the scholar and the sacred geo-heritage site is the teacher. The cinematic virtual reality experience is the notepad upon which scholars ascribe their notes.