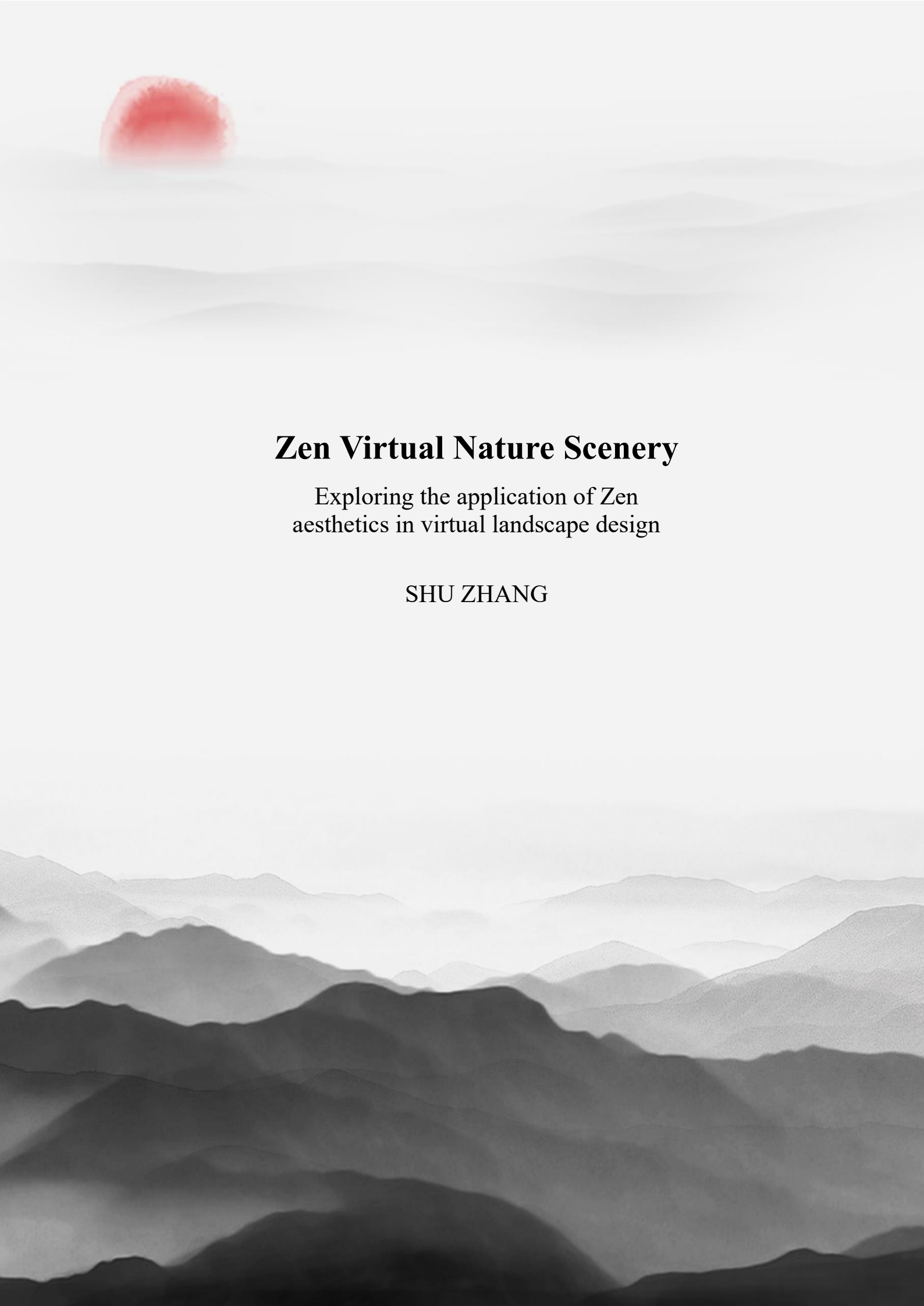

Zen Virtual Nature Scenery

Exploring the application of Zen aesthetics in virtual landscape design

SHU ZHANG

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School of Art and Design

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Abstract

This practice-led research project explores how Zen aesthetics creates a way of designing virtual contemplative landscapes.

The project combines action and research. Under the guidance of the action research framework, it analyzes the five concepts most closely related to design in Zen aesthetics and discusses their aesthetic thoughts and characteristics with some art and design cases. It also discusses critical elements in designing contemplative landscapes and virtual natural environments.

The creative inspiration for the virtual contemplative landscape in this project comes from the Zen epiphany obtained by the designer during Zen studies and on-site observation of natural landscapes. Based on some famous natural landscapes in New Zealand, this practice project designed a series of virtual contemplative landscape prototypes with the concepts and characteristics of Zen aesthetics and explored a complete creative process. The results of the practice project are presented as 5 VR landscape animations.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the Acknowledgments), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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Shu Zhang

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Acknowledgments

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1. Introduction

Walking in nature can be a contemplative activity. Exposure to nature can promote stress reduction, and time spent outdoors in nature can also help restore attention and cognitive function after fatigue from intense mental activity or "directed attention."[1] The research results of Mattila et al. show that virtual environments are generally considered as restorative as physical forest environments and are more fascinating and coherent. When it is impossible to enter the highly restorative natural environment, the virtual environment technology can have an effective restoration function.[2]

I have developed a keen interest in using virtual reality (VR) technology to design virtual contemplative natural landscapes as a digital designer. Especially during the pandemic, many people had different degrees of psychological problems, such as stress, anxiety, depression, due to the pressure of life and work. And because of travel restrictions, some people didn't have the opportunity to return to nature for relaxation or meditation.

Contemplative landscapes and contemplative spaces are familiar terms in design, landscape architecture, and architecture.[3] In general, a contemplative landscape is defined as a designer setting out to create a space that will bring peace of mind. But in this thesis, a contemplative landscape refers to a virtual natural landscape created by designers to calm the mind.

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[1] M. H. Depledge, R. J. Stone, and W. J. Bird, "Can Natural and Virtual Environments Be Used To Promote Improved Human Health and Wellbeing?," Environmental Science & Technology 45, no. 11 (June 1, 2011): 4660–65, https://doi.org/10.1021/es103907m.

[2] Osmo Mattila et al., "Restoration in a Virtual Reality Forest Environment," Computers in Human Behavior 107, no. June (June 2020), https://doi.org/10.1016/j.chb.2020.106295.

[3] Rebecca Krinke, Contemporary Landscapes of Contemplation (Routledge, 2005).

I inspected some of the more popular virtual natural environment applications or games related to meditation or relaxation on the market, such as Nature Treks VR, Guided Meditation VR, PLAYNE: The Meditation Game, and found that the virtual natural environment in these games or applications There is almost no clear style and design method, and their introduction to their virtual environment design ideas is almost blank. The current display design does not see the shadow of traditional culture but more to adapt to modern society and use high-tech technology to combine digital media with display design better.[4] I think it is necessary to explore the methods of designing virtual contemplative landscapes from the aspects of art and aesthetics, especially in combination with traditional art. Virtual reality works are technical in the way of construction but artistic in the form of visualization. In the design process of virtual reality works, the scene's layout, the structure of the scene model, the material, the texture, etc., all involve the aesthetic principles of visual art. Virtual reality is often a comprehensive application of traditional arts, integrating various art forms, such as painting, sculpture, architecture, music, etc.[5]

As a Chinese, every aspect of my life is deeply influenced by Zen culture. For me, Zen is not a religion but an esoteric and mysterious philosophy. The original meaning of Zen is contemplation and meditation (quiet thinking) to obtain intuitive spiritual understanding and advocates eliminating all external disturbances and conducting pure intuitive experience and internal reflection.[6] The aesthetic thought produced and developed under the influence of Eastern Zen is Zen aesthetics. Zen aesthetics profoundly influences many art and design fields in Asia, such as painting, flower arrangement, tea ceremonies, gardens, architectural design, etc.[7] Some literati, artists, or designers integrate their insights into Zen studies into their works, which can always give the audience a feeling of tranquility, indifference, and freedom. At the same time,

[4] Peng Liu et al., "Visual Space Design of Digital Media Art Using Virtual Reality and Multidimensional Space," *Mobile Information Systems* 2022 (May 12, 2022): e8220572, https://doi.org/10.1155/2022/8220572.

[5] "虚拟现实技术与美学研究--《武汉理工大学》2003 年硕士论文," accessed November 24, 2022, https://cdmd.cnki.com.cn/Article/CDMD-10497-2003095864.htm.

[6] 曾佳, "禅宗顿悟与艺术思维的异质同构关系," 艺术百家 2, no. 82 (2005): 62.

[7] Leonard Koren, *Wabi-Sabi for Artists, Designers, Poets & Philosophers* (Imperfect Publishing, 2008).

interacting with art and design works is itself a process of contemplation. Can the creative methods and aesthetic characteristics of Zen art be used for reference in the design of virtual landscape environments?

This research explores:

how Zen aesthetics creates a way of designing virtual contemplative landscapes.

The five concepts most closely related to Zen culture and design are "Impermanence[无常]", "Emptiness [空]", "Non-duality [不二]", "Non-doctrinaire [不立文字]", and "Epiphany [顿悟]". I discuss the aesthetic characteristics derived from them and try to apply these to the design of virtual natural landscapes. The design practice of this research project resulted in five animated prototypes of VR contemplative landscapes.

The thesis is structured in four parts:

The first part, The Contextual Review, introduces the conceptual framework of my project, and discusses the relevant theories and knowledge underpinning my practice.

The second part introduces the research method framework I adopted, including action research and corresponding methods.

The ideation of this project and the iterative development process are unpacked in Part Three, Description of Practice.

Finally, the Discussion and Reflection section assesses what I have learned from my practice-based research process and the limitations of this creative practice project.

2. Contextual Review

Introduction

This research explores:

how Zen aesthetics creates a way of designing virtual contemplative landscapes.

This context review aims to provide an overview of this question. There are three critical contexts in the research. The first part discusses eight key components that influence landscape contemplation: landscape layers and landforms, light and colour, vegetation and compatibility, archetypal elements, and characteristics of peace and silence. The second part briefly introduces the historical background of Zen aesthetics and selects five concepts most closely related to design in Zen culture (impermanence, emptiness, non-duality, non-doctrinaire, epiphany), analyzes the aesthetic ideas and artistic characteristics derived from them, and discusses their combination with the design of the virtual natural environment. The third part discusses three essential factors that affect the authenticity of the virtual natural environment (weather and ray tracing, material and texturing, and sound), and analyzes some typical cases as a reference for my project practice.

2.1 Contemplative landscape

Agnieszka et al. confirm that contemplative landscapes are measurable. Although their research is mainly focused on outdoor parks and garden landscapes, it is equally valuable for virtual natural landscapes. They found that the contemplation of space depends on eight key components: landscape layers, landforms, vegetation, light, colour, compatibility, archetypal elements, and characteristics of peace and silence. The most contemplative landscapes are those with a high degree of compatibility, in which all adjacent elements of the landscape achieve balance and harmony. The landscape should

contain foreground, midground, and background, allowing the viewer to see a wide field of view and distant views. Also important are smooth terrain, soft and clean colours, and changes in light and shadow. A contemplative landscape should be characterized by peace and silence and contain at least one archetypal element and focal point, such as an old oak tree.[8]

2.1.1. Landscape layers and Landforms

In contemplative landscapes, distant views are crucial. Many scholars believe that being able to see into the distance is a feature that significantly improves the quality of the landscape. Viewing from a distance stimulates the viewer's sense of personal freedom, mental pleasure, and stress relief. Landscapes with rich landscape layers, and broad, and distant horizons are more likely to make people meditate.[9] In addition, the smoothness of the ground and the handling of the skyline are also important. Gentle ground or mounds are more relaxing than rough and complicated roads. In addition, in any natural landscape, water is an essential factor that tends to increase the attractiveness of that landscape. Studies have shown that scenes with water scored higher than those without water. Natural environments with water, such as lakes, rivers, and beaches, are thought to be more conducive to emotional recovery.[2] In my project, the five main virtual natural landscapes are almost all related to water, and they all adopt a relatively broad field of view and pay attention to the layering of the landscape.

[8] Agnieszka A Olszewska et al., "What Makes a Landscape Contemplative?," Environment and Planning B: Urban Analytics and City Science 45, no. 1 (January 1, 2018): 7–25, https://doi.org/10.1177/0265813516660716.

[9] Lukas Navickas, Agnieszka Olszewska, and Theofrastos Mantadelis, "CLASS: Contemplative Landscape Automated Scoring System," in 2016 24th Mediterranean Conference on Control and Automation (MED), 2016, 1180–85, https://doi.org/10.1109/MED.2016.7535987.

2.1.2. Light and Colour

The light source is one of the crucial factors in the natural environment. From a psychological point of view, natural light can positively affect. Research has shown that varying amounts of natural light due to seasonal changes can affect mood. The experimental results show that in the virtual forest environment, natural light scenes with medium brightness (morning and afternoon) can achieve the best decompression effect rather than the brightest (noon) and darkest (evening) scenes.[10] Compared to yellow and greenish-yellow, blue, teal, and green seem the most pleasing and emotive hues.[11] In addition to blue and green, white is considered a pure colour, which more easily reduces distractions and creates a quiet and peaceful atmosphere.[12]

On the other hand, more saturated tones can amplify the mood, while pastel colours can stabilize and relax the spirit.[13] Therefore, natural colours with less contrast are more comfortable. Also equally important are the visibility of sunlight and the area of shade. Direct exposure of the observer to the sun is not recommended, as shady places are more suitable for contemplation.[5] In my virtual landscape, I use more gentle light and colour, especially in the sunrise and sunset scenes, and design light and shadow regarding the aesthetic characteristics of Zen aesthetics.

2.1.3. Vegetation and Compatibility

Vegetation density has been shown to affect the health benefits of natural landscapes. A recent series of studies by Jiang et al. discussing the relationship between tree cover

[10] Chang Li et al., "Effects of Brightness Levels on Stress Recovery When Viewing a Virtual Reality Forest with Simulated Natural Light," Urban Forestry & Urban Greening 56 (December 1, 2020): 126865, https://doi.org/10.1016/j.ufug.2020.126865.

[11] Patricia Valdez and Albert Mehrabian, "Effects of Colour on Emotions," Journal of Experimental Psychology: General 123, no. 4 (1994): 394–409, https://doi.org/10.1037/0096-3445.123.4.394.

[12] Iona Poston, "The Use of Colour in the Work Setting," Nurse Educator 21, no. 1 (February 1996): 23–26.

[13] Rikard Küller et al., "The Impact of Light and Colour on Psychological Mood: A Cross-Cultural Study of Indoor Work Environments," Ergonomics 49 (December 1, 2006): 1496–1507, https://doi.org/10.1080/00140130600858142.

density and stress reduction and preference found that lower vegetation density predicted higher happiness levels.[14] Furthermore, Misgav's research shows that high canopy cover and moderate plant densities enhance public preference. Although the forest edge has a complex multi-layered vegetation structure suitable for biological habitats, the vegetation structure inside the forest is more uniform (i.e., taller and more neatly arranged trees) and highly compatible, giving a sense of harmony and relaxation. Therefore, the inside of the forest works better than the edge of the forest in reducing people's physical stress.[15] People prefer medium-coverage vegetation to dense, high-complex environments. This result may be since high vegetation cover often blocks views, reduces the legibility of the environment, and creates feelings of insecurity and powerlessness.[16] I attach great importance to the density of the plants and the overall harmony, especially in my forest scenes, where the vegetation types are relatively uniform, and the trees are neither crowded nor too sparse, allowing the observer to see looming vistas. At the same time, the compatibility between different plant models and the overall coordination and comfort are also considered.

2.1.4. Archetypal elements

In contemplative landscapes, the focal element is often the most contemplative. In landscape design terms, a focal point is a plant or object that stands out from the landscape, directing the viewer's attention to a specific location. Placing a focal point in a landscape allows the viewer's eyes to focus and rest, and it will also help guide the viewer's eyes further into your landscape. Usually, the focus element stands out from the other elements around it in terms of colour, shape, texture, etc. These focal points create moments of tranquility in the landscape and help guide the viewer's eye from one

[14] Bin Jiang et al., "A Dose–Response Curve Describing the Relationship between Tree Cover Density and Landscape Preference," Landscape and Urban Planning 139 (July 1, 2015): 16–25, https://doi.org/10.1016/j.landurbplan.2015.02.018.
[15] Ayala Misgav, "Visual Preference of the Public for Vegetation Groups in Israel," Landscape and Urban Planning 48, no. 3 (May 1, 2000): 143–59, https://doi.org/10.1016/S0169-2046(00)00038-4.
[16] Yen-Cheng Chiang, Dongying Li, and Hao-Ann Jane, "Wild or Tended Nature? The Effects of Landscape Location and Vegetation Density on Physiological and Psychological Responses," Landscape and Urban Planning 167 (November 1, 2017): 72–83, https://doi.org/10.1016/j.landurbplan.2017.06.001.

area to another. The contemplative experience of the landscape requires some typical elements as focal points, such as boulders, old trees, springs, waterfalls, etc. In my virtual landscapes, one or two typical natural elements are used as focal points in the landscape so that the observer's line of sight has a foothold and guides them to look farther, and trigger their imagination and association.

2.1.5. Characteristics of peace and silence

Regarding the characteristics of peace and silence, Agnieszka pointed out in their research that design strategies must consider creating a sense of loneliness for the observer or a tranquil environment that contrasts with the chaos of the city.[5] However, their research was inconclusive on how to create an atmosphere of solitude and tranquility. This is what this research project hopes to find out through the study of Zen aesthetics.

2.2. Zen aesthetics

Zen aesthetics refers to the aesthetic thoughts produced and developed under the influence of Zen Buddhism in the East.

2.2.1. Background briefing

At the end of the 5th century, Bodhidharma came to China from India to propagate Buddhism. After Buddhism was introduced into China under Chinese Taoism and Confucianism, it gradually formed Chinese localized Zen Buddhism. The original meaning of Zen is to meditate, which is to stay away from trouble and calm the mind. It emphasizes achieving a clear, comfortable, and wise life state through meditation and

epiphany.[17] Zen Buddhism pays excellent attention to the issue of freedom of life and advocates the independence and liberation of individual life through enlightenment. Pi Chaogang emphasized that Zen aesthetics has its very unique nature. It is not aesthetics in the usual sense, nor is it a general philosophy of art. It reflects the meaning of life's existence and aesthetic thinking on the ontological level. It is a kind of life aesthetics that pursues the freedom of life.[18]

In the 9th to 10th centuries, influenced by Zen thought, many artworks gradually showed unique Zen aesthetic characteristics, such as the lonely and melancholic atmosphere and minimalist expression in Chinese poetry and monochrome ink painting. Zen Buddhism was introduced to Japan as an independent school in the 9th century.[19] Since then, under the influence of the concept of Zen Buddhism, the Japanese Zen aesthetics has gradually formed, with its main features including Emptiness[空], Wabi-Sabi[侘寂], Yūgen[幽玄], and so on. It is generally accepted that Zen is an integral part of the Eastern spirit. Similarly, Zen art has the essence of Oriental art.[20] I selects the five concepts of "Impermanence[无常]", "Emptiness[空]", "Non-duality[不二]", "Non-doctrinaire[不立文字]", and "Epiphany[顿悟]" in Zen culture. These are the five most essential concepts in Zen aesthetics and are closely related to art and design. This research explores their aesthetic thoughts, characteristics, and guiding role in design.

Yin Yang[21] mentioned in his research that plant landscape design should take simplicity as the main style under the guidance of Zen aesthetics. Plant landscape design should be as clean and simple as possible, which is influenced by the concept of "Emptiness"

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[17] "The Illustrated Encyclopedia of Zen Buddhism - Helen J. Baroni, Ph.D.

[18] 皮朝纲, "关于禅宗美学的逻辑起点，研究对象与理论范式的思考," 四川师范大学学报 03 (1999), https://doi.org/CNKI:SUN:SCSF.0.1999-03-005.

[19] Heinrich Dumoulin et al., "Zen Buddhism: A History (Volume 1: India and China)," September 2005, 520.

[20] Hisamatsu Shin'ichi, "On Zen Art," Marburg Journal of Religion 17, no. 1 (January 23, 2013), https://doi.org/10.17192/mjr.2013.17.3284.

[21] Yin Yang, "Study on the Application of Zen Aesthetics in Plant Landscape Design" (2018 5th International Conference on Education, Management, Arts, Economics and Social Science (ICEMAESS 2018), Atlantis Press, 2018), 675–78, https://doi.org/10.2991/icemaess-18.2018.136.

and "Non-doctrinaire" in Zen aesthetics. He also emphasized that the plant landscape design based on Zen aesthetics should minimize human factors, abandon complex and redundant decoration, and take natural and simple design as the primary goal, which comes from the concept of "Impermanence" in Zen aesthetics. In addition, he pointed out that the plant landscape design based on Zen aesthetics should lay out a static beauty that is independent of the world and focus on setting off the virtual spirit of Zen through the space environment, which comes from the concept of "Non-duality" in Zen aesthetics.

2.2.2. Impermanence [无常]

Impermanence is the essential attitude of Buddhism to view all things in the world, and it is one of the fundamental concepts of Buddhism. Impermanence refers to the existence of all things, matter, spirit, and all phenomena, which are subject to change and cannot be maintained forever. Therefore, with any phenomenon, its nature is impermanent. Change is the eternal theme of the universe.[22]

Zen Buddhism was introduced to Japan from China in the Asuka period and became the center of Japanese religion. The concept of impermanence in Zen Buddhism has significantly impacted Japanese traditional culture, and concepts such as life impermanence, the reincarnation of life and death, and rebirth in the pure land are becoming more and more popular. The Daimyo period in Japan was the peak period when Zen Buddhism was introduced into Japan. During this period, the political environment was terrible. The life of a samurai was like grass, and there was a danger of losing his life at any time. The concept of impermanence conveyed by Zen has resonated with many people and brought them great spiritual comfort.

In general, the Japanese view of nature is delicate and sensitive. Due to social changes and the world's impermanence, life is incredibly fragile and short in front of the vast

[22] 赵朴初, "佛教常识答问," 法音, 1983, https://doi.org/: 10.16805 /j.cnki . 11 -1671 /b.1983.03.00.

nature. People are easily moved by the changes of the four seasons and beautiful things like snow, moon, and flowers in nature. The concept of impermanence is the core spiritual content of Japanese aesthetics. Imamichi Tomonobu, a scholar of modern Japan, noted: "According to the general Japanese way of thinking, they often see beauty as something very elusive, as a phenomenon that will soon disappear." [23]

Wabi-Sabi[侘寂]

Wabi-sabi is one of the leading aesthetic features derived from the Zen concept of impermanence[无常]. In the Japanese Modern Language dictionary "大言海," Wabi[侘] has three meanings: pain and worry; living in solitude; austerity and loneliness. Some meanings of Wabi are similar to Sabi[寂]. The general meaning of Sabi is loneliness and seclusion. Around the 14th century, Wabi-Sabi took on a more positive connotation.[24] The combination of Wabi and Sabi means not adding extra decorations deliberately, emphasizing the inner beauty of things, and pursuing a natural, refined, and simple feeling. The beauty of Wabi-Sabi is a desolate, unassuming, unadorned beauty, an intuitive appreciation of the fleeting beauty in the material world, reflecting the irreversible flow of life in the spiritual world. The mottled light and shadow reflected in the window, the ruins of the ancient walls, and the autumn breeze blowing the withered leaves, and this seemingly desolate scene is not negative and decadent. On the contrary, this is a kind of mood that returns to dullness after prosperity.[25]

Influenced by the Zen concept of impermanence, Japanese designs favor asymmetrical, incomplete shapes. Japanese Zen scholar Suzuki Daisuke pointed out Zen believes that incomplete forms and flawed facts are more able to express the spirit.[26] Because a too-

[23] 今道 友信, 美について (講談社, 1973).
[24] Koren, *Wabi-Sabi for Artists, Designers, Poets & Philosophers*.
[25] Powell, Richard R., Wabi Sabi Simple: Create Beauty. Value Imperfection. Live Deeply. (Avon, MA, US: Adams Media Corporation, 2005).
[26] Daisetz T. Suzuki, Zen and Japanese Culture (Princeton University Press, 2019).

perfect form can easily make people turn their attention to the form itself and ignore the authenticity of the interior, all things are in a state of constant change. In this eternal motion, nature has left arbitrary trajectories, and these random flaws and irregularities create the beauty of Wabi-Sabi.

The 'Jo-an' Teahouse[27] in Kyoto, Japan, is a typical design of Wabi-Sabi aesthetics. Its architectural and decorative materials are derived from the natural environment, such as bamboo poles, hay, stones, etc. It maintains the original appearance of raw and primitive materials without complicated processing, with simple and elegant colours and rough materials, creating an elegant and tranquil atmosphere. The tea ware also keeps its irregularly primitive and rough feel inside the teahouse. In the dimly lit teahouse, tea drinkers are immersed in the tranquil atmosphere, drinking tea from jagged and rough teacups, and their hearts are filled with tranquility and serenity.

Figure 1 'Jo-an' Teahouse, The Agency for Cultural Affairs, https://kunishitei.bunka.go.jp/heritage/detail/102/1240

I also refer to the aesthetic characteristics of Wabi-Sabi when designing the virtual natural landscape. I tried some asymmetric but natural and harmonious compositions, using scanned models from the real natural environment, without too much modification and beautification, to restore its natural aging texture.

[27] "Jo-An," in Wikipedia, May 28, 2021, https://en.wikipedia.org/w/index.php?title=Jo-an&oldid=1025658466.

Yūgen[幽玄]

Impermanence also refers to the impermanence of life and death. The change of seasons makes people feel sad because of the passing of time, and the vicissitudes of the world are poignant because of the impermanence of fate. Yūgen focuses on expressing the beauty reflected over time. When discussing the origin of Yūgen, Miyyuan Kenji pointed out that "prajna[般若] Yūgen" in Chinese Buddhism refers to the profundity of Buddhism. The word "Yūgen" does not express beauty itself but represents the scale of beauty. Yūgen refers to "profound beauty." The "Yū[幽]" in Yūgen refers to the ghostdom[幽界], "Gen[玄]" refers to the entrance[玄関], and Yūgen is the "entrance to the ghostdom." A person's birth is the beginning of death, and the road of life is the entrance to the ghostdom. Life is limited, and it is precisely because of death that life is sorrowful. The beauty of veiled and mysterious sorrow is Yūgen. Onishi Yoshinori[大西克礼] pointed out that Yūgen has eight characteristics: concealment, dimness, inner fulfillment, ineffable, mysterious commonality, profound meaning, serenity, and softness. This metaphysical aesthetic view takes the pursuit of spiritual harmony as the highest goal.[28]

In artistic expression, the beauty of Yūgen is reflected in the relationship between light and shadow. Jun'ichirō Tanizaki mentioned in "In Praise of Shadows " that beauty does not exist on the object's surface but in the relationship between light and shade of the object. A pearl shines in the dark, but a jewel loses its charm when exposed to the sun. Lighting is not to use lights to cut through the night and destroy the darkness but to advocate that light and darkness complement each other, creating a reasonable contrast

[28] 大西克礼, 大西克礼美学コレクション, vol. 2 (東京: 書肆心水, 2013).

and balance between light and shadow.[29] Yūgen emphasizes that the effective use of light and shadow creates a subtle and hazy oriental classical beauty, creates a rhythm of light and dark visually, and brings spiritual comfort. This aesthetic feature often gives people a sense of tranquility and leisure and, at the same time, triggers the observer's association and imagination.

The window of enlightenment at ' Genkō-an '[30], a Zen temple in Kyoto, Japan, is a perfect example of Yūgen. People sit in the dim Zen room; the sun shines through the round windows, the beautiful flowers and trees in the courtyard seem to come from another world, and people can feel the light and the quiet beauty of life through the darkness.

Figure 2 The window of enlightenment at 'Genko-an' temple, https://genkouan.or.jp/en/

According to the aesthetic characteristics of Yūgen, I avoid high exposure and too bright light when designing virtual natural landscapes and use comfortable and soft light. Pay attention to the contrast and change of light and shadow, position the observer in shadow, and add some weather elements such as fog and light rain to highlight the mysterious and hazy quiet atmosphere.

[29] 谷崎 潤一郎, 陰翳礼讃 (中央公論新社, 1995).

[30] "Genkō-An," Discover Kyoto, accessed June 8, 2022, https://www.discoverkyoto.com/places-go/genko/.

2.2.3. Emptiness [空]

Buddhism believes that any kind of thing in the universe is born by karma and finally changes into other things. Buddhism calls all things and phenomena "Dharma[法]," and Dharma constantly appears and disappears and never stops. Only the Svabhava[自性] is eternal, yet it cannot be seen, heard, or touched, so it is also called Emptiness. Emptiness is neither present nor absent. However, what exactly is Svabhava? There are many schools of Buddhism, and I have searched a lot of literature and have not been able to find a standard answer. Perhaps only the truly enlightened person himself can understand. As far as I am concerned, perhaps the Svabhava is the essence of the universe, the original code, or the only truth of the universe, according to which all things and phenomena operate and change. Therefore, Buddhism says that the essence of all things is Emptiness. They do not exist independently, and they cannot remain unchanged forever.

On the other hand, for Zen practitioners, "Emptiness" is a state of purity without afflictions and obstacles, a peaceful state of mind that does not rejoice in things or grieve for oneself. To achieve this state, the meditator needs to be "without clinging to thoughts[無念]." "Without clinging to thoughts" does not mean without thoughts. A person is not a stone, and it is impossible not to have all kinds of thoughts. "Without clinging to thoughts," is when a thought arises, you can perceive it, know how it appears, let it come, and then let it disappear by itself. Don't be bothered by thoughts, don't let them affect your emotions. Therefore Buddhism is also known as the empty door. Studying Buddhism and practising it is to understand oneself, keep oneself from being troubled by emotions, maintain inner tranquility, keep the mind clear and wise, and understand the true meaning of life and the universe.

In terms of artistic expression, the most distinctive feature of "Emptiness" is blankness and a sense of nothingness, focusing on the space and distance between objects. "Blank"

is essential in graphic design. In visual design, the most overlooked element is blank space. Blank space can make the subject of the picture clearer and the layers of the picture richer. Chinese aesthetician Zong Baihua advocated that the cultivation of aesthetics lies in understanding "Emptiness," creating distance between objects, and isolating main elements. The concept of Emptiness has influenced various forms of traditional oriental art.

For example, Ma Yuan, a landscape painter in the Song Dynasty, has his unique expression techniques to highlight the sense of Emptiness. His classic work 'Fishing Alone on a Cold River' only depicts a boat and an old man fishing on a wide river. The rest is a large area of blank space, which reflects the loneliness of the old man fishing alone and increases the tranquility of the environment.[31]

Figure 3 'Fishing Alone on a Cold River,' https://www.tnm.jp/modules/r_collection/index.php?controller=dtl&colid=TA140

In some of my virtual natural landscapes, I refer to Emptiness features and blank layouts, pay attention to the relationship and distance between elements, and highlight typical elements to create an atmosphere of solitude and tranquility.

[31] 杨海涛, "禅宗美学在国画艺术创作中意境营造研究," 艺术评鉴, n.d.

2.2.4. Non-duality [不二]

"Non-duality" is a Buddhist term meaning no difference from each other. Buddhism believes that the essence of both sides of contradiction is equality and no difference. We should not cling to the opposition and distinction of duality to understand things. The two sides of things are actually unified, and the two sides of the contradiction are interchangeable, so we should look at both sides of things as a whole.

Japanese scholar Miaki Oshika[大鹿実秋] pointed out that Non-duality[不二] has three meanings.[32]

1. The two opposing sides are equal without distinction.
2. No favoritism.
3. It is unique, neither two nor three.

Zen treats movement and stillness as a whole. The Zen concept of movement is based on impermanence. It holds that all things are moving and changing, and all things in the world change and develop from appearing to becoming empty. On the other hand, stillness in Zen refers to the pure mind. One can attain a pure mind by perceiving the changes of all things and understanding the impermanence and indefiniteness of karma. Therefore, the basic view of Buddhism on motion and stillness is to observe motion by meditation and show the stillness by motion. Motion and stillness are one.

Influenced by the Zen concept of Non-duality, one of the Chinese classical garden design principles is the combination of the dynamic and static. Take 'The Humble Administrator's Garden'[33] in Suzhou, for example. Its layout is very clever, with rockeries, pavilions, flowers, trees, etc. Along the winding paths and corridors, you will

[32] 大鹿實秋, 成田山仏教研究所編, 維摩経の研究 (平楽寺書店, 昭 63), https://www.kosho.or.jp/products/detail.php?product_id=149176842.
[33] "Humble Administrator's Garden," in Wikipedia, March 15, 2022, https://en.wikipedia.org/w/index.php?title=Humble_Administrator%27s_Garden&oldid=1077333799.

find utterly different scenery every few steps through the windows or doors of the corridors. The scenery outside these windows is like a variety of elegant ink paintings. Tourists take a walk (dynamic) while admiring the view (static). However, when you stop and rest in a pavilion or attic, you will find goldfish playing in the pond, rippling water on the pool, shadows of leaves swaying, and the chirping of insects and birds all around. Visitors enjoy these beautiful views (dynamic) while resting (static). Although everything around is dynamic, those active elements set off the tranquility and comfort of the environment, allowing visitors to relax and immerse themselves in it.

Figure 4 'The Humble Administrator's Garden', http://www.szzzy.cn

In this project, I refer to the aesthetic characteristics of the combination of the dynamic and static. Many dynamic elements are added to increase the fun and realism of the virtual environment, and at the same time, these dynamic elements can also set off the tranquility and comfort of the environment.

2.2.5. Non-doctrinaire [不立文字]

There are three famous zen proverbs that explain the practice of Zen Buddhism.[34]

1. Not based on the written word;
2. Directly pointing to the human mind;
3. Achieving Buddhahood by understanding the Svabhava;

[34] 释普济，五灯会元（汉典，宋).

Zen believes that it is impossible to achieve enlightenment and attain the highest wisdom through language and writing. Language is a limited, relatively direct means of expression that cannot accurately capture the subtle meaning of truth. Someone's expression cannot be taken as an absolute imperative, nor can the fixed meaning in the text be taken as the total truth. People always believe in authority and classics, but it is easy to ignore the free understanding of their own minds.

Simple and intuitive cultivation is the fundamental characteristic of Zen Buddhism, which brings the characteristics of Zen aesthetics, advocates the elimination of all pretence, and pursues absolute Emptiness and a purely spiritual world. The non-dogmatic concept in artistic creation is a natural behaviour, which directly leads the artist to pursue absolute nature and pure freehand in his creation. Its purpose is to abandon complex forms and express the artist's state of mind with a straightforward creative technique.

For example, the "dry landscape" in Japanese gardens brings the minimalist spirit of Zen aesthetics to the extreme. In Kyoto, the garden of 'Ryōan-ji'[35] is a typical dry landscape garden. The monks used rocks to represent islands in the sea, raked lines of sand to represent sea waves, and planted moss or lawns to represent trees and flowers. Although the scenery is very abstract and simple, it gives the viewer the feeling of being placed in a sea of waves. The creator regards landscape creation as an expression of his inner world so that everyone who appreciates it can experience the silence that cannot be experienced in the noisy environment of the city.

[35] "Ryōan-Ji," in Wikipedia, March 19, 2022, https://en.wikipedia.org/w/index.php?title=Ry%C5%8Dan-ji&oldid=1078111660.

Figure 5 The dry landscape in 'Ryōan-ji,' http://www.ryoanji.jp/smph/eng/

When I design virtual landscapes, I pay more attention to the expression of personal intuition and perception rather than too much characterization of the details of the environment. I minimize redundant decorations and elements, making the scene look clean and simple, with the main purpose of conveying my feelings and creating a peaceful atmosphere.

2.2.6. Epiphany[顿悟]

Zen enlightenment and delusion are opposite. Enlightenment refers to the realization of the truth. In India, Zen refers to the way of practice, and enlightenment is the result of practice. There is a difference between the two. However, Chinese Zen scholars have changed Zen meditation from sitting meditation to daily life and from mental mindfulness to life experience, fundamentally changing the connotation of Zen. In China, there is no relationship between means and ends between Zen and enlightenment, and Zen contains the meaning of enlightenment.[36]

[36] 方立天, "禅·禅定·禅悟" 25 (1999), https://doi.org/10.15990 / j.cnki.cn11-3306 / g2.1999.03.001.

Huineng, the sixth patriarch of Chinese Zen Buddhism, believes that enlightenment is not achieved through recitation of scriptures or cultivation, and there is no specific method for enlightenment. An epiphany can happen anytime, anywhere in everyday life. An epiphany is sudden and unpredictable. It refers to the sudden awakening and understanding of the Dharma or the meaning of life, inspired by an accidental event in daily life and study. At the moment of epiphany, one is in a state of "without clinging to thoughts[無念]", feeling free and peaceful, without any troubles. But this state may disappear soon, perhaps only for a moment. However, an epiphany cannot be completely enlightened. Zen practitioners need to continuously study the Dharma, gain epiphany in life experiences, deepen the understanding of the Dharma and the meaning of life, and finally realize the Svabhava[自性] and become a Buddha.[37] Buddha is not a god but refers to an enlightened person who needs to achieve the realm of "no omissions[无漏]." No omissions refers to absolute purity without any trouble.

Zen epiphany is mediated by perceptual experience, and the form of epiphany is also expressed in the form of intuition. Zen emphasizes perception with the heart and intuition, rather than just seeing with the eyes, similar to aesthetic experience. Unlike abstract thinking, which emphasizes reasoning, it has no thought process. In terms of form, it is intuitive thinking. As far as the medium goes, it's an imaginative mind.[38] With the dissemination of Huineng's concept of epiphany, later generations translated epiphany as suddenly comprehending and understanding the method of solving problems. Some scholars interpret epiphany as a kind of sudden change of thinking.

In China, the word epiphany is also often used in the stage of inspiration generation in artistic creation. It refers to the similarity between the information accidentally contacted by the art creator and his own information, which prompts the art creator to instantly realize a certain key point. In Zen art creation, this key point is the sudden

[37] Red Pine, The Platform Sutra: The Zen Teaching of Hui-Neng (Catapult, 2006).

[38] 桑建中, "禅悟：一种心理现象," 学海, April 1992, https://doi.org/10.16091/j.cnki.cn32-1308/c.1992.04.005.

awakening and understanding of a certain Dharma or the meaning of life. Many Zen artworks convey the artist's insight into Zen Dharma and life.

In my project, the five virtual contemplative landscapes were inspired by epiphanies I gained during my Zen studies and field observations.

2.3. Virtual natural environment

Simulating nature has been shown to provide some of the benefits seen in actual nature, and the use of immersive VR can achieve the restoration of replicating nature. The higher the level of realism of the virtual environment, the stronger its positive impact. New VR technology makes it possible to provide a high degree of scene immersion and presence.[39] George Drettakis et al.'s research proves that spatialized 3D sound, rich weather simulation, high-detail vegetation, and shadows can improve the realism level of virtual environments.[40] The following discusses several main factors that affect the realism of the virtual environment and then analyzes some typical VR contemplative landscape design works.

2.3.1. Weather and Ray Tracing

The findings of Scott Roberts show that people are more inclined to use rich, dynamic weather simulations when compared to static environments. Rich weather simulations perform better in terms of immersion and realism without altering playability or environmental factors.[41]

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[39] Anderson, Allison P., et al., "Relaxation with Immersive Natural Scenes Presented Using Virtual Reality," Aerospace Medicine and Human Performance, no. 88.6 (2017): 520–526.

[40] George Drettakis et al., "Design and Evaluation of a Real-World Virtual Environment for Architecture and Urban Planning," Presence: Teleoperators and Virtual Environments 16, no. 3 (June 1, 2007): 318–32, https://doi.org/10.1162/pres.16.3.318.

[41] Scott Roberts and Dale Patterson, "Virtual Weather Systems: Measuring Impact within Videogame Environments," in Proceedings of the Australasian Computer Science Week Multiconference, ACSW '17 (New York, NY, USA: Association for Computing Machinery, 2017), 1–7, https://doi.org/10.1145/3014812.3014878.

Forza Motorsport 4[42] is a video game. Although it is a racing game, many players like to call it a travel simulator due to its excellent graphics and immersion. The game is based on a fictitious British region and faithfully restores many famous British landscapes. In addition to the hyper-realistic image quality, the most prominent feature of Forza Horizon 4 is diverse landscapes, a seasonal changing system, and a real-time weather system. The game even depicts the details of the rain and snow falling, and the realistic weather environment makes players feel like they are in the real world.

Figure 6 'Forza Motorsport 4' gameplay screenshots, 2022

Nature Treks VR[43] is a very popular (over 80% positive) VR game on the Steam game platform. The game focuses on allowing players to relax in a virtual natural environment. Its most significant advantage is that it has a huge scene library, a wide variety of animals, and a high degree of freedom. I tried the game, and I think the biggest surprise is how interactive the game is. The game has a variety of themed environments and a real-time weather system. Players can not only freely control the weather and time but also create their own scenes and items. However, too many choices and interactions are sometimes not good. As some players commented, "I just want to rest and relax in this game, and sometimes I have to create my own scenes, which makes me feel very tired." In addition, many players have no experience in

[42] "Forza Motorsport 4," in Wikipedia, June 1, 2022, 4, https://en.wikipedia.org/w/index.php?title=Forza_Motorsport_4&oldid=1090896013.

[43] "Nature Treks VR" (greenergames, n.d.), https://www.greenergames.net/nature-treks.

aesthetics and design, and the scenes they create are not necessarily ideal and suitable for them. Some players think that the style of different scenes in this game is very different, there is no clear trend, and no style is the style of this game. Some players also said in the comments that "perhaps because the virtual world is too huge, the scene and style are too complicated. The fidelity of the scenes is not satisfactory, especially the models in the close range are too rough." In my virtual contemplative landscapes, I will add real-time dynamic weather systems so the audience can feel the dynamic changes of weather and time to enhance the sense of presence. In addition, I will use 4K and above high-precision environment models because rough models will reduce the audience's immersion and even make them lose interest.

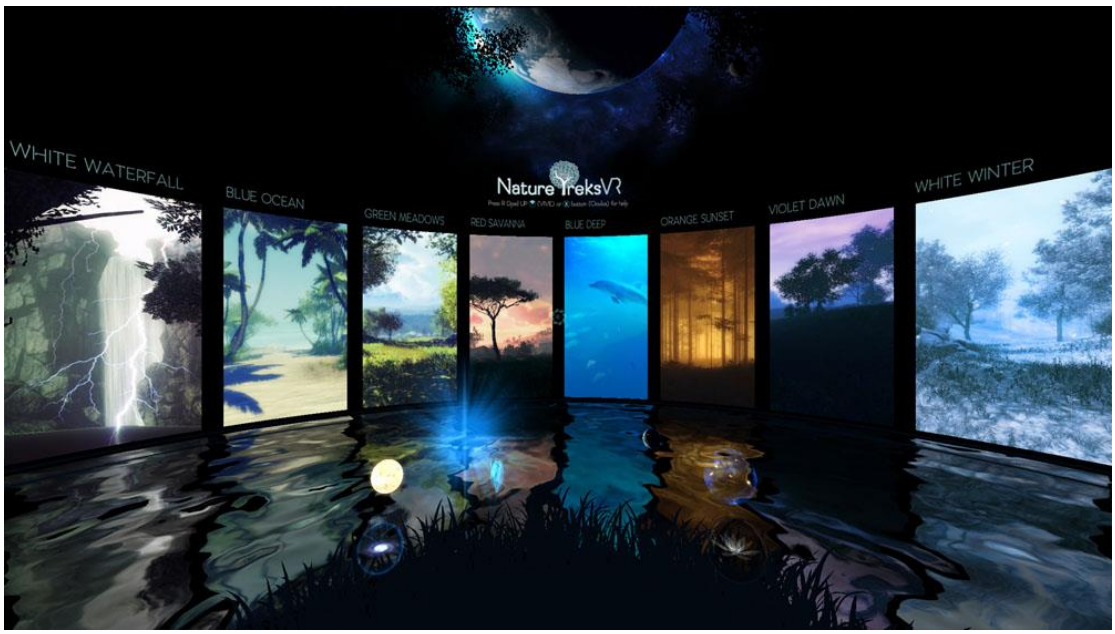

Figure 7 'Nature Treks VR' gameplay screenshots, 2022

Lighting is also critical in virtual environments. Reasonable lighting configuration can better reflect the scene's structure, make the colour of the picture look richer, and improve the immersion of the virtual scene. The quality of rendered images has changed over the past few years with improvements in ray tracing and increased computing

power.[44] The forest scene of the video game 'The Hunter: Call of The Wild' is very popular among gamers. In the forest at dusk, ray tracing can change the light passing through the leaves as the player moves. It can increase the realism and immersion of the scene. In my project, I also tried to add ray tracing technology and refer to the expression of light and shadow in Zen aesthetics to enhance the scene's appeal.

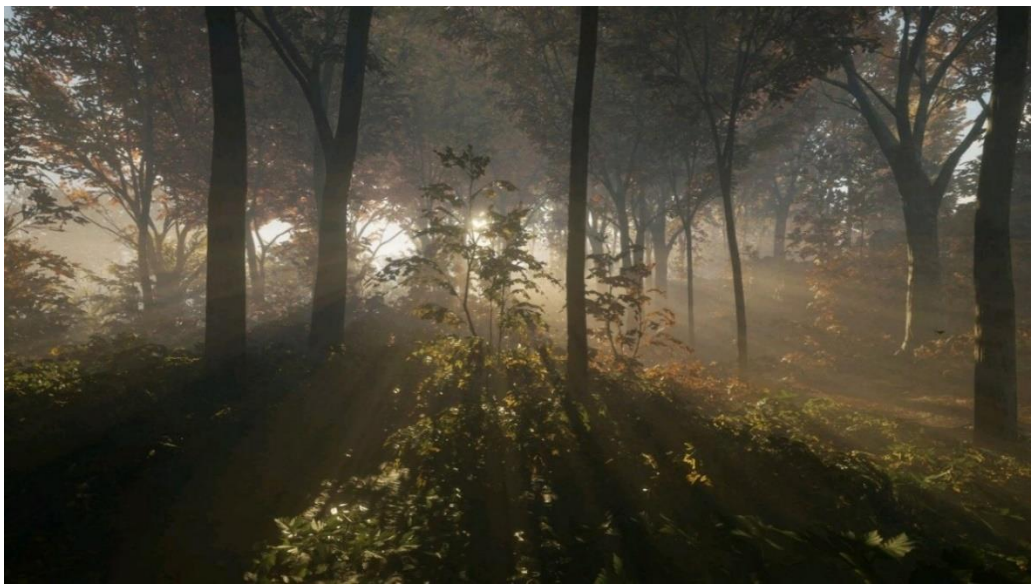

Figure 8 'The Hunter: Call of The Wild' gameplay screenshots, 2022

I used Unreal Engine 4(UE4) as the environment development software for this project. I chose Unreal Engine because it can use features such as dynamic weather and real-time ray tracing and is free for learning and developing internal projects. In addition, many relevant software teaching materials and plugins about UE4 on the Internet are very suitable for beginners and digital designers working independently. My project is based on many famous attractions in New Zealand. It does not completely restore the real scenery but creates virtual sceneries according to the imagination and the characteristics of Zen aesthetics. New Zealand is rich in landforms, and different landscape areas have their characteristics, bringing different immersive experiences to the audience.

[44] Pedro J. Pardo, María Isabel Suero, and Ángel Luis Pérez, "Correlation between Perception of Colour, Shadows, and Surface Textures and the Realism of a Scene in Virtual Reality," JOSA A 35, no. 4 (April 1, 2018): B130–35, https://doi.org/10.1364/JOSAA.35.00B130.

2.3.2. Material and Texturing

The fidelity of the generated environment is paramount for visual simulation of the environment. The accuracy of the environment model in the image is too low. Even if the interaction is good, it is useless. A high-precision environment model needs to be produced to show a more realistic scene atmosphere in the VR scene.[45]

Quixel Megascans is one of the largest libraries of photo scan assets. It contains many highly optimized photorealistic 2D and 3D assets, including many natural environment model assets such as vegetation, rocks, etc. These models are scanned from natural objects and have 8K and above HD resolution textures. These models can be seamlessly imported into Unreal Engine for use via plugins. Many of the models in my virtual landscapes are from Quixel Megascans. These high-quality and accurate 3D models greatly enhance the fidelity of the virtual environment.

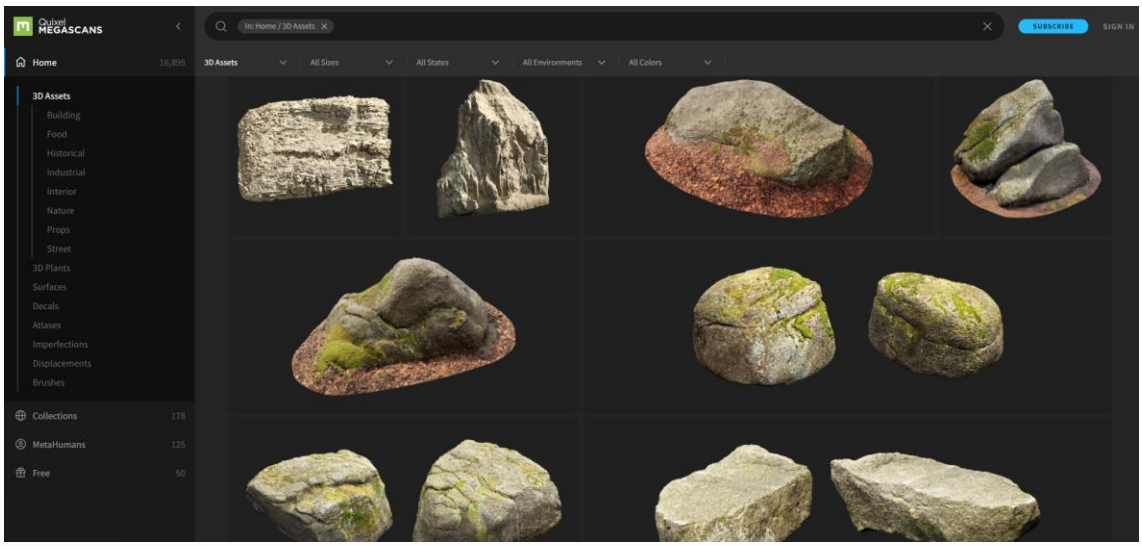

Figure 9 Quixel Megascans webpage screenshots, 2022

When designing virtual scenes, the material and texture pattern is also of great significance to the rendering effect of the scene. The models in virtual reality mainly

[45] Yahong Wang and Xiao-bing Hu, "Three-Dimensional Virtual VR Technology in Environmental Art Design," International Journal of Communication Systems 35, no. 5 (2022): e4736, https://doi.org/10.1002/dac.4736.

reflect their surface features by materials and textures. We can only get a realistic picture effect using suitable materials and textures.[46]

The Zen-scenario animated short 'After the New Rain in the Empty Mountain' was well received by the audience for its surreal and delicate painting style. Watching his animations makes it hard for me to differentiate the virtual from the real. Designer Dai Xinqi attaches great importance to the use of materials and textures. To perfectly restore the model's realism, he conducted on-the-spot investigations and records on the material and texture of the model. For example, he recorded the wetness of the tree trunk and soil after the rain and adjusted the model's material according to the actual situation of the inspection.

Figure 10 'After the New Rain in the Empty Mountain' animation screenshot, 2022

This approach is also critical to my design practice. To better express the details of the landscape, it is necessary to collect relevant data through on-site observation.

[46] Luke Ahearn, 3D Game Textures: Create Professional Game Art Using Photoshop, 4th ed. (New York: A K Peters/CRC Press, 2016), https://doi.org/10.1201/9781315229676.

2.3.3. Sound

Sound is an essential part of an immersive virtual environment and a crucial medium in conveying the scene's atmosphere. The tranquility of the environment can be emphasized by describing the subtle sounds in nature, such as the singing of birds and insects. These natural sounds make people feel relaxed and pleasant, and humans interpret these sounds as beneficial noises, which helps reduce stress.[47]

In addition, some natural weather is also conducive to people's mood stability, such as light rain. A study conducted in 2012 showed that noise such as light rain could significantly improve participants' sleep quality by reducing the complexity of brain waves.[48] Music expert Mary Plummer mentioned that the sound outside the camera is an excellent way to create suspense in the scene. The appearance of off-site sounds can stimulate the imagination and curiosity of the audience, thereby enhancing the sense of immersion in the scene.[49]

'Just Rain: Sound & Sight Rain' is a sleep aid and relaxation app based on 3D surround natural sounds. It provides many high-quality 3D natural sounds, such as rain and running water, providing users with a more realistic and immersive sound experience. I referenced these sleep aid and relaxation apps. Using a surround sound recording device, real 3D surround sound data was collected from New Zealand's natural environment and combined with some post-generated sounds to enhance the immersion of my virtual landscape.

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[47] Eleanor Ratcliffe, Birgitta Gatersleben, and Paul T. Sowden, "Bird Sounds and Their Contributions to Perceived Attention Restoration and Stress Recovery," Journal of Environmental Psychology 36 (December 1, 2013): 221–28, https://doi.org/10.1016/j.jenvp.2013.08.004.

[48] Junhong Zhou et al., "Pink Noise: Effect on Complexity Synchronization of Brain Activity and Sleep Consolidation," Journal of Theoretical Biology 306 (August 7, 2012): 68–72, https://doi.org/10.1016/j.jtbi.2012.04.006.

[49] Mary Plummer, Soundtrack Pro (Peachpit Press, 2006).

In conclusion

Investigating the eight components that influence landscape contemplation has taught me what landscapes are more contemplative and has helped me choose and conceive my scenes. Through the study of Zen aesthetics, I learned some aesthetic characteristics derived from the Zen concepts and the inspiration of these to design, which helped me find the combination of virtual environment design and Zen aesthetics. In addition, I learned that the key to Zen art lies in the creator's epiphany. Finally, the investigation and reflection on the virtual environment design made me understand the elements that enhance the realism of the virtual environment. The study and analysis of some classic cases played a guiding role in my project practice.

3. Methodology And Methods

This research is a practice-led exploration with a primary focus on:

how Zen aesthetics creates a way of designing virtual contemplative landscapes.

Action research is the core methodology of this research. I use various research methods in my research practice, including on-site observations, mood boards, and prototyping.

3.1. Action research

Action research aims to bridge the gap between theory and practice by combining "action" with "research." According to Swann's model, action research follows six steps: question - research - collect data - formulate - develop - evaluate.

Action research is divided into three phases: research, practice, and reflection.

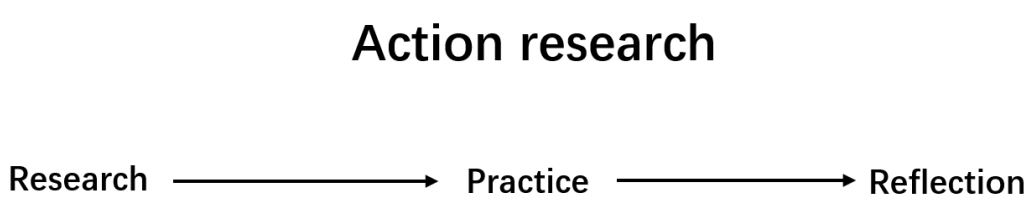

Figure 7 Action Research Flowchart, Shu Zhang, 2022

He emphasizes that the design process is not linear but iterative. It can be effective by constantly re-examining the problem, analyzing the problem, and comprehensively correcting the solution.[50] A key reason for choosing Action Research is that my design practice process is iterative, similar to Action Research.

First, I analyzed the research question:

[50] Cal Swann, "Action Research and the Practice of Design," Design Issues 18, no. 1 (2002): 49–61.

how Zen aesthetics creates a way of designing virtual contemplative landscapes.

I needed to find out by practising developing a series of virtual contemplative landscapes. I realized that, to solve this problem, I should investigate three key contexts: contemplative landscapes, Zen aesthetics, and virtual natural environments. First, I needed to understand what kind of landscape is contemplative? Then I wanted to know what Zen aesthetics is? What are the characteristics? How did they influence the design? Finally, I also needed to understand how to design a highly immersive and realistic virtual environment?

During the research phase, I conducted a contextual review and, based on research by Agnieszka et al. learned about eight key components that influence landscape contemplation. I then studied the five concepts most closely related to Zen culture and design, analyzed the aesthetic ideas or characteristics they derived, and explored their application in design through some case studies. Also, through my research on the concept of epiphany in Zen, I learned about the process of creating Zen artwork. Finally, I learned some key elements that affected the realism of the virtual environment and analyzed some typical cases as a reference and guidance for my practical projects.

The second is the practical phase. I used mainly on-site observation, mood boards, and prototyping. Being immersed in nature and stimulated by the natural environment outside can help inspire creators. On-site observations also helped me gather the image and sound data needed to make the prototype. Mood boards help develop my inspiration, clarify my design ideas, and lay the groundwork for sketching and prototyping. Prototyping is using a set of tools to implement my ideas and make them tangible.

Finally, I needed to test and check my prototype in the reflection phase constantly. Reflect on whether my prototype matches what I had in mind when I conceived and designed it. Whether it aligns with the mood I want to convey. Whether it contains the

zen aesthetic I want to express. Whether it resonates with me emotionally, then modify and iterate. It's a constant looping process.

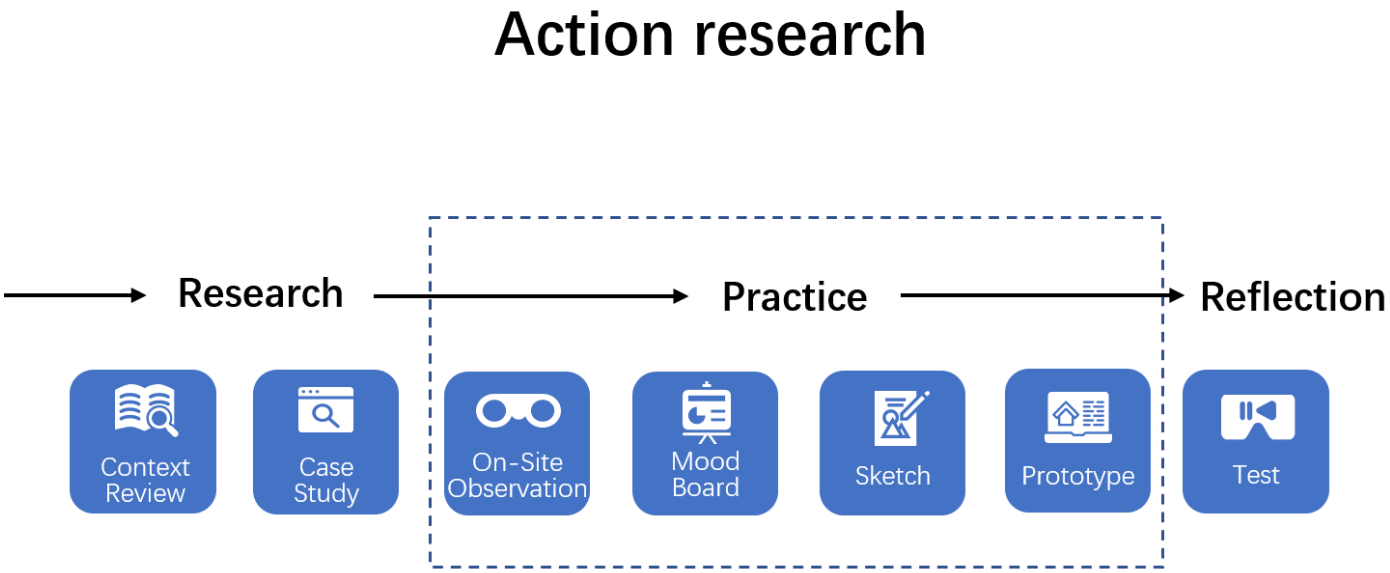

Figure 8 Methods and tools in the action research, Shu Zhang, 2022

3.2. Methods

3.2.1. On-site observation

On-site observation has been widely used as a qualitative data collection technique in many research fields. In this research project, on-site observation is a means of collecting data and one of the important ways to inspire creators.

On the one hand, the virtual natural environment in this project is based on the natural landscape of New Zealand. On-site observation helps me collect image and sound data from the scene. The main tools used are cameras and stereo recorders. The camera allowed me to collect photo and video data about the virtual environment. It also helped me document many material details in natural environments, such as soil after rain, moss on rocks, etc. The expression of model texture is essential to enhance the sense of

presence and immersion in the virtual reality environment. Recording and analyzing the details of the target elements in the natural environment helped adjust the model data in the virtual environment. In addition, the surround sound recorder allowed me to easily record the sounds of the real natural environment, such as the sound of running water, the chirping of birds, etc., and add them to the prototype design to enhance the immersion of the virtual environment.

Figure 9 Collect images data on-site, Shu Zhang, 2022

Figure 10 Collect sounds data on-site, Shu Zhang, 2022

On the other hand, traditional Asian artists have a close relationship with nature. For Chinese artists, nature is a source of inspiration, and externalities provide them with resources to explore aesthetics. Chinese cultural traditions believe that all things are interconnected and interdependent, forming a harmonious whole that is constantly evolving. When Chinese literati appreciate nature, they do not regard nature as the object of understanding but are committed to communicating with nature and regard nature as a friend.[51] Inspired by this, I needed to constantly immerse myself in the natural environment and feel the resonance with nature through on-site observation to inspire an epiphany about Zen philosophy or the meaning of life. This can be understood as to how researchers maximize the chance of discovery during the research process. At the same time, on-site observation was a catalyst for me, allowing me to exercise my insight constantly.

Figure 11 Access to nature for zen Epiphany, Shu Zhang, 2022

[51] Meijun, F, "Ecological Consciousness in Traditional Chinese Aesthetics," Educational Philosophy and Theory 33, no. 2 (2001): 267–70, https://doi.org/10.1111/ j.1469-5812.2001.tb00268.x.

3.2.2. Mood board

Mood board is a research method in which researchers use descriptive text, images, graphics, and other display forms to organize the collected knowledge, construct concepts, analyze, form ideas, and refine solutions related to design activities. It is a basic and widely used method for designers to do exploratory work.[52] Through various exhibits, researchers can express thoughts, feelings, emotions, concepts, and relationships. There are two types of mood boards: physical and digital. Physical mood boards are created by gluing together different types of traditional media, including pictures from newspapers and magazines, photographs, fabrics, inspirational objects, and more. Digital mood boards are created on a computer using digital media resources using graphic software tools. I generally tend to use digital mood boards.

For me, the digital mood board is more convenient and faster. It also allows me to add more electronic materials, such as video and sound, which help me comprehensively consider the virtual scene's design. I use this method and tool during the design practice phase to help develop design ideas, conceive the landscape, and identify the main parameters of the virtual landscape. I use this method during the reflection and iteration phases to refine and improve the prototype. After gaining an epiphany during on-site observation, I used keyword associations to expand my thinking on the mood board, select appropriate symbolic images to concretize the emotions, and finally confirm the main elements in the scene. Then, combined with the elements that affect landscape contemplation and the characteristics of Zen aesthetics, the landscape layers, terrain, vegetation, light, colour, material texture, archetypal elements, in the scene are analyzed.

[52] Steve Garner and Deana McDonagh-Philp, "Problem Interpretation and Resolution via Visual Stimuli: The Use of 'Mood Boards' in Design Education," Journal of Art & Design Education 20, no. 1 (2001): 57–64, https://doi.org/10.1111/1468-5949.00250.

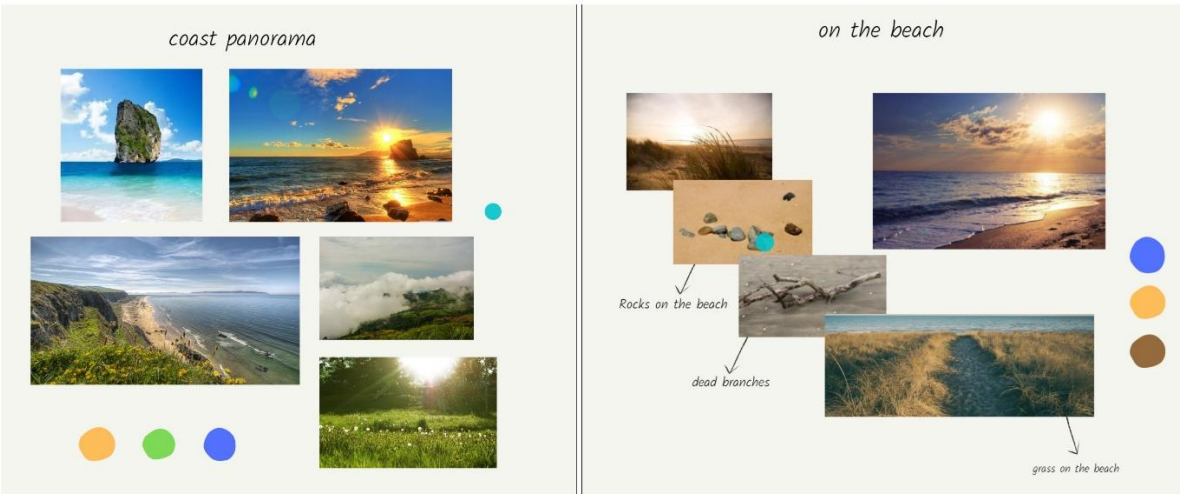

Figure 12 Coast landscape mood board demo, Shu Zhang, 2022

3.2.3. Prototyping

Prototyping refers to the process of creating a model exhibiting and organizing all the essential components.[53] It is the pre-production procedure and displays an artifact that approximates the final design.[54] In my design, prototyping supports me in taking my idea a step further to a visual and practical model. The process and result of the prototyping also enable me to revise and optimize my design iteratively. Strictly, prototyping consists of two stages: 3D scene sketches and 3D scene modelling.

First, sketching is a flexible, fast, and inexpensive device to visualize my scenes and design. It is an explorative stage during prototyping and thus is favourable to designers. Unlike traditional hand-drawn sketches, I use computer software to make simple 3D sketches in this project. According to my inspiration after meditation, I first used Unreal Engine 4 to construct the key elements (usually 3-4) in my imagined scene. Unreal Engine 4 is a computer 3D design tool that can create realistic visuals and immersive experiences, hereinafter referred to as UE4.

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[53] Christiane Floyd, "A Systematic Look at Prototyping," in Approaches to Prototyping, ed. Reinhard Budde et al. (Berlin, Heidelberg: Springer, 1984), 1–18, https://doi.org/10.1007/978-3-642-69796-8_1.

[54] Bradley Camburn et al., "Design Prototyping Methods: State of the Art in Strategies, Techniques, and Guidelines," Design Science 3 (ed 2017), https://doi.org/10.1017/dsj.2017.10.

Take the coast landscape in this project as an example. The scene contains three main elements: dead trees, the ocean, and the sun. I first imported the models of these three elements into the level and then set their textures to ink style. By continuously debugging the positions of these elements to determine the general scene layout, such a simple ink-style 3D sketch was completed. It looks like a traditional Chinese ink painting. 3D sketching helped me build a scene efficiently and quickly determine the positions of the main elements and their relationships.

Figure 13 Coast landscape 3D sketch demo, Shu Zhang, 2022

The next step is to build the prototype of the landscape. After identifying the main elements in the scene and their layout, I first needed to build a base terrain for the scene. World Create allowed me to create 3D terrain models from sketches quickly. Then, I imported the terrain model into UE4 for further adjustments, adding sky, weather, lights, vegetation, to the scene in UE4. After the basic elements in the scene were determined, I adjusted the material details in the scene, such as roughness, reflectivity, and added more detailed elements, such as small flowers, moss, mushrooms, etc., to enhance the realism of the virtual scene.

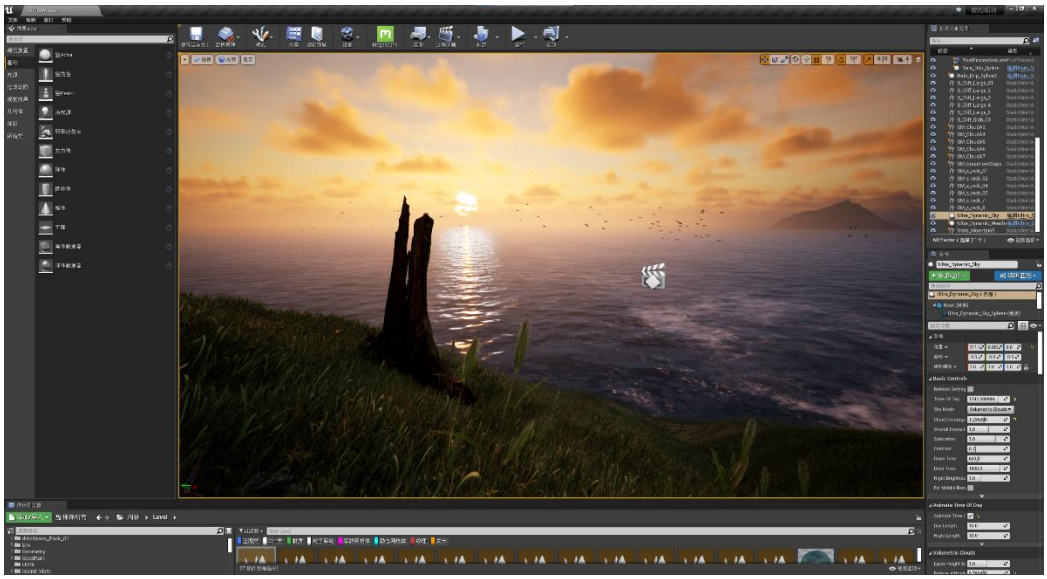

Figure 14 Virtual coast landscape prototype demo, Shu Zhang, 2022

In addition, it is sometimes necessary to consider local lighting, add some local lights, and adjust the relationship between light and shadow to highlight archetypal elements and picture textures. One problem with prototyping is that designers can deviate from the original purpose and expectations in the process. I needed to reflect and evaluate prototypes to reduce this problem. Suppose the virtual scene prototype is different from the picture I imagined or does not resonate with me emotionally. In this case, I would go back to the mood board step, rethink and plan the scene, and make a new prototype sketch. Generally speaking, prototyping is a process that I constantly review and iterate.

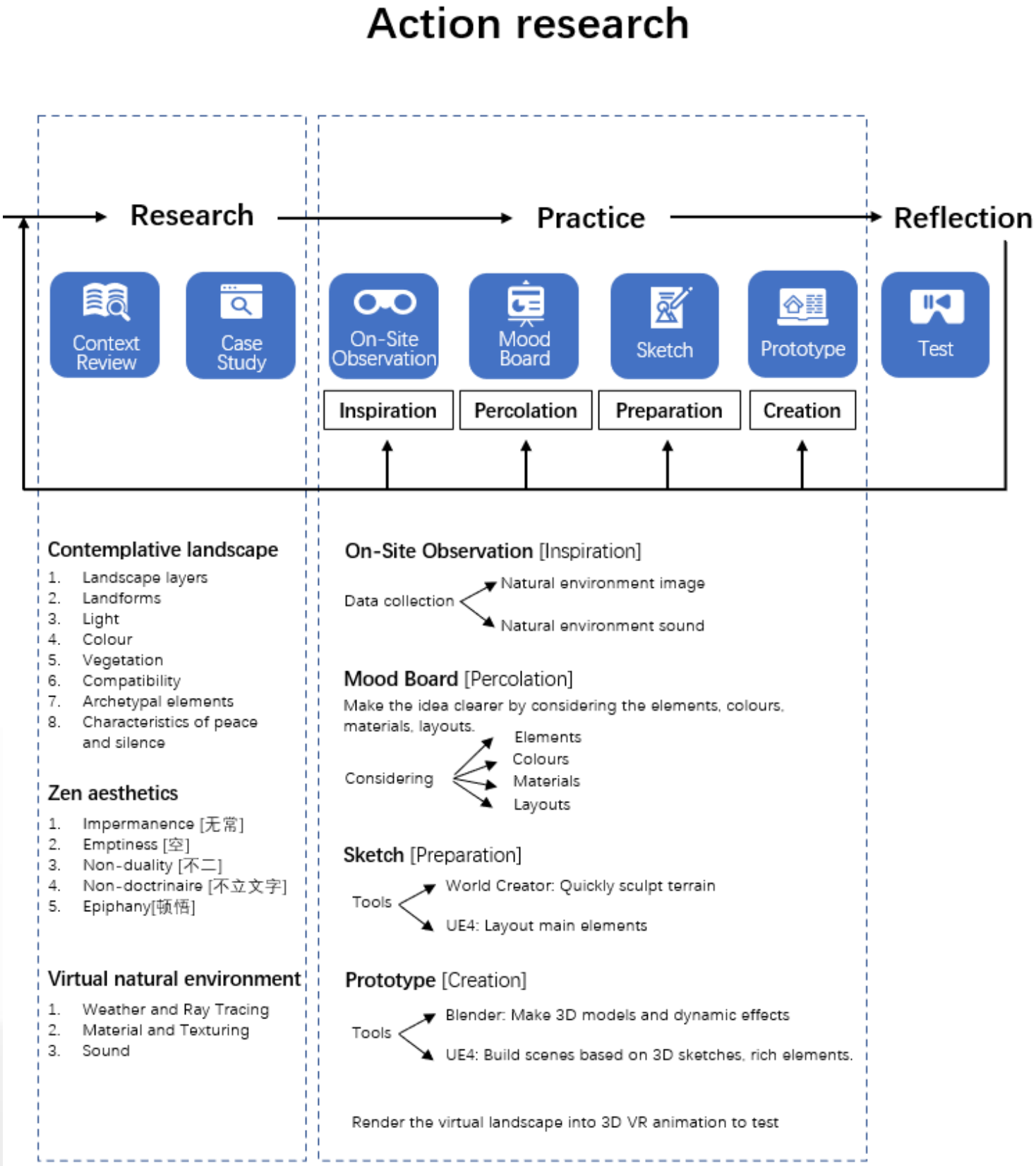

Figure 15 Action research overview chart, Shu Zhang, 2022

4. Description of Practice

During the on-site observation, I inspected most of the landscapes of the North Island and South Island of New Zealand, such as coasts, grasslands, forests, mountains, rivers, lakes, springs, waterfalls, and so on. During my investigation, five scenes made me feel tranquil and I had a Zen epiphany: the coast, meadows, forests, lakes, and springs. So the final prototype of my project is virtual contemplative landscapes designed around these five scenarios. First, I will take the meadow landscape as an example to introduce my inspiration activities and practice process in detail.

4.1 Meadow landscape

From the beginning of inspiration to the completion of the work, whether visual art or auditory art, the process of creation has a clear trajectory. The creation process of my virtual contemplative landscape is a widespread five steps: Inspiration → Percolation → Preparation → Creation → Reflection

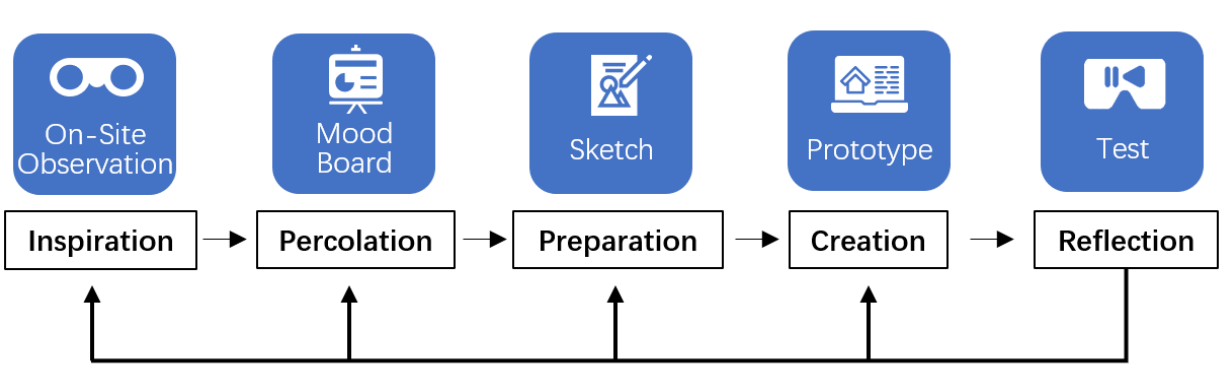

Figure 20 Five steps to creating a virtual contemplative landscape, Shu Zhang, 2022

4.1.1. Inspiration

In the contextual review, I mentioned that epiphany occurs during the inspiration stage, but what is the relationship between epiphany and inspiration? Lai Kaiping[55] believes that inspiration is a complete process of the activity. Enlarging and slowing down the inspiration process can be divided into four stages: Intuition → Mental image → Epiphany → Ecstasy

Figure 21 Four stages of inspiration activities, Shu Zhang, 2022

[55] 赖开兵, "诗歌创作灵感思维机制初探" (四川师范大学, 2015).

Intuition

First, intuition is the creator's immediate reaction to the external environment, and a certain natural feeling is directly obtained from the experience object. At this stage, the creator is in a state of unconsciousness. Emotion and reason are not involved in this process. The main task of this stage is to discover the existence of beauty and lay a solid foundation for the generation of inspiration.

Mental imagery

The natural feeling obtained through intuition stimulates the joy and impulse of the creator's psychological activities and causes psychological resonance (i.e., similarity and dependence). This similarity prompts the creator to stimulate a desire and promotes the generation of mental images through brain imagination, association, contrast, and other activities. The mental image conforms to the creator's state of mind or forms a striking similarity.

Epiphany

In the process of thinking at the speed of light, the information the creator is exposed to is similar to his own information, which prompts the creator to realize a certain critical point in an instant, which is the creator's epiphany. An epiphany is the sudden realization of a solution to a problem. It is the decisive moment in the inspirational activity because all factors have undergone a qualitative change at this stage. In the process of Zen art creation, epiphany refers to the creator's sudden comprehension and understanding of certain Zen concepts and desire to express them through artistic creation.

Ecstasy

After the epiphany, the creator enters a state of excitement and joy. This state is called "ecstasy," which is an unconscious state in which reason does not control thinking because the problem at this stage has been fundamentally solved or a way of expression has been found. The creator is addicted to his world in this state. The emergence of the "ecstasy" state does not mean the solution to all problems. Sometimes, new problems may arise. Completing artwork sometimes requires multiple inspirational activities, which have different missions and solve different tasks.

The Meadow Landscape expresses my epiphany about "Emptiness." Before my epiphany, my understanding of Emptiness was always vague. A chance epiphany I had in the meadow gave me a clearer understanding of Emptiness.

The meadow landscape is a very common natural landscape in New Zealand. Over Christmas, I saw such a scene on a meadow near the coast northeast of Dunedin. It had just rained that day, and the grassland was covered with fog and water vapour. I could only see a tree in front of me, and I couldn't see anything further away. I looked at the tree in front of me and the fog around me, feeling deja vu. I feel calm and comfortable inside. Thinking back on this feeling carefully, a picture like this appeared in my mind. I was standing in a fog, surrounded by chaos, and I couldn't see anything. It was as if I was in the mother's womb, and it was as if the universe hadn't formed yet. I didn't think about anything at this point, just silently enjoying the absolute tranquility and freedom.

Figure 22 The meadows northeast of Dunedin, Shu Zhang, 2022

Figure 23 The mental imagery after seeing the meadow, Shu Zhang, 2022

But this state did not last long, maybe just for a moment. I noticed in the distance there seemed to be a blurry shadow behind the fog. I suddenly had a thought, what is in the distance? What is behind the fog? Is that a mountain? When I noticed this thought, countless thoughts came up. How far am I from the mountain? What is on the mountain? When one thought appeared, more thoughts appeared, and various problems followed. They affected my mood, making it impossible for me to remain calm. I was far away from the quiet and free feeling I had just felt.

Suddenly, I had a full new understanding of Emptiness. For me, Emptiness is that moment of tranquility and freedom in the fog. When I noticed the shadows behind the fog, I had a thought; when I got attached to that thought, more thoughts came to haunt me. I also understood what Huineng, the sixth patriarch of Zen, meant by "without clinging to thoughts [無念]." When a thought arises, don't let it linger in your mind. Let it go away on its own to maintain inner peace and freedom. Although I am currently unable to be without clinging to thoughts, this epiphany gave me a clearer understanding of Emptiness. I hope to express my feelings about this epiphany through the virtual landscape. At this point, my inspiration phase is complete, and I have an idea to create.

4.1.2. Percolation

After the inspiration stage is completed, the creator has obtained a preliminary idea. The percolation stage is to develop the idea, and the method I used was a mood board. First, the main elements in the scene are grassland, fog, and a tree. The ambiance of the environment is quiet and empty. The feeling I hope to convey is ease (no stress) and freedom. In addition to the main elements, I needed to determine other elements and parameters in the landscape through the mood board, such as colours, layouts, materials, etc. The aesthetic feature of "Emptiness" in Zen aesthetics is to leave blank and pay attention to the distance between objects. I needed distant reference objects to isolate the critical element. Therefore I decided to add some looming mountains to the landscape as vistas. The close view is a meadow, the middle view is a tree, and the distant view is a looming mountain.

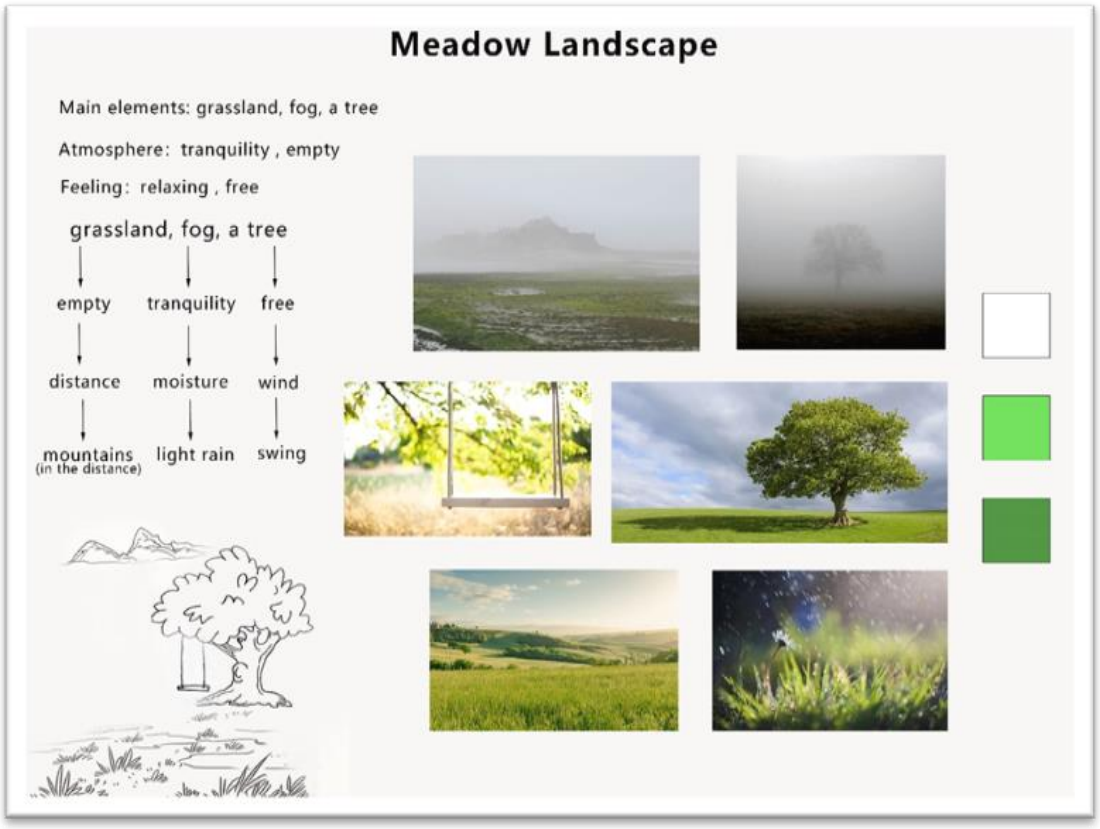

Figure 24 The meadow landscape mood board, Shu Zhang, 2022

Next, I wanted to highlight the tranquil atmosphere. From the word fog, I think of moisture, and then I think of rain. Generally, heavy fog is accompanied by rain. Rainy days are good for stabilizing people's emotions, especially the noise of light rain can reduce people's stress by reducing the complexity of brain waves. Therefore, I decided to set the weather in the meadow scene to light rain.

Finally, I also needed to consider how the meadow scene conveys a feeling of relaxation and freedom. The word freedom makes me think of birds flying in the sky, and then I think of the wind. For me, freedom is the feeling of flying in the wind. I recalled this feeling carefully, and the image of me sitting on a swing as a child and swaying with the wind came into my mind. The wind blew across my face while sitting on the swing, and I felt lighter and lighter as if I had become a bird. That feeling is relaxed and free. So I decided to add the swing to the landscape, and the tree and the swing became

archetypal elements in the landscape. The mood board clarified my idea of the landscape and formed a complete picture.

4.1.3. Preparation

The preparation phase is more active and focused. Once the artist has been inspired and determined how to move forward, he needs to figure out how to make it happen. This means that the artist needs to start making blueprints or sketches. In this project, I chose to use UE4 to make 3D sketches. Since the virtual natural landscape is 3D, the 3D sketches help me grasp the space's layout and each element's positional relationship. The main element in the landscape is only one tree, so sketching the meadow landscape is much simpler than the other four landscapes. First of all, I used World Creator to create a simple terrain. The meadow landscape's terrain is a large area of flat grass with only some mountains in the distance. Then I imported the terrain into UE4 and added the core element: "a tree." I didn't want the audience to pay too much attention to the tree but to feel the overall atmosphere of the environment. After a lot of searching and repeating for comparison, I chose to use a common oak tree that can be found everywhere. Finally, I set the textures of the mountains and tree to ink style and adjusted their positions, so a simple 3D sketch was complete.

Figure 25 The meadow 3D sketch, Shu Zhang, 2022

4.1.4. Creation

With the 3D sketch complete, it is time to implement it! The first is to add textures for the terrain and the main elements of the scene. To add realism, the surfaces of the virtual environment generally contain multiple layers, and the designer can choose the corresponding layers to draw according to his needs. The terrain texture of the meadow landscape is composed of multiple layers such as grass, soil, and sand. After the terrain texture is drawn, sunshine and weather need to be added to the scene. I used the dynamic weather plugin of UE4. The dynamic weather can change in real-time, just like the weather in the real environment. I set the scene to morning, increased cloud density, and added a light rain effect and volume fog. I adjusted the parameters of the volumetric fog to reduce the scene's visibility, making the mountains in the distance looming.

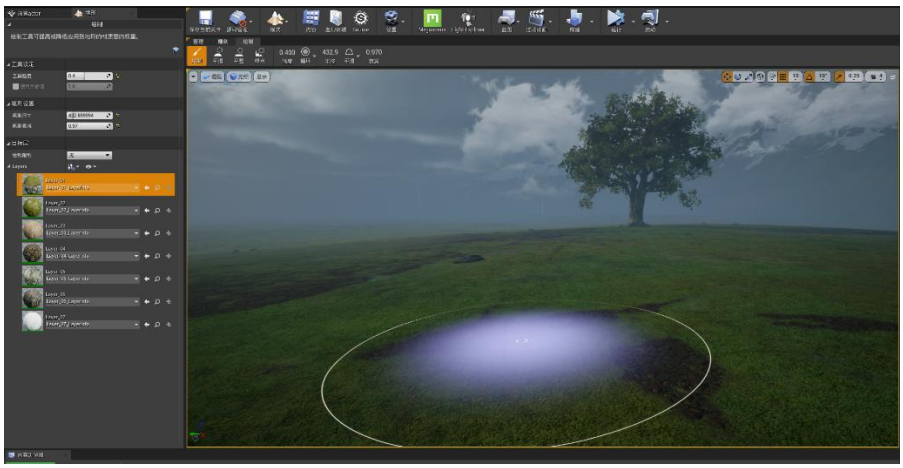

Figure 26 Drawing terrain layers for meadow landscape, Shu Zhang, 2022

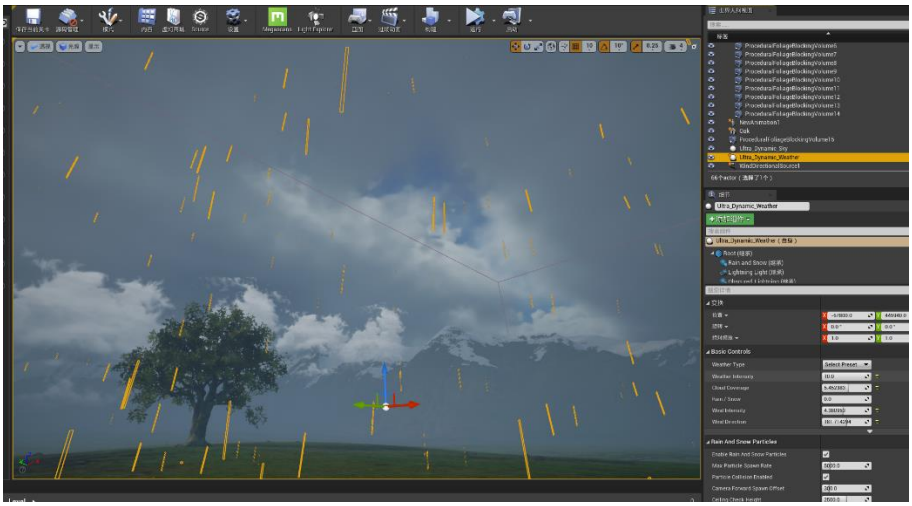

Figure 27 Adding dynamic weather to the meadow landscape, Shu Zhang, 2022

The next step was to add vegetation and detailed elements. The main vegetation in the meadow landscape is very simple and only grass. I selected a combination of models of various grasses to draw. The size and density of the grass in the scene are not uniform. The height and density of grass in the foreground (i.e., around the audience) are relatively high, while the grass height and density in the midground (i.e., around the oak tree) are relatively low. I recorded some details of the environment after the rain through on-site observation. For example, wet soil, small flowers in the grass, wet tree trunks, etc. I added corresponding detail elements in the virtual environment and adjusted their textures according to the collected data.

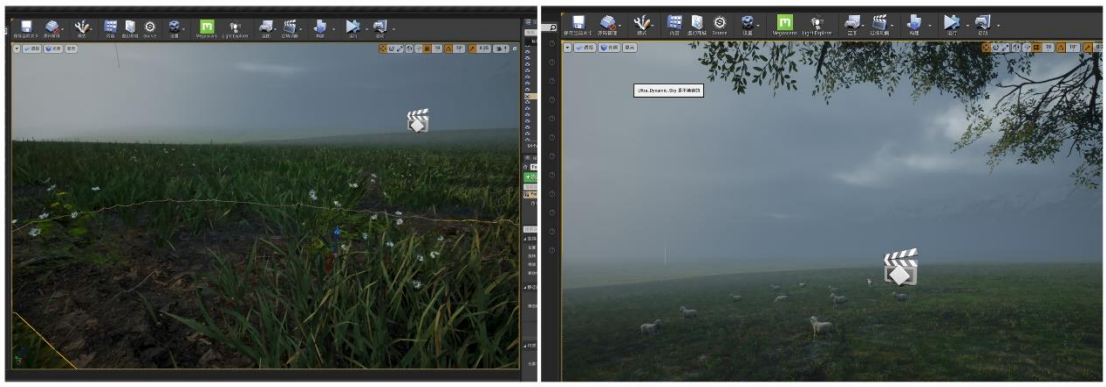

Figure 28 Adding vegetation and detailed elements to the meadow landscape, Shu Zhang, 2022

In addition, referring to the real environment in New Zealand, I added some grazing sheep to the meadow. Finally, to make a swing. It is undeniable that UE4 is very good

at building virtual environments, but in terms of modelling, I think that Blender has an unparalleled advantage. So in my projects, I use Blender to model and program individual elements. I observed the swings near my residence on the spot and learned about the general structure of the swings. And referring to the aesthetic characteristics of Wabi-Sabi in Zen aesthetics, I chose the most primitive materials for the swing: hemp rope, and unprocessed wooden boards. Such materials are simple and elegant and are more harmonious with the surrounding natural environment.

Figure 29 On-site observation in the skate park, Shu Zhang, 2022

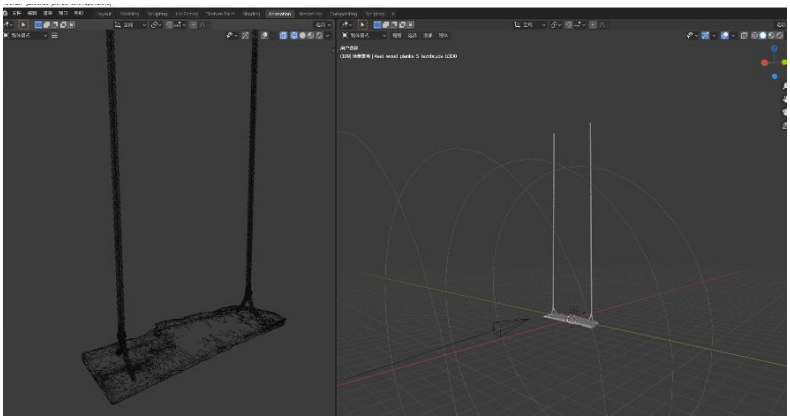

Figure 30 Building a swing model in Blender, Shu Zhang, 2022

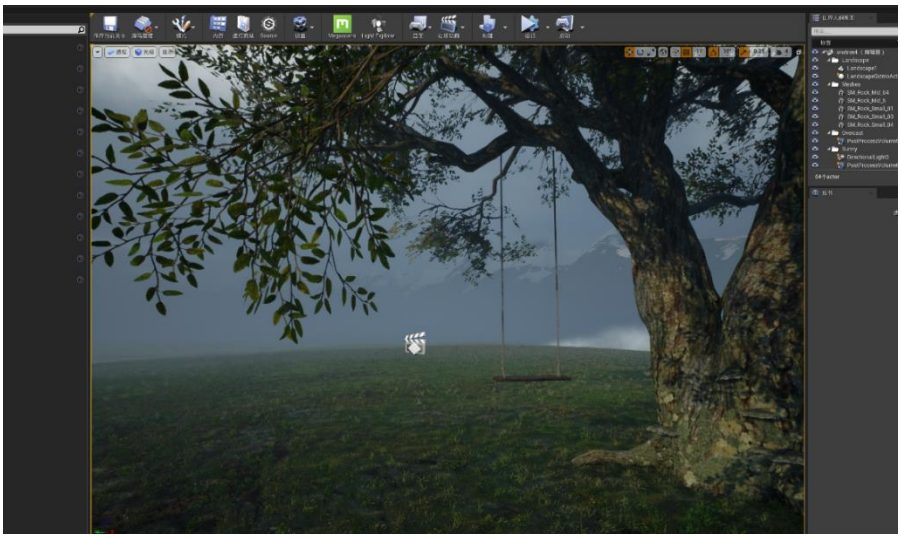

Figure 31 Meadow Landscape demo Shot 1, Shu Zhang, 2022

Figure 32 Meadow Landscape demo Shot 2, Shu Zhang, 2022

Iteration I

I found some problems through repeated testing by myself and related professional friends. Although the weather in my meadow landscape is dynamic, many main elements are static, which greatly reduces the realism and immersion of the virtual environment. Consider the Non-duality concept of Zen aesthetics and the aesthetic characteristics of the unity of dynamic and static. Since the audience's position is

immobile, it is necessary to make the surrounding elements move and use dynamic elements to set off the quietness of the environment. I added a directional wind source to the virtual environment, and the branches and leaves of the oak tree would shake when the wind blew. Also, in Blender, I added a slow sway to the swing.

Iteration II

Despite the added dynamics, the current virtual environment didn't give me the feeling of epiphany. I carefully recalled my understanding of Emptiness and found the problem. While the flocks of sheep grazing on the meadows add liveliness and realism to the scene, they complicate the landscape. Emptiness is characterized by leaving blank spaces and allowing the main elements to be isolated to create a lonely and peaceful atmosphere. So I removed all the sheep from the meadow, kept the meadow clean and empty, and increased the density of the fog so that the virtual environment was closer to the scene in my mental image.

4.2. Lake landscape

In the Chinese view, the sunrise symbolizes birth and the sunset symbolizes death. Sunrise and sunset are like life, they are short and difficult to last, but they are also the most beautiful times of the day. So I wanted to do a sunrise landscape and a sunset landscape. During the Christmas break, I passed by Lake Wanaka on the South Island and spent the night there. In Wanaka, there is what has been described as the loneliest tree in the world, and it may be the most photographed tree in New Zealand. Its delicately curved trunk appears to have grown straight out of the pristine waters of Lake Wanaka. From the shore, the tree stands alone in the water, and the lake is broad and rippling gently. In the distance, some mountains with snow on top are surrounded by clouds. The whole scene gives a feeling of loneliness and serenity. As the sun slowly sets, the light becomes warm and soft, and the afterglow on the distant mountains turns golden. The tree in the lake also seemed to be covered with a golden coat. The scene was suffocating at that moment. I hoped that amazing beauty would last forever, but the sun disappeared at speed visible to the naked eye, and the moon slowly rose.

Figure 33 Lone Tree, Lake Wanaka, Shu Zhang, 2021

In the evening, the sky appeared all over with starlight. I stood by the lake looking at the sky and suddenly had an epiphany. Over a long time, compared with the vast expanse of the universe, human life has been like a shooting star across the night sky. In the world, we are just travellers. We can't take anything when we leave. No matter how good, things will eventually disappear. So something of beauty is fleeting and hard to catch. All we can do is enjoy the moment and quietly appreciate it. At that moment, I had a clearer perception of the beauty of impermanence and had an idea for the design of the lake landscape.

According to the mood board, I hope the work conveys the Zen concept of impermanence. Impermanence can be manifested as change, things are changing every second, and these changes create the beauty of impermanence. The cycle of seasons is beautiful, as is the alternation of the sun and the moon. Things have their unique beauty whether they flourish or decay, which has nothing to do with time, but a stage in reincarnation. I want to show the different states of Lake Wanaka, from sunset to moonrise so that the audience can feel the beauty of the lake's changes. Therefore, I decided to add a time-lapse effect (from sunset to starry sky) to the landscape to speed up the passage of time. Let the audience see the changes in the sunset and moonrise of Lake Wanaka and feel the impermanence and shortness of life. In addition, as a static element, the lone tree in the lake contrasting sharply with the rolling water and the dynamic starry sky. The whole scene would be a combination of dynamic and static.

I sculpted the 3D terrain with reference to the terrain in and around Lake Wanaka. The foreground is the shore of the lake, the typical element is a lone tree in the lake, and some snow-topped mountains are in the background. I got rid of other complicated elements to make the picture look as simple and empty as possible. I adjusted the direction of the sunsets according to the real environment, added real-time dynamic weather to the landscape, and reduced the thickness and density of the clouds so that the audience could see the starry sky more clearly. In addition, I adjusted the moon's

trajectory so that it landed right between the branches to enhance the landscape's impact. I also added some dynamic aurora appropriately to make the starry sky look more vivid and beautiful.

Figure 34 Lake Landscape demo Shot 1, Shu Zhang, 2022

Figure 35 Lake Landscape demo Shot 2, Shu Zhang, 2022

4.3. Coast landscape

With a sunset landscape, I also needed to design a sunrise landscape. Sunset symbolizes the disappearance of life, while sunrise symbolizes the beginning of life. The sun sets today, and the sun rises tomorrow, and the day after tomorrow. Sunrise and sunset, tides ebb and flow, just like the constant cycle of life.

I chose the sunrise on the coast because watching the sunrise on the coast has a broader view and watching the sunrise on the cliff is without obstructions. The field of vision can be seen farther, and the sun can be clearly seen rising from the sea level. At first, I used Piha Beach as the prototype of my coast. Piha Beach has a beautiful, open coastline, and a huge rock is on one side of the coast, which can be used as a distant landscape element to guide the viewer's gaze towards the distance. Based on field observations and collected imagery, I drew a 3D sketch of the coastal landscape.

Figure 36 Piha beach, Shu Zhang, 2021

However, I discovered a critical problem when building the scene in UE4. I made a common-sense mistake: Piha is located on the west coast, which doesn't see the sunrise. I didn't notice the problem, and I didn't do field observations at sunrise. While designers can use their imagination and creativity in designing virtual environments, they still

need to refer to natural prototypes. Suppose some viewers recognize that the prototype of the virtual landscape is Piha Beach, but the sun rises from the west. In that case, it will easily lead to the inability to concentrate and contemplate. Although I had done a lot of work, I had to go back to the previous steps and start again due to the mistakes in the previous work. This problem also gave me a great warning. Be sure to do an excellent job of on-site observation and pre-design preparations.

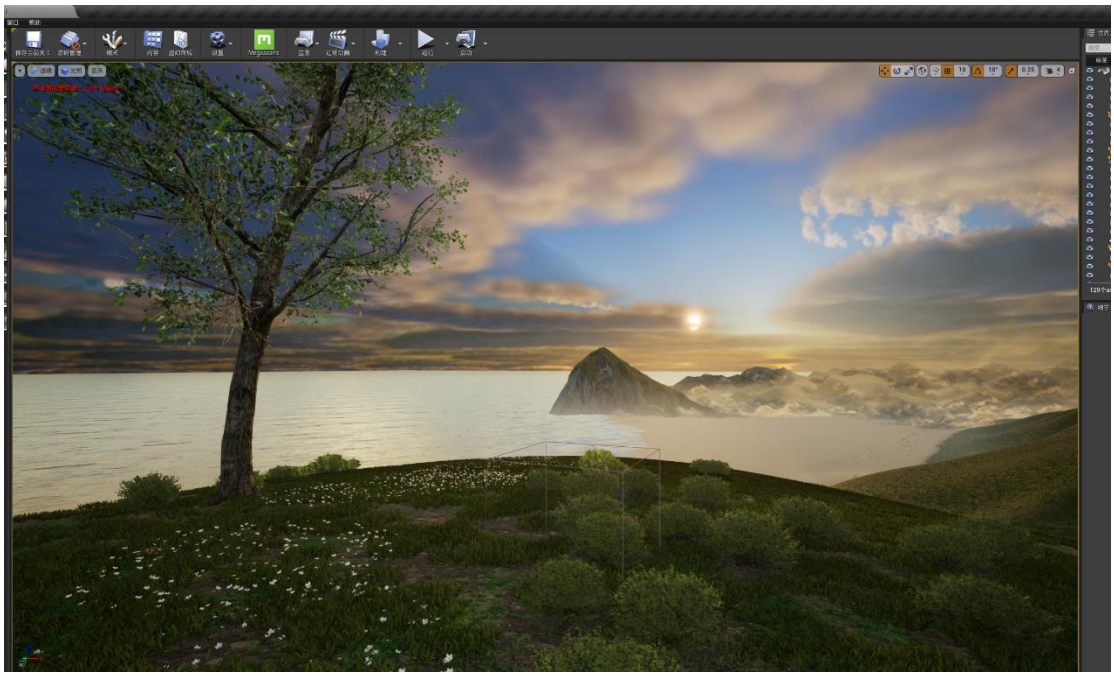

Figure 37 Virtual coast landscape based on Piha Beach, Shu Zhang, 2021

I started to rethink the prototype of the landscape. The second time, I chose the East Cape as the prototype for the coast sunrise scene. East cape also has a charming coastline, and a mysterious island can be seen in the sea not far from the coastline. The most important thing is that the East Cape is located in the easternmost part of New Zealand. It is the first place in the world to see the sun, which is of extraordinary significance to the people of New Zealand. During the holidays, I went there specifically to observe the site. Unfortunately, due to the road collapse, I could not get there at sunrise. Although I caught a ride across the beach to the East Cape in the morning in someone else's SUV, I had to take pictures in the car and leave because the East Cape is closed to outside vehicles.

Figure 38 East Cape coast, Shu Zhang, 2021

After coming back, I mainly designed the coastal landscape by referring to the network pictures of East Cape sunrise. I used a 3D sketch to determine the main elements and layout of the landscape. Considering the feature of "emptiness" in Zen aesthetics, I should pay attention to the distance between objects, keep the scene clean, and avoid overly complex and crowded elements. In the background, the sun is the most distant element in the landscape from the audience. It is located at the intersection of sea level and sky. The small island near the coast is the midground. Then I needed a typical element for the foreground, which is also the focal point of the landscape, where the audience's eye can rest. I chose a dead tree as a typical element for the foreground because I had an epiphany on the beach.

During my on-site observation, I once found a dead tree on the beach that fell to the ground. Although the tree had been dead for a long time, many young blades of grass were in the gaps of its trunk. The vitality of the grass was in stark contrast to the dead tree. The death of the tree made the grass grow. Maybe the grass will grow into a big tree one day, life alternates and reincarnates like this, and this is the impermanence of life.

Figure 39 Grass grew on a dead tree on the beach, Shu Zhang, 2021

Figure 40 Dead tree in the virtual landscape, Shu Zhang, 2021

Likewise, dead trees symbolize death in coast landscapes, while sunrises symbolize new life. These two elements form a strong contrast between life and death, representing life's impermanence and conveying the Zen concept of non-duality, the unity of life and death. In addition, a dead tree will not be too conspicuous in the foreground, nor will it block people's sight. The three main elements, the sun, the island, and the dead tree, serve as the landscape's background, midground, and foreground elements. They are separated from each other and form a triangular layout.

Figure 41 Coast Landscape demo Shot 1, Shu Zhang, 2022

Figure 42 Coast Landscape demo Shot 2, Shu Zhang, 2022

4.4. Forest landscape

In China and Japan, many temples are built in forests, and monks tend to meditate in the woods. The quiet and comfortable forest environment is conducive for people to focus their attention. I went to Rotorua's famous redwood forest for on-site observation. A huge original dead wood is at the entrance of the redwood forest. It lies there quietly, like a large artwork, and many people take pictures of it. It reminds me of the beauty of Wabi-Sabi. It is not just youthful, vibrant things that are beautiful. Beauty is everywhere, just like this piece of wonderful dead wood, which has been hit by years of wind and rain to achieve its current appearance. Its beauty is solitary and subtle, and the rugged ravines and complex textures on the trunk surface seem to tell its story. Just like life, whether it has been brilliant or embarrassed, it is a journey, and every experience is touched and rewarded. We should be thankful for the time and experience that made us what we are now.

Figure 43 The dead wood at the entrance to the redwood forest, Shu Zhang, 2022

Entering the redwood forest, I was shocked. The trees here are very tall and straight; some big trees even require a few people to hold their hands to hug them. As I strolled through the forest with the soft wood chips under my feet, breathing in the fresh air, I felt the pores all over my body relax. Walking and walking, I found a magical scene. There was a huge dead tree on the ground, and seven redwood trees grow above its dead trunk. This alternation of death and life made me feel the impermanence of life once again. I was in the depths of the forest before I knew it, the density of trees was getting higher and higher, and the light became darker. I thought to myself the trees were all the same here, and I might be lost. Will I be stuck here? I had a bad suspicion, and the more I thought about it, the more afraid I became, and I lost the relaxed and happy mood just now. I felt the trees around me also become scary, and I stood there anxiously.

Figure 44 Redwood Forest, Rotoroa, Shu Zhang, 2022

I suddenly became aware of my thoughts, and from the first thought, I became increasingly worried, and more thoughts followed that trapped me and made me lose my cool. However, it wasn't the trees around me that scared me, but my own thoughts. At that moment, I had another epiphany and had a clearer understanding of the "without clinging to thoughts[無念]" emphasized by the concept of "emptiness." I slowly

adjusted my emotions, ignored those thoughts, and allowed myself to regain my composure and calmness. I take a slow walk in one direction. Not long after walking, I saw a small stream, and the surrounding trees became sparse. The sun shone through the trees, and I felt peaceful and calm like never before.

Based on this experience, I wanted to design a forest landscape based on the redwood forest. First of all, according to the research of Jiang et al., if the forest density is too high, it is easy for it to feel oppressive to people, and the forest with a lower density is more likely to make people feel relaxed. Second, the trees inside the forest are more uniform and more relaxing than at the edge of the forest. In addition, considering the simple and clean artistic features of Zen aesthetics, I only chose redwood trees as the main landscape vegetation to avoid too much clutter of vegetation in the landscape. And the forest density is appropriately reduced to give the audience a wider field of vision and more light.

I creatively added a stream to the forest landscape. The stream divides the forest, broadens the viewer's view, and draws the viewer's eye into the distance. In the background, I added a lake and some looming mountains. When considering foreground and focal points in the landscape, I thought of the dead wood at the forest entrance and the dead tree with seven trees growing on its trunk. Although they are dead, their broken bodies still show the beauty of Wabi-Sabi of impermanence. Therefore, I chose a redwood tree broken from its roots as a typical element in the foreground. Its trunk straddles the stream, becoming a natural bridge that perfectly blends with its surroundings.

Figure 45 Forest Landscape demo Shot 1, Shu Zhang, 2022

Figure 46 Forest Landscape demo Shot 2, Shu Zhang, 2022

4.5. Spring landscape

The inspiration for Spring Landscape came from some epiphanies I had while studying Zen. Buddhism believes that time and space are essentially Emptiness. The universe is impermanent, and these constantly changing phenomena give people the concept of time, but time is just a cognitive phenomenon. All dharmas[法] in the universe are the product of cause and effect. Therefore, Buddhism often uses cause and effect to explain time. In the past, the cause and effect have already appeared. Now, the cause has appeared, and the effect has not appeared. In the future, the cause and effect have not appeared. The thoughts attached to the past, present, and future are all empty. At first, I didn't understand the meaning of this sentence until something happened, and I had an epiphany.

At the end of last year, my girlfriend returned to China after graduation, and soon after, she and I broke up and stopped contact. After we broke up, I couldn't let it go for a long time. Especially in the dead of night, I always thought of the days I was with her. I was obsessed with the past, often unable to sleep, resulting in a poor mental state and difficulty concentrating. I often thought that I would be less uncomfortable if I asked her to wait for me to return to my country for the reunion. However, I began to worry about the future again. If I go to her after graduation, can I get her back? Has she found a new lover? Our two families are far away from each other. Can we get the blessings of our family members? Where will we live? Thoughts like this bothered me every day, and I felt so miserable that I didn't know what to do.

I suddenly woke up when I had a clearer understanding of "without clinging to thoughts[無念]" after reading the "Platform Sutra" by Huineng, the sixth patriarch of Zen. The past has happened, and I can't change it. There's no point dwelling on the past. The future has not happened, and all the speculation and worry are also meaningless and will only affect people's state. Since clinging to the past and the future are

Emptiness, what is the point of my thinking about them now? Buddhism advocates that everything goes according to circumstances and that it enjoys the present moment[當下]. Many scholars are not entirely accurate in translating the "當下" into the present. The present moment [當下] has nothing to do with time and space. The point of the present moment [當下] is to focus on everything you do. Focus on eating when you eat, focus on work when you work, and sleep when you sleep. Always maintain a quiet and clear mind. After I figured this out, in later life, although I couldn't be without clinging to thoughts all the time, sometimes when a thought appeared, I would notice it and would not think more along the way. The breakup has less and less impact on me and doesn't disrupt my emotions in real-time.

After this epiphany, I hoped to express this state of tranquility through the virtual landscape. After consulting many materials, I found that Han Shan, a poet, and monk in the Tang Dynasty, had his views on this state of "without clinging to thoughts." Someone asked him what the mind of Zen meditation looks like? He replied in a poem that the mind of Zen meditation is like the white moonlight shining on clear spring, and I cannot explain this feeling to others. Zen cannot be explained in words, and everyone needs to experience and comprehend it themselves. Han Shan's poems gave me an inspiration. The scene of the moonlight shining on the spring he described resonated with me. I once had a similar feeling and wanted to design a spring landscape based on this theme.

At first, I wanted to use the blue spring in Putaruru as a prototype for landscape design, and I also made on-site observations. However, when I designed several versions, I found that I was unsatisfied and did not achieve the desired feeling. Perhaps the algae in the blue spring are too rich and colourful, which is different from the scene I imagined. I looked at a few other places and chose Mirror Lake near Milford Sound in the South Island. Although Mirror Lake is a lake, its surface is smooth, the water quality

is clean, and the water plants on the lake are neat. Moreover, there are some mountains in the distance as a background. The landscape has a wide field of vision and rich layering, which is suitable as a contemplative landscape.

Figure 47 Virtual spring landscape based on blue spring, Shu Zhang, 2021

Figure 48 Mirror Lake, Milford-Te Anau, Shu Zhang, 2021

I made some modifications to the Mirror Lake, reducing the area and depth of the lake to make it look more like a spring. Soft reeds replace aquatic plants on the water surface, and I added a dead tree with moss to the shore. The slender and straight trunk guides the viewer's sight from the shore to the centre of spring. In this landscape, I mainly refer to the characteristics of Yūgen in Zen aesthetics. Yūgen is a mysterious and esoteric quiet beauty that is separated from the world, emphasizing the use of light and shadow in artistic expression. In the artworks of the Yūgen style, light only exists on the subject the designer wants to represent. In the interlacing of light and shadow, it is like being between life and death, experiencing the impermanence of life in a gloomy and tranquil atmosphere. To accentuate the contrast between light and shadow, I purposely increased the brightness of the moonlight and added supplemental light sources around individual main elements.

In addition, I added some tall trees beside the spring. The moonlight shines on the ground and water through the gaps between the leaves and branches. The dappled shadows of swaying leaves on the soil, the shimmering moonlight on the water, and the reeds swaying gently in the wind, these dynamic elements add a serene and profound atmosphere to the environment. The distance of the spring is gradually shrouded in darkness, and only the outlines of some mountains can be seen faintly, revealing a deep sense of mystery. No one knows where the spring water will flow, leaving the audience with infinite imagination. Finally, I added some light blue flowers to the water plants and supplemental lighting above them. Blue is the colour of the sky without irritation, representing tranquility, depth, and melancholy, and these flowers are more refined and mysterious under the illumination of moonlight.

Figure 49 Spring Landscape demo Shot 1, Shu Zhang, 2022

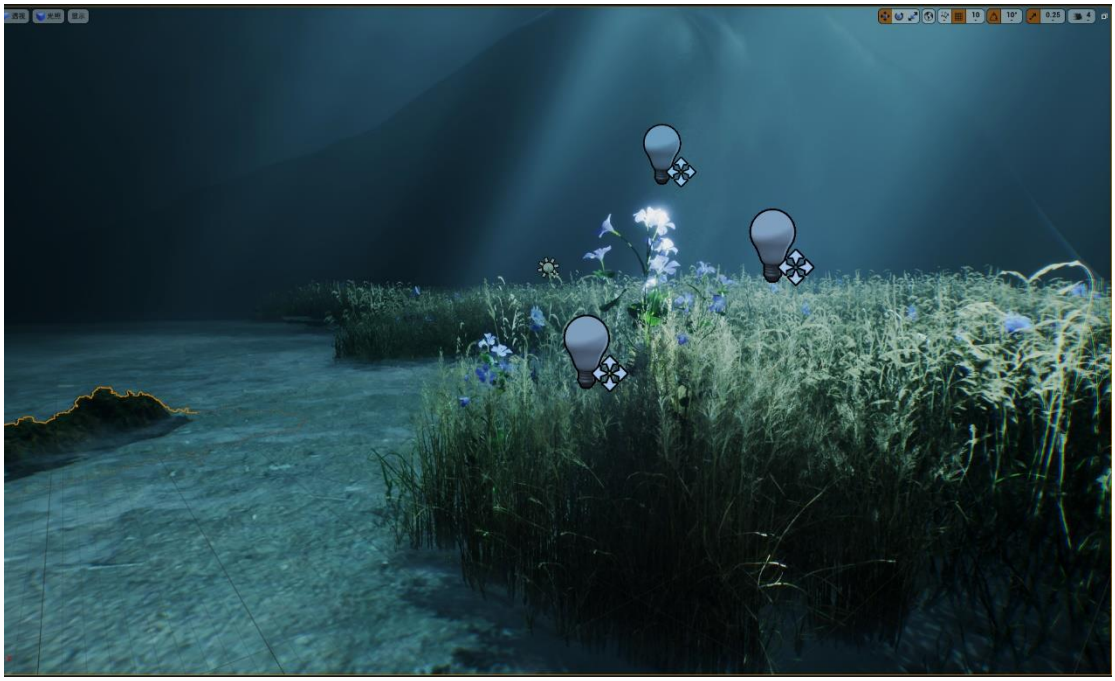

Figure 50 Spring Landscape demo Shot 2, Shu Zhang, 2022

4.6. Reflection

Reflection is constantly inspecting and testing prototypes and iterating to improve them. After the virtual landscape is built, it needs to be rendered into a stereo VR animation for inspection and testing. I usually start by placing some cameras that come with UE4 in the virtual environment to find the ideal audience position and viewing angle. For the first few rendering tests, I used a moving camera. I planned a fixed movement trajectory for the camera, and the audience followed the movement trajectory for a landscape tour. However, the result was not ideal. The fixed trajectory was not the subjective will of the audience, nor could it maintain the ideal landscape perspective.

Furthermore, when I rendered a 360° VR video for testing, the moving camera easily made the viewer dizzy. VR equipment allows the audience's perspective to follow the movement of the head. When the display speed of the headset cannot keep up with the moving speed of the body, it will cause a mismatch between the proprioception and the visual system and lead to vertigo. The moving lens will aggravate the occurrence of this problem.[56] Most of the VR devices on the market today have similar problems. I looked at some VR applications and videos, and most were fixed cameras (i.e., the audience is in a fixed position). Therefore, my project's VR animation display of the virtual landscape also uses one or two fixed position shots.

I first used a regular camera to find a good position and angle to record and render it into a 1080P animation to preview the landscape effect. After confirming the angle and position, I replaced the regular camera with a spherical camera to render the stereoscopic VR animation. By comparing 360° and 180° VR animations, I found that 180° VR animations were more suitable for this project. The purpose of rendering into VR videos is to display better and test the virtual landscape. 180° degrees can effectively control the viewer's field of view within the effective range, while 360°

[56] Hironori Akizuki et al., "Effects of Immersion in Virtual Reality on Postural Control," Neuroscience Letters 379, no. 1 (April 29, 2005): 23–26, https://doi.org/10.1016/j.neulet.2004.12.041.

video may cause the viewer's perspective to shift beyond the range of the virtual landscape the designer wants to show. The head rotation of the 180° video is much lower than that of the 360° video, which significantly reduces the probability of vertigo.

Figure 51 360° camera in the virtual landscape, Shu Zhang, 2022

In addition, UE4 can currently render 8K resolution videos at a maximum. Under the same resolution, the larger the frame, the lower the resolution of the picture. Therefore, the clarity and display effect of 180° videos are also better than 360° ones. UE4 can render each frame recorded by the 180° camera into a left and right stereoscopic VR image with a maximum size of 7680*3840 and then import all the frames into the Adobe Premiere Pro video editing software to synthesize a complete stereoscopic VR video.

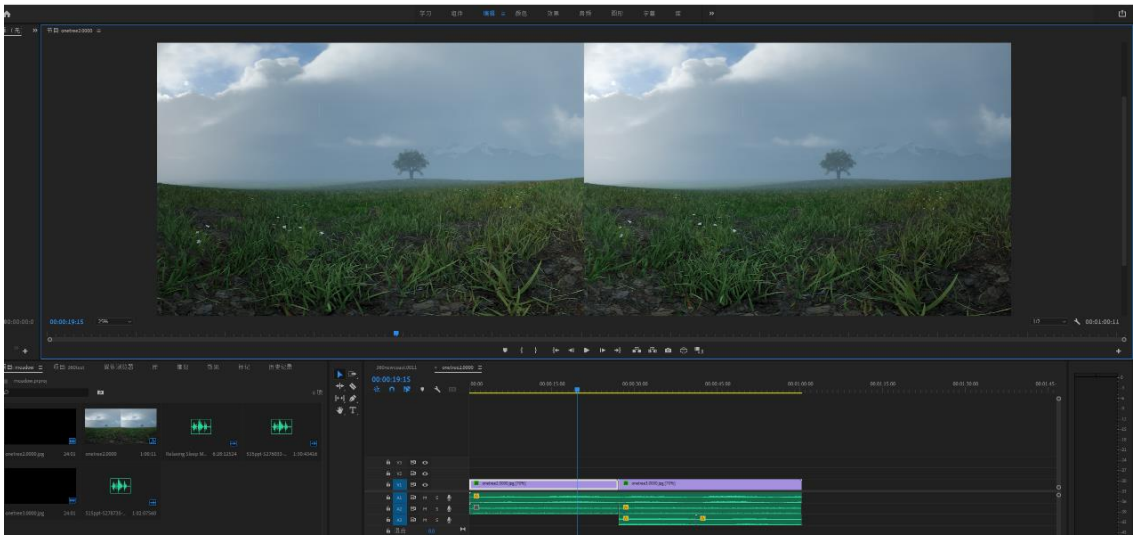

Figure 52 Edit 3D virtual landscape animation in Adobe Premiere Pro, Shu Zhang, 2022

The next step is to adjust parameters such as the video's tone and add sounds to the video. The Zoom H2n is a handheld audio recorder capable of capturing four-channel surround sound audio. During the on-site observation, I used the Zoom H2n to record some New Zealand natural environment sounds, such as rain, lake water, ocean waves, wind blowing leaves, etc.

Figure 53 Zoom H2n records stereo surround sound, Shu Zhang, 2021

After the prototype animation was made, the device I tested was the Pico Neo 3, which uses a 5.5-inch LCD monitor with 4K resolution (3664*1920) and a maximum refresh

rate of 120Hz. And it is equipped with 360° surround integrated stereo speakers, which support 3D spatial sound effects, which met the needs of my project testing and demonstration.

Figure 54 Pico Neo 3 VR headset, Shu Zhang, 2022

Figure 55 VR headset wearing demonstration, Shu Zhang, 2022

Figure 56 VR animation testing and inspection, Shu Zhang, 2022

In addition to self-experience, I invited friends who love art and design to come to my house, experience my virtual contemplative landscapes with a VR headset, and appreciate the works' aesthetics. These tests are informal, and participation and feedback are voluntary. Participants are invited to a relaxed atmosphere so they can feel relaxed and comfortable. After the VR experience, they made some aesthetic suggestions for my work.

Professor Jennifer Li has been a lecturer in Orthodontics at the University of Sydney for over four years. She also works with St George's Hospital Sleep Research Center treating patients with sleep apnea. After viewing the five virtual landscapes, she said:

> "*These landscapes are really beautiful, they can make me feel peaceful and forget other things. They have a strong sense of immersion and sometimes remind me of some previous things. I don't understand Zen culture, and I don't know if this is the effect of Zen aesthetics, but it does give me a different experience. Although I can't understand the feelings you get through Zen epiphany, I seem to have some of my own insights.*"

Besides, Jennifer also pointed out that there is no problem in appreciating these virtual landscapes only from the perspective of art and design. They have a tranquil and unique

charm. But from the perspective of clinical medicine, more clinical trials and data analysis are needed to prove the medical value of the Zen virtual landscape.

Zayne Tao is a landscape photographer based in New Zealand, specializing in composition and capturing light and shadow. He said:

> *"I think some virtual landscapes are familiar to me. Their prototypes should be some famous natural landscapes in New Zealand. I feel that your virtual contemplative landscape looks more shocking than the real landscape. Your shooting angle and composition highlight these natural landscapes' advantages perfectly. From the perspective of photography, framing these five landscapes is excellent, which can bring the audience a sense of immersion, and some scenes are very story-telling, which is easy to resonate with the audience."*

Zayne also affirmed the lighting effect in virtual landscapes. He mentioned that although the moonlight in the spring water landscape is very bright and even a little distorted, this brightness adds more details to the scene, and the audience will not feel scared. He suggested that I could learn more about photography lighting to enhance the lighting effects in the landscape.

Moon Wei is an interior designer. She thinks the five virtual landscapes' elegant colors and simple, clean layouts are very comfortable and relaxing. But the main elements in the landscape are somewhat single, basically trees. Moon suggested that I could try more design styles in addition to realism, such as designing 3D virtual contemplative landscapes in ink style with reference to traditional Chinese black and white ink paintings. She said:

> "*It will be more interesting to combine traditional art with modern digital technology and innovate more.*"

5. Discussion and Reflection

5.1. Methodological background and the contribution to the research

Action research is the core methodology of this research. I used various research methods in my research practice, including on-site observations, mood boards, and prototyping.

According to Clive Dilnot, design practice as a consultative process may not be considered knowledge-building research. Still, when reflection is combined with analytical thinking, it can contribute new knowledge to the field of research.[57]

This research project aimed to explore:

how Zen aesthetics creates a way of designing virtual contemplative landscapes.

The first contribution is that action research guides me to find answers to questions through practice, and the design process is a research process. The philosophical worldview behind action research has shaped my understanding of the creative practice. For practice-led researchers, knowledge comes from practice. Through research, practice, and reflection, I have explored a complete design process of a virtual contemplative landscape based on Zen aesthetics. From the perspective of aesthetic characteristics and evaluation elements of contemplative landscape, the virtual contemplative landscapes I designed conform to the aesthetic characteristics of Zen. The five virtual landscapes of the coast, meadow, forest, lake, and spring all meet the elements that affect landscape contemplation. These five landscapes are at different times of the day, the coast is the early morning sunrise, the meadow is the morning, the

[57] Dilnot, C, "The Science of Uncertainty: The Potential Contribution of Design to Knowledge," Doctoral Education in Design, In Proceedings of the Ohio Conference, 456 (October 1998).

forest is the afternoon, the lake is the evening sunset, and the spring is midnight. They contain different Zen aesthetic features.

All five landscapes contain water, rich landscape layers, open views, and beautiful distant views. None have intense lighting, and the primary colors are blue and green. The vegetation types in the five landscapes are relatively uniform, without complex and messy plants. Especially in the forest landscape, I chose the scene inside the forest. The redwoods are tall and neatly arranged. The density of the trees is relatively sparse. Along the stream, the audience can see the lake in the distance. In addition, each landscape contains one or two typical elements, which serve as focal points in the landscape to attract the viewer's attention. A dead tree on a cliff in the coast landscape. An oak tree on the grassland and a swing under the oak tree in the meadow landscape. A dead tree across the creek in the forest landscape. A dead tree in the lake landscape. Some blue flowers in the moonlight in the spring landscape.

In design practice, I mainly refer to "Emptiness" and "Non-doctrinaire" concepts in Zen aesthetics when making scene layouts and element selection. Use as few elements as possible to make the landscape look clean and simple. Learn from the aesthetic characteristics of "blank space," pay attention to the distance between objects, and isolate the main elements. When considering the material and color of the model, I referred to the aesthetic characteristics of Wabi-Sabi. I used the texture of the physical scan to highlight its rustic beauty after being corrupted by nature. Some main elements, such as dead trees, have texture resolutions as high as 8K or more. I appropriately reduced the saturation of each element in the scene to make the color look more elegant and comfortable. When designing the dynamic effects and sounds of the elements in the scene, I referred to "Non-duality," the concept of Zen aesthetic that dynamic and static are one. It is necessary to highlight the quiet environment and atmosphere, not to make all the elements static. Some dynamic elements, such as insects and birds, falling leaves, shaking swings, can instead bring out the tranquility of the environment and

promote inner peace. When designing the lighting in the scene, I referred to the aesthetic characteristics of "Yugan" and appropriately reduced the brightness of the entire scene to avoid overexposure. Pay attention to the relationship between light and shadow, let the light shine through the shadow, and put the main elements under the soft light. For example, in the spring water landscape, the soft moonlight shines on the spring water, and the blue flowers in the spring water, through the gaps in the swaying branches, make people feel mysterious and peaceful. In the depths of the spring, where the moonlight cannot reach, where the darkness gradually swallows up the moonlight, it also makes people have infinite fantasies.

In addition, according to the paradigm of Chinese art creation, I found the relationship between epiphany and inspiration, understood the process of inspiration, and followed it for design practice. But before I started to practice, my understanding of Zen art or design was only about integrating the characteristics of Zen aesthetics into art creation or design. However, when I started doing it, I realized that the key to Zen art is the Zen epiphany of the creator. A Zen-like art or design work not only adds some Zen aesthetic features but also needs to convey the artist's or designer's understanding of Zen culture and philosophy. Therefore, to design Zen works, designers must first learn Zen culture and understand Zen concepts.

The second contribution is that learning in practice also inspired my passion for research. On-site observation is not only used as a research method to collect data and materials but also enables me to get close to and integrate into nature. In communicating with nature, I have exercised my insight into discovering and perceiving beauty. The mood board connects traditional Oriental art creation with modern digital design. Under the traditional Oriental art paradigm, artistic creation emphasizes two-dimensional change rather than three-dimensional space. As a link between Zen aesthetics, landscape design, and virtual environment design, the mood board makes the traditional Oriental aesthetics and 3D digital design collision out of creative sparks.

In addition, design practice taught me many more basic design thinking frameworks and exercised my operating skills in many design software and tools. It also allowed me to gain more knowledge related to Zen aesthetics, such as traditional Chinese ink painting, Japanese aesthetics, Japanese films, etc. These have given me richer insights into oriental art. In practice, I applied the knowledge I learned to design and finally explored the complete creative process of a Zen virtual contemplative landscape from inspiration to prototyping to reflection.

5.2. Limitation

First, look back at my landscape design. The typical elements in the scene are too single, with almost all trees or dead trees. Although trees are common landscape elements in the natural environment and are very suitable as typical elements, attempts should be made to increase the diversity of the landscape. I can also start from different perspectives, for example, designing some miniature virtual natural landscapes from the perspective of an ant or a flying insect.

Secondly, the analysis of Zen aesthetics still needs to be deeper. Every artistic feature in Zen aesthetics has its unique cultural connotation and form of expression. Whichever aesthetic feature can have various forms of expression in artworks and can be referenced to design virtual landscapes in different environments at different times. This research only briefly analyzes some main aesthetic concepts of Zen aesthetics and their artistic features and tries to refer to them for virtual environment design. Next, I will conduct more in-depth research and analysis on a single Zen aesthetic feature, such as Wabi-Sabi or Yugen, and try to design more contemplative virtual landscapes based on them.

In addition, the limitation of this project is that the Zen virtual landscape design is based on the designer's Zen epiphany, which has a certain degree of privacy, cannot be imitated by others, and is not easy to promote. Moreover, whether these virtual meditation landscapes can arouse the general emotional resonance of the public and whether they can restore human physical and mental health still needs more scientific and effective experiments to prove.

6. Contributions and Conclusion

In conclusion, I address the expected contributions of my research. This research project attempted to apply Zen aesthetics to the design of virtual contemplative landscapes. Under the action research framework, I analyzed Zen aesthetics' main concepts and characteristics, found their integration points with virtual environment design, and realized the importance of epiphany to Zen art and design. I explored the complete set of processes for creating Zen virtual landscapes through design practice. The final result is displayed as 5 VR landscape animations. This project does not involve comprehensive user testing. It is an attempt at the creative design of virtual landscape, focusing on the combination of Zen aesthetics and virtual landscape design, as well as the exploration of design methods and creative process.

In the design community, contemporary design needs to consider the implantation of different cultures. As an important part of oriental culture, Zen culture contains very rich ideas. Its attention to the beauty of life and its reflection on the poetic nature of life can not only improve self-cultivation, purify the mind, but also answer some ultimate questions of human beings. Combining Zen aesthetics and digital design can endow digital design with more cultural value and provide innovative design theories and methods. The creative process of the virtual landscape in this project can provide a reference for other designers, artists, or scholars to build their projects and create more creative designs.

In addition, although virtual reality technology has developed in leaps and bounds, the aesthetic research of virtual reality has not yet been followed up. , The existing research on virtual reality and interaction is more from a technical or philosophical perspective, and the design research from the perspective of the art design is still relatively backward. At this stage, most of the main practitioners of virtual reality design come from game

designers, programmers, which have certain limitations on aesthetics and work quality. At the current stage, when technology has developed to a certain extent, understanding the characteristics of media and improving the quality of works and interactive experiences have become the key issues of virtual reality art design. The combination of Zen aesthetics and virtual environment design is expected to fill this gap and provide a certain reference for the artistic aesthetics and evaluation of virtual reality design in the future.

Combining Zen aesthetics and virtual reality is also very exploratory in the medical community. From a clinical standpoint, meditation has been found to reduce stress and blood pressure, positively affecting human physical and mental health.[58] Virtual reality technology is also widely used in the medical field, especially in treating mental illness.[59] Because virtual reality is relatively new, there is not much overlap between clinicians who know best how to treat patients and designers who can design and develop virtual reality applications. Currently, the best solutions point to a partnership between the two specialties to meet the medical and technical requirements to the highest standards. Virtual landscape design based on Zen aesthetics may play a crucial role.

In the future, I hope to cooperate with more technical people in the creative and virtual reality fields to continue to develop Zen VR applications based on the virtual contemplative landscape. Interactivity is a key feature of virtual reality and contributes to the sense of presence.[60] Based on the virtual environment, it is also necessary to consider the interaction between man and environment, try more cultural integration, and more humanized and personalized functions. At that point, I can invite the larger community to participate in the experience. My research may be able to provide new

[58] Alberto Chiesa, "Zen Meditation: An Integration of Current Evidence," The Journal of Alternative and Complementary Medicine 15, no. 5 (May 2009): 585–92, https://doi.org/10.1089/acm.2008.0416.

[59] Lan Li et al., "Application of Virtual Reality Technology in Clinical Medicine," American Journal of Translational Research 9, no. 9 (September 15, 2017): 3867–80.

[60] Joschka Mütterlein, The Three Pillars of Virtual Reality? Investigating the Roles of Immersion, Presence, and Interactivity, 2018, http://hdl.handle.net/10125/50061.

insights for interactive and immersive media design in relaxation, decompression, and mindfulness and provide effective assistance for the public to relieve mental stress and maintain physical and mental health. In addition, design is an important carrier of culture. Seeking the combination of Zen aesthetics and contemporary design provides a way of thinking for the inheritance and development of Zen culture in today's society to a certain extent.

My research should be well suited to design disciplines, researchers in the field of VR and most importantly, those people who desire to escape to the outdoors in real-time and enjoy the peace and relaxation in their natural environment. For example, in big cities, people who have problems such as insomnia and anxiety due to work and life's stress do not have the time and opportunity to travel and relax. And those affected by disease or epidemics are prevented from moving freely. This research uses Zen aesthetics and 3D digital technology to design idealized virtual natural landscapes. I hope these virtual contemplative landscapes will help these people escape to a more beautiful, serene healing space and promote mindfulness or insight to restore a better state of mind and body.

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Appendices

Video links:

It is recommended to choose 4K resolution to watch

1. Overview of 5 virtual landscapes (2 minutes short films):

https://youtu.be/yXZr1Aue2ic

2. VR animations of 5 virtual landscapes (Better watching with a VR headset):

VR Coast:
https://youtu.be/bplT2fvm6SI

VR Meadow:
https://youtu.be/REgAnKFMoAw

VR Forest:
https://youtu.be/T5jbYUyRElk

VR Lake:
https://youtu.be/Xi8gAv181eM

VR Sring:
https://youtu.be/A8Y1ErCfJaE