

LET IT GROW

Immersive installation in relation to cultural expression and audiences'
perceptual experience

Yachan Yuan

Department of Design

Collaborative and Industrial Design

Author Yachan Yuan

Title of thesis 'Let it Grow'- Immersive installation in relation to culture expression and audiences' perceptual experience

Department Department of Design

Degree programme Collaborative and Industrial Design

Year 2020

Number of pages 91

Language English

Abstract

Currently, immersive art installation has become one of the most rapidly growing segments of the immersive design industry. As a hybrid of art and technology to collectively disrupt the zone of single material expression, full-body, sensory immersion installations have emerged and given people more opportunities to experience different realities.

As various immersive exhibitions emerged in the year 2019, it was evident to see that more pop-up exhibitions start to be generated by instant interaction and astonishing digital illusions. The lucrative market space and audiences' pursuits of novelty underlined by the overall development of this industry provoked the critical question that this thesis takes into consideration, that is, 'What is the intrinsic value behind immersive art?'

In order to enhance the cultural perception of this project, it is significant to understand the relationship between audiences' cultural experiences and a range of design methods. Based on audiences' linear experience of this project, this study divides audiences' experience into three stages - 'before exploring', 'exploring', and 'after exploring'. In the first stage, this study investigates the realm of psychology to gain an understanding of how the inherent value of artworks promotes people's intrinsic motivation for spontaneous immersion. In the second stage, this study conducts two representative case studies adopting several design factors to understand how the aesthetic distance between the artwork and audiences' knowledge affects audiences' perception of an unknown culture. The goal is to retrieve the optimal aesthetic balance as well as further develop the reflective design approaches.

In the third stage, this study strategically carries out through practical design using design approaches to better understand participants' perceptual experience. To investigate how the perceptual process evolves, a practical design is conducted by creating a physically immersive installation based on a Finnish myth story called 'Revontulet'. Besides, a questionnaire is designed to further understand audiences' interests and willingness to participate in the installation, and the questionnaire aims at gathering audiences' feelings, including different factors, to evaluate the design approaches and the design work.

Keywords Immersive art installation, cultural perception, flow theory, aesthetic distance

Acknowledgments

I would like to express my special thanks of gratitude to several people who helped with the realization of this project.

First of all, I would like to thank Tongji University for giving me the opportunity to study at Aalto University, Finland, and providing me with quality education and Department of Design for supporting me through meaningful and practical projects. My study life and experience during this time inspired me to come up with this project.

I would also like to thank Matti Niinimäki for sharing his knowledge and the kind comments on my thoughts. I appreciate the support I have received from Pipsa Asiala, whose literature material and practical advice have been invaluable during my writing process.

I especially thank my supervisor Andrés Lucero, who gave patient guidance on my content and text during my prolonged writing process. Despite that I was not in Finland at the time this thesis was written, we held Skype meetings throughout the entire process to ensure the right direction towards the completion of this project was achieved. Last but not least, thank you to my family in China: to my mother and my father for being there and supporting me.

I still remember the time when I was walking in Helsinki, where is known as the 'designer's paradise', and I couldn't help falling in love with this city where nature and modern design coexisted. It is the ubiquity of life and the mystery within this land that cultivated the unique design in Finland, which in turn brings inspiration and strength to my creation.

TABLE OF CONTENTS

1. INTRODUCTION.....	1
1.1 Project background.....	2
1.2 Research questions	4
1.3 Structure of the thesis.....	6
2. BACKGROUND RESEARCH.....	8
2.1 Immersive art installations in the digital era.....	9
2.2 The challenge under an immersive art stream.....	12
2.3 Immersive art as a tool for cultural perception.....	14
3. DESIGN APPROACHES.....	16
3.1 'Flow' theory and intrinsic motivation.....	16
3.2 Aesthetic distance.....	19
3.3 Case study.....	22
3.3.1 The weather project.....	22
3.3.2 Museum of the Moon.....	27
3.4 Conclusion of case analysis and design approaches.....	31
4. PROJECT REALIZATION.....	35
4.1 Concept.....	35
4.2 Starting point for the design.....	35
4.2.1 Hunting the Aurora in Lapland.....	35
4.2.2 Myths of 'Revontulet'.....	37
4.2.3 Sketching the idea.....	39
4.3. Physical construction.....	40
4.3.1 Space	40
4.3.2 Space model.....	43
4.3.3 Space construction—outside.....	46
4.3.3 Space construction—inside.....	49

4.4	Visualization.....	51
4.4.1	Research contents.....	52
4.4.2	Before exploring—dynamic posters.....	53
4.4.3	Before exploring—H5 page design.....	56
4.4.4	Exploring—visual design.....	58
4.4.5	After exploring—pamphlet design.....	67
5.	EXPERIENCE EVALUATION.....	69
5.1	Audiences' experience pre-evaluation.....	69
6	CONCLUSION.....	75
	References.....	77
	Appendix A—pamphlet	
	Appendix B—questionnaire	

1. INTRODUCTION

The immersive art installation has lately become one of the most rapidly growing segments in the immersive design industry. This kind of art is a hybrid of art and technology with higher requirements on the sense of space, which combines elements of the installation art with visual art generated by computational tools to collectively construct the immersive environment. The virtual experience of immersive art allows people to be released from material substance and to become more immersed in artworks than ever before. As a result of the increasing demands for real commerce and entertainment, recently, full-body, sensory immersion installations have emerged and given people more opportunities to experience different realities (Davies, 2005). Nevertheless, the existence of intrinsic value behind immersive installations depends on varying degrees of seriousness and artistry of artworks. When exploring immersive arts generated by instant interaction and astonishing digital illusions, the artistic pursuit further centers on creating immersive experiences by using cutting-edge technology rather than quantifying participants' experience. It becomes easy to make people fall into luxurious comfort and excitement exclusively. As such, intrinsic values that support immersive art installations should not be neglected, my consideration was promoted by the reflection on the concern of cultural values that artists' visions assign to the works, moreover, as a visual symbol to be designed and perceived by audiences.

To further analyze the relationship between immersive artworks and cultural expression, I created an immersive installation that would not only bring sensory affection, but also act as a form of visual story to convey one specific Finnish myth 'Revontulet' of the natural world to the participating audiences. Therefore, the theoretical significance of this research is to explore the design methodologies of immersive systems based on participants' perceptual experience. The practical significance of this research is to better penetrate the summarized design approaches into a pragmatic design-work. As a result, the integration of digital and physical space further allowed me to expand on my artistic and cultural

expressions, and the entire immersive system was designed with a questionnaire to further understand audiences' interests and willingness before participating in the installation.

1.1 Project background

My previous experience of exploring different immersive art exhibitions sparked my initial interest in creating a culture-integrated installation. In the fall of 2018, I visited an immersive art exhibition named 'Massless'¹ at Amos Rex Museum in Helsinki, Finland. This exhibition was held by the Japanese art collective Teamlab to improve people's relationships with the natural world to continuously transform people into parts of their artworks.

In the vast underground space, five digital artworks with unprecedented virtual and sensory experiences were presented to the public at the same time. To maximize the visual experiment, audiences were instructed to explore the exhibition in a pre-designed order. The piece of work that left me with a profound impression was the first digital artwork 'Black Waves'. The installation of 'Black Waves' (Figure 1.1) used computer-generated wave patterns to simulate the dynamic movement of water. All lines were drawn through numerous water particles to visualize a dynamic wave in the three-dimensional space. Audiences were made to stand in front of one huge digital screen, with the intention to create a sense of immersion through the elimination of boundaries between people and the world.

Black Waves reminded me of one of the famous Japanese premodern paintings, 'Kanagawa Wave Map', which contained more Japanese cultural characteristics in it than any other works. It was composed of the collections of blue and white lines in a living entity of the ukiyo-e style. When audiences were standing in front of the art installation, they were able to immerse themselves in the classical Japanese painting and feel the vitality of the natural world with the integration of the rivers and the sea. As water, such as rivers and

¹ Teamlab is an interdisciplinary, collective art group based in Japan. The official website of 'Massless' can be checked through: <https://www.teamlab.art/e/amosrex>.

oceans, are often being expressed by a series of lines in Japanese ukiyo-e art, this artwork was a great way to educate viewers on Japanese culture using common elements that they are familiar with. Audiences can find a connection to the way premodern Japanese people subjectively perceived the world and how they behaved toward it.



Figure 1.1 'Black Waves' designed by the Japanese art group 'TeamLab'. Audiences immersed themselves in these pieces of artwork (source: photos posted by Instagram users Jayfishey & Anuniemela)

After being inspired by 'Massless', I visited many other immersive art exhibitions but only to notice that some instant immersive art started to lose their meanings to the pursuit of surface-level sensory stimulation. As a designer, I began to consider the level of impact this had on the immersive art and how to incorporate cultural elements and factors into the design process. 'Let it Grow' was an immersive installation created for my artistic and

cultural expression based on the idea behind the Finnish word 'Revontulet', which originated from a mythology story of Sami people's culture. This installation uses the combination of space and visual expression as the form to depict this myth and natural scenes for each audience. When people lay in the dome, they can appreciate the most characteristic natural winter and get to know the story of 'Revontulet' through different visual materials (Figure 1.2).

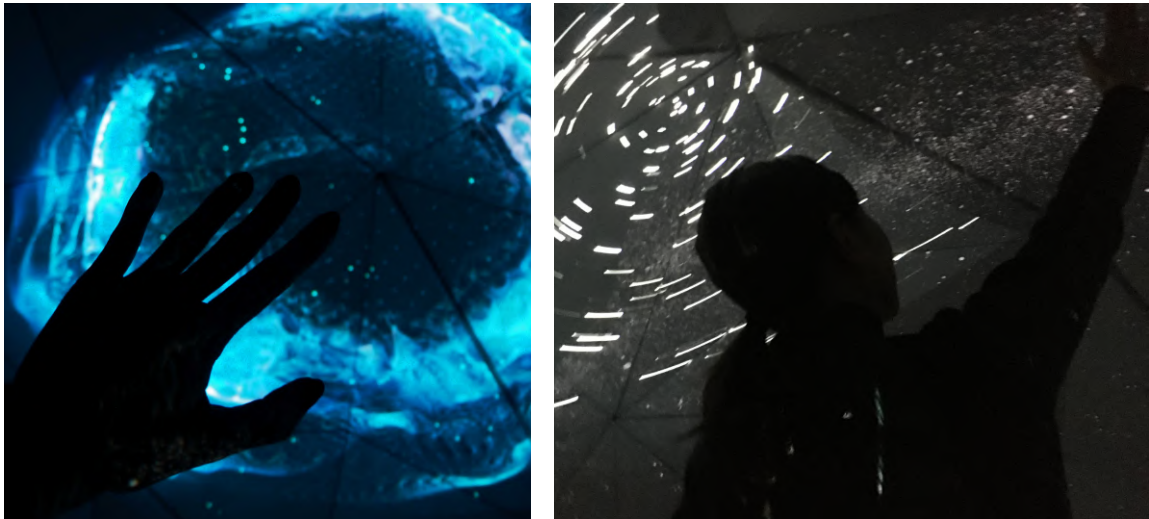


Figure 1.2 Visual images taken inside the installation of 'Let it Grow'

1.2 Research questions

The thesis is composed of a theoretical component and a practical component. As mentioned above, my research was inspired by the Japanese immersive art exhibition, where artists uniquely integrated the cultural elements into the art expression. The immersive installation 'Let it Grow' is designed to further explore the idea of cultural expression with a twist of the Finnish cultural story. The theoretical section is a study of developing design approaches to enhance the cultural experience of this installation (LIT). The objective of this component is to question, challenge, and analyze audiences' experiences to identify specific design needs. It focuses on audiences' intrinsic motivation

to draw the relationship between psychological state and the system itself to jointly explore the cultural perception throughout three experience stages rather than technical interaction.

Consequently, all scholarly research can be summarized to provide supporting approaches for the practical component. My study was strategically carried out through practical design using research methodologies to better understand participants' experience. The concept of "reflective practice" coined by Donald Schön (1983), states that art is "knowing in action", which is essentially a creative way of knowing 'how' rather than knowing 'what' with reflective practice. Therefore, the practical component of the study applies the methodologies summarized from the research. It documents the installation development process, including the inspiration, specific design components, as well as a pre-evolution of audiences' study to examine their willingness to participate.

What is the intrinsic value behind immersive art?

This question is raised upon the reflection of the intrinsic value behind works of art, after witnessing the recent trend in immersive art installations about pursuing surface-level entertainment. As an attempt to answer the question, I have considered various researchers' points of view and conducted two case analyses, accompanied by the data analysis, to illustrate that the reflectiveness and profound insights a piece of artwork offers to its audiences are what make it great. Refer to Chapter three for further details on two cases.

My artistic explorations and observations of the research in immersive art installation converge on two specific questions of practical design:

1. What factors should be considered when designing a culture-based installation (LIT) for audiences?

In order to enhance the cultural perception of this project, it is critical to understand the correlation between audiences' psychology activities and a range of design methods. Based on audiences' linear experience, I divided it into three stages—'before exploring', 'exploring', and 'after exploring'. In the first stage, I looked into the realm of psychology to gain an

understanding of the inherent value of artworks, which motivates audiences' intrinsically and stimulates their spontaneous immersion. In the second stage, I conducted two representative case studies adopting several design factors to understand how the aesthetic distance between the artwork and audiences' knowledge could affect audiences' perception of an unknown culture.

2. How does the installation (LIT) influence audiences' experience and cultural perception?

Previous research paved the first step towards a more profound understanding of the influence that LIT has on audiences' experience and cultural perception. I further investigated the topic through the creation of a physically immersive environment to study participants' real experiences. In the third stage, a questionnaire is constructed with a focus on gathering information around the audiences' willingness and interests to participate in the installation.

1.3 Structure of the thesis

The body of the thesis has five chapters, which consist of the theoretical part and the practical part together. The first three chapters explore more theoretical design approaches on cultural-based immersive installations, and the following two chapters document my installation design process based on the summarized design approaches (Figure 1.3).

The first part (Chapter 1) introduces an overall context of the thesis, providing a brief introduction for thesis questions and an installation LIG. The second part (Chapter 2) deals with background research, which discusses the current situation of immersive art and cultural reflection in an art context. The third part (Chapter 3) draws attention to scholarly research and case studies to specifically conclude related design methodologies.

The fourth part (Chapter 4) describes the project 'Let It Grow' in detail from its conceptualization, prototype, and final realization, each component of LIG is specifically

discussed. The last chapter (Chapter 5) details the evaluation of the whole design system. The feedback of the cultural story on audiences' experience is investigated through questionnaires.



Figure 1.3 Structure of the thesis

2. BACKGROUND RESEARCH

A recent review of the Art literature found that artists had long started the exploration of the notion 'Immersion' back a few decades ago. Around the 1960s, early media artists began to utilize limited programming and computational tools to conduct a series of immersion experiments. These series of experiments adopted the art form "Happenings", which was one of the participatory media arts at the time that places a huge emphasis on the organic relationship between art and its environment, artist, and the audience (Wardrip-Fruin & Montfort, 2003). In 1975, American psychologist Mihaly Csikszentmihalyi first proposed the concept of an immersive state in the field of psychology and named it 'flow'. In one of his seminal work "Flow: The Psychology of Optimal Experience", the best experience was defined as "the holistic sensation that people would feel when they act with total involvement" (1990, p. 36). From the late 1990s to the early 2000s, immersion gained increasing interests from the media and artists as two dominant research streams: one with the focus on video games, narrative and human experiences and the other with the focus on virtual reality systems (Seo et al. 2015, p. 2), propelled to dominate the Art and Humanity fields. Currently, the rapid evolvement of new technologies enables artists to create more interactive and immersive projects, which has led immersive art down a multidimensional development path. As a result, artists and academics still cannot reach a consensus on the definition of 'Immersion' given its wide-ranging involvements and applications in many fields. Each sub-category included is being absorbed, connected, and embraced (Seo et al. 2015, p. 1), which means immersion has multiple forms and flexible features that can be applied to various environments and situations.

Despite the fact that immersive applications vary among different art fields, it is generally conceptualized as a way allowing audiences to forget about the outer physical space and foster psychological feelings of 'being there' in a virtual world. The psychological power of the immersion enables audiences to access the fabricated world, create realities in realities, and suspend the physically situated world (Mitchell, 2010, p. 99). Mitchell states that the immersion emphasizes on the feeling of "being there", which requires people's bodies to be

physically immersed in the space and become part of the environment, (2010, p. 99). This description corresponds to the view of Lukas (2013), which points out that sensory immersion allows people to forget about outer space and time as well as impart them different psychological feelings inside the virtual world (p. 4). The notion of immersion is further conceptualized as a metaphorical concept of "transportation" by both Murray and Ryan in their seminal theoretical works. Murray (1997) defines the immersion in his paper as the "experience of being transported to an elaborately simulated place", which has later been described by Ryan (2015) using the term "fictional recentering" as the "consciousness that relocates itself to another world..." (p. 73). Similarly, Carol Manetta and Richard Blade (1998) define immersion as people's emotional response to become part of the virtual world. In light of all literature and research mentioned above, it is conceivable that immersive arts create an unprecedented emotional experience through manipulating the inherent or internal space to influence audiences' senses and psychological states.

2.1 Immersive art installations in the digital era

In the context of digital media, the immersive projects have been largely applied in recent years, engaging in various forms including but not limited to theatre, exhibitions, and VR games, which present an overall upward trend in recent years. The "Immersive Design Industry Annual Report" published by Ricky Brigante in 2019 Immersive Design Summit, summarized the development trend of the whole industry and measured the impact of immersive design from both a business and design standpoint. The annual report obtained data and disciplines from more than 100 immersive companies worldwide and took all sub-industries into consideration to identify the overall industry trend as a whole.

During the year 2019, the convergence of mass media, technology, artistic entertainment, business, and education continues to accelerate. Statistics have shown that the present state of the immersive industry is still in a period of rapid growth stage, as indicated by the increase in industrial revenues and the number of companies. According to the same

statistics, as of the year 2018, the whole industry was valued at \$ 4.5 billion, with more than 700 updated immersive events cataloged in North America alone, and the industry value continues to grow with an upward trend. In addition, the number of companies that were involved in the creation of immersive artworks has been growing significantly as well during the last few years, with more than 40% of the companies surveyed were founded within the past two years and a continuously rising trend for the next few years. While various sub-industry groups accelerate at different paces, the overall group experiences a rising trend, which shows the great potential for a widespread impact as the industry gradually matures (Figure 2.1).



Figure 2.1 Pictures from the "Immersive Design Industry Annual Report": Immersive works were reported as being located across more than 85 cities worldwide (left). Some of the most commonly-used words to describe immersive works (right)

In light of the current evolvement of the immersive industry, immersive art installations that are designed either by independent artists or large-scale companies have become the center of public attention and become one of the most rapidly growing segments of the industry. In China, a number of immersive exhibitions like the international's 'Rain House' (Figure 2.2) and Teamlab's 'Borderless' have been held countrywide from the year 2015 to 2019. These immersive exhibitions have become one of the most popular and

provocative landscapes to facilitate people's aesthetics and break the metaphorical fourth wall between the public and artistic creations.

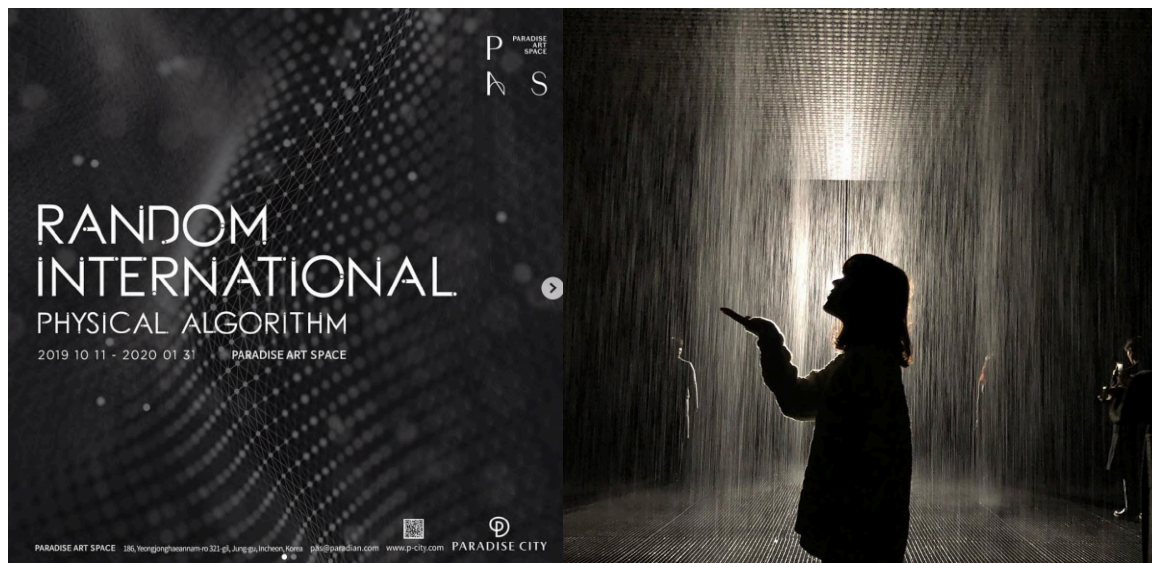


Figure 2.2 The exhibition of 'Rain House' designed by Random International and attracted lots of audiences to experience this paradise art space (source: the official website of Random International)

Figure 2.2 above presents 'Rain House' designed by Random International, a unique offering that differs from any traditional art/cinema installations and VR (Virtual Reality) installations. This type of artwork is a hybrid between installation arts and visual arts that are generated by computational hardware and software, disrupting the zone of single material expression. The artists created this to showcase the coexistence of two distinct styles to blur the boundaries between illusion and reality by having the two distinct styles coexist side-by-side. Even most of those immersive artworks that are conducted in the form of installations or exhibitions, which originate from a similar form of installation art, and further merge the elements from both psychological and physical aspects. Quoting Brigante's (2019) words, this kind of artwork is expressed in unexpected ways to capture audiences' excitement by using the words "dynamic, enrapturing, and enthralling" (p. 9). These apparent cults of the immersive and atmospheric environment are concurrent with increasing exhibitions at present, and their potential will be tremendous and undeniable in the future.

2.2 The challenge under an immersive art stream

Enjoying the cutting-edge technology and entertainment brought by emerging artworks, the phenomena of the lucrative market, and novelty pursuit that under the overall development of the industry provoke a critical question that this paper takes into consideration. That is, 'what is the intrinsic value behind immersive art?'

Among various emerging immersive exhibitions are emerging, more pop-up exhibitions tend to be formulaic and reproducible. A typical example is the exhibition 'Infinity Mirror Room' (Figure 2.3) held by Japanese artist Yayoi Kusama at Hirshhorn Museum and Sculpture Garden in the year of 2017. In this artwork, Yayoi Kusama used mirrors to replicate the real space decorated by infinite lights to construct a borderless space, allowing audiences to enter the space and be immediately wrapped by the illusionary world. As a result, this series of artwork 'Infinity Mirror Room' gained a huge success and was presented in more than twenty-three countries worldwide by 2019.



Figure 2.3 'Infinity Mirror Room' designed by an artist called Yayoi Kusama, who specializes in using mirrors to replicate a real space

However, given the nature of the artwork being easily replicable, many commercial institutions have copied this form of exhibition to commercialize on the interests (Figure 2.4). Evidently, Wang (2018, p. 742) once commented that the exhibitions are filled with

technology and infinity mirrors, concentration is so much at the same time that it is receiving huge amounts of the ticket revenue, and various countries and cities were besieged by the large-scale roving exhibitions.



Figure 2.4 Similar form of 'Infinity Mirror Room' designed by MITSUI OUTLET (left), 'The Mirror Room' designed by THE FAKE FACTORY (right)

However, It is difficult to define 'pop-up' immersive exhibitions. Most 'pop-up' immersive exhibitions were able to build up a surreal and colorful fantasy but failed to be associated with profound and positive connotations. As such, lots of so-called immersive experiences for audiences are falsely advertised as aesthetic and educational. Instead, audiences are exposed to flat photos which only captured the momentary feelings. Once people leave the exhibition hall, they no longer have any memories regarding the experience. This type of exhibition, which is rather the opposite of what immersive art intends to do, gradually turns into a counterattack of two-dimensional images on three-dimensional reality, which leads to negative audiences' experience. Limin Wang also pointed out that the mass media continues to infiltrate fragmented information into people's lives, which merely monetizing on people's enthusiasm and curiosity to pursuit new technology (2018, p. 742). Therefore, artworks that lack depth often miss out on deeper meanings beyond the pursuit of surface-level sensory satisfaction and tend to quickly fade out of the public eye.

2.3 Immersive art as a tool for cultural perception

Given that most of the immersive exhibitions can only be classified as 'entertainment', it is crucial to identify the traits and elements that make an artwork profound and meaningful. With that being said, not only can a great artwork be both entertaining and educational, artists should also possess a mission of shaping cultural values when creating their work. When observing the effects of new technologies on the creation of immersive arts, Stogner (2010, p. 118) describes the new technologies as "(the) new communication devices, the pens, pencils and printing presses of future generations which are evolving as the essential tools of cultural representation and interpretation". Having only the participation of the audience is not enough to define one piece of art as an immersive work. Whether it is achieved through technology or other means, an immersive work should allow audiences to engage with the work, rather than merely as observers. Immersive artworks should be beyond pure entertainment (Brigante, 2019, p. 24), allowing their recipients to gain new things or to develop a critical eye on society (Arts Council Tokyo, 2017, p. 1) to push the artwork onward and evolve more powerfully.

Despite that all immersive artwork presents audiences with blurred feelings between virtual and real, the main focus of an immersive artwork remains on the pursuit of visual expansion and holistic experience. Kwastek (2015) states that "immersion is not only effective as a visual-spatial illusion but also in the sense of cognitive immersion in illusory worlds or artistically staged processes" (abstract). He emphasizes that immersive artworks cannot exclusively focus on generating visual illusions as audiences will not necessarily reflect on it critically.

So far, immersion has been examined by many scientific researchers as multimodal relationships between psychological state, vision, and spatial space. Even though research on audiences' immersive experiences is conducted from a scientific perspective, they traditionally standardize or objectify results without much focus on the meaning of combining cultural elements in design aspects. As a matter of fact, the role of the audience and the creator coexist in each artwork. The ultimate goal of the artwork is to have the

audiences understand and adopt the intrinsic values or artistic expressions created by designers, which is also why audiences are also defined as 'recipients'. To my knowledge, few studies to date have examined the relationship between immersive artwork and cultural expression. I designed my project to investigate audiences' perception experience as it is the soul of immersive arts. I considered psychology feeling and physical space are two key factors that determine the quality of the whole viewing process. To understand how the recipient-centric experience is effectively connected to the immersive system and the cultural concepts behind it, I divided the process of the recipient's artwork participation into three stages—'before exploring', 'exploring', and 'after exploring' (Figure 2.5). To analyze this intertwined experience, I will examine each stage regarding its significance and design methods, and then conclude on how they are adapted into the final concept.

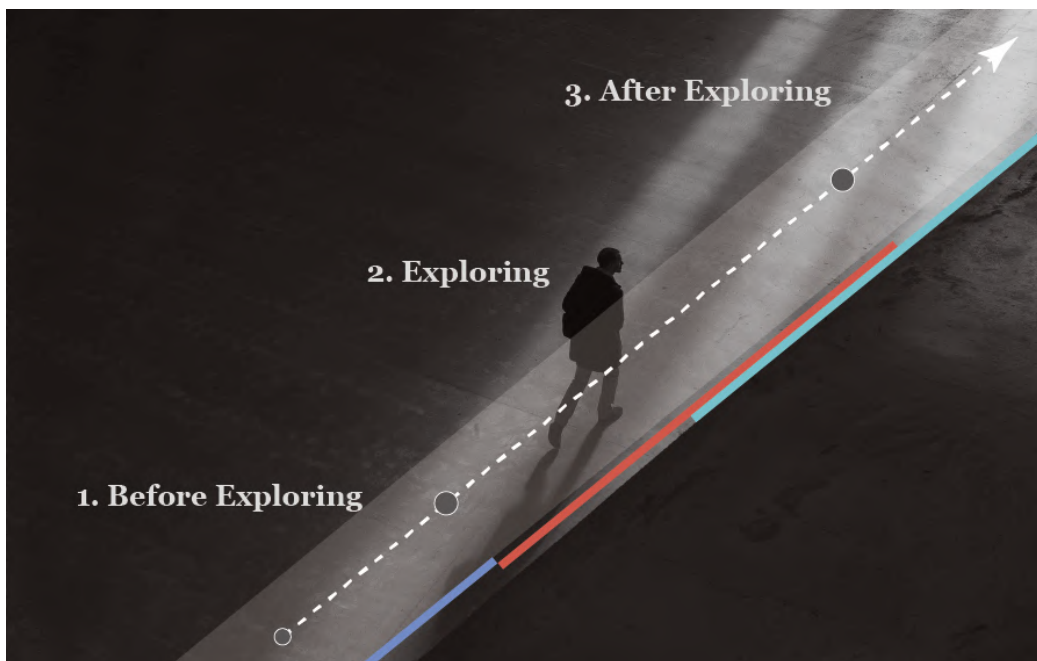


Figure 2.5 Three stages of linear experience—'before exploring', 'exploring', and 'after exploring'

3. DESIGN APPROACHES

This chapter draws attention to the realm of psychology, early research of 'flow' by Mihaly Csikszentmihalyi (1975), accompanying the concept of 'flow within intrinsic motivation'. The flow state is regarded as a pivotal theory to analyze the approach of enhancing audiences' cultural perception in the first experience stage—'before exploring'. The purpose of this research is to demonstrate the potential relationship between the audiences (recipients) and the system, therefore emphasizing the significance of enduing inherent value to an immersive system.

3.1 'Flow' theory and intrinsic motivation

The first notion of immersion was originated from Maslow's concept of 'peak experience', which was then enhanced by Mihaly Csikszentmihalyi's 'Flow' (1975) in the realm of psychology. In his seminal work "Flow: The Psychology of Optimal Experience", the optimal experience was defined as "the holistic sensation that people feel when they act with total involvement" (1990, p. 36). This term refers to an intrinsically enjoyable state of being 'in the zone' or 'in the groove', where people are wholly absorbed in activities without any conscious intervention and ignore temporal concerns such as time, food, and ego-self. The idea of flow emphasizes on a subjective experience that comes from individual perception rather than depends on materials or specific mediums.

After forming the initial concept, accordingly, the next focus of flow theory fascinated positive psychologists and became how such a feeling could be created and controlled. The concept of 'flow within intrinsic motivation' was brought to the public's attention by researchers such as Deci and Ryan (1985). This concept refers to the engagement due to the pleasure and satisfaction of an activity. More specifically, flow is accompanied by intrinsic motivation, which comes from individuals' within, and driven by interests, enjoyment,

core values, and inherent satisfaction. Any of the incentives among them provided by activities may trigger motivation and then convert it into active engagement (Schiefele, 1996; Schiefele & Köller, 2001). With this concept gradually being applied to the general phenomena of immersive activities, the design-focused concerning artworks has turned on methods of increasing emotional and cognitive intensity (Kwastek, 2015, p. 159).

According to the definition of Intrinsic motivation mentioned above, emotional and cognitive intensity can actively shape audiences' experience towards the immersive systems. Somuncuoglu and Yildirim (1999) stated that people who are motivated by intrinsic motivation are likely to be engaged deeply in the flow state. Golan Levin also held the view that cognitive involvement can make recipients wholly engrossed in the experience as well as strengthens the relationship between the system and themselves. Thus, to conclude on the observations of intrinsic motivation, it seems that intrinsic motivation is highly subjective and has a unidirectional influence on inducing the flow state in the first place.

However, despite aesthetic interests are subject to individuals' spontaneous tendencies, by no means it can happen without a trigger. According to Deci and Ryan (2017), "intrinsic motivation depends on ambient supports for basic psychological needs, especially those for competence (feeling effective) and autonomy (feeling volitional)" (p. 2). This evidence indicates that the maintenance and enhancement of this inherent propensity require some supportive conditions. This support is somewhat related to usability or dependent on a particular outcome and autotelic experience brought by the system itself, which is generated or facilitated by individuals' interests of involvement. Therefore, the interaction between intrinsic motivation and the system is a virtuous circle that is acted on promoting each other and jointly facilitating the holistic experience.

The concept of 'flow' has been adapted by different fields like Physical Education, Literature, Communication Studies, and then entered into the realm of Art. In the context of immersive art, 'autotelic experience' might be more accurate than 'usability' to describe the immersive process brought by artworks. According to Sansone & Smith (2000, p. 343), "individuals are

considered to be intrinsically motivated when their behavior is motivated by the actual, anticipated, or sought the experience of interest". When recipients come to the exhibitions with intrinsic motivations such as personal interests, learning motivation, and critical thinking towards artworks, they are more susceptible to experience immersion. These kinds of psychological motivations lead people to "seek out novelty and challenges, to extend and exercise one's capacity, to explore, and to learn" (Ryan and Deci, 2000, p. 70). On the other hand, the systems with some inherent values, such as reflective elements, interactive experience, and emotional connections, can powerfully provoke audiences' psychological and cognitive emotions. Those systems can be considered as extra ambient supports when it comes to facilitating individuals' interests as well as strengthening their learning motivation (Figure 3.1).

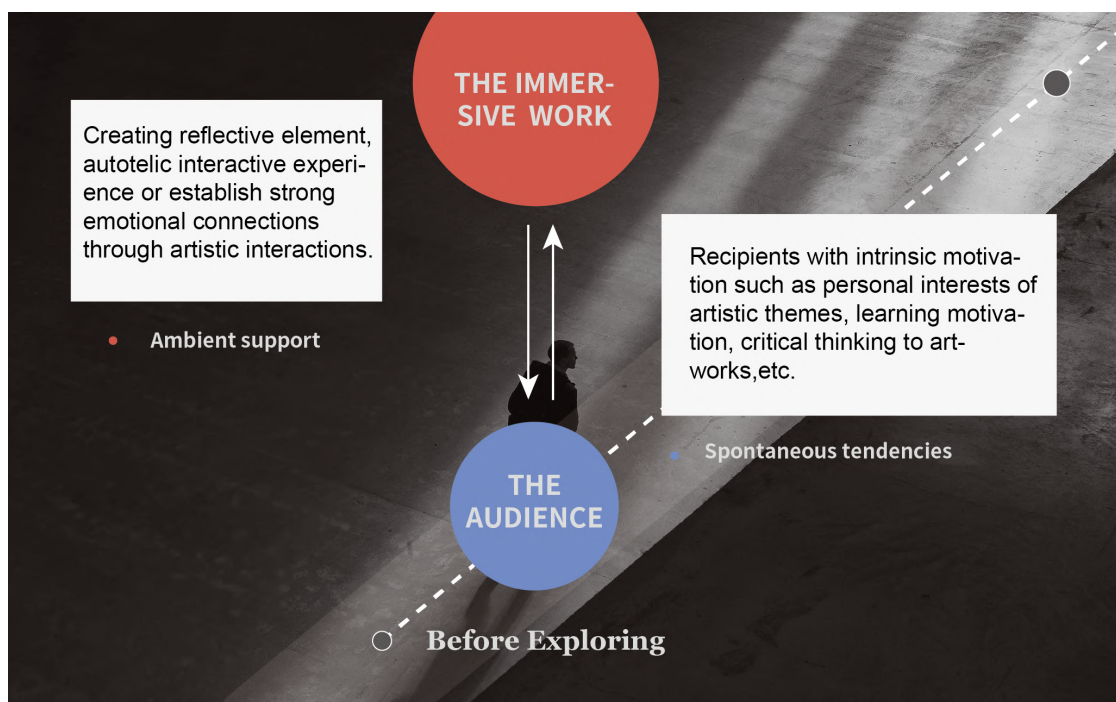


Figure 3.1 Relationship between the audience's intrinsic motivation and the immersive system

To conclude, an inherent value of artworks is where art and entertainment play part ways, and the inherent value generated by the immersive system can trigger individuals' spontaneous tendencies to be curious and interested. Therefore, with a new appetite for

cultural engagement, audiences will become more eager for authentic experiences that can shift their perspectives or offer them something genuinely enriching.

3.2 Aesthetic distance

As mentioned above, the most optimal situation for audiences to actively engage in an aesthetic activity is when audiences' intrinsic motivation and the system's ambient support effectively act on each other. Nevertheless, it came to my attention that many audiences' experience is limited to their abilities to critically grasp the statement or sense from an artistic work throughout the second stage 'exploring'. In some instances, for those audiences who have limited artistic knowledge, their experiences may lead to displeasure (Silvia, 2013). In other words, it is crucial to make sure that the theme of the artwork fits the audience's psychological anticipation, and that the immersive environment affordances leave space for triggering critical reflection. Moreover, one needs to make sure that the artists' vision is transferred into understandable creations. These situations form gaps between audiences and artworks that are called 'aesthetic distances'.

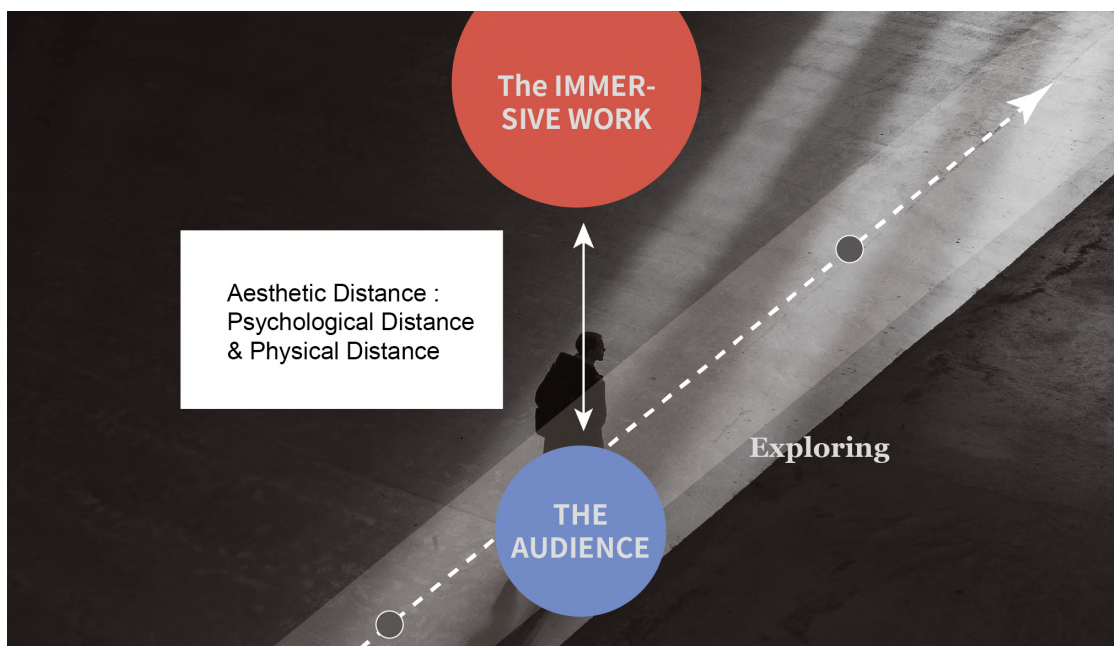


Figure 3.2 When audiences are exploring the artwork, There may exist gaps between audiences and artworks that are called 'aesthetic distances', which include psychological distance and physical distance.

The term 'aesthetic distances' includes psychological distance and physical distance simultaneously (Figure 3.2). Psychological distance refers to the psychological distance between individuals' knowledge, experiences, emotions, attitudes, and design philosophies of artworks. Physical distance refers to the physical distance in a spatial space. The psychological concept of aesthetic distance, which is derived from Edward Bullough's (1912) seminal article, as detailed in the article titled "Psychical distance' as a factor in art and an aesthetic principle", describes the distance between an audience involvement and aesthetic object presented in an artwork. Edward Bullough emphasizes that 'psychological distance is the basic premise of any profound understanding of aesthetic activities'. It is pivotal to be aware of the extent to which specific reactions may lead to appreciation, even the range of reactions that audiences may have to this type of art.

Two extreme conditions are observed with psychological distance: under-distancing and over-distancing. Specifically, audiences should maintain an optimal psychological distance from objects to achieve aesthetics. Under-distancing appears when the subject matter is "crudely naturalistic,' 'harrowing,' 'repulsive in its realism'" (Bullough, p. 94). When practical utilitarianism overwhelms aesthetic enjoyment, it is easy for audiences to consider the utilitarian purpose of the object, in which the audience may not immerse themselves in real aesthetic activities. Conversely, over-distancing takes place when the object "produces the impression of improbability, artificiality, emptiness or absurdity" (Bullough, p. 94). In these cases, communications with the aesthetic object are lost, and the true aesthetics cannot be appreciated. There are multiple factors that influence aesthetic distance. Therefore the 'distance-limit' varies depending on the level of complexity of the situations.

Besides, maintaining proper physical distance is also the fundamental requirement for immersion. If we imagine the visual artwork as a utopian world perceived by our inherent desire, space can be considered as an outside physical carrier for all messages and scenes. It is a robust aesthetic environment that takes an existing space, expands the boundary of vision and perceptions of dimensions (Seo et al. 2015, p. 36). The entire environment creates conditions for a cohesive, unique, and immersive experience that matches the

whole art concept, and this can be done in multiple ways with different foci or materials (Pelowski et al. 2018, p. 2).

To conclude, the inherent value, psychological state of audiences, and aesthetic composition of the space are mutually reinforced and interweaved in an artwork. However, artworks differ on their themes and purposes as conveyed by artists, which might not seem to be comprehensive as the set of standards, and the detailed principles can be applied to all cases. To analyze the design principles in the second stage—exploring how to achieve the optimal distance between audience and system, I conducted two cases regarding the installation LIT, which are similar in nature as described below.

3.3 Case study

The concept of the installation (LIT) originated from Finnish myths and nature scenes. In these two similar case studies, I draw attention to how to balance 'aesthetic distance' concerning design philosophy, space setting, participation, and reflection respectively. The purpose is to measure the proper aesthetic distance between artworks and participants to provide better perceptual experience.

3.3.1 The weather project

In 2003, Scandinavian artist Olafur Eliasson's prestigious work 'The Weather Project' was exhibited in the Tate Modern Museum, London. This project used the representation of the sun and sky to bring London's unpredictable weather into the Turbine Hall, creating atmospheric and immersive space for audiences (Figure 3.3).



Figure 3.3 'The Weather Project' designed by OLafur Eliasson in the Turbine Hall

a) Design philosophy

The design philosophy of 'The weather project' was not solely limited to the individual sphere but inspired by social-cultural factors. The idea of 'The weather project' was

conceptualized when Eliasson observed the unique weather atmosphere in London. He found that London's weather was particularly dynamic: It snowed the day before and it could be sunny the next day. The weather topic gradually became daily conversations among locals because it was ideal as 'small talk', non-threatening, and not far beyond people's daily life. Therefore, the unpredictable weather and distinctive weather culture attracted Eliasson's significant interests to capture it, which become a cultural symbol that linked people and the artwork.

b) Space

'The weather project' used a semi-circular screen, aluminum mirrors, and artificial mist to create the illusion of sun in the specific space (Figure 3.4). The hall ceiling was covered with hundreds of aluminum mirrors, which visually expanded the volume of the hall. A semi-circular steel projection screen constructed the giant sun with approximately two hundred mono-frequency lights shining behind, in conjunction with ceiling mirrors foil. The sun was completed in a full circle by half mirror reflection and half projection, symbolizing the mix of reality and illusion. A hazy dry-machine hung in the air to further diffuse the light, drifting and coalescing like clouds. As the mist increased throughout the day, the air turned into a fuzzy medium, and the yellow sun above the front emanated diffuse light, thereby making the whole scene look like an endless upside-down sunset.

The leitmotif throughout Eliasson's creations was naturalness. Besides that, the weather motif of the project itself was natural enough to connect with nature in the first place. The whole experience atmosphere was integrated with natural components to capture and portray the weather in London. Under such an atmosphere, people's natural intimacy and desire to explore natural elements further increased the emotional connection between audiences and the artwork.



Figure 3.4 Process of making the project of 'The Weather Project', a great deal of attention was paid to the aesthetic composition of the space, such as mist and light

c) Participation & Immersion

Audiences' perceptual process was a vital part of 'The Weather Project'. The focus of this project was not the physical construction of nature itself, but the creation of a specific alternative to perceive a connection between audiences and the environment. The aluminum mirror on the ceiling had incredible reflection quality. It perfectly reflected the sun with pure black and yellow. The vast floor allowed audiences to lie down on the ground while staring at the ceiling and recognizing themselves through with the mirrors in the air (Figure 3.5). Everyone in the Turbine Hall was seen as small black silhouettes and became part of the environment.

The way of watching from the mirror was a vigorous idea that embedded audiences' bodies in the environment. When roaming freely or lying leisurely on the floor, they looked at themselves in the mirror and were able to associate the perceived subject and perceived object with a unified whole through the perception of environmental elements.

Correspondingly, infinite emotional qualities such as quiet, cheerful, peaceful, mysterious, and melancholic were achieved as part of the realm of atmospheric experience.

d) Emotion & reflection

The use of light mediums occupied a central place in this project, allowing the audiences to experience the mystery world emotionally. The weather project showcased mastery components of the universe, especially the tiniest details of weather like lights and mist. Besides, Eliasson considered the project was not pure grotesque spectacle or entertainment. He stated that "The mirror, not the sun, is what people are staring at: so the work is not so much the general spectacle of a fake sun, but a person's individual encounter with his own reflection"². Therefore, in this project, a situation was created through optical media, which not only manifested a physical phenomenon but also inspired a comprehensive understanding of the sun that was rooted in diverse cultural backgrounds.

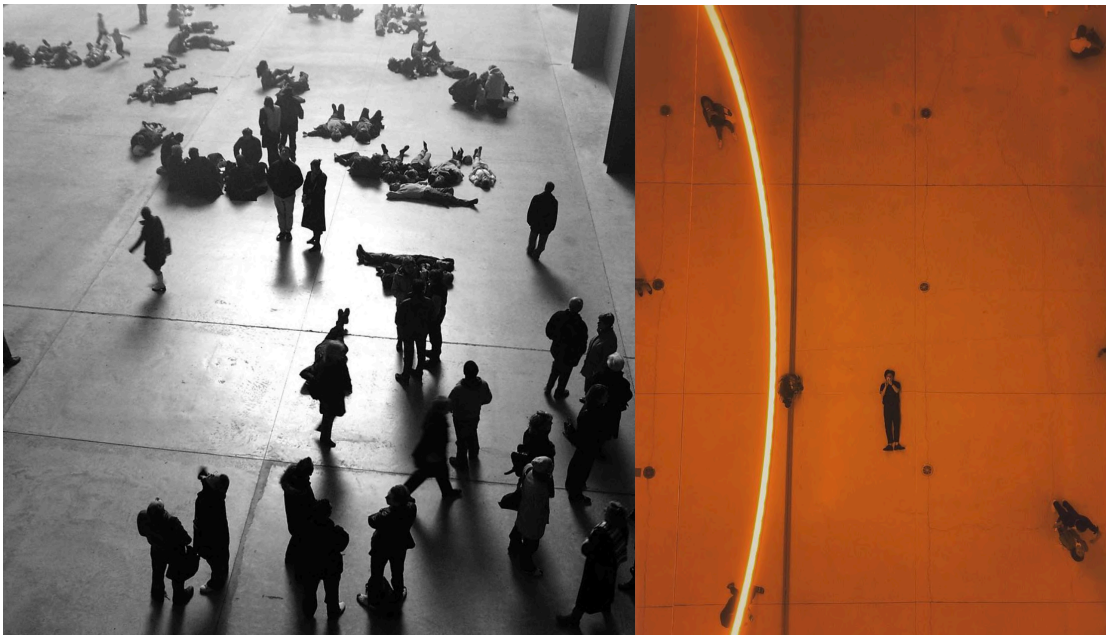


Figure 3.5 Audiences lay on the floor to appreciate the artwork, they looked at themselves in the mirror and were able to associate the perceived subject and perceived object

² Quoted in Kimmelman, "Sun Sets at the Tate Modern."

e) Conclusion

To conclude, Eliasson attached great importance to the reflections on perceptions and the surrounding environment. The whole project was based on the composition of natural elements to capture London's weather culture (Figure 3.6). Leveraging the atmosphere, people's natural intimacy and desire to explore natural elements further enhanced the emotional connection between the audience and the work. On the other hand, Eliasson recorded the coexistence of sensation and intellectual comprehension through the artwork and books (Figure 3.7). Eliasson enabled viewers to reorder their perception of the environment and their place within it, which consequently challenged audiences' conventional understanding of the environment.

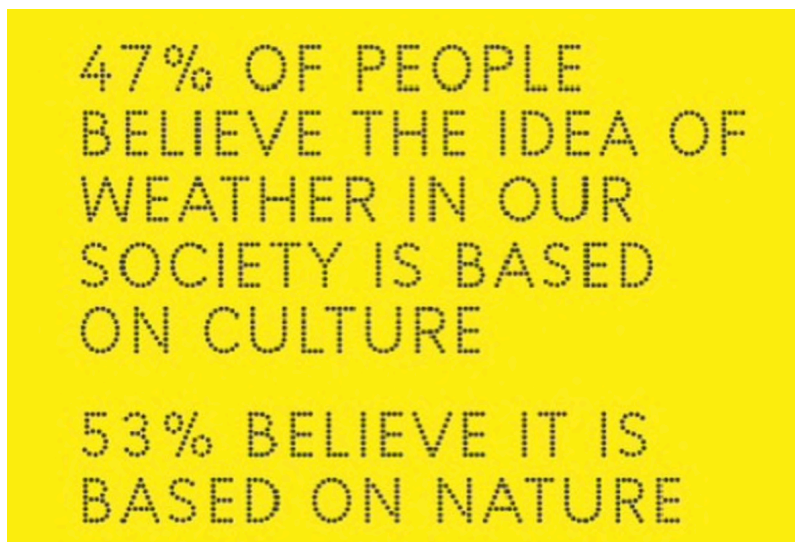


Figure 3.6 A research result shows audiences' two perspectives of 'The Weather Project'



Figure 3.7 A design record of "The Weather Project" by Olafur Eliasson. Scientific and social research data, mock-ups, goals and findings are included

3.3.2 Museum of the Moon

'Museum of the Moon' was a touring artwork designed by British installation artist Luke Jerram. It was a 7 meters spherical lunar imagery along with music compositions created by BAFTA and composers. 'Museum of the Moon' has been presented in several different temporary venues. Each venue arranged their lunar related activities beneath the moon, which altered the viewing experience and interpretation of the artwork (Figure 3.8).

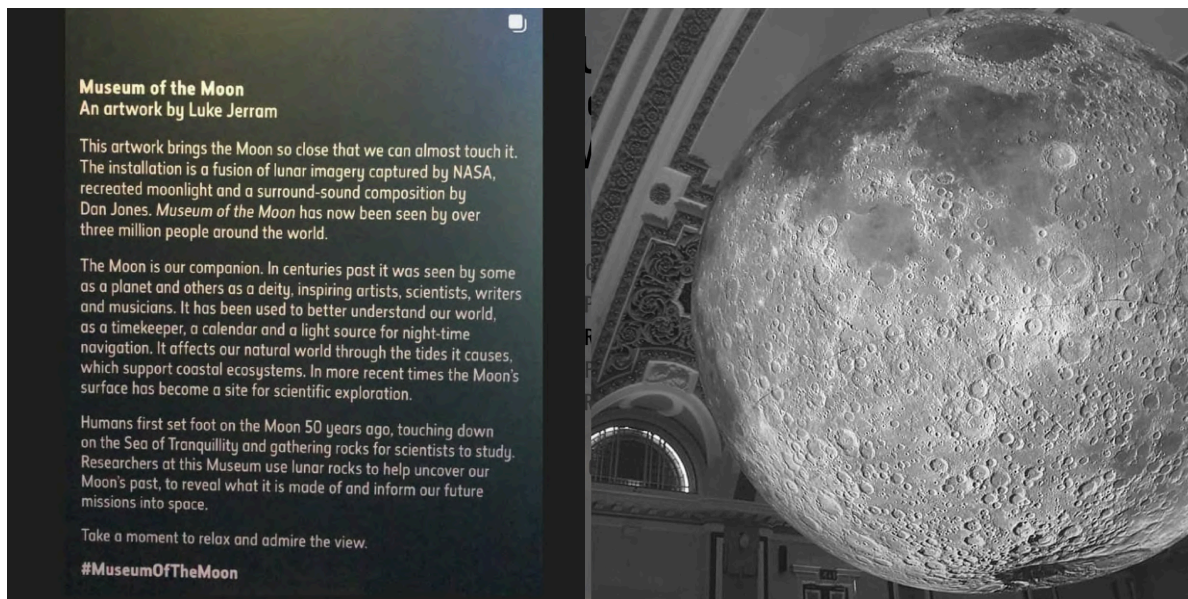


Figure 3.8 The touring artwork, 'Museum of the Moon', designed by artist Luke Jerram

a) Design philosophy

The design philosophy of the 'Museum of the moon' was inspired by Luke Jerram's observation of his daily life. During his 22 years of life in the UK, many extraordinary cultural installation art projects were created to inspired people around the globe, including the 'Museum of the Moon'. The inspiration for this artwork came after Luke Jerram's observation of the tidal variation as he passed over the Avon Cut in Bristol every day. After that, he came up with the idea of using the 23-meter-wide and high-resolution image to wrap his lunar artwork, with imagery was taken by NASA satellite of the Lunar Reconnaissance Orbiter.

b) Space

'Museum of the Moon' was presented both indoors and outdoors in various spaces to offer audiences different visual experiences depending on the location of the venues in which the 'moon' was located (Figure 3.9). For instance, when 'Museum of the Moon' debuted at the Bristol International Balloon Festival in the year 2016, two moon balloons were exhibited at the same time, one filled with air for indoor use and the other filled with nitrogen for outdoor use. Two balloons' surfaces were decorated with 120 dpi printed imagery and brought people with different visual effects under specific environments. When these installations were installed in a dark space, the light inside was a simulation of moonlight, thus making the entire device look like a glowing sphere that floats in the space.



Figure 3.9 Fallen moon exhibited outdoor next to the Bristol docks in 2019 (left). Suspended moon exhibited indoor in Rochester Cathedral in 2020 (right) (source: the official website of 'Museum of the Moon')

c) Participation & Immersion

This work was composed of the image of the moon, lights, and music trinity, creating a sense of realistic moonlight immersion for its audiences. When the 'moon' floated on the dark streets of Bristol for several days, it enabled audiences to contemplate in the moonlight, observe, immerse, and compare cultural similarities and differences worldwide. As the project website stated: "from the beginning of human history, the moon has acted as a 'cultural mirror' to our beliefs, understanding, and ways of seeing"³. As this installation

³ Quoted from the research section of the website 'Museum of the Moon': <https://my-moon.org/research/>

began to tour around the world, it brought the collective musical works, narratives, mythologies, and the latest moon science to its audiences (Figure 3.10).

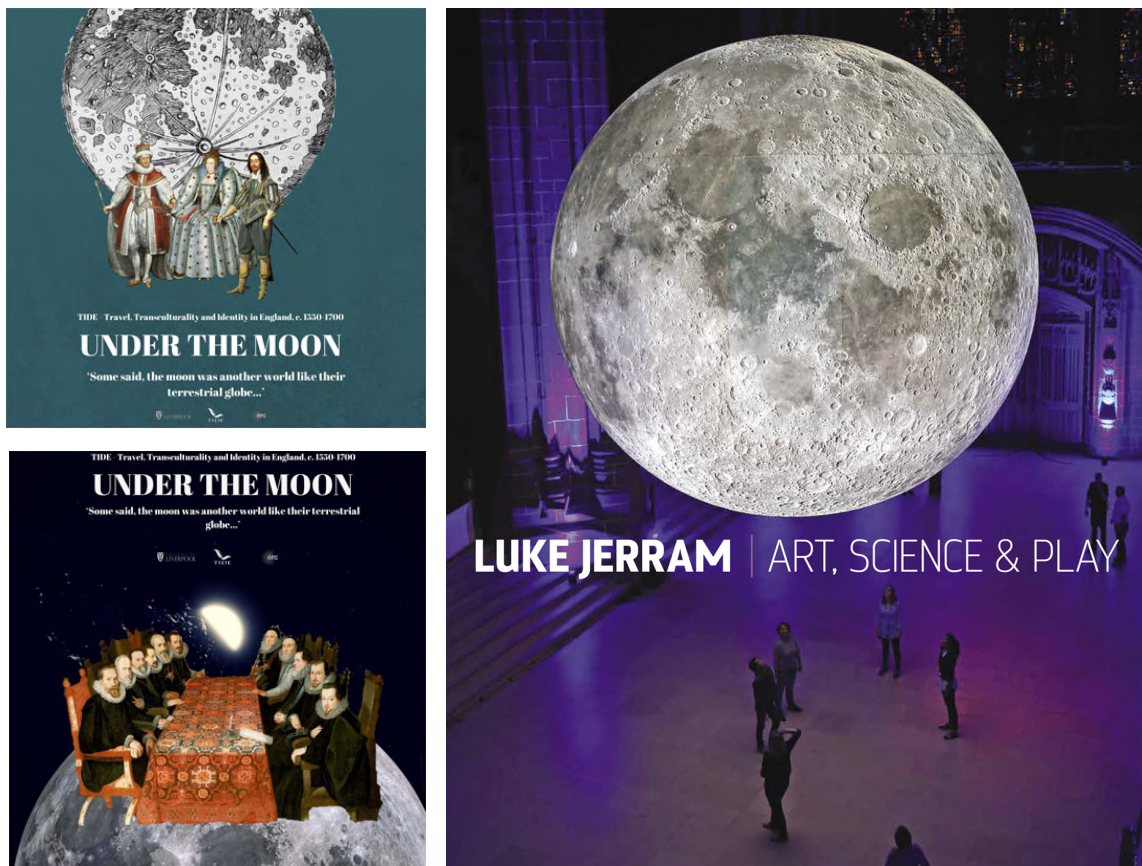


Figure 3.10 Posters of the moon exhibition held in Liverpool Cathedral: Costumed actors enlivened historical documents written by Renaissance writers including Shakespeare (left). The book published by Luke Jerram to collect experiences of the moon from its myth to science (right)

d) Emotion & reflection

Despite the different feelings and beliefs that were reflected upon this installation, the moon connected audiences as it is a 'cultural mirror' of societies. For centuries, the moon had been interpreted as a god, a planet, a timekeeper, and a calendar that exists in different historical and cultural backgrounds. A lot of artists, poets, scientists, writers, and musicians had been inspired by the moon to create great masterpieces throughout history. Therefore, this touring artwork had inspired many people to passionately explore the lunar culture and reflect upon the moon.

e) Conclusion

Luke Jerram believed that the success of this project was attributed to his color blindness, which led to his innate perceptual interest in light and the realization of this project.

Besides, the 'Museum of the Moon' enabled people to observe and consider cultural similarities and differences around the world. The project started a lunar cultural exchange around the globe and further explored the influence of the culture through human history. Furthermore, the project even further changed people's understanding of presenting an artwork as the artist followed his 'moon' to travel from one place to another. The artist, through online questionnaires and videos, collected feedback from audiences with regards to their thoughts and ideas about the moon—from myth to science (Figure 3.11).

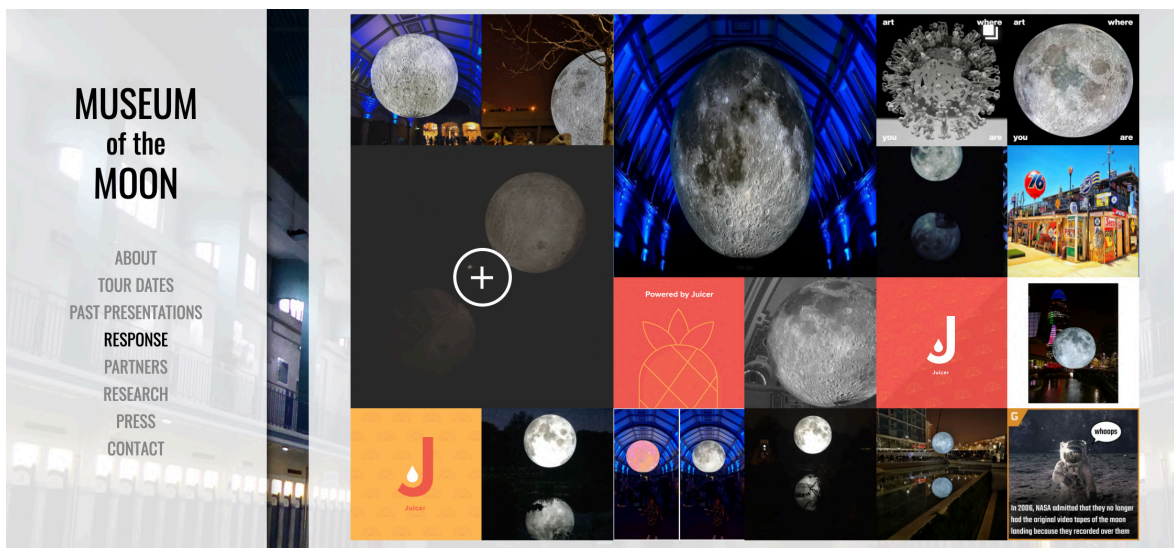


Figure 3.11 The official website of 'Museum of the Moon' constantly collects public responses to this artwork

3.4 Conclusion of case analysis and design approaches

These two specific projects successfully allowed the audiences to gain a profound understanding of design philosophies, and one of the important and indispensable design factors concerning aesthetic activities was 'audiences' experience'. In 1999, the Strategic Experience Modules (SEMs) were proposed by Schmitt to describe consumers' experience. The five experience modules were summarized as "sense", "feel", "think", "act", and "relate" (p. 68). Furthermore, Dubé and LeBel (2003) divided the experience into four similar 'pleasure dimensions'- emotional, intellectual, physical, and social pleasure, and these four dimensions closely corresponded to Schmitt's four experience blocks (feel, think, act, and relate). Researchers such as Gentile et al. (2007) further segmented the experience into following experience modules (Figure 3.12):

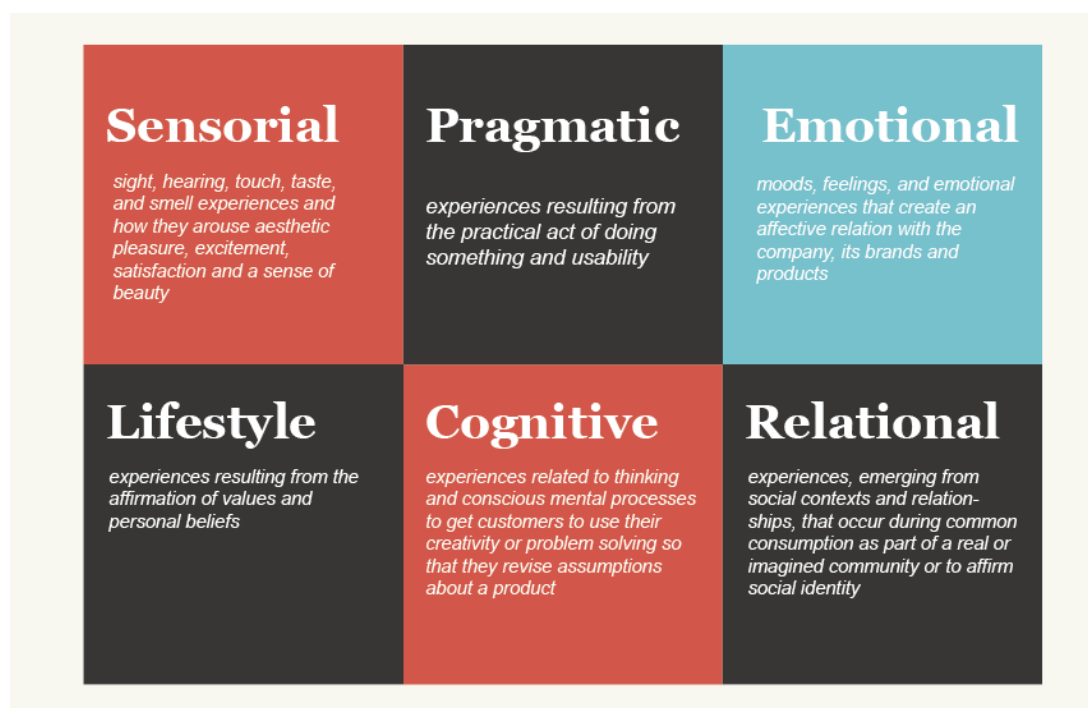


Figure 3.12 Experience modules proposed by Gentile et al

According to Gentile et al.'s experience-based research, favorable experiences were summed up as six modules, including sensorial, emotional, cognitive, pragmatic, lifestyle, and relational. Combining these SEMs modules with three stages in linear experience. Each

stage of 'before exploring', 'exploring', and 'after exploring' respectively corresponds to audiences' 'predictive', 'cognitive' and 'emotional' (Figure 3.13). Therefore, to measure the proper aesthetic distance between the artwork and audiences, a few design conclusions can be drawn from both designers' perspective and audiences' perspective from projects of 'The Weather Project' and 'Museum of the Moon'.

a) Before exploring—Predictive

Designers' perspective: Design philosophies of these two projects both came from designers' observation of local cultures. From the designers' perspective, understanding different roots in various cultural backgrounds are critical to the exploration of the social environment people live and the identification of inherent values.

Balance aesthetic distance (Audiences' perspective): These two projects also used natural themes to reduce the distance between works and audiences. Despite that personal experience results in cognitive differences, the relationship between humans and nature has always been the most intimate. The unknowingness of nature always evokes people's passion for exploring their living environment.

Design dimension: When audiences are exploring the artwork with a specific purpose and interests created by artworks, their enthusiasm for participating in the activity will be mobilized, which may potentially encourage their intrinsic motivation and spontaneous immersion.

b) Exploring—cognitive :

Designers' perspective: In these two cases, with the assistance of light media such as fog, light, and texture, the displays of virtual sun and virtual moon were designed based on the 'reality', representing the real environment which the artist was trying to mirror, therefore shrinking the psychological distance between the audiences and artworks.

Balance aesthetic distance (Audiences' perspective): When audiences' bodies were wrapped under the environment, their bodies naturally became a part of the artworks. The

sounds, communications, sensory stimulations that took place around them could collectively promote reflections of the artwork.

Design dimension: Two crucial design elements, including space construction and psychological stimulation, can shrink the aesthetic distance between audiences and artworks. Firstly, the arrangement of the spatial details should be defined according to the artistic theme, physically immerse audiences. Secondly, mobilizing audiences' multiple perceptions such as sight, touch, and hearing can enhance their sensory experience, psychologically immerse audiences.

c) After exploring—emotional

Designers' perspective: These two projects were recorded through videos, books, and audiences' feedback were collected through questionnaires, which helped designers to gather audiences' reflections on artworks.

Balance aesthetic distance (Audiences' perspective): Audiences can spontaneously develop a sense of psychological satisfaction after viewing the well-designed immersive art. When at the moment, their emotions perk up a notch, which enhances audiences' absorptions over foreign culture and folk wisdom.

Design dimension: Firstly, some visual materials such as pamphlets can be designed for explaining cultural elements to strengthen audiences' emotions. Besides, online questionnaires can be designed to collect audiences' feedback and further help designers to evaluate the experience concerning artworks.

Related Theories

Experience Process

Experience Module

Design Dimensions

The Weather Project

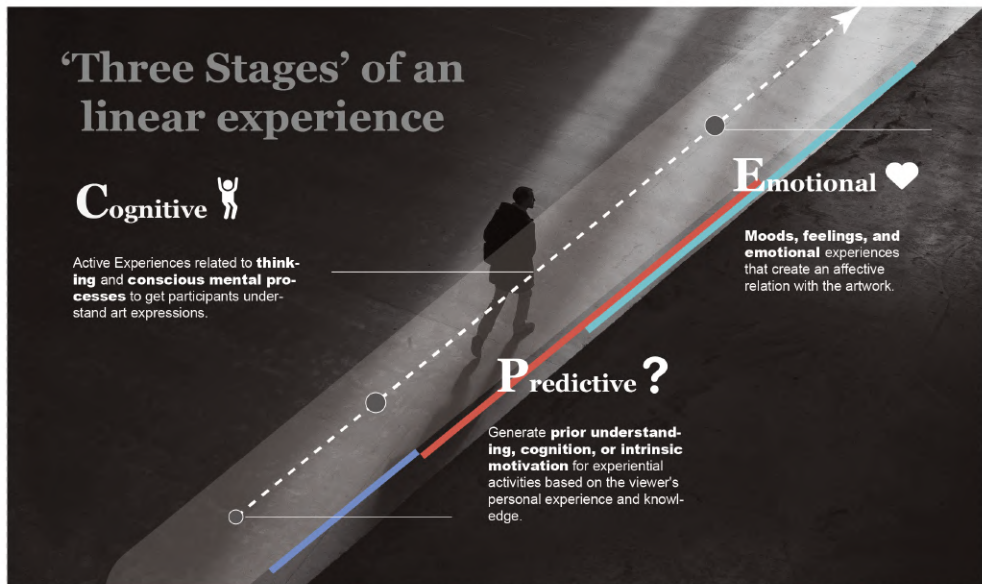
Museum Of the Moon

Intrinsic motivation

When recipients with intrinsic motivation such as personal interests of artwork themes, learning motivation, critical thinking, they are more susceptible to experience immersion. On the other side, the system itself has inherent value can be seen as the extra ambient support to facilitate personal interests as well as strengthen learning motivation.

Aesthetics distance

Two extreme conditions can be observed in relation to distance: under-distancing and over-distancing. Appreciator should maintain an optimal psychological distance from objects in order to achieve aesthetics.



Before:

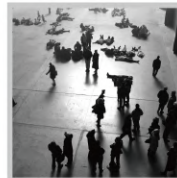
Inspire audiences intrinsic motivation by entitle the work intrinsic value.

Exploring :

Space - physical place
Sensorial - sight, hearing, touch, taste, and smell experiences can arouse audiences' aesthetic pleasure, excitement, satisfaction.

After:

Strengthen viewers' feelings and emotions by recording or designing visual materials.

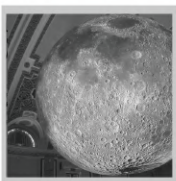


47% OF PEOPLE BELIEVE THE IDEA OF WEATHER IN OUR SOCIETY IS BASED ON CULTURE
 53% BELIEVE IT IS BASED ON NATURE

Weather culture -
 weather topic roots in daily conversations of locals, not far beyond people 's common acknowledgment, and it also occurs in other cultures.

Space - Combination of sun and light mediums
Sensorial - walk, lay down, observation, etc.

Recording - The project was recorded by website, books and videos. Audiences can have a comprehensive understanding of the sun.



Moon culture -
 Different cultures worldwide have their own historical, cultural, scientific and religious relationships with the Moon.

Space - Combination of moon, narratives, mythologies and musics.
Sensorial - Hear, talk, observation, etc.

Recording - Feeling are recorded by website, books and videos. Audience can compare cultural similarities and differences worldwide.

Figure 3.31 Summary table of design analysis and approaches

4. PROJECT REALIZATION

4.1 Concept

The concept of the installation "Let it Grow" was inspired by my impressive experience of seeking aurora borealis in Äkäslompolo, Lapland, Finland. This chapter describes my experience in Lapland, literature research on Sami's ancient mythology of aurora borealis and their core belief – animism, which is deeply rooted in the Finnish culture. As a result, the concept of digital artwork (LIG) was developed and visualized.

4.2 Starting point for the design

4.2.1 Hunting the aurora in Lapland

Finland is a natural islet with a long-standing culture and a great art environment. Lapland, as one of the greatest landscapes in northern Finland with graceful natural landscapes and distinctive climatic glamour, attracts tourists from all over the world to experience its wilderness and exoticism.

My trip to explore the lure of nature and aurora borealis in Lapland was in February of 2019. The frozen lake, Äkäslompolo, located in the northern wilderness of Yalls, which was a perfect site to see the northern lights due to the remote location away from any light pollution. The entire process was short but extremely memorable. In the beginning, there was a green haze appeared on the horizon. Shortly after that, the sky began to light up with a colorful display of lights. It was like swaying shafts of light from the headlamp, which was visible as a thin green ribbon starting to dance along the sky. At times, the aurora merely covered a

small part of the sky, and the rotation of the earth made the aurora expand to unexpectedly cover the whole sky with a mixture of a bright green glow and a blue glow later. When I stared into the weaving glow, the scene was like a heavenly drawing. The shining green arches and light curtains flowed into the stars, which was the most beautiful scene that I have ever seen. At that moment, above the Arctic Circle, the most beautiful scenery was hanging over Lapland (Figure 4.1).



Figure 4.1 Photos of Aurora taken during my trip in Yalls, Lapland

4.2.2 Myths of 'Revontulet'

In 1621, a French mathematician and astronomer, Gasandy, named this magic light 'Aurora' and the northern lights 'Aurora Borealis'. Throughout history, aurora borealis has occupied a prominent spot in both mythology and folklore of most indigenous people who live within the auroral oval. Those myths and folkloric stories have naturally attracted some imaginations from time to time. For example, in old Scandinavian, the aurora was translated as 'herring flash', which represented large groups of shiny fish swimming and reflecting into the night sky. In Sweden's myths, aurora symbolized good news for fortune. Swedish ancestors believed that the lights were gifts from benevolent gods that brought people with warmth and good harvest. Another legend described northern lights as the glows from the shields and armors of the Valkyrie, female warriors who equipped with helmets and armors, ride crossing the northern sky on their horses. Besides, the lost souls who figured a lot in Norse mythology also viewed the aurora as the 'Bifrost Bridge', a glowing rainbow arc that guided the souls of the warriors to the final resting place.

Despite different mythical stories about the northern lights mentioned above, the most attractive one for me is an aurora folkloric story that spreads among Lapland native people. In the beautiful Sami legend, the magical phenomenon of aurora is called 'Revontulet' in Finnish, which means 'the fire of the fox' (Figure 4.2): "As it runs along the fells, the fox's flaming tail whips crystals of snow into the sky and the fur scratches the trees, setting the skies on fire."⁴

The word 'Revontulet' consists of 'revon' and 'tulet', which mean 'fox's' and 'fires' in English respectively. In an ancient folklore of Northern Finland, there was a mythical animal called 'Tulikettu'. Tulikettu was a magical giant fox with fiery and radiant fur that lived in snowy hills far north. This fox was so precious, which made hunting it every hunters' dream. Hunters

⁴ There are many relative websites to depict the folk tale of Finnish aurora. This description comes from the website -Dark Side of the Auroras – meaning and myths: <https://www.lapland.fi/visit/only-in-lapland/lapland-northern-lights-myths-auroras/>

believed that whoever could catch the fox would receive all the wealth and fame on the earth. However, no one could ever catch it because Tulikettu could run as fast as the wind. Every time the firefox ran in the snowy-capped hills, its bushy tail would touch the snow sending a magical trail of sparks into the sky (Ojanen & Linnea, 2019). Currently, the northern light in Finnish is still 'Revontulet' which literally means the fox's fires in English. Moreover, this story was more than just a myth, and was scientifically approved, because in dry cold air, the charge attached to the fur could generate electricity and create tiny sparks.



Figure 4.2. Illustrations that depict the story of 'Revontulet'. It was every hunters' dream to catch the firefox (left). The firefox ran in the snowy-capped hills, its bushy tail would touch the snow and sending a magical trail of sparks, forming the aurora appears in the sky (right).

4.2.3 Sketching the idea

The mythical story of 'Revontulet' is mysterious and impressive, which inspired me to explore the deep beliefs behind Sami's mythology and their faiths in living in harmony with the natural environment.

Until this data, the most ancient belief of Sami until today is still closely associated with animism. In general, animism attributes life to natural elements such as animals, plants,

force, and celestial bodies. Each entity has natural phenomena with an animating soul or spirit (Bird-David, 2002). Similarly, according to ancient Sami's contexts, all natural beings are believed to have souls or spirits. The relationships among land, animals, human-beings, plants, stones, and the Northern Lights are related and reciprocal, and they have a connection with each other. Besides, Sami people believe that animals and souls have emotions and consciousness and that both animals and souls possess ways to act and communicate with the entire environment (Bird-David, 2002). A Finnish Sami artist wrote in his poem that "we have lived here from generation to generation ... when they come they will find this land, us, and we are stones, plants, animals, fish, water, wind, earth, sky ...". Also, the writer Hatt (2013) mentioned these relationships in her speech. She stated that "all of nature up there under the Northern Lights in the Lapps'- and it is animated- starry heavens, the stones, the mountains, the trees and the people who live under the earth-all are alive in the Lapp soul". With such beliefs, living in harmony with nature has formed the initial conception of the Sami world and foster Sami people's deep respect and a humble attitude towards nature, allowing people to see themselves as parts of nature.

The Northern Lights are always young and full of vitality, which is like all the creatures in the land of Finland that have spirit, energy, life, and their own freedom. My personal experience of seeking the aurora and the Sami's lofty respect for nature brings me a sense of awe and inexplicable feelings about this land. This is a natural paradise that people from the hustle and bustle of the cities can hardly feel and step into. Therefore, I deemed that seeking the northern light is a way to gain an insight into the most authentic natural world. Everything that grows there is flourishing and endless. The beams of light can guide people to find their genuine innermost part. Based on my experience and thoughts, I proposed the concept of the immersive installation 'Let it Grow'.

Participation: When audiences walk into the hemispherical dome, they can lay down in the center of the ground and get wrapped by a cushion. When they look up, a visual story

accompanied by ambient sound is projected on the ceiling of the dome, and audiences can appreciate visual content leisurely (Figure 4.3).



Figure 4.3. Installation sketch

4.3 Physical construction

As summarized above in the design approaches section, physical space is a fundamental requirement of the immersion. The final space construction is based on a study of immersive physical characteristics and mainly matches the theme of the LIG installation. Besides, spatiality, security, and aesthetics are vital factors that should be considered when designing the study. This chapter describes the two main reasons as to why the dome is chosen as the final immersive space, as well as the detailed process of how the dome was made.

4.3.1 Space

In order to create an immersive environment for LIG, an ideal physical space requires the following physical factors and aesthetic characteristics:

- a) A separate space

- b) Dark and opaque**
- c) Thematically motivated**
- d) Meet the requirements of the projection**

After considering the factors above, a hemispherical dome comes into my mind for two specific reasons.

Firstly, a hemispherical dome simulates the structure of the Lapland aurora dome. In Finnish Lapland, the Northern Lights are visible on around 200 nights per year, and the aurora dome is one of the distinctive constructions to watch aurora locally. The traditional ways to watch aurora are snowshoeing, cross-country skiing, or riding a snowmobile. However, Lapland people offer a comfortable and straightforward way to experience nature's most spectacular light show in an interior space. It is a round igloo-shaped tent where people can perfectly enjoy the magical winter scenery of the aurora borealis (Figure 4.4). Its transparent ceiling allows people to enjoy the best possible view of the starlit sky and Lapland spectacular aurora borealis while lying on a bed.

Secondly, dome environments attempt to demonstrate the potential and possibilities of visual immersion for expanding sensory perception. The early dome theaters were more used in astronomical theaters, allowing viewers to experience an immersion of visual space and feel a temporal acceleration of celestial mechanics in a seemingly infinite sky dome. By blurring the boundaries of space and time, these initial dome projection theaters provided a way in which the general public could indirectly experience the movement of the sky. While the early Dome Theater (Figure 4.5) was primarily used to show audiences astronomy knowledge, in the 1950s and 60s, immersive dome theaters became a more common medium for education and experimentation (McConville, 2007, P. 20). After that, a number of new media artists used technologies and dome environment to explore a wide variety of media topics critically.

To summarize, using a dome in this project offers the best viewer experience and matches all physical factors mentioned above in this project. Since domes can be used in showing

astronomical sciences, the sky-like ceiling is sufficient to showcase aurora as it offers a separate and opaque personal space with no environmental light inside to allow viewers to better focus on visual contents.



Figure 4.4 Aurora domes in Lapland, allowing people to perfectly enjoy the magical winter scenery of the aurora borealis

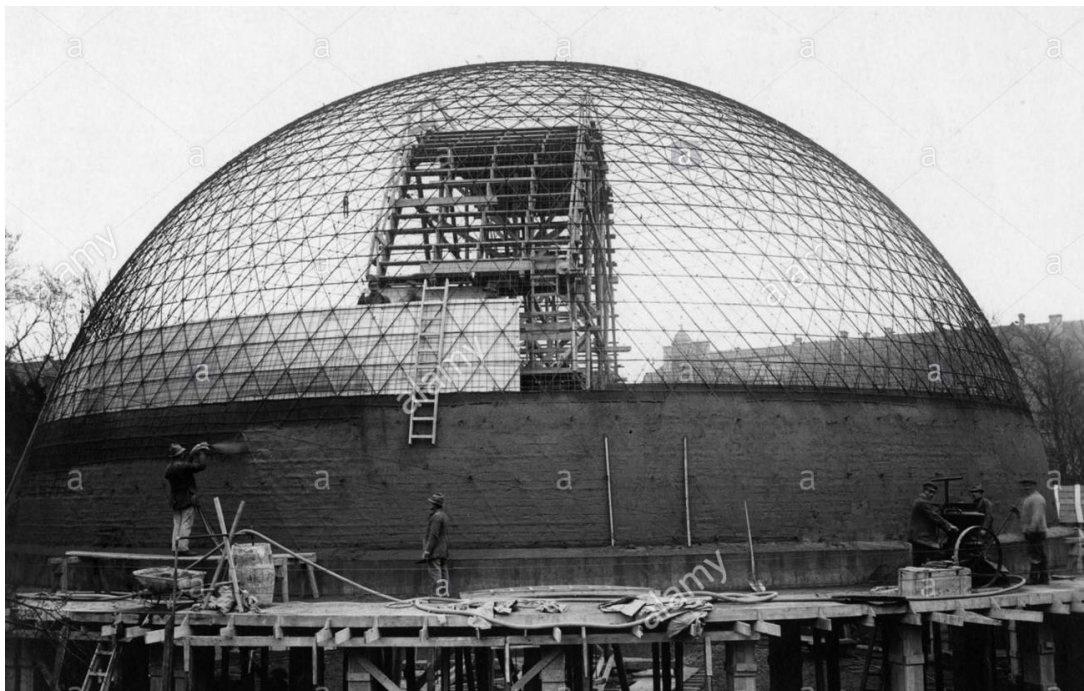


Figure 4.5 Zeiss Projection Dome in 1923

4.3.2 Space model

In all solid volumetric geometries, a sphere has a minimum surface that resists pressure. The light and sturdy natural features of a sphere also make it an ideal shape for spatial dome construction.

The geodesic dome structure was popular through architectural history. A geodesic dome structure was first invented as an architectural theater 'Zeiss' (Figure 4.5) by engineer Walther Bauersfeld for a planetarium to house a planetarium projector and detected the planetarium (McConville, 2007, p. 2). After years of exploring nature's constructing principles, in 1945, Buckminster Fuller popularized the widely known geodesic dome (McConville, 2007, p. 12), which was successfully adopted by architectural usages.

The geodesic dome has intensive structural stability. This segmentation distributes the load to the whole structure by placing triangular elements evenly on a spherical surface of the dome, making geodesic domes expandable to enclose a large volume with the least amount of possible structural weight.

A geodesic dome has a hemispherical thin-shell structure based on a geodesic polyhedron. In general, all polyhedrons that are composed of the same regular polygon can be further composed of either of these five types: regular tetrahedron, regular hexahedron, regular octahedron, regular dodecahedron, and icosahedron. Among these five types, the icosahedron is composed of triangles networks that form a spherical shape. This method of dividing 20 equilateral triangles into a plurality of triangles close to a sphere is called 'Geodesic segmentation' (Figure 4.6).

A geodesic dome is referred to as 1V, 2V, 3V, or higher levels due to the number of times the edges of the original triangle is divided into. The more complex the network of triangles are, the more spherical the geodesic dome looks like. For instance, a 1V dome has only one triangle in its pattern and less closely approximates a hemisphere, while a 6V dome has more triangles of multiple sizes that are arranged in an intricate pattern to create a more

smooth and spherical shape. Therefore, higher-level domes offer more intensive structural stability, which is ideal for more giant dome constructions.

In this section, in order to calculate the actual dome volume, I chose two types of spherical domes, made them into paper models, and compared them with each other (Figure 4.7).

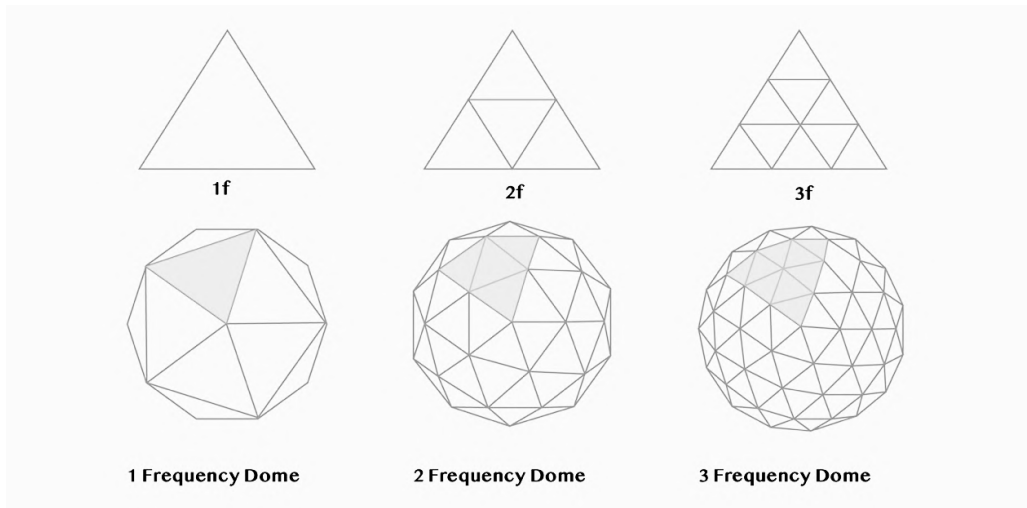


Figure 4.6. Geodesic segment: a geodesic dome is referred to as 1V, 2V, 3V, or higher levels due to the number of times the edges of the original triangle is divided into

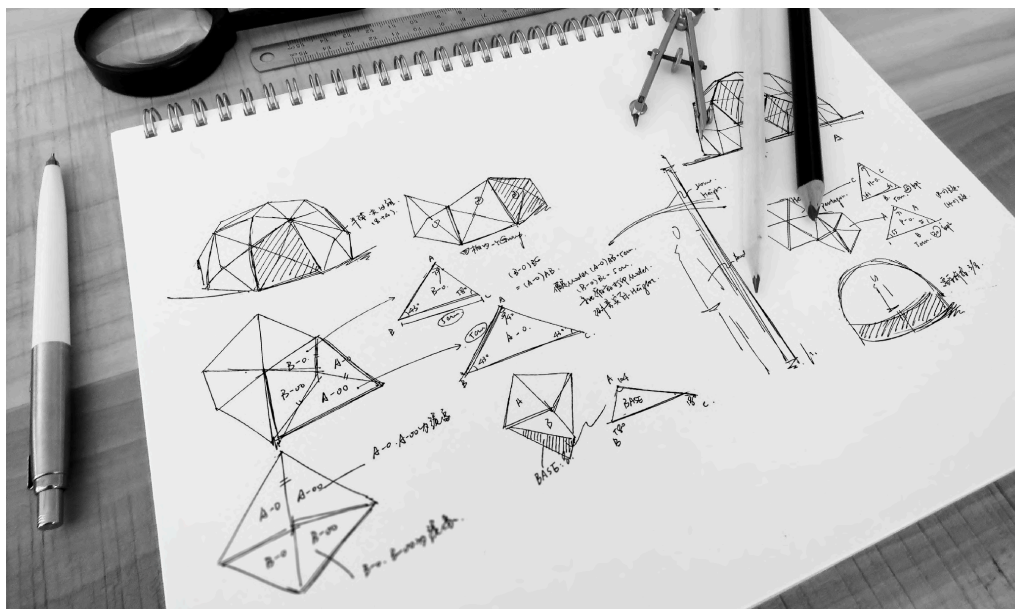


Figure 4.7. Two dome models sketches

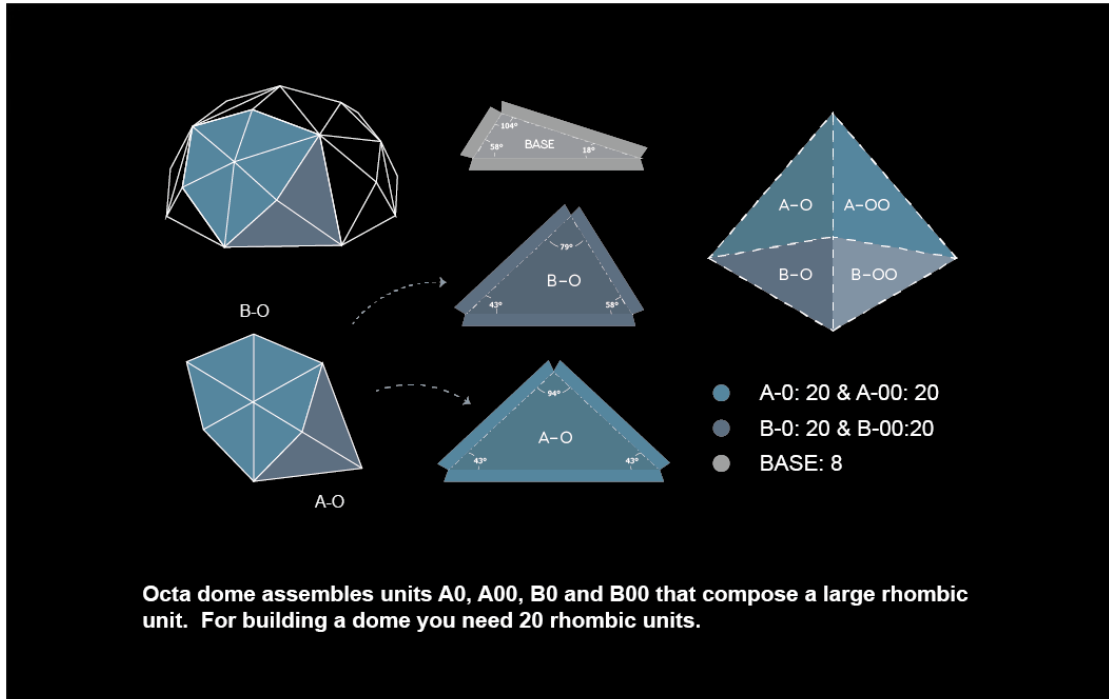


Figure 4.8 Components of the Octa dome

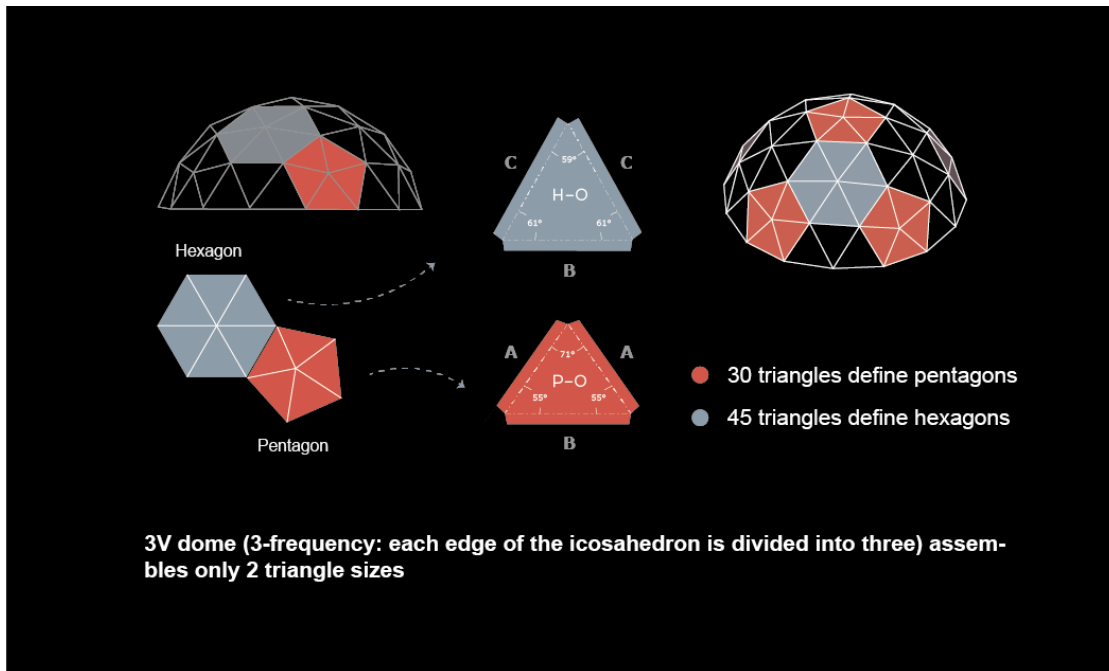


Figure 4.9 Components of the 3V dome

3V dome: A 3V Geodesic Dome (Figure 4.9) comprises of two different triangular sizes. As shown in Figure 22, the whole dome consists of 75 triangular units of two different types: triangles P-O and triangles H-O. Five triangles P-O can form pentagon groups, while six triangles H-O can form hexagons groups. The 3V dome can be built with pentagons that are defined by 30 triangles H-O and hexagons that are defined by 45 triangles P-O.

Octa Dome: Octa-geodesic Dome (Figure 4.8) is another type of dome structure designed by a Japanese architect called Hajime Narukawa. He proposes the method to make the personal approximate spherical space³. This type of geodesic dome has a structural network made of subdivided octahedrons. As shown in Figure 4.9, the structure of the Octa dome needs four types of triangular units, including unit A-O, A-OO, B-O, and B-OO. Unit A-O and A-OO are respectively mirrored to each other, and B-O and B-OO are the same. Assembling these four types of triangular units can compose a sizeable rhombic unit. After assembling 20 rhombic units, eight units 'BASE' are needed to attach to the bottom of the Octa Dome to make the whole structure stable.

4.3.3 Space construction—outside

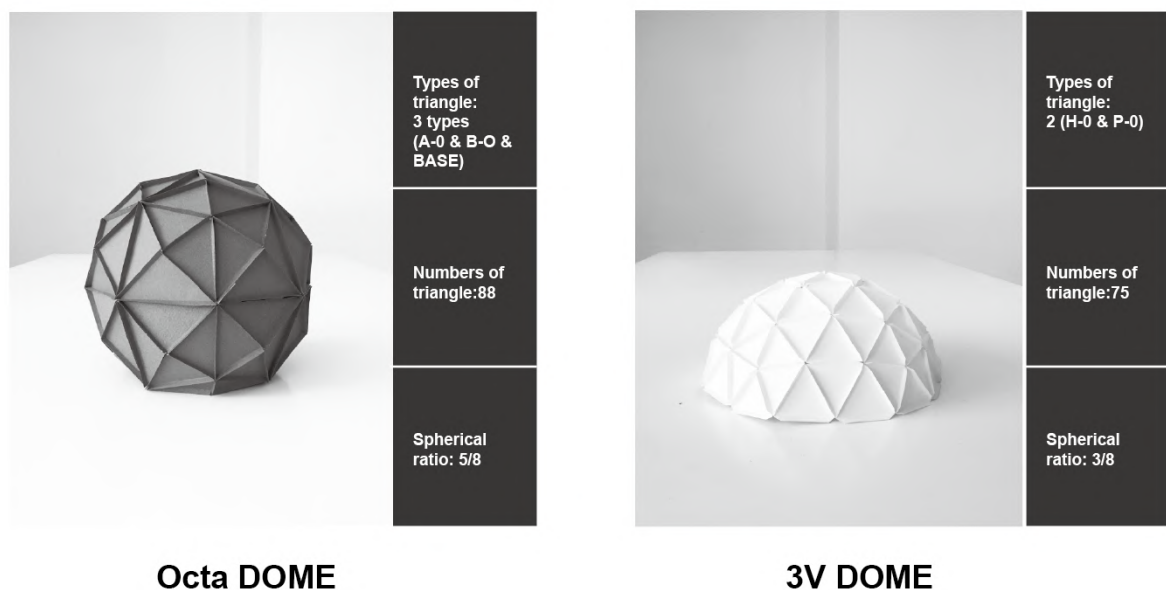


Figure 4.10 Comparison of two domes' data

As shown in Figure 4.10, by comparing these two domes, their triangle types and numbers approach to the same value. The Octa-dome has a more spherical ratio than the 3V-dome, which means that the Octa-dome has a larger volume, and it more closely approximates a

³ This geodesic dome has a structural network made of subdivided octahedrons, which structure can be checked through Hajime Narukawa lab's website: <http://narukawa-lab.jp/archives/octa-geodesic-dome/>

hemisphere. Considering that the interior of the dome needs to accommodate equipment, such as a cushion and a projector, and requires sufficient height to ensure a distance between the projection and the dome, the Octa-dome is the ultimate choice for this physical space.

After selecting the optimal model, I checked some materials and the possibility of constructing the Octa-dome (Figure 4.11). I conducted two experiments to construct the physical dome. The dome was constructed by triangles, which were made of paper cardboards (Figure 4.12). Since the stability of the dome is often influenced by structural materials and fixing subjects, I identified several problems during the first trial (Figure 4.13) and improved the dome in the second attempt (Figure 4.14). Finally, the completed dome has 2.4 meters in diameter and approximately 2 meters in height, which can accommodate around 2-3 people at a time.

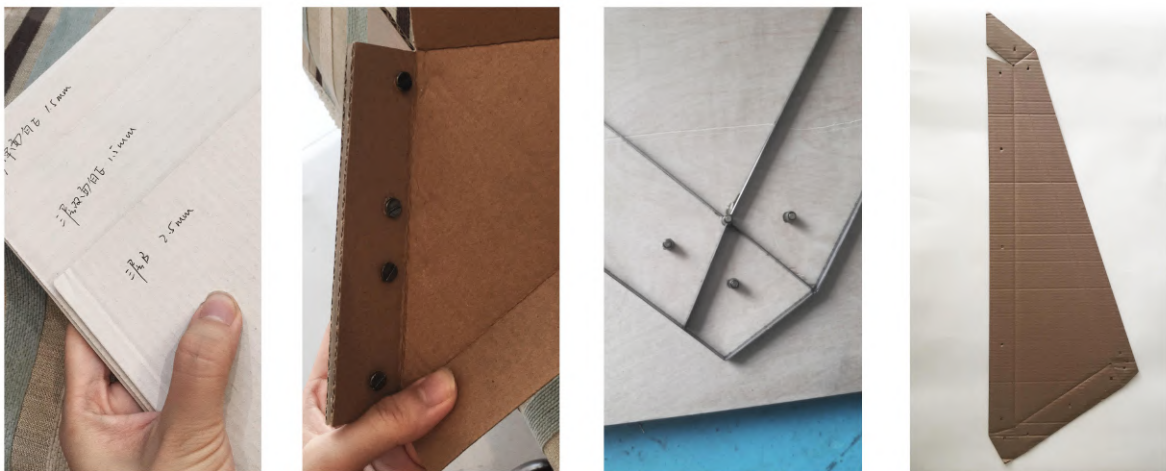


Figure 4.11 Comparing the thickness of different paper cardboards (a). Choosing proper cardboard to make several triangles and connect their sides by using nuts (b). Making sure each size of triangles and then modeling three types of wooden cutters (c). Using these completed cutters to cut 88 triangles in total (d).

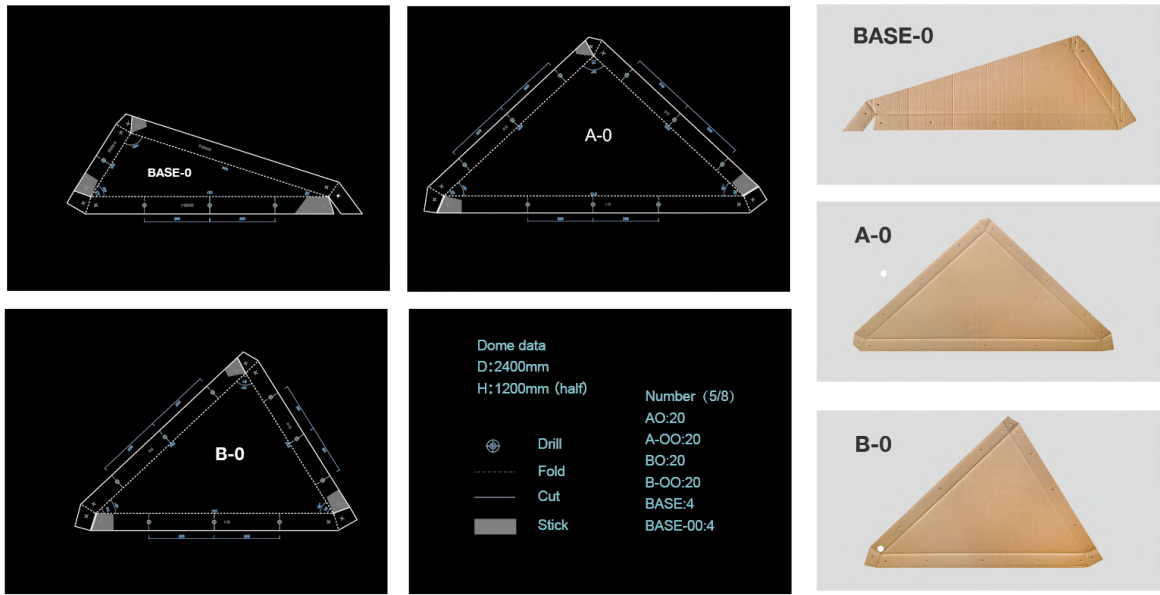


Figure 4.12 Detailed industrial drafting of three types of triangles for modeling wooden cutters and paper cardboards

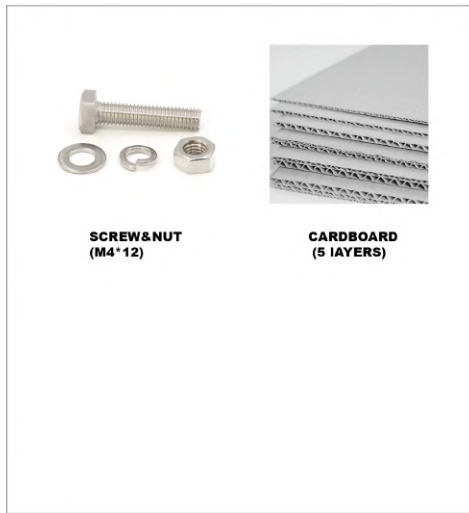


Figure 4.13 The first trial

Materials: Cardboards (5 layers)

Direction: Holing on two connecting sides of triangles with equal distance, and fixing them with screws, gaskets, and nuts

Challenges:

1. Hard to construct and deploy.
2. The tension of the cardboard is large.
3. Hard to fasten screws, gaskets, and nuts

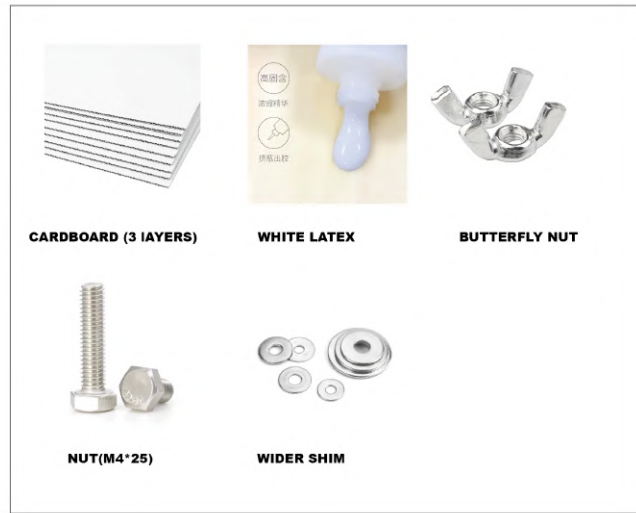


Figure 4.14 The second trial

Materials: Cardboards (3 layers)

Direction: Holing on two connecting sides of triangles with equal distance, and fixing them with glue, screws, gaskets, and nuts

Challenges: After taking off a rhombic unit as a door, two adjacent units cannot hold a balance; thus they are suggested to be replaced by cardboards of 5 layers

4.3.4 Space construction—inside

To make the octagonal dome structure more stable, a wooden frame was customized to match the geometric bottom of the interior space (Figure 4.15). This frame was made to balance the inward power from the lower hemisphere cardboard. The wooden frame was composed of eight wooden strips, and each of which was 630 mm long, 26 mm wide, and 40 mm high. The splicing place was fixed by angle steels and screws (Figure 4.16).

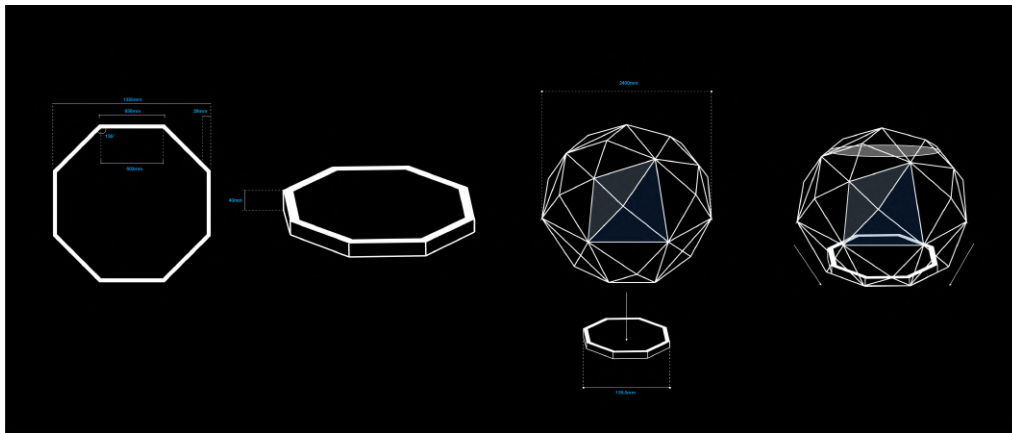


Figure 4.15 The sketch of a wooden frame which was made to strengthen stability



Figure 4.16 Fixing eight sections of the wooden frame by using angle steels and screws

Meanwhile, the optimal capacity for the interior of the dome is around 2-3 people at a time. The internal space facilities also include recliners, audio, and a short-focus projector. The external appearance and internal space are shown in Figure 4.17.

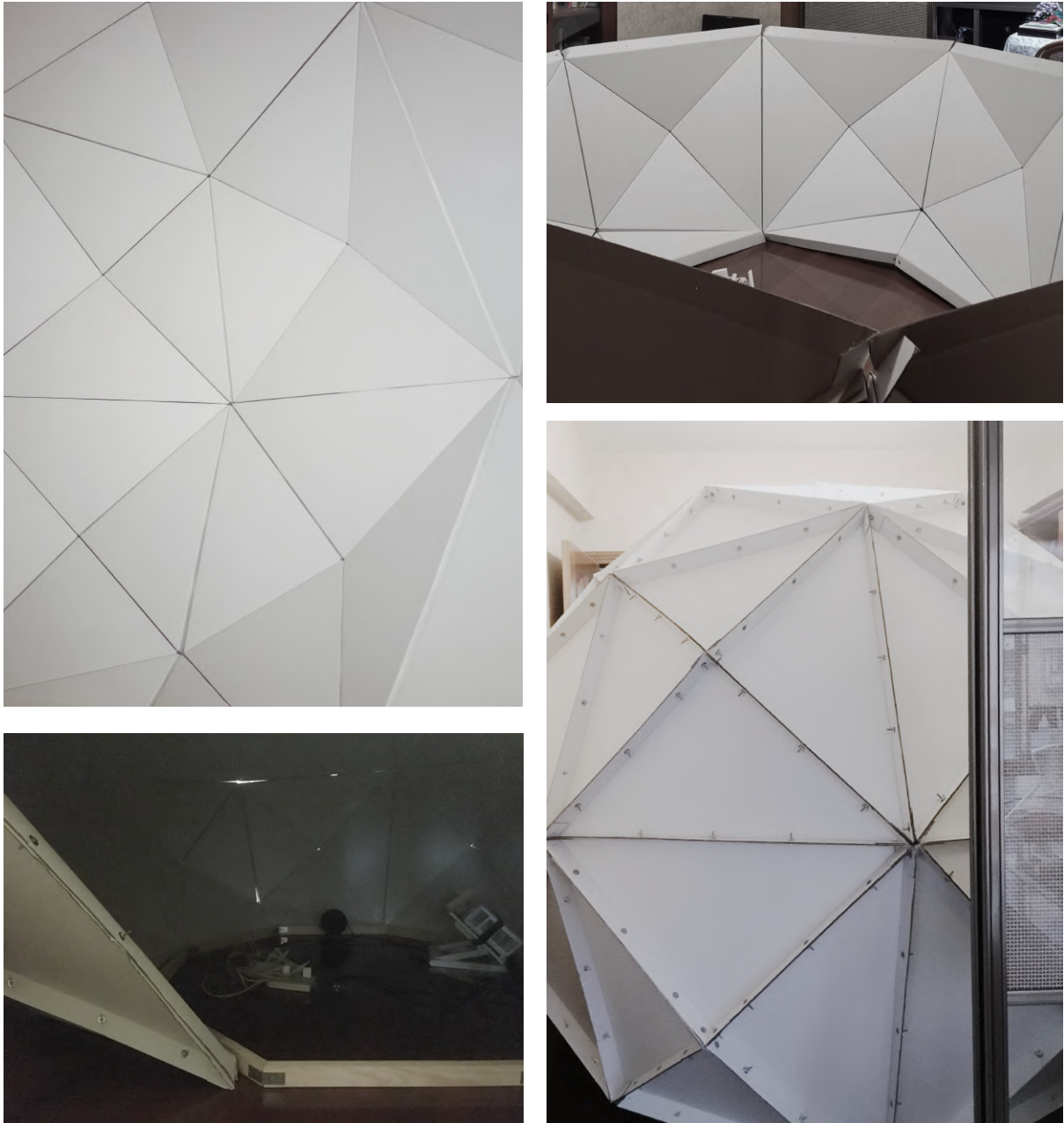


Figure 4.17 The completed dome occupied a small room

4.4 Visualization

To allow a completed cultural experience, all design products are specifically identified and built based on the needs of audiences. According to the following three stages of the design approaches as following, each stage has the interconnected visual products to form the entire process (Figure 4.18).

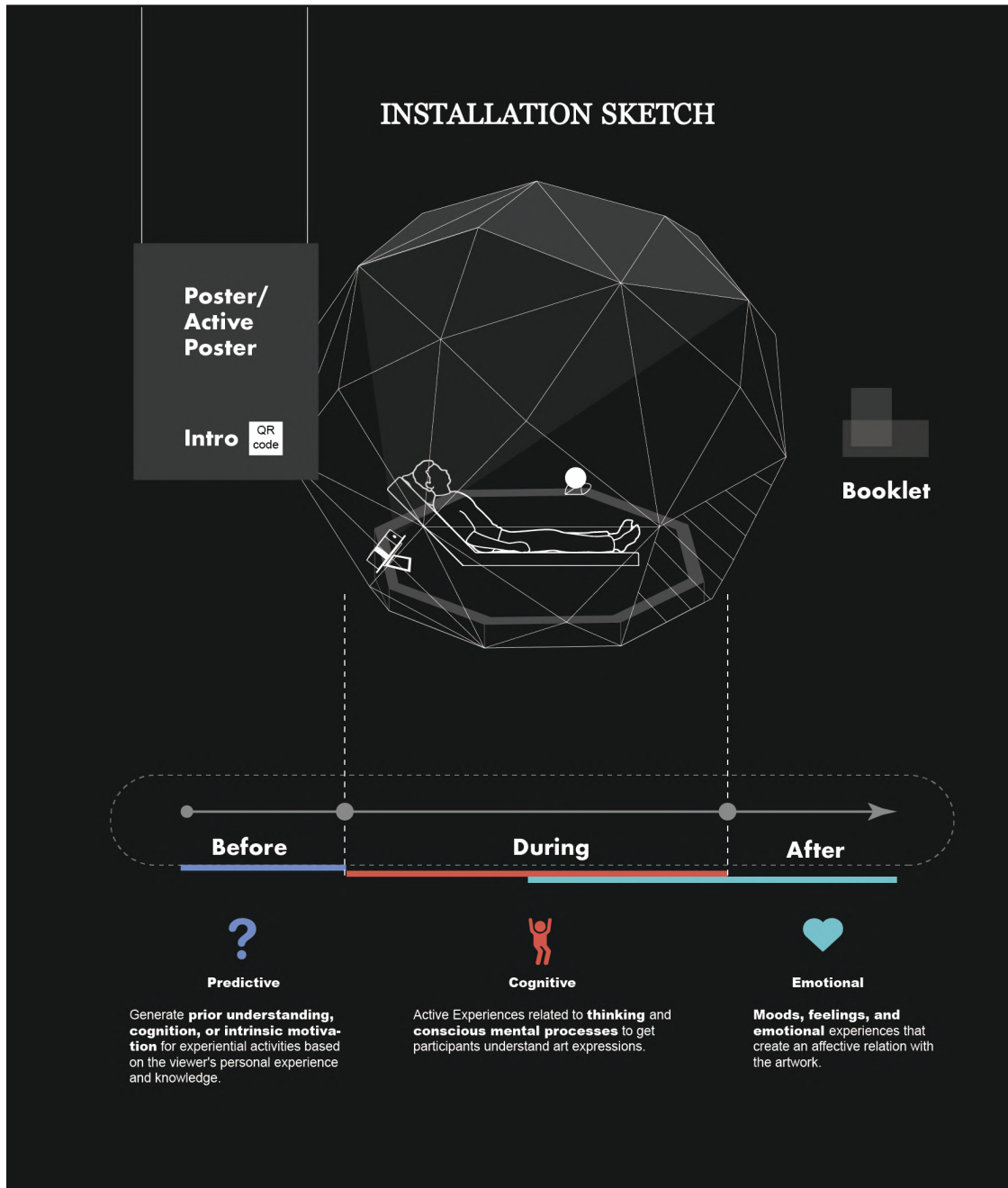


Figure 4.18 Three stages and interconnected visual products of the whole experience

4.4.1 Research contents

Since the design concept of 'Let it Grow' is inspired by various natural elements of Finland, the visual content should not only include a mythological story, but can also present what the mysterious nature looks like and how the Sami cognize the world - respecting all lives is reverence for the universe, for nature, and for ourselves.

When I was traveling in Finland, Finland impressed me with its primitive, magical, and unusual natural landscape. The purity of nature made people relaxing, peaceful, and cheerful towards life. In order to know more mysterious natural phenomena, I consulted the website of 'VisitFinland'⁴ to summarize the distinctive natural elements and native culture about winter as reference (Figure 4.19). As Nordics struggled to adapt to the long duration of the winter, they believed that the winter was rather mysterious, which led to many beliefs and rituals.



Figure 4.19 Natural elements and native culture of winter in Lapland were collected as reference

⁴ 'VisitFinland' is the official travel guide website of Finland. Travelers can discover fantastic things to do and become inspired to travel to Finland.

4.4.2 Before exploring—dynamic poster

The visual product related to the first stage is a dynamic poster. According to the experience modules and design methods summarized in Chapter 4, when the immersion system itself contains specific inherent values and spiritual connotations, it can inversely stimulate audiences' psychological and cognitive emotions. For example, if an immersive system has a theme that can trigger thinking, or targeted interactive competition, or has a powerful emotional connection through mobilizing audiences' senses, audiences may find it interesting and inherently satisfying and become easier to fall into a flow state with the system. Thus, the system can be considered as a support for promoting individuals' intrinsic motivation. However, in the first stage—before exploring, audiences merely have any information, such as themes, forms, or participation methods, about artworks in advance. This kind of information often made available to the audiences through visual product design placed by designers, such as posters, websites, or banners. Through their exposure to the pre-designed information, audiences can eventually decide whether to take part in activities.

Currently, in the design context, the widespread use of electronic screens and portable mobile devices offer better visual communication and spread effects among the public than dynamic posters. Active posters can not only express designers' ideas and comprehensive personalities but also can attract audiences' attention quicker than still pictures do. In this project, the purpose of designing an active poster before audiences' participation is not only to deliver textual information but also to stimulate audiences' intrinsic motivation before their participation, thus allowing them to engage the experience actively.

The poster's visual content is to present the scene of 'Revontulet' based on the real scene inside the dome and its theme. There are three primary elements in this poster – a background, graphics, and texts. The background is a real photo that took inside the dome, which simulates the Aurora corona with its rapidly moving ripples. The graphic part is a gleamy fox that keeps running along the fell, which is drawn with Adobe Illustrator. The skeleton construction is completed with Adobe After Effects to realize its running animation.

When the running fox's tail sends a magical trail of particles into the sky, the title of the poster gradually appears in a rotating manner, and then the short description fades into the screen (Figure 4.20).

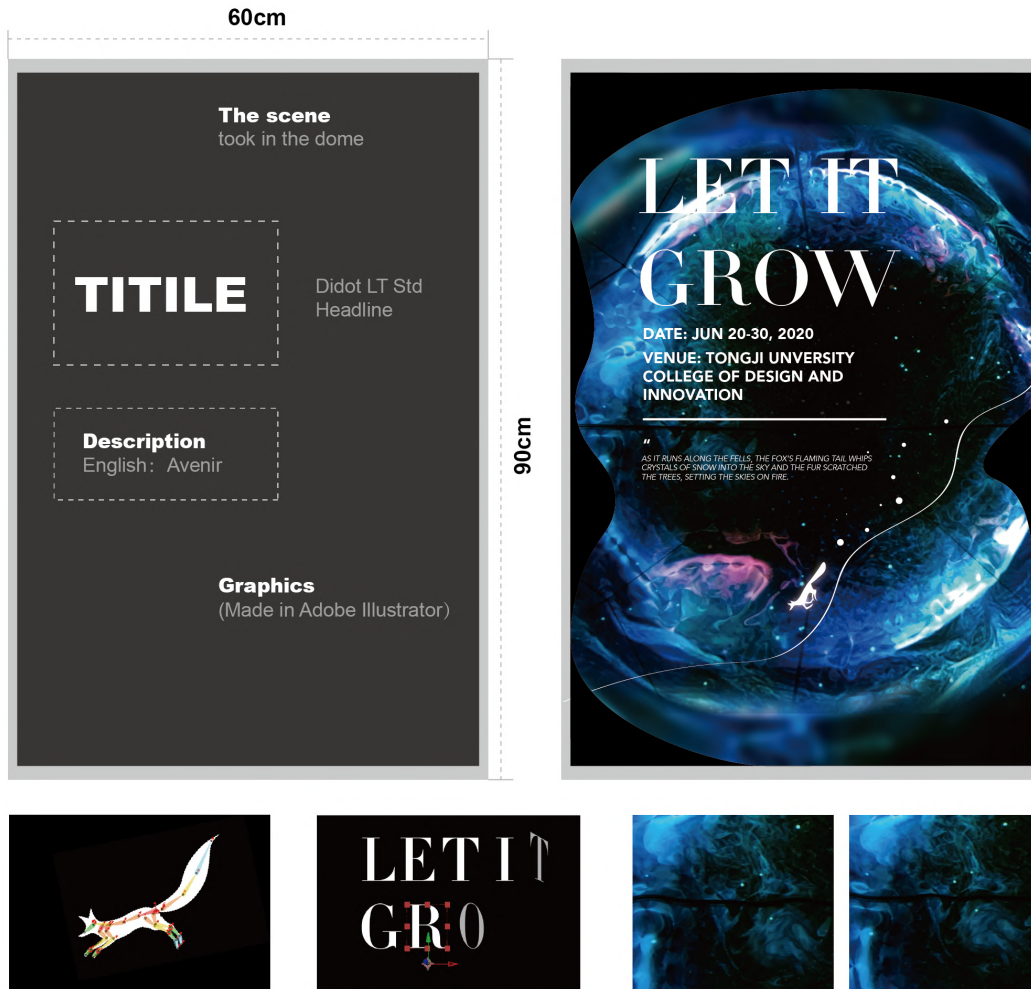


Figure 4.20 Poster design and Dynamic elements: The fox was illustrated in Adobe Illustrator, Completed Duik skeleton construction in Adobe After Effects

The texts appear in a rotating manner with the descriptive texts appear in a fade-in manner

The background is a photo took inside the dome. In order to highlight other main visual elements, the turbulent displacement of Adobe After Effects is used to create a subtle evolutionary effect

In the future exhibition, this poster (Figure 4.21) is intended to be placed adjacent to the installation to attract audiences at a very first glance. To summarize, the purpose of dynamic posters is to inform the audiences about the thematic information in advance, with the aim

to firstly stimulate their imagination and interests, and then bring them unknown perspectives and rich visual experiences.



Figure 4.21 Poster of 'Let it Grow' (print version)

4.4.3 Before exploring—H5 page design

The second visual product related to the first stage is the HTML5 page. HTML (Hypertext Markup Language) is the primary language that composes web documents that are designed to be displayed in a web browser, HTML5 is the latest version of HTML, as referred to as H5. In recent years, due to the performance support of major browsers, HTML5 is more abundantly applied in functional features and has a wider application than HTML4. One of the crucial features that HTML5 has is its ability to support multimedia in web browsers. It can support multimedia functions such as video and audio, Class 3D, graphics, and motion effects, so as to meet the different needs of information dissemination and audiences' interaction. Therefore, the design purpose of the H5 page is very similar to the active poster, which focuses on effectively translating audiences' interests into active participation.



Figure 4.22 Homepage of the H5 page

The completed H5 page in my project includes four modules and 16 sub-pages in total. After audiences quickly scan the QR code, they can log into the homepage and find a menu icon in the upper left corner, and a music icon in the upper right corner (Figure 4.22). A pop-up window will appear on the left side when they click the menu icon. Audiences can browse each page on the pop-up window by clicking corresponding texts - animation, works, models, and contact. The background music will remain playing after the audiences log into the homepage. However, considering the diversity of the environment when the audience browses the page, audiences have the option to turn on or turn off the music setting by clicking the record player icon at any time.



Figure 4.23 Animated pages of the H5 page

The first six pages of the H5 page showcase dynamic animations of Finland's natural culture with short text descriptions (Figure 4.23). When audiences flip the page, the text description will appear first. After reading those texts, audiences can click the screen to trigger animations, which are in accordance with the text meaning. For instance, when audiences enter the page of 'The First Snow', descriptive text will slowly emerge from bottom to up,

the snowdrifts downward from audiences' upward angle to the center of the background, from light to heavy, thus jointly creating a snowing atmosphere. By using the combination of texts and animations, audiences can quickly browse and understand those native cultures, meanwhile having a better visual immersion.



Figure 4.24 Introduction pages of the H5 page

Besides, the last three pages include an introduction and an installation sketch (Figure 4.24). The introduction includes two parts, a text of the myth of Revontulet and a supplementary of the design philosophy of this installation. This introduction is placed here because these contents are not included in the poster. Moreover, audiences can understand how this installation works following the installation sketch.

4.4.4 Exploring—visual design

After explaining what the animation looks like, this section introduces how this installation works. The visual contents are produced with a series of Adobe tools, such as Adobe After Effects, Adobe Photoshop, and Adobe Illustrator. Since all scenes are based on the winter

season and natural features of Finland and mainly try to showcase the dynamic evolution of natural elements, the storyline of "Let it grow" is simple and without much narrativity. The visual story design is briefly summarized as follows: The Aurora season began in Finnish Lapland as soon as the nights started becoming colder – this far north, that is at the end of August. When the sky began to snow, the little white fox woke up on the snow fell. Mysterious light revealed in the starry sky from time to time, attracting the little fox to follow and start the journey of finding the aurora. To further explain how to produce the animation mentioned above, the whole producing procedure can be divided into the following three parts.

1) Scenes and characters

The first half animation mainly showcases that the little fox embarks on the journey of looking for aurora, during which it meets some other creatures and experiences many unpredictable phenomena in the winter.

I selected several scenes to apply the distinctive natural elements summarized in the earlier research stage to my study. In the dome environment, there is no natural light except the projector ray, allowing the audiences to fall into a more immersive state while watching the aurora within this dark environment. The selected design factors are listed following:

(a) In order to highlight the theme of pursuing aurora, most scenes are drawn in black and white style, except the appearance of the aurora, which is multi-colored (Figure 4.25).

(b) Considering the viewing is conducted flat from the ground, most of the scenes are designed to be at audiences' upward angle (Figure 4.25).

(c) In order to make visual content fit better to the shape of the top of the dome and blur audiences' sense of space and time, the visual screen shape is designed in a circular (Figure 4.26).

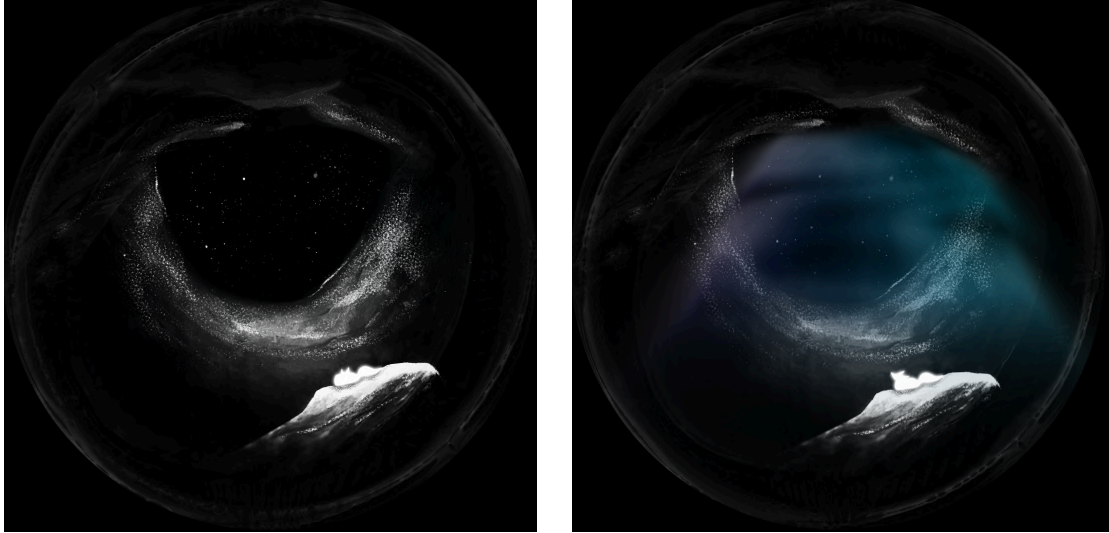


Figure 4.25 The scene was drawn to be at audiences' upward angle. The scene is in black and white style, except the appearance of the aurora which is multi-colored

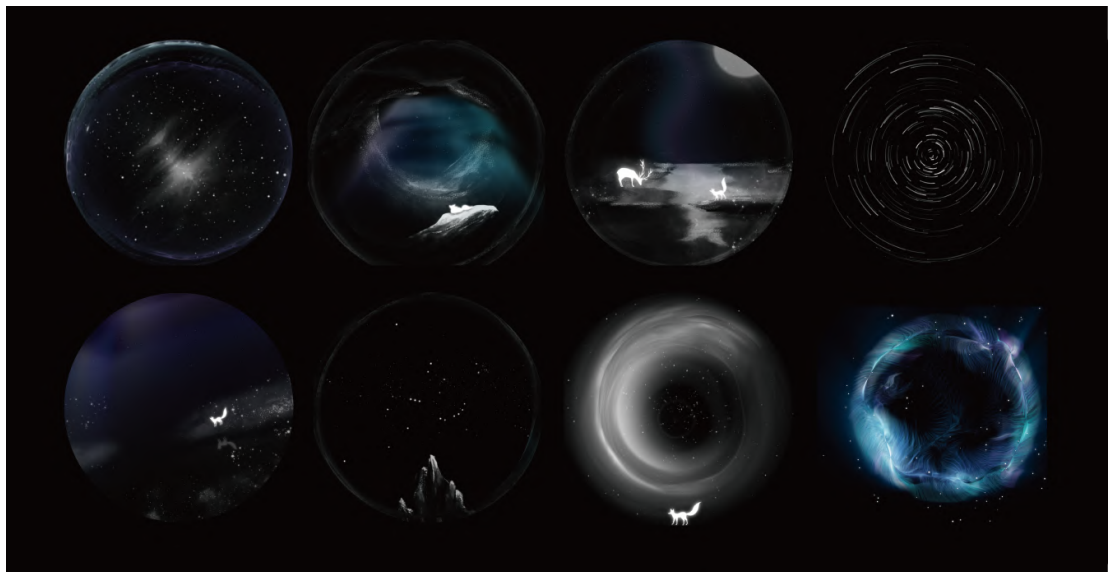


Figure 4.26 The shape of the visual screen is designed based on audiences' looking up angle

Sami people believe that animals have energy, spirits, consciousness, possess ways to act and communicate with the entire environment. Therefore, animal characters are designed in glowing white color in this animation. According to the myth, the protagonist of the story is a white Nordic fox, which has a fluffy and beautiful tail. Other characters and animal

elements used in the story are some of the common symbols that often appear in Finnish culture (Figure 4.27).

During the design process, all scenes in the story were drawn with the brushes tool in photoshop. Animal characters such as the fox and reindeer were firstly drawn and layered through illustrator, and then has their dynamic skeletons constructed through After effects (Figure 4.28). Node keyframes were lastly added through Duik Bassel to achieve dynamic movement such as walking and running (Figure 4.29).

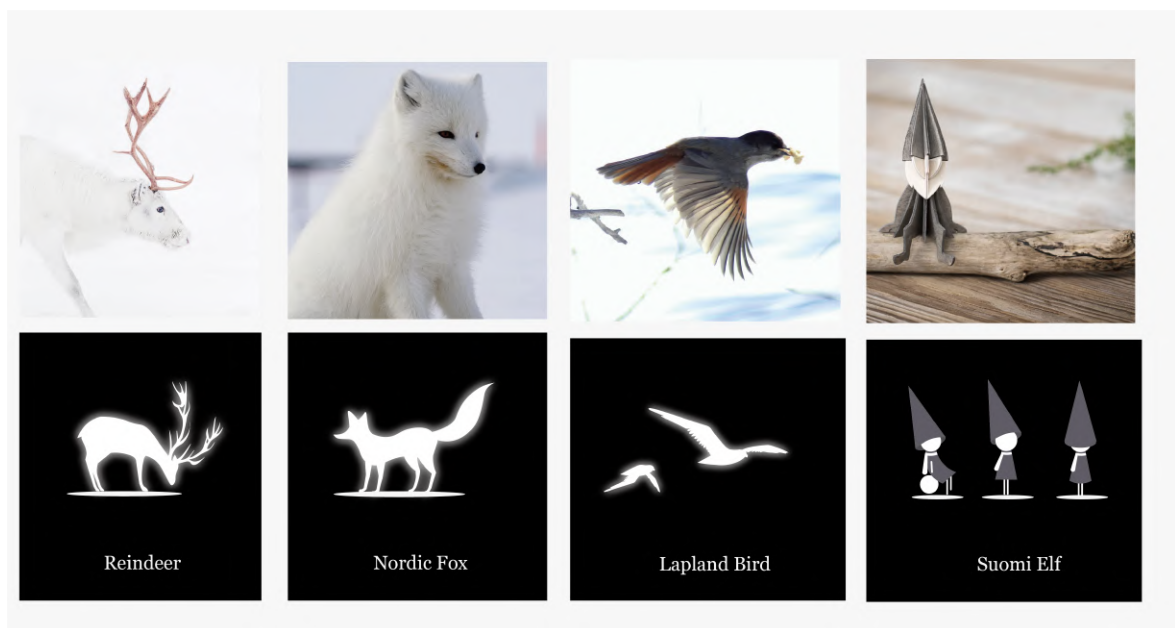


Figure 4.27 Animated creatures in the story

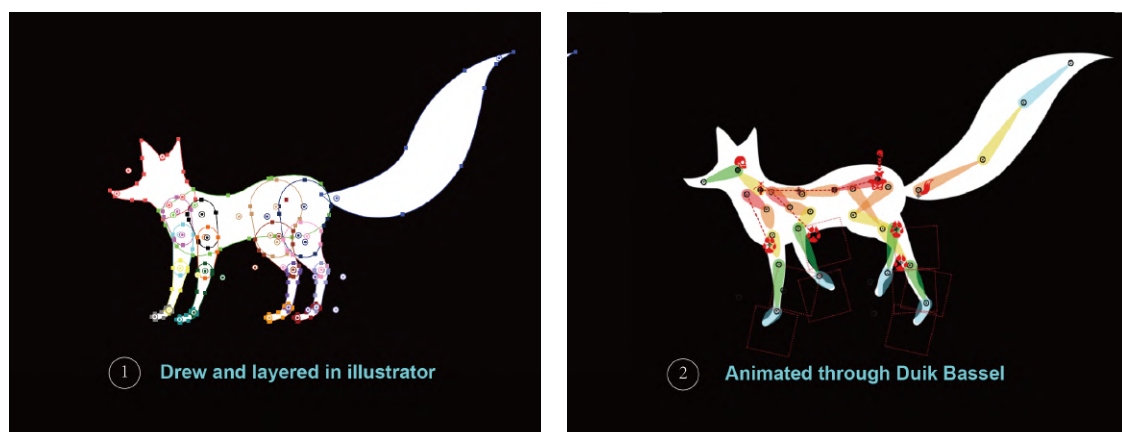


Figure 4.28 Two steps of animating an animal

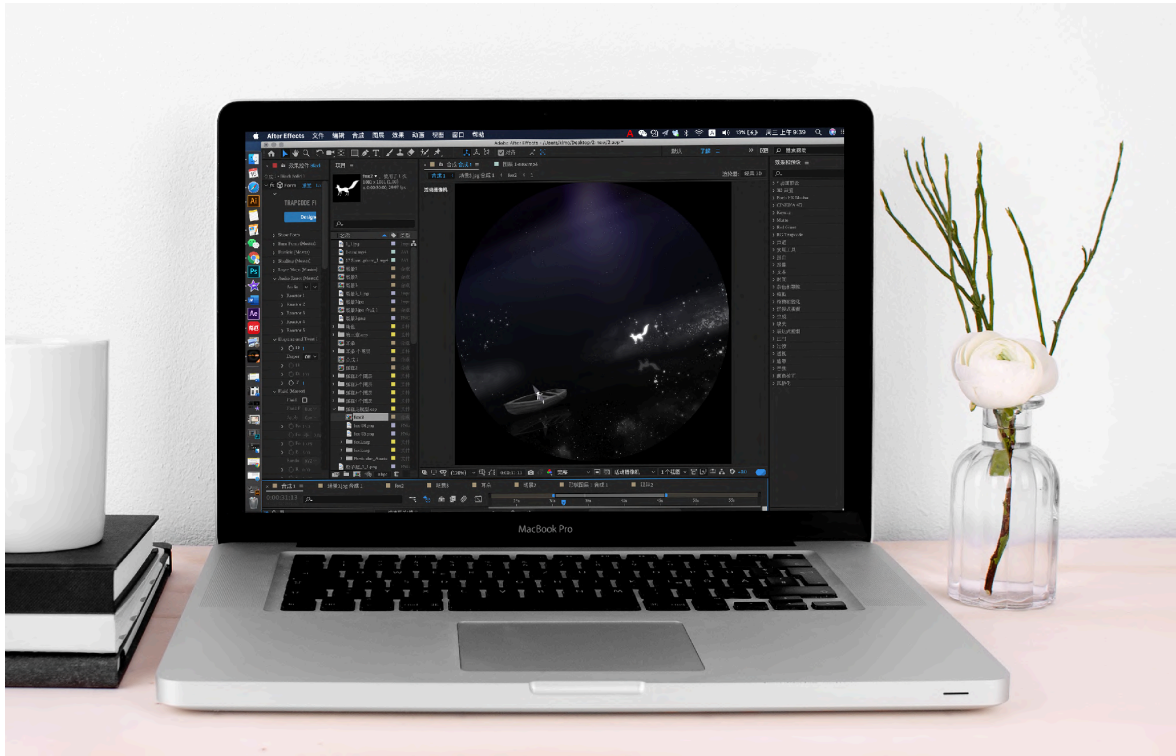


Figure 4.29 Node keyframes were lastly added through Duik Bassel to achieve dynamic movement such as walking and running

2) Aurora borealis and music visualization

The second half of the animation mainly showcases the gorgeous aurora generated by the little running fox and the dynamic movement of the aurora.

Since visually watching and hearing are the most direct and natural ways for humans to obtain external information, the creative way of combining music and visual pictures can give audiences a better immersive feeling of wrapping in space and actively stimulate their sensorial experience. In this project, the background music was designed to run through the entire artwork from beginning to end. The visualization of Aurora borealis was the climax part of the whole animation, accompanied by the 3D visual image and the background music.

According to a Norwegian scientist named Kristian Birkeland, there are various colors and types of the aurora (Figure 4.30). Green is the most common one, which caused by the high concentration of oxygen atoms at low altitudes. Red appears when charged particles collide

with oxygen molecules at a much higher up level in the atmosphere. Various shades of blue occur when particles collide with nitrogen molecules, which only happens during intense solar activity. White, pink, yellow auroras are generated as a mix of these three basic colors. Besides, according to the different levels of solar activity, the shapes of the aurora can be divided into arc aurora, drapery aurora, diffuse aurora, corona aurora, stripe corona and others.



Figure 4.30 Different types and colors of the aurora

The aurora borealis in my project simulates the aurora from the clam stream to the active corona (Figure 4.31). The shape, size, and color of the aurora are changed according to the frequency and intensity of the music, thus allowing the visual image to dominate the audiences' main sensory system. At the very beginning, the aurora features multiple, but light curves that were hanging over the sky with very dim brightness. As the music reaches its climax, the aurora would change continuously and accordingly to its peak outburst, which was a bright red aurora that was clearly visible and moves quickly within a short time, After this, there would be several other coronas appearing with changeable color. The display

was active for a period even though its magnificence diminished slightly over time, and bluish beams were left in this deep and borderless dome (Figure 4.32).



Figure 4.31 Coronas cover much of the sky and diverge from one point on it

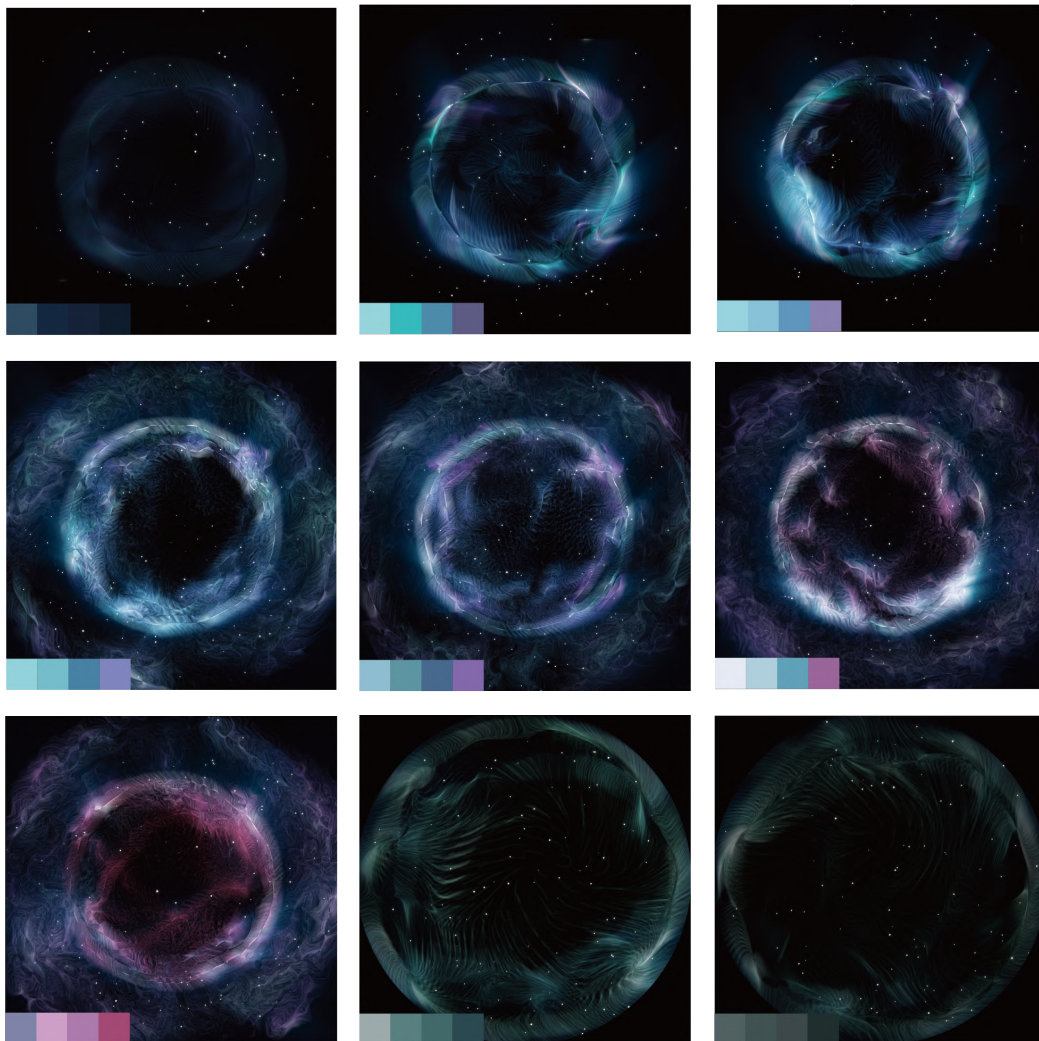


Figure 4.32 Shapes and colors of the aurora are changed according to the music

3) Projector and visual size

Because the top of the dome is hemispherical, in order to avoid distortion after the screen is projected, the screen display part is designed to be a perfect circle according to the shape of the dome. In AE, the screen size was set to 1080 * 1080 pixels, and the pixel aspect ratio was square. The height of the completed dome was about two meters. Projected to the dome top using Optoma GT1080 short-focus projector (3800 lumens), the vertical projection distance was between 0.9 meters and 3.3 meters. The projected picture inside the dome was around 200 Inches (Figure 4.33- Figure 4.35).

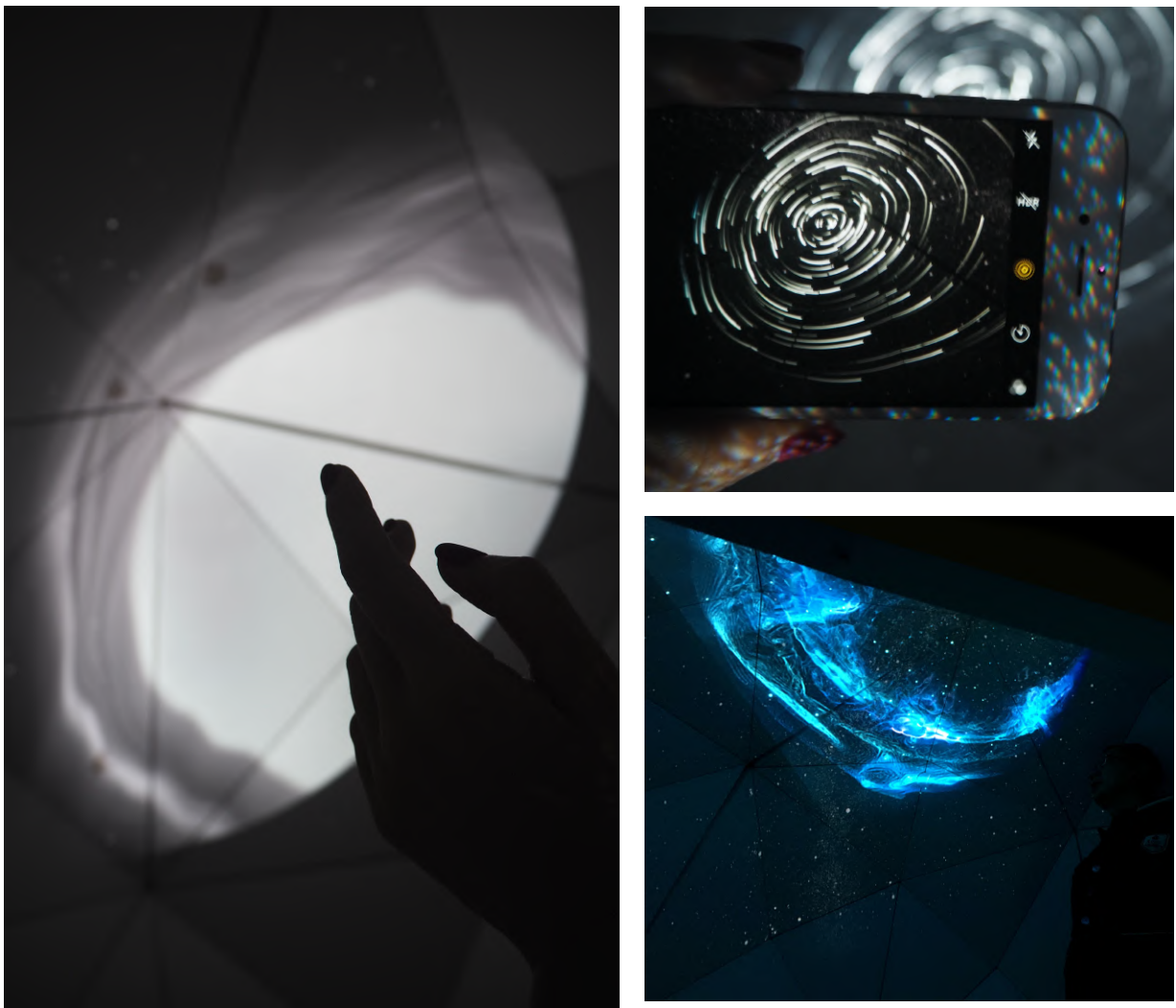


Figure 4.33 Projected images taken inside the dome

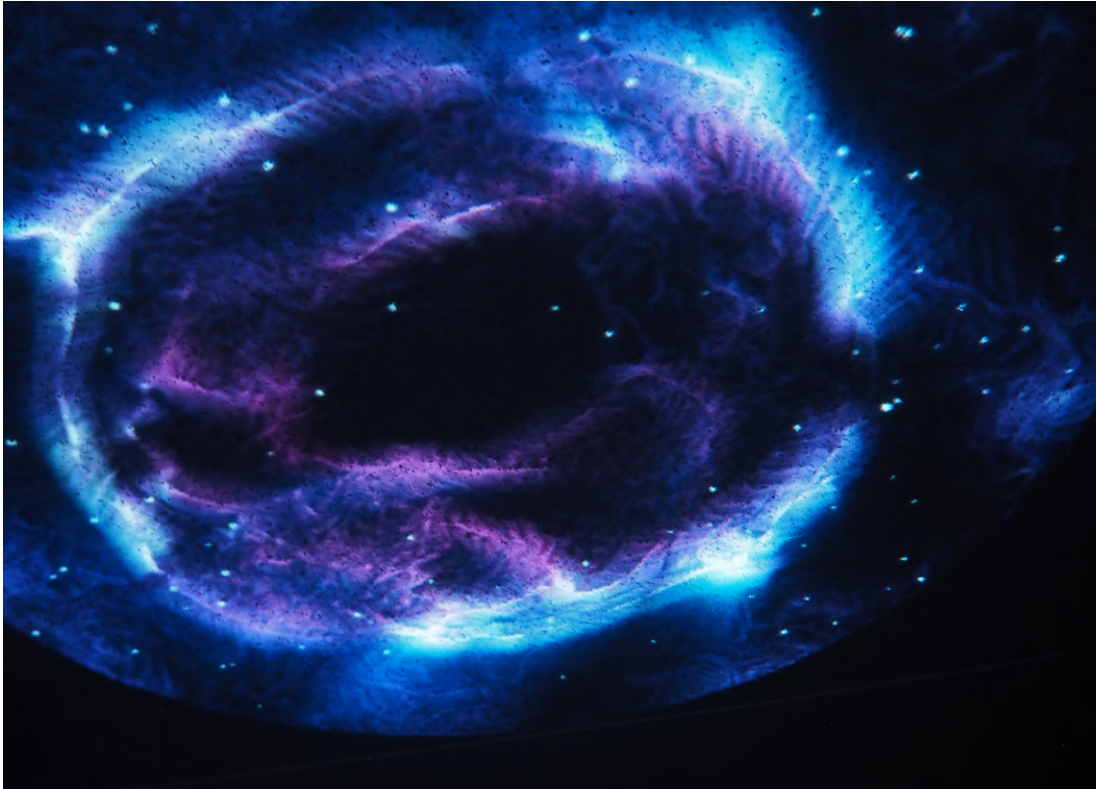


Figure 4.34 Projected image taken inside the dome

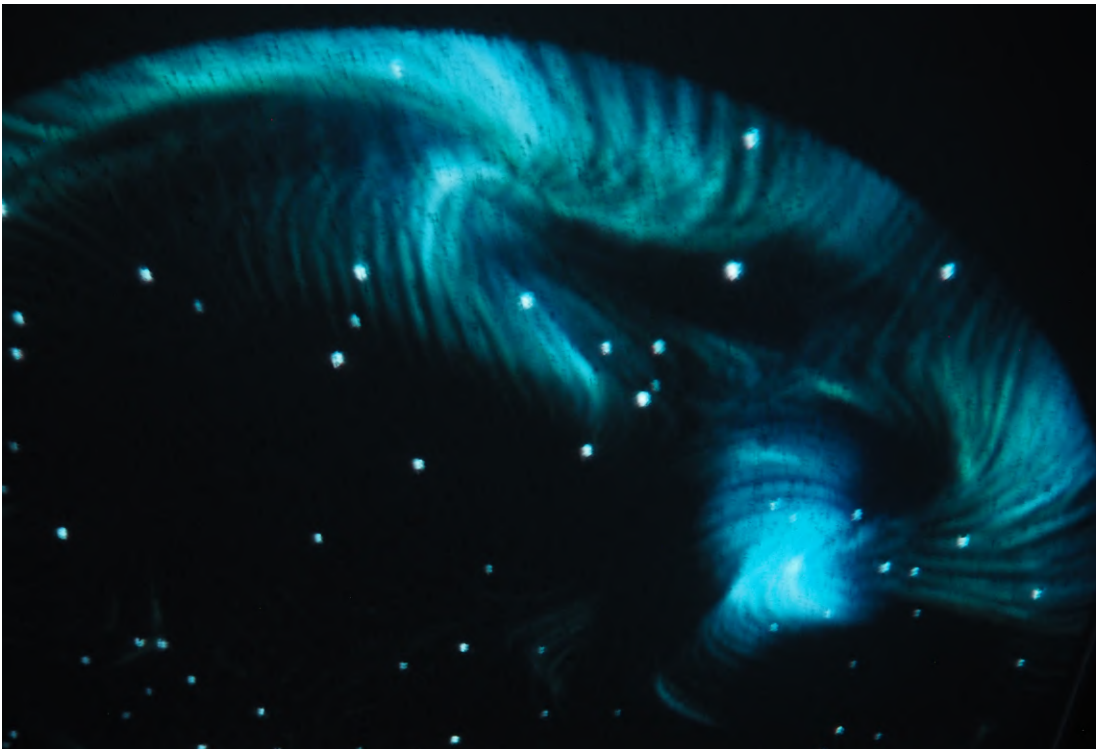


Figure 4.35 Projected image taken inside the dome

4.4.5 After exploring—pamphlet design

After explaining how the installation works, this section introduces a pamphlet, which details the installation from why this pamphlet is needed, how this pamphlet is designed to what the pamphlet looks like.

There are two specific reasons to design a visual pamphlet for my audiences. First of all, since the main purpose of the installation is to convey cultural symbols, the pamphlet is utilized as a visual tool to strengthen memories between people and the artwork. Some of the visual contents during the experience were abstract and without textual descriptions, and having a pamphlet to explain the meaning of each cultural symbol in more detail can enhance audiences' memory. The pamphlet can also deepen audiences' impression of the artwork, thus transforming their visual symbols into cultural memories. Secondly, it is of many audiences' interests to collect this kind of pamphlets after exploring various exhibitions. Having pamphlets could help audiences track their activities and different experiences to be reviewed later at any time. By incorporating a pamphlet, I would like my audience to carry the memories forward and collect this small pamphlet as a commemoration for their experience.

The exhibition pamphlet is designed to incorporate visual photos and text descriptions of the installation (Figure 4.36). It includes the design philosophy of the installation, the story of the foxfire, and knowledge of the snowy night - Orion's belt star, polar night, aurora in Finland.

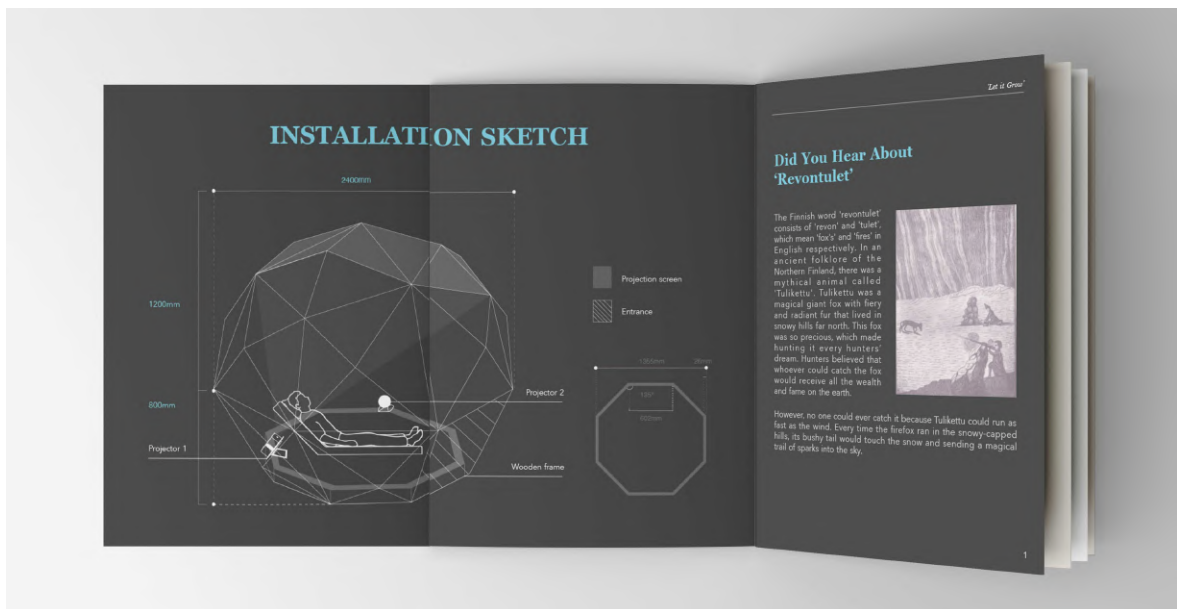


Figure 4.36 Pamphlet design

5. EXPERIENCE EVALUATION

5.1 Audiences' experience pre-evaluation

To further understand audiences' personal interests and willingness to participate in this installation, a questionnaire is designed to gather answers to the 12 basic questions.

Since the final exhibition of the installation will be held in Shanghai, China, there were 100 Chinese people age from 10 to over 50 who took part in this questionnaire survey. Among the total of 12 questions, the first seven questions are fundamental questions about people's familiarity with the Aurora, and the last five questions are related to the installation LIG.

No. 1 Your Age (single choice)

OPTIONS	SUBTOTAL	PROPORTION
Under 20	4	4%
20-30	31	31%
31-40	16	16%
41-50	15	15%
Over 50	34	34%
The number of qualified voters		100

No. 2 Have you ever seen Aurora before (single choice)

OPTIONS	SUBTOTAL	PROPORTION
Yes	12	12%
No	88	88%
The number of qualified voters		100

No. 3 Do you have plans to see Aurora in the future (single choice)

OPTIONS	SUBTOTAL	PROPORTION
Yes	72	72%
No	28	28%
The number of qualified voters		100

No. 4 What is your impression of Aurora (multiple choice)

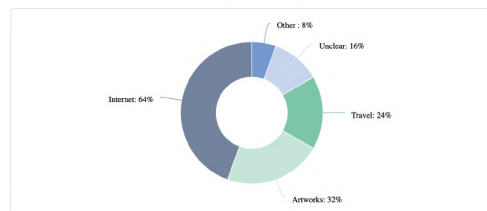
OPTIONS	SUBTOTAL	PROPORTION
Mysterious	78	78%
Touched	34	34%
Marvelous	66	66%
Beautiful	53	53%
Unclear	7	7%
Other (詳細)	3	3%
The number of qualified voters		100

No. 5 Did you know one or more myths and legends about Aurora (single choice)

OPTIONS	SUBTOTAL	PROPORTION
Yes	38	38%
No	62	62%
The number of qualified voters		100

No. 6 How did you know about myths and legends about Aurora (multiple choice)

OPTIONS	SUBTOTAL	PROPORTION
Other (詳細)	8	8%
Unclear	16	16%
Travel	24	24%
Artworks	32	32%
Internet	64	64%
The number of qualified voters		100



No. 7 Have you heard the story of the Finnish myth "Fox Fire" of Aurora (single choice)

OPTIONS	SUBTOTAL	PROPORTION
Yes	15	15%
No	85	85%
The number of qualified voters		100

Figure 5.1 Question No.1 to No.7

According to the data collected for the first seven questions (Figure 5.1), 88% of people have not seen Aurora before, and 72% of people have plans to go see the Aurora in the future. Even though most people have not experienced Aurora in their lives, the words 'Mysterious', 'Marvelous', 'Beautiful' are the most commonly-used words to describe their impression towards Aurora. When it comes to their familiarity towards Aurora myths and legends, it shows that up to 62% of people know one or more myths, and 64% of these people get to know the myths through the Internet, while 32% and 24% of these people recognize them by artworks and traveling respectively. In addition, although most people have their personal channels of knowing the myths related to Northern Lights, 85 people have never heard about the Finnish myth story of 'Revontulet' before.

No. 8

Does such a poster interest you in knowing the Aurora Legend: (single choice)

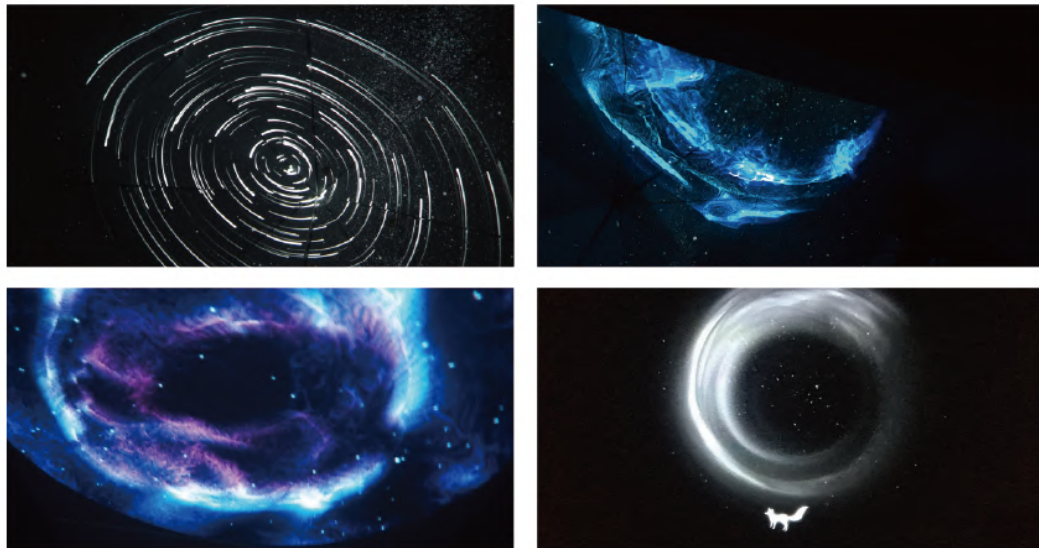


OPTIONS	SUBTOTAL	PROPORTION
Yes	72	72%
No	28	28%
The number of qualified voters	100	

Figure 5.2 Question No.8

No. 9 (single choice)

Would you like to spend five minutes knowing the story of "Fox Fire" by experiencing an immersive installation.



OPTIONS	SUBTOTAL	PROPORTION
Yes	84	84%
No	16	16%
The number of qualified voters	100	

Figure 5.3 Question No.9

In order to understand better about their willingness to know this specific cultural myth as well as take part in a related art activity, I constructed question No.8 (Figure 5.2) and question No.9 (Figure 5.3) around my designed poster and visual photos to see if the visual products can stimulate their participation interests in the first stage – before exploring. A positive result shows that 72% of people have interests in knowing the myth through the poster and that 84% of them have interests in knowing the myth when seeing visual images taken inside the installation. More motivating factors can be seen in question No.10 (Figure 5.4) and the doughnut chart below.

In this doughnut chart (Figure 5.4), 'curiosity' and 'exploration of culture' are two factors with the highest proportions, followed by 'love nature', 'personal interest', 'poster design', and 'myths'. This result matches the previous flow theory of the 'before' experience. If the

artwork itself has an inherent value, it can be seen as the ambient support to facilitate personal interests as well as strengthen people's learning motivation. On the other hand, people who are motivated by the artwork develop more curiosity and desire to participate in artistic activity. Especially in my case, nature is also an essential factor that cannot be ignored. Despite that the tastes and interests of visual poster design vary from person to person, the extraction of critical cultural information and the passion for nature before the experience can still spark their high interest in art installations.

No. 10 What factors make you willing to participate in the experience (multiple choice)

OPTIONS	SUBTOTAL	PROPORTION
Poster design	43	43%
Personal interest	45	45%
Curiosity	58	58%
Exploration of culture	50	50%
Myth	20	20%
Love nature	48	48%
Other [详细]	9	9%
The number of qualified voters	100	

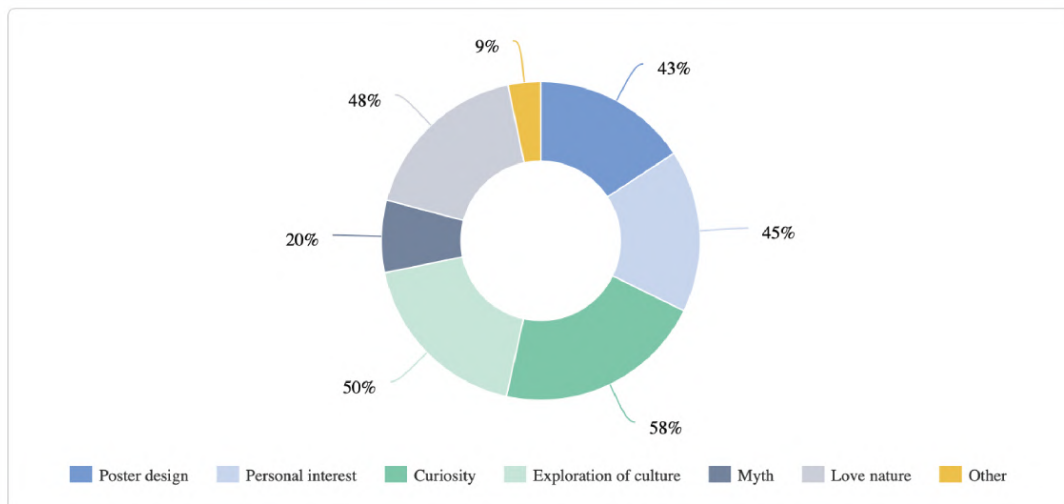


Figure 5.4 Question No.10

Question No.11 is designed to understanding the necessity of designing the pamphlet in the third stage - after exploring (Figure 5.5). As shown in chapter 4, the pamphlet is

designed for the installation with more Nordic nature descriptions inside. The data shows that 84% of people are happy to get this free pamphlet, and some of them actually prefer to get the pamphlet before their experience.

No. 11 (single choice)

Do you want a free pamphlet to help you know more about Nordic nature after experience



OPTIONS	SUBTOTAL	PROPORTION
Yes	84	84%
No	16	16%
The number of qualified voters	100	

No. 12

Are you willing to know more about culture through technology or immersive experiences in the future (single choice)

OPTIONS	SUBTOTAL	PROPORTION
Yes	92	92%
No	8	8%
The number of qualified voters	100	

Figure 5.5 Question No.11 and No. 12

Question No.12 (Figure 5.5) initiates from a reflection of the intrinsic value behind immersive works, aiming to know the potential educational power that technology or immersive experience has over culture elements in the future. The data shows that 92% of people are willing to experience cultural content through the use of technology or immersive art in the future.

Currently, as some museums are examples of attempting to strike a balance between culture dissemination and digital experience, immersive artworks can play a similar role in combining art, culture with technology for audiences as well. Some researchers hold the opinion that people, especially young people aged 8 to 28, enjoy digital exhibits and they are thought to be "active users of culture" rather than "passive consumers" (Howe, Strauss & Markiewicz, 2006). As illustrated by the result of the questionnaire, it is evident that people become more acceptable and understanding towards the culture reference incorporated in artworks, through the application of digital technology over the years.

6. CONCLUSION

Throughout this project, I have undergone several steps to realize the initial concept, and ultimately summarized the design method of 'let it grow' (Figure 6.1). I always think back to the original intention of doing this project, perhaps out of the love of Lapland culture, or because of the interest in creating an immersive installation. In any case, I insist that immersive installation can use its power to shape people's imagination and inspire them in the process of experiencing the design spirit. These factors continuously motivate me to further explore the possibilities regarding cultural perception in my design work.

Writing this thesis is a process of continuous exploration. To document the project and personal reflection, I described the production process in as much detail as possible, which ultimately help me understand how the project was constructed from the beginning. I also hope that my design approaches can benefit the readers when seeking for start point to build an immersive artwork. During the writing process, I found that literature regarding psychology is relevant and bring meaningful benefits to the study of audiences' experience: increase interests and participation, stimulate emotions, and enhance learning. Even some challenges exist in this digital era that we as designers need to face. We construct work based on how we as human perceive the world to get a new understanding from the audiences' perspective, as well as maintain a reflective and forward-looking attitude towards society.

My attempt to create immersive installation LIT will continue in the future. As in the case of 'Museum of The Moon', our common environment – nature - can cause cultural exchanges worldwide in different cultural contexts. The mythological stories of the Finnish Aurora narrated by the installation 'Let it grow' is able to inspire many feelings as the installation travels to different regions and be presented to different cultural backgrounds. Inspired by these stories, we break the boundaries between nature and ourselves and become familiar with the crystallization of wisdom in the process of humans getting along with nature, which allows us to imagine beyond the digital effects created by digital technology.

Related Theories

Experience Process

Experience Module

Design Dimensions

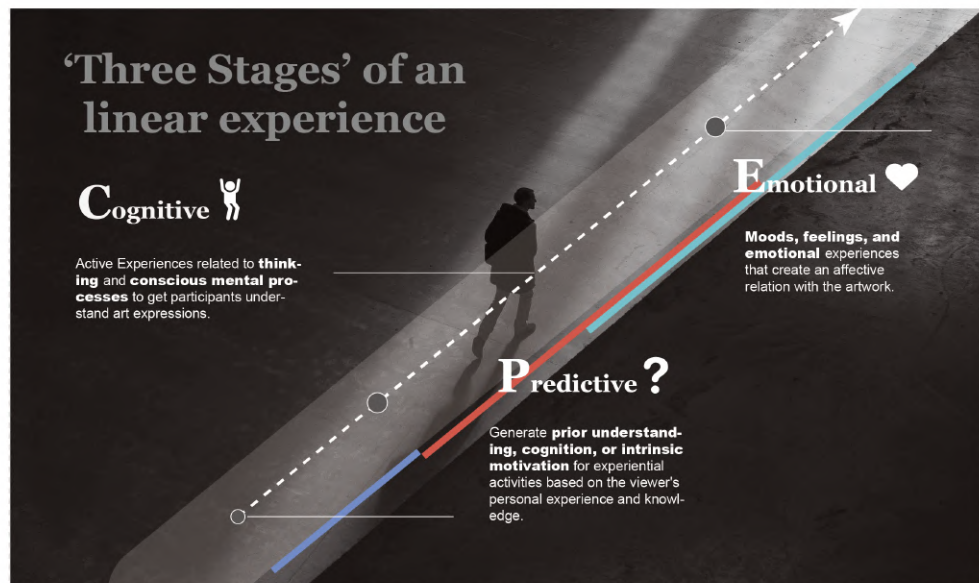
let it Grow

Intrinsic motivation

When recipients with intrinsic motivation such as personal interests of artwork themes, learning motivation, critical thinking, they are more susceptible to experience immersion. On the other side, the system itself has inherent value can be seen as the extra ambient support to facilitate personal interests as well as strengthen learning motivation.

Aesthetics distance

Two extreme conditions can be observed in relation to distance: under-distancing and over-distancing. Appreciator should maintain an optimal psychological distance from objects in order to achieve aesthetics.



Before:
Inspire audiences intrinsic motivation by entitle the work intrinsic value.

Exploring :
Space - physical place
Sensorial - sight, hearing, touch, taste, and smell experiences can arouse audiences' aesthetic pleasure, excitement, satisfaction.

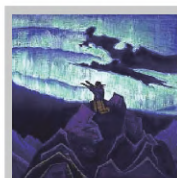
After:
Strengthen viewers' feelings and emotions by recording or designing visual materials.



Nature phenomena -
An aurora sometimes referred to as northern lights or southern lights, is a natural light display in the Earth's sky, predominantly seen in the high-latitude regions.

Space - In order to create an immersive environment for LIG, an ideal physical space concerning several physical factors and aesthetic characteristics was constructed.

Questionnaire - a questionnaire is designed to gather answers to the 12 basic questions.



Aurora culture -
Throughout history, aurora borealis has occupied a prominent spot in both mythology and folklore of most indigenous people who live within the auroral Oval.

Sensorial - Lay down, watch, hear, talk, observation, etc.

Pamphlet - A pamphlet is utilized as a visual tool to strengthen memories between people and the artwork.

Figure 6.1 Design approaches of LIT based on previous research

Reference

- Arts Council Tokyo. The Japan Foundation Asia Center. (2017). *Art & Technology: Changing Times, Contemporary Trends, Future Platforms*. Retrieved from: <https://jfac.jp/en/culture/news/art-and-technology-report-170317/>
- Bird-David, N. (2002). "Animism" Revisited. *Current Anthropology*, 40(S1), S67–S91. <https://doi.org/10.1086/200061>
- Brigante, R. (2019). *INTERACTIVE, INTIMATE, EXPERIENTIAL: The Impact of Immersive Design: 2019 Immersive Design Industry Annual Report*. Retrieved from: <https://noproscaenium.com/interactive-intimate-experiential-the-impact-of-immersive-design-d98394a95109>
- Bullough, E. (1912). 'PSYCHICAL DISTANCE' AS A FACTOR IN ART AND AN AESTHETIC PRINCIPLE. *British Journal of Psychology*, 1904-1920, 5(2), 87–118. <https://doi.org/10.1111/j.2044-8295.1912.tb00057.x>
- Csikszentmihalyi, Mihaly (1975). *Beyond Boredom and Anxiety: Experiencing Flow in Work and Play*, San Francisco: Jossey-Bass. ISBN 0-87589-261-2
- Csikszentmihalyi, Mihaly (1990). *Flow: The Psychology of Optimal Experience*. New York: Harper and Row. ISBN 0-06-092043-2
- Davies, C. (2005). *Landscapes of Ephemeral Embrace: A Painter's Exploration of Immersive Virtual Space as a Medium for Transforming Perception*. University of Plymouth, Plymouth, UK.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. *Intrinsic Motivation and Self-Determination in Human Behavior*. Springer US. <https://doi.org/10.1007/978-1-4899-2271-7>
- Dubé, L. and J. L. LeBel (2003), 'The content and structure of laypeople's concept of pleasure'. *Cognition and Emotion* 17(3), 263–296.

Gentile, C., N. Spiller, and G. Noci (2007), 'How to sustain the customer experience: An overview of experience components that co-create value with the customer'. *European Management Journal* 25(5), 395–410.

Hatt, E. D. (2013). *With the Lapps in the high mountains a woman among the Sami, 1907-1908*. Madison: The University of Wisconsin Press.

Kwastek, K. (2015). *Aesthetics of interaction in digital art*. MIT Press Ltd.

Kwastek, K. (2015). Immersed in reflection? The aesthetic experience of interactive media art. In *Immersion in the Visual Arts and Media* (pp. 67–86). Brill.

https://doi.org/10.1163/9789004308237_005

Lukas, S. A. (2013). *The Immersive Worlds Handbook: Designing Theme Parks and Consumer Spaces*. Burlington, MA: Focal Press.

Manetta, C., & Blade, R. A. (1998). Glossary of Virtual Reality Terminology. *International Journal of Virtual Reality*.

McConville, D. (2007). Cosmological Cinema: Pedagogy, Propaganda, and Perturbation in Early Dome Theaters. *Technoetic Arts*, 5(2), 69–85.

https://doi.org/10.1386/tear.5.2.69_1

Mitchell, B. (2010). The immersive artistic experience and the exploitation of space. In *CAT 2010: Ideas before their time : Connecting the past and present in computer art* (pp. 98–107).

Murray, J. H. (1997). *Hamlet on the Holodeck*. Free Press (pp. XII, 324 S.). Retrieved from <http://www.amazon.ca/exec/obidos/redirect?tag=citeulike09-20&path=ASIN/0684827239>

Ojanen, E & Linnea, S. (2019). *Suomen myyttiset eläimet*, s. 44–46. Minerva. ISBN 978-952-312-799-9.

Pelowski, M., Leder, H., Mitschke, V., Specker, E., Gerger, G., Tinio, P. P. L., ... Husslein-Arco, A. (2018). Capturing aesthetic experiences with installation art: An empirical assessment of emotion, evaluations, and mobile eye tracking in Olafur Eliasson's

“Baroque, Baroque!” *Frontiers in Psychology*, 9(AUG).

<https://doi.org/10.3389/fpsyg.2018.01255>

Ryan, M. -L. (2015). *Narrative as virtual reality 2: Revisiting immersion and interactivity in literature and electronic media*. Baltimore Johns Hopkins University Press.

Schön, D. (1983). *The Reflective Practitioner*. New York, NY: Basic Books.

Sansone, C., & Smith, J. L. (2000). Interest and self-regulation: The relation between having to and wanting to. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation* (pp.343-372). San Diego: Academic Press.

Schiefele, U. (1996). *Motivation und Lernen mit Texten*. Göttingen: Hogrefe

Schiefele, U. & Köller, O. (2001). Intrinsische und extrinsische Motivation. In D. H. Rost (Ed.), *Handwörterbuch*

Schmitt, B. (2010). Experience marketing: Concepts, frameworks and consumer insights. *Foundations and Trends in Marketing*, 5(2), 55–112.

<https://doi.org/10.1561/17000000027>

Seo, J., Corness, G., Gromala, D., & Schiphorst, T. (2015). Aesthetics of immersion in interactive immersive environments: a phenomenological case study of light strings. In *Proceedings of the 21st International Symposium on Electronic Art* (p. 8). Retrieved from http://isea2015.org/proceeding/submissions/ISEA2015_submission_237.pdf

Silvia, P. J. (2013). Interested experts, confused novices: art expertise and the knowledge emotions. *Empir. Stud. Arts* 31, 107–115. doi: 10.2190/EM.31.1.f

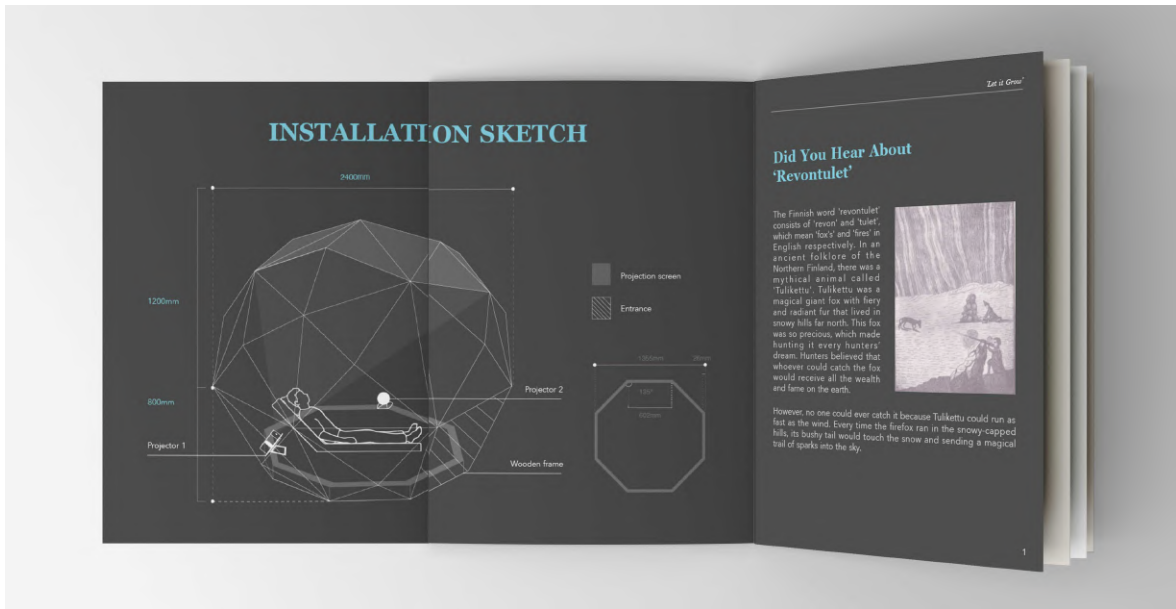
Somuncuoglu, Y., & Yildirim, A. (1999). Relationship between achievement goal orientations and use of learning strategies. *Journal of Educational Research*, 92(5), 267-277.

Stogner, M. B. (2010). The immersive cultural museum experience - Creating context and story with new media technology. *International Journal of the Inclusive Museum*, 3(3), 117–130. <https://doi.org/10.18848/1835-2014/cgp/v03i03/44339>

Wang, L. M. (2018). Socio-cultural Function of Art in Contemporary Art Digital Media Art and Humanistic Care. In: *2nd International Conference on Culture, Education and Economic Development of Modern Society (ICCESE 2018)*. [online] Atlantis Press. Available at: <https://doi.org/10.2991/iccese-18.2018.169> [Accessed 22 Apr. 2019].

Wardrip-Fruin, N., & Montfort, N. (Eds.). (2003). *The New Media Reader*. Cambridge, London: The MIT Press.

Appendix A—pamphlet



Aurora Myths In Different Cultural Backgrounds

Throughout history, aurora borealis has occupied a prominent spot in both mythology and folklore of most indigenous people who live within the auroral Oval.

Those myths and folkloric stories have naturally attracted some imaginations from time to time. For example, in old Scandinavian, the aurora was translated as 'herring flash', which represented large groups of shiny fish swimming and reflecting into the night sky. In Sweden's myths, aurora symbolized good news for fortune. Swedish ancestors believed that the lights were gifts from benevolent gods that brought people with warmth and good harvest. Another legend described northern lights as the glows from the shields and armors of the Valkyrie, female warriors who equipped with helmets and armors, riding crossing the northern sky on their horses. Besides, the lost souls who were figured a lot in Norse mythology also viewed the aurora as the 'Bifrost Bridge', a glowing rainbow arch that guided the souls of the warriors to the final resting place.

4



5



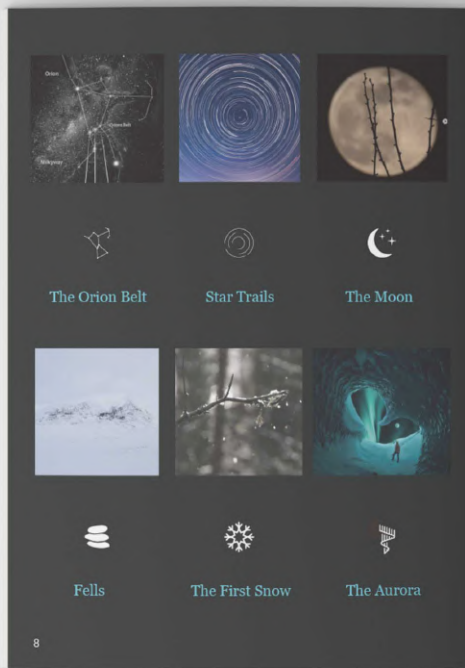
6

ANIMISM

Till this date, the most ancient belief of Sami until today is still closely associated with animism. In general, animism attributes life to natural elements such as animals, plants, force, and celestial bodies. Each entity has natural phenomena with an animating soul or spirit.

Similarly, according to ancient Sami's contexts, all natural beings are believed to have souls or spirits. The relationships among land, animals, human-beings, plants, stones, and the Northern Lights are related and reciprocal, and they have a connection with each other. Besides, Sami people believe that animals and souls have emotions and consciousness, and that both animals and soul possess ways to act and communicate with the entire environment.

7



The Orion Belt

Star Trails

The Moon

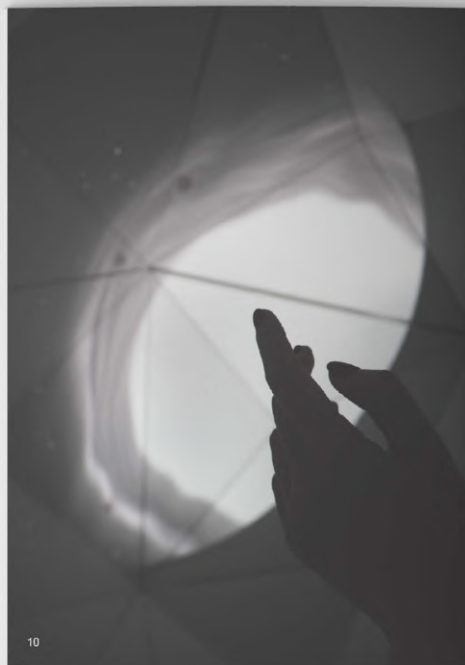
Fells

The First Snow

The Aurora



A Finnish Sami artist wrote in his poem that "we have lived here from generation to generation ... when they come they will find this land, us, and we are stones, plants, animals, fish, water, wind, earth, sky ...". Also, the writer Hatt mentioned these relationships in her speech. She stated that "all of nature up there under the Northern Lights in the Lapps" and it is animated- starry heavens, the stones, the mountains, the trees and the people who live under the earth-all are alive in the Lapp soul".



THE MOON

Winter in Finland is a magical season. Completely still but mighty, pitch black yet dazzlingly bright. It is enigmatic and merciless, commanding great respect.

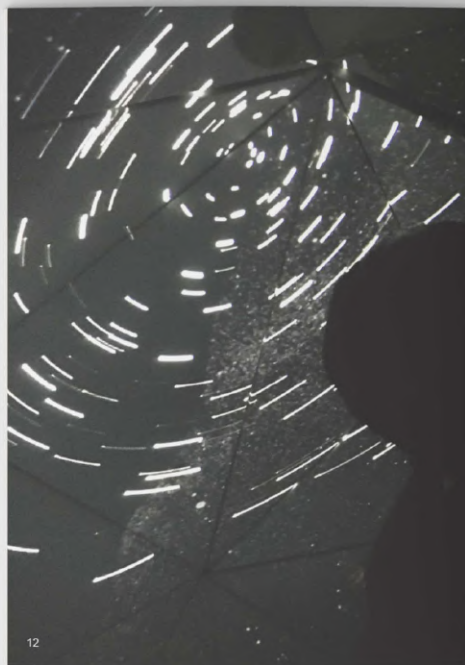
The moon watches over Lapland's people in the dark. When the sky is clear, the clean snow reflects the light of the full moon and there is no need for a torch on the fells.



ORION BELT

Orion is the most magnificent constellation of the day. It is located in the Finnish myth of the celestial equator. These three stars represent Vainamoinen's sickle and Kalefang's sword.

The Orion Belt is a constellation in Orion. It contains three bright stars, ζ (Alnilak), ε (Anilam), and δ (Mintaka). Finding the Orion's belt is the easiest way to determine the Orion position in the night sky. At around 9 o'clock in the middle of January each year, when Orion crosses the meridian, it is the easiest time to find the Orion belt.



THE STARS

Edith Sodergran (Finland)

When night comes
 I stand on the steps and listen,
 stars swarm in the yard
 and I stand in the dark.
 Listen, a star fell with a clang!
 Don't go out in the grass with bare feet;
 my yard is full of shards.

FELLS

In the winter, previously inaccessible regions become terrain to be conquered. Snow covers the rocky fells making it easier to move about. Sami's forefathers believed the fells (tunturit) were petrified giants or whales.



THE FIRST SNOW

Michaelmas on 29 September is when winter's gate creaks open and the wait begins. Up north, the first snow falls in October and the region has permanent cover by November. The Finnish word for November, marraskuu, contains the word marras, which refers to the top layer of the ground hardened by the frost.

The two-month long polar night (kaamos) begins in November when the sun no longer rises above the horizon. The darkness takes on shades of blue, violet and purple, colors that tame a restless soul. The snow white on the ground is the color of purity. It turns a new leaf in life.



What causes the aurora borealis?

It is known that there is a correlation between sun spots and the northern lights, with more occurrences during sunspot maximums than minimums. During times of sunspot maximum, the solar wind, a stream of plasma coming from the sun comprising protons and electrons, is powerful and restless. Some of the particles brought by the solar wind are trapped by the earth's magnetic field and follow the magnetic force into the ionosphere and collide with the oxygen, nitrogen and hydrogen gases there.

The red and green colors occur when electrically charged particles collide with oxygen atoms, various shades of blue when the particles collide with nitrogen molecules. Solar winds can easily reach a speed of 900 kilometers a second.

AURORA BOREALIS

Go north. In northern Lapland the lights shine about every other clear night between September and March. In southern Finland they are visible on about 10-20 nights a year.

Though they might look almost within reach, auroras form at altitudes of over 100 km. Auroras are caused by electrically charged particles originating from the sun. Multi-coloured displays form when different atmospheric gases are agitated by this solar wind.

The thrill of witnessing the Aurora Borealis is a once-in-a-lifetime experience for many. Some, however, get hooked and can never get enough of the blazing colours in the sky.





Appendix B—questionnaire

Hi! Thank you for taking your time to fill the questionnaire. I am a student of Collaborative and Industrial Design at Aalto University, Finland, and recently completed my graduation project and thesis. This questionnaire aims to know if you would like to know the myths behind Finnish Aurora through experiencing one art media installation. Your response will be of great help to my design! Thanks again

Knowledge : Aurora is called 'revontulet' in Finnish, The word 'revontulet' consists of 'revon' and 'tulet', which respectively mean 'fox's' and 'fires' in English, meaning "the fire of the fox".

*** 1. Your Age**

- Under 20
 - 20-30
 - 31-40
 - 41-50
 - Over 50
-

*** 2. Have you ever seen Aurora before**

- Yes
 - No
-

*** 3. Do you have plans to see Aurora in the future**

- Yes
 - No
-

*** 4. What is your impression of Aurora 【多选题】**

- Mysterious
 - Touched
 - Marvelous
 - Beautiful
 - Unclear
 - Other _____
-

*** 5. Did you know one or more myths and legends about Aurora**

- Yes
 - No
-

* 6. How did you know about myths and legends about Aurora 【多选题】

- Internet
 - Travel
 - Artworks
 - Unclear
 - Other _____
-

* 7. Have you heard the story of the Finnish myth "Fox Fire" of Aurora

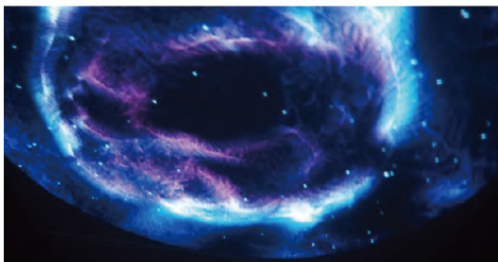
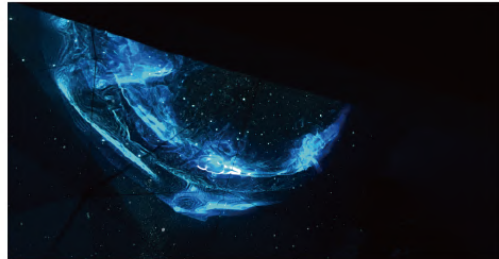
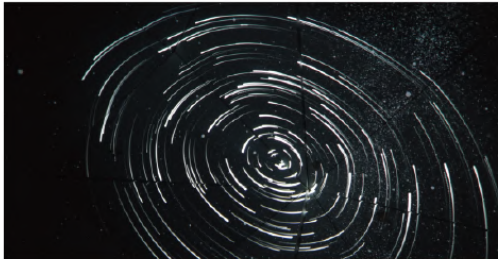
- Yes
 - No
-

* 8. Does such a poster interest you in knowing the Aurora Legend:



- Yes
- No

- * 9. Would you like to spend five minutes knowing the story of "Fox Fire" by experiencing an immersive installation.



Yes

No

- * 10. What factors make you willing to participate in the experience 【多选题】

Poster design

Personal interest

Curiosity

Exploration of culture

Myth

Love nature

Other _____

* 11. Do you want a free pamphlet to help you know more about Nordic nature after experience



Yes

No

* 12. Are you willing to know more about culture through technology or immersive experiences in the future

Yes

No