

The Playful Karoo: Translating a South African Story into the Metaverse

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ABSTRACT

This research paper explores different game design methodologies that can be used to translate the South African novel *Souvenir* by Jane Rosenthal, set in the semi-desert region known as the Karoo into a Virtual Reality experience, which can live on the *Metaverse*. The paper suggests that the translated Virtual Reality experience can be used as a tool for climate change action and awareness, as well as a way to preserve South African stories on the *Metaverse*. The paper focuses on various narrative design methodologies for storytelling in game design, suggesting which would work best for the translation of a novel into a Virtual Reality experience. Additionally, it explores practical methodologies for the production of 3D game objects and assets required to recreate the Karoo landscape as described in the novel. This encompasses an exploratory excursion conducted within the Karoo region itself, wherein the collection of primary data is executed for the creation of game assets. Additionally, this involves a comprehensive examination of Henry Jenkins' methodologies in game design, particularly focusing on narrative elements within gaming. A meaningful impact on the *Metaverse* is pursued through the translation of this Karoo-based South African novel, into Virtual Reality.

KEYWORDS

South Africa; Karoo; Metaverse; Virtual Reality; climate change; game design; methodologies; Souvenir

Introduction

The Anthropocene, a widely recognised geological epoch marked by the significant impact of human activity on the Earth's systems and environments, has garnered substantial attention in the sciences and humanities for many years (Lewis and Maslin 2015). This paper considers various game design methodologies through which the Anthropocene is manifested in the Karoo—a semi-desert region in South Africa, through the lens of Virtual Reality (VR). These methodologies are centred around the representation, replication, and reproduction of the narrative of a South African novel, *Souvenir* by Jane Rosenthal (Rosenthal 2004), into Virtual Reality. This project forms part of my doctoral research, in which a key concept throughout is that of transmedia, and the translation of the analogue

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to the digital. This paper focuses on the production of a vertical slice of a VR video game from that of the novel's quintessence.

In the development of a video game, a vertical slice is a complete portion of the game that showcases all of its core mechanics¹ and features. It serves as a prototype or demonstration of the game and is usually created early in the development process to test and refine gameplay elements (Ismail 2022). A vertical slice typically includes a small portion of the game's content and is designed to give a representative sampling of the finished product. The purpose of a vertical slice is to provide a baseline for the development team to work from and to give stakeholders and potential investors an idea of the direction and potential of the game (Tereshchuk 2022).

In this paper, different game design methodologies will be explored in order to suggest a potential means of creating a vertical slice of *Souvenir* (Rosenthal 2004) within a VR game. *Souvenir's* narrative deals with a fictional future, set in the place currently known as the Tankwa Karoo, in the year 2070. Its story follows the main character, a human clone, whose sole purpose is to maintain the futuristic technology that allows humans to grow and produce crops after an apocalyptic climate catastrophe decimates the globe. Throughout the narrative, as the clone traverses the Tankwa Karoo, the author visualises and describes the aftermath of a posthuman perspective of the Karoo's landscape:

At first the fallen trees, rolling back and forth in the waves, became the instruments of further damage, till the forest was pushed back to where the sides of the ravines rose so steeply that they were protected from the new water onslaught. There, the forest trees survived and a new beach was created over what had been the flat forest floor on the forest side of the lagoon (Rosenthal 2004, 149).

My research investigates the potential of game design and VR as tools for telling stories of urgent issues related to the Anthropocene, specifically those themes of climate change presented in a South African story, *Souvenir*. VR is able to provide engaging and interactive experiences that are more immersive than any other platform available since the inception of this article. The immersive qualities of VR are attributable to its multi-sensory engagement, which profoundly places the player in a game's 3D world. This immersion is facilitated by the comprehensive sensory stimulation offered by VR—encompassing auditory, tactile, and visual elements—thereby allowing players to experience and interact with a 360-degree virtual environment and its objects. This sensory integration ensures a heightened sense of presence within the game's virtual world, offering a deeply engaging and interactive experience (Wilkinson, Brantley, and Feng 2021). In this research, VR is used to simulate a first-person experience of climate change, including visualisations of rising sea levels, extreme weather events, and other consequences of climate change, as depicted in *Souvenir*, allowing users to explore and understand these impacts in a way that would be difficult or impossible in the physical world. It has the potential to help people understand and appreciate the importance of addressing climate change and taking action to reduce its negative impacts. The overall research project that this paper is based on explores the limitations and benefits that may present themselves when using VR as a tool for education, storytelling, and action against climate change. Scholarly discourse in film and game studies has posited the

¹Game mechanics often refer to the system, rules, actions or interactions that a player can perform within a game. For example, a player is often able to move around in a 3D video game using the WASD keys on a keyboard (Eng 2020).

concept of VR as an “empathy machine” (Milk 2015). This theory suggests that immersing individuals in the virtual worlds of others can heighten emotional responses and empathy, thereby fostering deeper human connections. However, neuroscientist Chloe Prince (2020) critiques this viewpoint, arguing that the technological allure and advancement of VR might overshadow its potential to foster empathy or human connection. Prince contends that the focus on VR’s “cool factor” may detract from its capacity to genuinely enhance interpersonal understanding (Prince 2020). Contrasting perspectives in scholarly research, particularly within the fields of education and training, indicate that VR has been efficacious in enhancing student participation and engagement. This body of research underscores VR’s utility as an educational tool, suggesting its potential to transform traditional learning paradigms by fostering more interactive and immersive learning experiences. According to PWC’s article on VR training, “employees in VR courses can be trained up to four times faster” (PricewaterhouseCoopers 2022). This is due to the immersive and practical interaction, as mentioned previously, that VR experiences and training offer employees (PricewaterhouseCoopers 2022).

The key outcome of this research involves the translation of part of *Souvenir* into a video game to digitally archive South African stories and examine the feasibility and limitations of this process. In the context of this research, while the evaluation of player attitudes towards climate change and their emotional responses to the VR adaptation of *Souvenir* is acknowledged as significant, such measurements are not conducted. This omission is attributed to these aspects being beyond the scope of the current research. Instead, the primary focus is on the examination of game design methodologies as they relate to the adaptation of a South African narrative, with a particular emphasis on the integration of climate change themes within the storyline.

The *Metaverse* is a term used to describe a collective virtual shared space created by the convergence of virtually enhanced physical reality and physically persistent virtual spaces, including the sum of all virtual worlds, Augmented Reality, in combination with or hosted on the internet (Mystakidis 2022). The archiving of South African stories and landscapes in the *Metaverse* could potentially provide a unique opportunity to preserve and share cultural heritage and history in a digital format that is accessible to a global audience. By creating virtual representations of South African stories and landscapes, such as those in *Souvenir*, it may be possible to create immersive and interactive experiences that allow people to learn about and engage with the South African Karoo in a way that would not be possible through other adaptations or translations of the novel in different creative media forms.

In my work, the contrast between the “real” and the “virtual” is examined through the process of drawing reference from the physical environment of the Karoo and creating a translation of this into a digital world for the player to experience in VR. Through examining archival depictions and an observational field visit to the Karoo, references were obtained for the creation of fictional, apocalyptic VR experiences that reflect the emerging impacts of climate crises on the region. The focus on the game production of the vertical slice of *Souvenir* into a VR experience enables an exploration of multiple game design methodologies that have aided me in its creation. Some of these methodologies include Henry Jenkins’ exploration of game design as a form of narrative architecture, which investigates the storytelling capacity of game worlds (Jenkins 2004). Danny Weinbaum’s methodologies emphasise environmental design in video games, focusing on the creation of immersive and interactive spaces (Weinbaum 2017). These methodologies

collectively contribute to the advancement of video game design as a multifaceted discipline and are applicable to the design of a landscape in Virtual Reality.

The Karoo

To contextualise the fictional, post-apocalyptic setting of *Souvenir*, it is essential to analyse the historical and climatic conditions of the Karoo region as it stands at the time of writing this article. Understanding the Karoo's past and present climate is critical to accurately depicting its transformation in the Virtual Reality adaptation of the novel *Souvenir*. This historical and climatological analysis will be instrumental in crafting a narrative that authentically reflects the novel's setting within the VR platform.

The Karoo has a long and varied history, dating back to the early Stone Age, when the area was inhabited by hunter-gatherer societies known as the San people (Rusch and Parkington 2010). During the colonial period, the Karoo was home to a number of Boer farmers who established large sheep and cattle farms in the region. In the 19th and 20th centuries, the Karoo became an important centre of the South African diamond and gold mining industries, which attracted many immigrants from other parts of the country and abroad. Today, the Karoo is known for its unique and varied flora and fauna, as well as its rich cultural and historical heritage (Dean et al. 1995). Acknowledging the historical complexity of the Karoo and its landscape is critical, particularly in the context of the San people, the region's original inhabitants, who suffered extensive cultural and territorial decimation due to colonialism. The impact of colonial brutality profoundly altered the landscape, displaced the indigenous population, and significantly influenced contemporary perceptions and interactions with the Karoo (Karoo South Africa n.d.).

Whilst the Karoo is characterised by its arid and dry climate, it supports a wide variety of unique and diverse flora and fauna. The vegetation in the Karoo is adapted to harsh and dry conditions and includes a variety of succulent plants, grasses, and shrubs. Some of the notable plants found in the Karoo include the *Albuca spiralis*, *Gethyllis villosa*, and the *Lithops*, or stone plant, to name just a few (Hallinan and Shaw 2022). The fauna of the Karoo is equally diverse and includes a number of unique and endemic species in the region. Some of the animals found in the Karoo include the meerkat, the springbok, the black-backed jackal, and the Karoo Chat bird. The Karoo is also home to a number of threatened and endangered species, including the black rhinoceros, the cheetah, and the pangolin (Dean and Milton 1999).

The vast expanse of the Karoo, which includes the sub-region known as the Tankwa Karoo where the fictionalised story of *Souvenir* is set, predisposes it to extreme weather events, including drought and flooding. Climate change is already exacerbating these conditions, adversely impacting the region's ecosystems. Rising temperatures, changes in precipitation patterns, and shifts in the distribution of plants and animals are all potential consequences of climate change in the Karoo, and these symptoms are highlighted in the story of *Souvenir*, as the author describes the climate in the Tankwa Karoo:

Nowadays all these careful calculations were a bit of a joke. The science of weather prediction had long been in disarray, and the only thing that could safely be predicted was that it was hot and would get hotter. The interior was slowly turning into a desert. Farms in the karoo no longer ran thick-fleeced merino sheep, but had gone back to indigenous

short-haired sheep and goats, and some kept small herds of Nguni and Afrikaner cattle (Rosenthal 2004, 12).

As reflected in the fictional story of *Souvenir*, these real-life climate changes could have significant impacts on agriculture, water resources, and biodiversity in the region. It is important to recognise that climate change is a global issue and that human activities, such as the burning of fossil fuels and deforestation, are major contributors to this phenomenon. It is crucial that action be taken to address and mitigate the negative impacts of climate change in order to protect the environment and the communities that depend on it.

Reports written in 2022 highlight the escalating negative impacts of climate change in the Karoo, indicating a faster and more significant influence on the environment. (Marais 2022). An article from the *Farmer's Weekly* magazine states that “plant numbers in the Succulent Karoo Biome are declining at an alarming rate due to the combined impact of climate change and the illegal removal of these rare and endangered plants from their natural habitat” (Marais 2022).

If the climate crisis is not handled correctly or action is not taken to preserve the ecosystems of the Karoo, irreparable damage will be done to its fauna and flora, which could decimate the Karoo's natural landscape. *Souvenir* describes this in detail as a fictionalised future. Although written as science fiction, when reading *Souvenir* 18 years after its publication, its posthuman descriptions appear more real than ever. In an article published in *BusinessTech*, specialists in renewable energy from *Uswitch* consolidated diverse climate change data, including emissions statistics from multiple nations and findings from the Intergovernmental Panel on Climate Change (BusinessTech 2022). This compilation of data was subsequently fed into MidJourney, an AI image-generation tool, to project visual representations of various countries' landscapes under the hypothetical scenario of a continued disregard for climate change warnings. This endeavour aimed to visually articulate the potential environmental transformations based on the analysed data. The output visuals from MidJourney show different parts of the world and their potential destruction if the carbon emissions do not reach Net Zero by the year 2050—only 20 years before the fictionalised time setting of the narrative in *Souvenir* takes place (BusinessTech 2022). The images created by MidJourney are recognised as not being precise or absolute predictions of the future. Instead, they serve as thought-provoking visual exercises, showcasing the potential of new technologies in narrating future scenarios based on current climate data. These images reflect the dystopian and climate apocalypse that is similarly imagined and described in *Souvenir*, where the Earth has reached an inhabitable, posthuman state. A prominent image, generated by MidJourney, shows the potential catastrophic damage that the Kruger National Park in South Africa could be subject to, and the lifeless barrenness that will engulf the landscape. The BusinessTech article's relevance to the VR adaptation of *Souvenir* lies in its illustration of new technologies' capabilities in addressing climate change issues and enhancing public consciousness about them. This portrayal aligns with the thematic essence of *Souvenir*, offering an alternative vision of a post-apocalyptic future. Both the utilisation of AI, as exemplified in the article, and the immersive VR experience of *Souvenir* function dually: they serve as both a cautionary tale and a medium for potentially raising awareness about the critical impacts of climate change.

New technologies, such as AI and VR, have the potential to significantly raise awareness about climate change in South Africa. AI can be used to analyse and interpret large amounts of data related to climate change, helping to create more accurate and comprehensive models of how climate change is affecting the world. VR, on the other hand, can be used to create immersive, interactive experiences that allow people to virtually visit and learn about the impacts of climate change in different parts of South Africa. By leveraging these technologies, it is possible to engage people in a more meaningful and impactful way, helping to raise awareness and understanding about the issue of climate change and the steps that need to be taken to address it. This is exactly what the green energy experts at *Uswitch* have done through their exploration of using AI-generated photos and data to show in an explicitly visual manner the severe and irreparable damage that climate change can do to the world if there is no intervention or action taken. This exemplifies the strategic use of novel technologies in conceptualising a future deeply affected by climate change, where humanity has failed to adequately safeguard the planet's ecological integrity. It presents an innovative approach to envisioning a world shaped by environmental neglect, highlighting the critical need for proactive stewardship of Earth's natural resources. In the same vein, the game production and design of *Souvenir* into a Virtual Reality experience aim to show how climate change will affect the landscape in South Africa as it is presented in the story of *Souvenir* and, at the same time, digitally archive a portion of the novel.

Capturing references for environmental design

There are various game design methodologies that can be used when replicating or reproducing the Tankwa Karoo landscape in *Unity*, a popular game development engine and VR production software. One approach is to use procedural generation, which involves using algorithms to randomly generate elements of the landscape, such as terrain, vegetation, and other features (Ikeda 2023). This can be an efficient way to create a large, diverse landscape, but it may lack the level of detail and hand-crafted touch that can be achieved through manual design. Another approach is to use hand-crafted design, where the landscape is created by an artist or designer using tools within *Unity*, such as the *Terrain Toolbox*. This allows for greater control and attention to detail, but can be more time-consuming and may require a larger team to create. A hybrid approach, combining elements of both procedural generation and hand-crafted design, may also be used to achieve a balance between efficiency and detail (Van Brummelen & Chen n.d.). Ultimately, the choice of game design methodology depends on the specific needs and goals of a project. In the case of replicating the Tankwa Karoo, as it is represented in *Souvenir*, a hybrid approach will be necessary since the landscape of the Karoo is so unique and vividly described in the futuristic novel, particularly with the effects of climate change already in place in the novel. There will be use for some procedural generation of the landscape in *Unity*, but the placement of the foliage and the creation of the 3D models and textures will need to be hand-crafted to capture the detail of the Karoo.

In order to do this hand-crafted approach, a game designer will need to gather references of the Tankwa Karoo's landscape, including its flora and fauna. This necessitated a field trip to the Karoo, undertaken to meticulously capture the landscape's details—from

photos of the landscape forms, soil, and plant life to videos of the skyscape over time. These references, along with archival sources, can be used directly in the *Unity* gaming engine to bring the landscape to life in Virtual Reality. In his article in the *Game Developer Journal*, game designer and environmental artist, Danny Weinbaum, offers multiple aspects of environmental design that need to be considered when replicating or creating a landscape in a game. These include the clustering of foliage and plants to create a more sporadic effect, adding “dead things” around the environment for a sense of texture and time-lapse, and the placement and sizes of rocks and pebbles to break up foliage patterns and repetition (Weinbaum 2017). All these elements add a sense of realism to a game’s landscape and help to immerse the player in the video game’s world. Above all, Weinbaum’s strongest suggestion for game developers and environmental designers is this:

Walk in forests, pay attention, look at what’s there. Rely on what you objectively see, not your own ideas of what a [landscape] has. Whenever you are trying to capture the magic of reality, you need to be informed by what you actually see, not what you think you see. This is true even if your forest is a stylized fantasy forest with orange waterfalls and blue bushes (Weinbaum 2017).

This methodology echoes the game design methodology that will be implemented when recreating and producing the landscape of the Tankwa Karoo as it is described in *Souvenir*. By incorporating elements of the natural world and drawing inspiration from the Tankwa Karoo, a sense of authenticity and depth is created, even in a Sci-Fi, climate-destroyed, fictional world (Weinbaum 2017). Referencing the landscape, and the structure thereof is particularly important to recreate the spacing and capacity of the Tankwa Karoo. This includes the hills and valleys that are seen in the Karoo—the way in which the mountains and planes are shaped will help bring a sense of placement for the player. Ultimately, if the game designer can place the player, who is familiar with the Karoo, inside of a Virtual Reality replication of it, the player would be able to recognise or get a sense of where they are; both in the Karoo and in the narrative of *Souvenir*. By including elements of the real world that players are familiar with, game designers can help to anchor Virtual Reality experiences, and make them feel more immersive and believable.

Narrative design methodologies

To recreate a portion of the narrative of *Souvenir*, or translate the analogue to the digital, as a game designer, I use a method of storytelling in games called *Environmental Narrative*. According to game studies academic Henry Jenkins, this is a method of storytelling that uses a game’s diegetic space and the player’s exploration and curiosity to convey a message or story (Jenkins 2004). Adopting this storytelling methodology in the VR adaptation of *Souvenir* is crucial, as a literal translation of the novel into an interactive format could result in a superficial experience. It is not feasible to replicate every detail from the novel in the game environment, thus necessitating a more interpretative approach to capture the essence of the story within the constraints of the video game medium. This method ensures a deeper, more meaningful interactive experience that aligns with the novel’s narrative while being practically achievable in game design. As a game designer, my strategy involves selectively extracting key elements from the *Souvenir*’s narrative to craft the game’s storyline. This story will be conveyed to players, not just through

conventional narrative techniques, but also through the interactive objects within the game world and the mechanics available to the player.

Souvenir's narrative follows the story of a *barbiclone* whose name is Souvenir Petersen (Rosenthal 2004). Throughout the novel, her purpose in life, much like the other clones in the world, is to mechanically service the various technologies that help farmers produce crops across the Karoo after the effects of climate change have damaged the landscape (Rosenthal 2004). In order to travel from farm to farm, she flies across the landscape in a dirigible, also known as a Zeppelin aircraft, "by 2070 the dirigibles of the Energy People were a familiar sight as they flew from farm to farm and all the outlying settlements to maintain the turbines, the farmers' main source of electricity" (Rosenthal 2004). Souvenir Petersen, often nicknamed Souvie in the novel, frequently uses her dirigible as a nomadic home—a refuge where she writes journal entries about the people she meets, the work that she does, and the events of the climate as time moves on in the story. These journal entries are made evident throughout the novel, written in the first person from Souvie's perspective, which is a change from the descriptive, third-person writing that encompasses the rest of the book. Within these journal entries, Souvie often writes and describes the landscape of the Karoo, the plants and flora within it, and the structure and features of the landscape:

This avenue, once grown, will make a splendid mark on the landscape, a most felicitous curve and shape which can be seen from miles away. The road runs up the shoulder of a long rounded hill, a gentle slope. The approach to the house is preceded by a long straight gravel road across a plain which turns as it begins the ascent. See sketch. Couldn't have devised it better myself. Should look like a question mark from far away (Rosenthal 2004, 41).

It makes sense then that the description of the landscape in Souvie's journal, as well as the main events that happen throughout the narrative, is what the vertical slice of the Virtual Reality experience should be based on. It is a matter of translating these journal entries, and the description of the landscape throughout the novel, using the game design methodology of environmental narrative storytelling.

In his article, "Game Design as Narrative Architecture" (2004) Jenkins describes game developers and designers "less as storytellers and more as narrative architects" (Jenkins 2004), because the manner in which a game's diegetic space is created directly influences the way in which that game is able to communicate a story to the player. This is especially true for Virtual Reality experiences, where the player is more immersed in a game's world than ever before. In newer Virtual Reality games and experiences, the player is able to not only look around and hear different audio in a 360 degree of freedom, but also use their hands or controllers to touch, grab, shoot, throw, push, pull, etc. all kinds of objects within a game's world. The hand-controller barrier faced by many console and PC games is slowly being faded away by Virtual Reality experiences and the world that they emerge the player into. Therefore, the design of the diegetic space has a profound impact on the game's narrative, as it can shape the choices that players make and the actions they take within the game. For example, a game set in a sprawling open-world city may allow players to explore and interact with various neighbourhoods and landmarks, giving them a sense of freedom and agency within the game world. In contrast, a game set in a more confined and linear environment may guide players through a more structured narrative with a clearer set of objectives and challenges (Jenkins 2004).

This is where Jenkins' theories around the production of different types of environmental narrative worlds in games come to light, in relation to the production of the vertical slice of *Souvenir*.

Jenkins provides four different kinds of narrative spaces that game designers are able to create when designing the diegetic world in video games. The first type of story mode or narrative space that Jenkins mentions is that of evocative spaces, which draw upon pre-existing stories but offer new narrative experiences to the player (Jenkins 2004). This means that players will be able to experience a different perspective on a pre-existing narrative that they may have already experienced. Jenkins gives the example of the video game, *American McGee's Wonderland*, which draws connections and references to the original work of Lewis Carroll's *Alice in Wonderland*. Carroll's original work acts as a jumping pad, on which the characters and narratives in *American McGee's Wonderland* are based (Jenkins 2004).

Enacting spaces, or spatial stories, allow the player to perform within the game's environment and are dependent on the player's exploration and completion of a journey in order to complete the game's story (Jenkins 2004). Jenkins references the classic narrative trope of the Hero's Journey as an example of this in video games, "spatial stories are held together by broadly defined goals and conflicts and pushed forward by the character's movement across the map. Their resolution often hinges on the player's reaching their final destination" (Jenkins 2004). Examples of this type of narrative can be found in games such as the Half-Life Series (Valve Corporation 1998), a first-person shooter classic whereby the player acts as Gordon Freeman, a theoretical physicist who must survive an alien invasion in the world and find a way to close interdimensional portals that allow the aliens access to Earth (Valve Corporation 1998).

Emergent narrative spaces are not necessarily planned or structured stories. In this environmental narrative space, the story is not pre-scripted or planned; rather, the player constructs the story through gameplay, interactions, or mechanics within the game's world (Jenkins 2004). Jenkins gives the example of *The Sims* in his article (Electronic Arts 2000), explaining that there is no predefined narrative in the game (Jenkins 2004). It is up to the player to create their *Sims* characters, build houses, and use the social interactions between the *Sims* to create a family with names and stories of their own. These *Sims*' stories are not created by the game designer but rather unfold as time moves on and the player engages with the game and their *Sims*' virtual lives (Jenkins 2004).

Finally, and perhaps most importantly, Jenkins offers the definition of embedded narratives. Embedded narratives encourage the player to explore the game's space or interact with objects within the diegetic world to find clues in order to construct the story of the game. The information is distributed across the game's space, encouraging exploration and curiosity within the player to find out more about the characters and world of the game's narrative. Typically, these games do not have explicit or typical elements of storytelling, like interactions with characters and dialogue. Instead, these games typically take on the form of a monologue, through which the player's character controls and investigates the world. An example of this type of narrative world can be found in the video game *Gone Home* (Fullbright 2013). *Gone Home* is a first-person game that follows the story of the player's character, Katie Greenbriar, who comes home after being overseas for some time. She, or the player, finds the house empty and needs to explore the house and the notes left behind in order to unlock areas in the house and find clues as to what happened

to her family. *Gone Home* (Fullbright 2013) set the precedent for embedded narratives in video games today, and many have followed similar gameplay and narrative designs since *Gone Home*'s initial release in 2013. Many developers now refer to games that are similar to *Gone Home* as “walking simulators” that focus more on story, exploration, and investigation rather than shooting, jumping, or other stereotypical mechanics from the first-person shooting gameplay genre (Fullbright 2013).

It is worth mentioning a VR game that has taken this idea of the embedded narrative and used it within its tutorial scene—*Super Hot* (SUPERHOT TEAM 2016). In the first few scenes of *Super Hot*, the player is situated in what seems to be an old office space from the 1990s. It is littered with old computers, floppy discs, and a radio with cassettes that play director voice-overs from the game design team, SUPERHOT Team. This space is intended to be a place of refuge for the player, in between different chapters of the game. Here, the player can listen to voice-overs from the game design team about translating *Super Hot* from a PC or console game to that of a VR game (SUPERHOT Team 2016). However, it also has elements of embedded narrative design within it, referencing parts of the story that should reflect “real life” before the player puts on a headset in the office that transports them into the *Super Hot* simulated world.

The narrative design and game design of souvenir in VR

In order to reproduce the narrative of *Souvenir* inside a Virtual Reality experience, Jenkin's embedded narrative methodology has been used. This allows the player to explore and investigate their surroundings in Virtual Reality to find clues and bits of the story that are presented to the player through objects in the world. In *Souvenir*, as mentioned above, the main character uses a dirigible as her main source of transport, but it is also her home and refuge to write in her journal. The dirigible, then, presents an ideal location for the embedded narrative of *Souvenir* to take place. Here, the player will find themselves in the cockpit of the dirigible, and various objects relating to the story will be scattered around. The player will be able to interact with these objects by grabbing them and picking them up with their VR hand in order to read, listen, and interpret them in relation to the overall narrative of the novel. The player's character will be Souvie, the main character in the novel. As Souvie, the player will be able to walk around the dirigible, interact with objects, and come to understand Souvie's story in the Tankwa Karoo. These objects will act as pieces of the story, as well as items that allow for meaningful play to happen (Flanagan 2009). Whilst not necessarily offering the stereotypical gameplay mechanics found in a shooter-genre Virtual Reality game, the proposed vertical slice will make reference to that of the “walking simulator”, such as *Gone Home* (Carpenter 2019), and offer playful interactions with the objects that surround the player in the dirigible.

An example of the objects and surroundings can be found directly in the novel itself, where Souvie retires to her dirigible to begin journaling:

... as she took [the journal] from its drawer below her bunk, a handmade book. This, in its way, held a lot of work for her. She had bound it herself, though somewhat crudely with board covers and glue along the spine holding the pages (Rosenthal 2004, 14).

Journal entries and descriptive texts like the above need to be extracted from the novel of *Souvenir* in order to create these narrative objects and the described landscape of the

Karoo as assets for game development. In the Virtual Reality world of *Souvenir* the player is immersed in a vividly rendered 3D environment, taking on the role of the pilot aboard a dirigible. The game opens with a detailed design that brings the Karoo landscape to life, juxtaposing its arid terrain with the vibrant presence of coral aloë and the lushness of bushman grass amidst ancient rocks. The player experiences a blend of sensory elements—from the visual spectacle of the cooling dirigible engines to the auditory backdrop of the wind rustling through quiver trees and the distant song of a Karoo Chat bird. This intricate portrayal of the Karoo in VR encapsulates both its stark natural beauty and the technological elements of the dirigible, offering a rich, multi-sensory experience that reflects the described visuals in the novel.

In order for the production of this described VR experience to begin, once the narrative objects have been established from the novel, a game designer and 3D modeller are then able to create the 3D assets that are needed for the Virtual Reality environment that the player will be situated in. The first, and perhaps most important, asset to design is that of the Karoo landscape, in which the dirigible is placed. In order to do this, the 3D modeller and game designer in the team can take the references from the field trip to the Karoo and, for example, turn the photographs of the soil into textures in Unity. The actual structure of the landscape, the peaks, and the valleys can be created using *Unity's* inbuilt *Terrain Toolbox* system, as well as a useful online tool called *Cities: Skylines Map Generator*. Using this tool, I can search for the Tankwa Karoo GPS coordinates where *Souvenir* is based and retrieve a heightmap of the area (see [Figure 1](#), a screenshot by the author, as an example of selecting an area for heightmap generation, for reference). The image that is generated is in a.png file format and is made up of black, grey, and white matter, which almost looks like a *Perlin Noise* pattern (see [Figure 2](#), a .png file generated by *Cities: Skyline Map Generator*, for reference). In this file, the darker areas are of low altitude and the lighter areas are of higher altitude, showing what the landscape's peaks and valleys look like on a 2D image. This heightmap can then be placed into *Unity's Terrain*

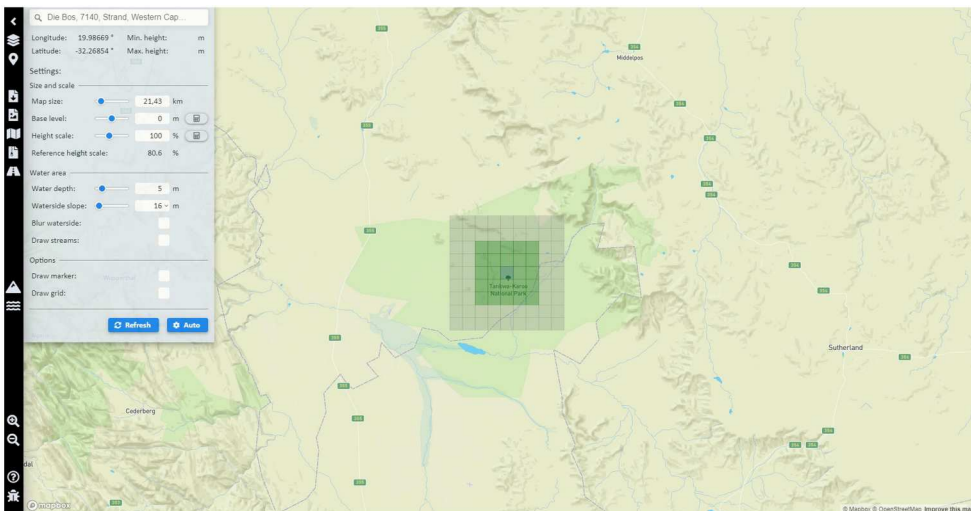


Figure 1. A screenshot by Andrea Hayes, as an example of selecting an area for heightmap generation.

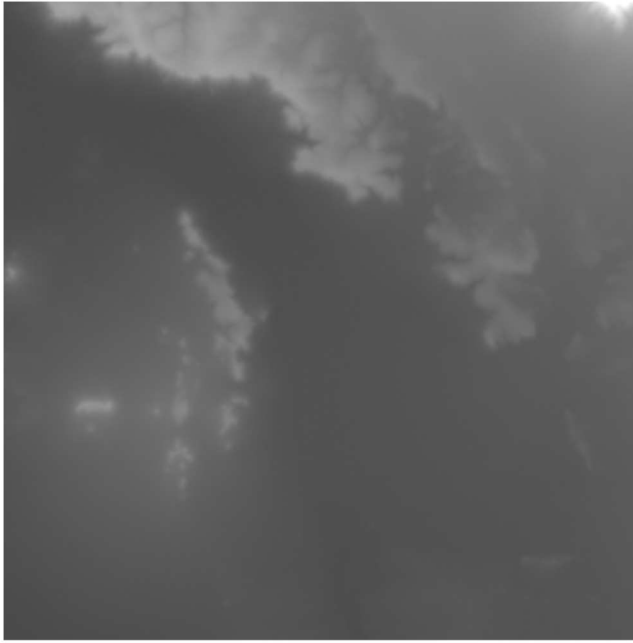


Figure 2. A .png file generated by Cities Skyline Map Generator.

Toolbox, which is able to read heightmaps and then generate a terrain or landscape based on the given heightmap's darker and lighter areas (see [Figure 2](#) for reference). This approach is significant as it enables the accurate recreation of the Karoo's topography, including its peaks and valleys, in a way that bypasses the need for more complex and technology-intensive land surveys, such as those conducted with drones. This method offers a more efficient and potentially cost-effective means of geographical representation. Once the terrain is generated in *Unity*, the game designer can paint the terrain with the textures generated from the reference photos of the Karoo (see [Figure 3](#), a screenshot created by author of a generated terrain using the *Terrain Toolbox* in *Unity 2021.3.7f1*, for reference).

Once the terrain is generated and painted with the referenced soil, skybox, and normal maps from the field trip to the Karoo, the 3D modeller can begin creating models of the different types of flora found in the Karoo, as mentioned in section one. This will include using 3D software, such as *Blender* or *Maya*, to recreate the Karoo's plants. These plants will need to be hand-crafted since there is little reference to 3D models of plants found in the Karoo online. Reference to these plants and trees will also be drawn from *Souvenir's* description of the Karoo's flora and fauna in order to replicate the landscape: "Vegetation had long since crept back into the area that once had been under water, karoo bush mainly, and a few karee trees, the indigenous willows, showing that there was still water below ground" (Rosenthal 2004). Once modelled, these trees and plants can be scattered across the generated terrain, as described within the novel. This way, it is possible to make a digital twin of the Karoo's landscape, in which the narrative of the game takes place. Once the scenery is complete, the game design team can focus on creating narrative objects, such as her journal, a map of the area that Souvie uses, the scissors she

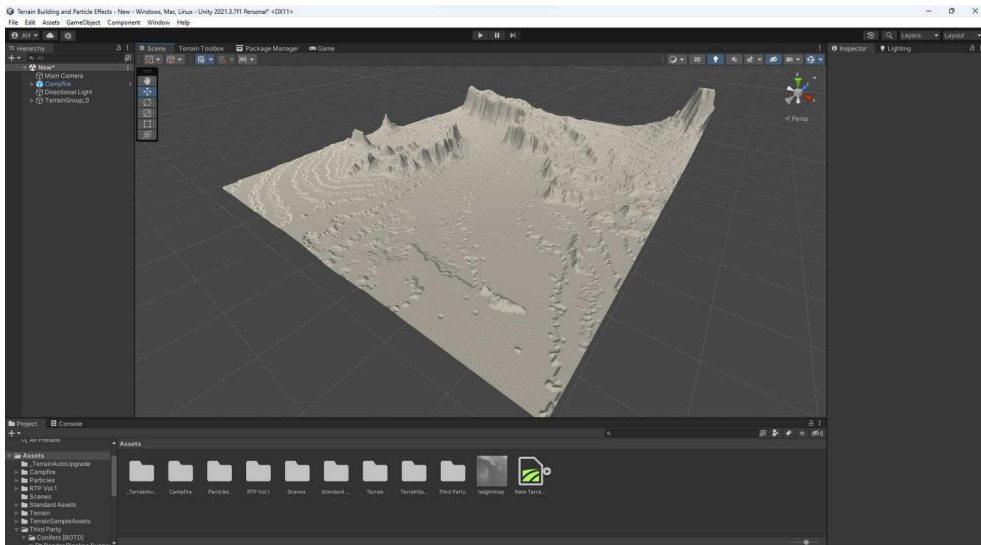


Figure 3. A screenshot, created by Andrea Hayes, of a generated terrain using the Terrain Toolbox in Unity 2021.3.7f1.

uses to cut her hair, as well as the “wonder of ingenious design” of the dirigible (Rosenthal 2004, 8).

In order to create the interactions and communication between the vertical slice game and a VR headset, a game designer can make use of the Oculus Software Development Kit (SDK) that is provided inside *Unity*. This SDK acts as a toolbox for the game programmer and engineer of the game to allow the user to interact with objects in the game with their virtual hand or the controllers that come with the Meta Quest 2 or 3 headset. This means that the SDK will be used to add mechanics and interactions to the game so that the player can grab, pick up, and put down items within the vertical slice.

Souvenir in the Metaverse

Though this paper has focused on the different game design methodologies that a game designer can select to create a South African-based story and landscape in VR, it is worth exploring what it means and the value of its addition to the *Metaverse*. The *Metaverse* is largely focused on the creation of new virtual worlds and economies with the idea of “some sort of new digital economy, where users can create, buy, and sell goods” (Ravenscraft 2021). Having said this, the definition of the *Metaverse* remains a subject of considerable debate among scholars and industry professionals, with some noting the challenges in articulating a clear definition (Benjamin 2023). Some suggest that, due to this ambiguity, the *Metaverse* as a concept may need reevaluation and a strategic overhaul (Danneberg 2023). Moreover, the issue of accessibility of the *Metaverse* is prominent, especially in South Africa, where advanced technology like VR headsets is not widely available. However, with over a third of the population having access to smartphones (Taylor 2023), initiatives by groups like Africarare are working towards making the *Metaverse* accessible via smartphones, broadening its reach in South Africa (Modise 2023).

I would argue that the *Metaverse* allows for much more meaningful interactions with these new virtual worlds. The *Metaverse* can be a place to digitally archive places to visit and stories to tell. In their article in the *ArchDaily*, journalist, and architect Camilla Ghisleni speaks about the potential of archiving and preserving prehistoric buildings and places in the *Metaverse*:

By ignoring geographic barriers, [the Metaverse] make[s] places and buildings more accessible to people around the world. In recent years, many initiatives have emerged to digitize museums and historic buildings, stimulated by the Covid-19 pandemic, and their main goal was to raise funds for the preservation of such physical spaces (Ghisleni 2022).

The *Metaverse* has the potential to connect people to real-life places by visiting digital twins of buildings, museums, parks, and more. It harbours significant potential for archiving various South African narratives, particularly through the recreation and exploration of historical sites and events within virtual spaces. The *Metaverse* offers a platform for the virtual exploration and interaction with historically significant yet deteriorating buildings across South African urban landscapes. It can also serve as a digital medium for the narration of cultural and historical stories from South Africa, encompassing a diverse range of narratives from the rich tapestry of cultures and languages in the nation. The *Metaverse* thus emerges as a pivotal tool in the preservation and dissemination of South African heritage and stories (Boffard 2022). In the same vein, the translation of *Souvenir* from novel to VR video game is a way of preserving cultural and social aspects of South Africa. *Souvenir's* narrative can be preserved for future generations to physically interact with and explore.

Conclusion

Climate change is a major threat to the Karoo region in South Africa. As a semi-desert region, the Karoo is already facing challenges due to drought and water scarcity. As global temperatures continue to rise, the Karoo is expected to experience more frequent and intense heat waves, which could lead to further drying of the region and put additional strain on already limited water resources (Hoffman et al. 2009). Additionally, infrequent and extreme weather conditions will emerge from climate change in the Karoo and are expected to lead to unaccustomed weather events, such as heavy rainfall and flooding, which could further damage the fragile ecosystem of the Karoo. Overall, it is clear that the Karoo is in danger because of climate change, and urgent action is needed to address this issue and protect this unique and important region in South Africa.

While the development of a VR experience will not necessarily solve the issues of the climate crisis in the Karoo, VR and the *Metaverse* can be used as tools to help raise awareness and call people to action against climate change by translating a part of the story of *Souvenir*. In order to create said VR experience, a game designer can use various game design methodologies in order to translate a South African story, such as *Souvenir* by author Jane Rosenthal, from a novel to an interactive and immersive experience. In this paper, I have suggested multiple game design methodologies to recreate the Tankwa Karoo's landscape and *Souvenir's* narrative about the climate crisis into a VR experience that can live in the *Metaverse* for players to explore and interpret. The first method to begin the recreation of the Karoo's landscape is to physically go to the location and capture references, such as photos and videos, with particular attention to the clustering

patterns of the plants and trees, the sporadic nature of “dead things” and/or matter around the landscape, and the way in which rocks and pebbles are placed around the landscape (Weinbaum 2017). This reference will allow me to create a more realistic and accurate depiction and replication of the Karoo’s landscape in a VR experience. Once I have gathered references of the Karoo, I can begin to import them into *Unity*, a gaming engine, in order to create textures and materials which can be used to paint the terrain. The *Terrain Toolbox* inside of *Unity*, as well as the generation of height maps from *Cities: Skylines Map Generator*, helped recreate a more accurate and cost effective representation of the Tankwa Karoo and its structure in relation to its peaks and valleys. The 3D modelling process then begins to create 3D objects for the narrative, such as Souvie’s journal, as well as the plants and foliage that can be placed around the terrain.

I have presented and explored different types of environmental narratives, as suggested by Jenkins, which can be used to translate the story of *Souvenir*. Jenkins mentions four different types of environmental narratives that have been used by game designers in the past, but the most relevant one to use for a VR experience would be that of an embedded narrative (Jenkins 2004). By placing narrative objects, or 3D models that hold potential meaning through player interpretation, around the environment, the video game can tell a story through its space and diegetic world. Embedded narratives encourage exploration and player interaction for a story to progress. This lends itself well to a VR experience, where players are encouraged to explore spaces with 360 degrees of freedom, pick up items, and listen to spatial audio in their environment. It has been suggested that, for the translation of *Souvenir* from the analogue to the digital, the player is placed in Souvie’s dirigible, a place of refuge and reflection for the main character. Here, the player can interact with and interpret narrative objects that are taken from the novel and placed around the dirigible. The player must then explore this dirigible and view the Karoo’s landscape through openings and windows in the dirigible, in order to retain and understand the story of *Souvenir* and the future result of the climate crisis that the Karoo currently faces.

The importance of *Souvenir*’s story living inside of the *Metaverse* is twofold. Firstly the VR experience of *Souvenir* acts as an archiving process for a South African story to live in a posthuman world in the *Metaverse*. Secondly, it acts as a meaningful piece of preservation of South African stories in a virtual space that is mostly engulfed by superficial commodities and economies. It brings a powerful and important meaning to the *Metaverse* that is more than cryptocurrency and blockchains, which are, ironically, adding to the climate crisis (Ravenscraft 2021). *Souvenir*, as a Virtual Reality experience, reflects the relationship between humans and nature. It is my hope that *Souvenir*’s VR story will act as a tool for climate change awareness and activism and that it may stand as a visual version of Rosenthal’s cautionary tale about what the future of humanity might look like if the climate crisis is not taken seriously.

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