STAGING NARRATIVE SPACE IN VR: ON A TILTING FLOOR

INTERSECTION BETWEEN
CLASSIC AND NEW MEDIA

MASTER THESIS

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ABSTRACT

In this age of digitalization, this thesis explores questions about the materialization of memory and the possibility of an aesthetic medium, Virtual Reality (VR), functioning as the container of a story and its subsequent materialization. Through this praxis-oriented project combining new media (VR) with classic media (drawing with raw materials), an audience travels in three different time-spaces and experiences the most passive spectatorship, then a more active one.

The whole journey examines the meaning of immersion through four issues in the realm of socio-political narrative and fantastic narrative: (1) harmonious formation of the context and its form, (2) the somewhat uneasy distinctions between Augmented Reality (AR), Augmented Virtuality (AV) and VR, (3) attraction and manipulation in a panoptic environment and, lastly, (4) the reason for mapping and translation. Also, by researching the origins of immersive media and the justification of the procedure of materialization, the reason for telling the story in both specific media is described.

KEYWORD: Virtual reality, Immersion, Memory, Materiality

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Anna-Sophie Todorov, Aixa Navas Valbuena, Jonas Obertüfer, Charles von Humboldt, Hamzeh Al Thweib, Mohamad Khalil, Homero Ruiz, Sarah Alvim and Dong-Uk Jung.

For my mother and grandmother

LIST OF CONTENTS

1. INTRODUCTION

There is a personal memory, which does not have any form or tactility. As a medium in this work of art, the personal history metamorphoses to drawings clothed by semiotics, and then to a series of collective and personal experiences in Virtual Reality (VR).

The aim of this project is to create narrative space with mixed media making spectators experience and share a feeling of empathy, as they follow the process of decoding each of the signs, which are spread around as a form of network, and have a conversation in the VR situation. The network consists of two (in)visible spaces: VR experience in the Digital Bauhaus Lab (DBL) and a piece of a drawn scene in a physical environment.

The whole experience in VR starts with the question: "Do we stand on a stable floor?" It will be like experiencing an earthquake in which the trembling is psychological. Soon, the subject of experience in the here and now changes to an artifact in a sinking ferry in 2014. Inside of a cabin on the ferry, there is not going to be a simulation of the ongoing tragedy but rather the instruction of what should have been done. As a third stage, the spectator moves to the compounded panoramic image of memory in 2020 made by me and Soon-Yi, a young Korean girl who lived in Nagasaki, Japan, at the beginning of the 1940s.

A piece of drawn scene, 10 meters in height, is planned to be installed in the middle of the staircase of the Bauhaus-Universität Weimar main building. The drawings will have a voice to express themselves as a materialized memory with parameters of their materials, the voice, contained memory and the movement of people around the artwork. All these elements will be juxtaposed next to each other and talk by themselves with their own properties. Because the installation does not control the body movement of spectators, they can not only look at the scenery up close or far on the ground floor, but also contemplate it while walking up and down the spiral staircase, following the painter's previous body movements with their gaze.

From chapter 2 to chapter 4, there will be theoretical examinations about the position of my work according to the analysis of relevant VR cases, understanding of time and space in VR within materiality, and also the investigation about the spectrum of the understanding of VR space according to different scholars and artists. And then, there will be an accumulation of practical work as a form of documentation between chapters 5 and 6.

Chapter 2, staging narrative space in VR, will explain and examine four different cases in terms of socio-political and fantastic narrative space, concentrating on each issue:

1. How the form of media affects our sensory perception, level of information acceptance and feeling of empathy.

2. The borderline of AR and VR throughout virtuality in our physical environment.

3. Differences between manipulation and guidance.

4. The importance of mapping the physical reality in VR.

In chapter 3, Time-Space in VR Theatre, a description of the idea of time and space entangled with memory and its materiality will be examined. Chapter 4 will discuss where the VR work is positioned in the Reality-Virtuality Continuum, VR as an aesthetic medium over the sphere of the technological tool, and Panorama as an origin of VR.

There will be a synopsis of the work of art, script, and cue sheet of sound change in chapter 5. The series of images about the work process will be displayed in chapter 6. Lastly, chapter 7 will contain the conclusion of this thesis.

2. STAGING NARRATIVE SPACE IN VR

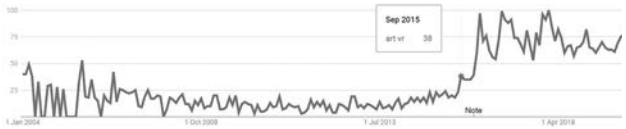


Figure 2.01

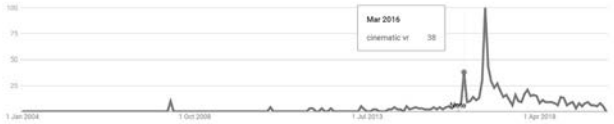


Figure 2.02

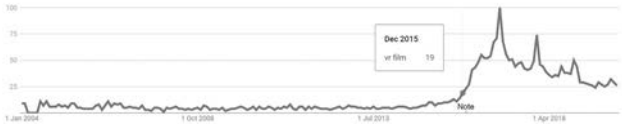


Figure 2.03

VR head-mounted displays (HMDs) visualizing computer-generated imagery (CGI) and/or artifacts in our physical environment have been developed since the early 1960s.[1] Interactive screens with physical bodies/artifacts were used in the art world in the 1970s.[2] Considering that VR has been applied in simulation training of soldiers, pilots, astronauts, medical doctors, and engineers, as well as in many game development areas, the technology is not new at all. But VR as an aesthetic tool or cinematic/theatrical medium seems like unknown territory for multimedia artists and designers who are working in between art and science. Even though some pioneers, like Myron Krueger, Brenda Laurel and Char Davies developed their hardware and software for an immersive experience with artistic vision, it took a while for VR technology to be accepted in the art scene.

The frequency of VR's use as an aesthetic tool significantly increased during the last half-decade. Simultaneously, the topography of narrative space, its tools, its level of visualization and its methodology of experiment have also been altered.

Before we inspect the understanding of the peculiar methodology and the meaning of narrative space in the aesthetic medium VR, an evaluation of the term "narrative space" is necessary. "Narrative Space" is an umbrella term, which was coined by Stephan Heath in the field of film theory in 1976. Heath defines the term

1 JARON LANIER, "VIRTUALLY THERE," Scientific American 284, no. 4 (2001): 66–75.

2 Myron Krueger, "The Artistic Origins of Virtual Reality," Computer Graphics Visual Proceedings. New York: The Association for Computing Machinery, Inc, 1993, 148–149.

Figure 2.01 Google trends: Keyword - VR art (https://trends.google.com/trends/explore?date=all&q=art%20vr)

Figure 2.02 Google trends: Keyword - Cinematic VR (https://trends.google.com/trends/explore?date=all&q=cinematic%20vr)

Figure 2.03 Google trends: Keyword - VR film (https://trends.google.com/trends/explore?date=all&q=vr%20film)

by pointing out the mutual relationship between control of spatial coherence, narrative, and spectatorship.[3] Yet, my understanding of narrative space is somehow different. Narrative space for me comes along with the materiality of artifacts, such as the method of its production, its usage, its utility, its history, its memory related to the artifact and traces of people who are connected to these artifacts for many different reasons and ways. Therefore, whenever the metadata of this material is recognized by somebody, it begins to expand as a volume fills a space, where it has been surrounded, where it has been situated, where it has been touched by someone.

3 M. G. Cooper, "Narrative Spaces," Screen 43, no. 2 (June 1, 2002): 139–57, https://doi.org/10.1093/screen/43.2.139.

With this understanding of the term "narrative space", four pieces of work will be discussed across a range of narrative spaces in VR, from the socio-political to the fantastic:

- "Across the line" by Emblematic Group
- "Situation Room" by Rimini Protokoll
- "Draw Me Close" from a collaboration between the National Theatre of Great Britain (NT), The National Film Board (NFB) and Jordan Tannahill
- "Chalk Room" by Laurie Anderson and Hsin-chien huang

My work as a piece of art is positioned on the intersection of the issues raised by these four examples. Therefore, by examining the traits of the narrative spaces and varied methods of these works, the position, narrative, visual form, time-space and methodology of expression in the praxis part of this thesis will be defined.

The virtual reality experience considered in this thesis is confined to whether the use of HMDs is employed or not. As VR pioneer Dr. Brenda Laurel argues, the term "VR" is indeed too broad and overused. I personally agree with the argument that VR has a core characteristic; namely, that the experience should feature a fully surrounded simulated environment.[4] Similarly, the argument of researcher Dr. Andrew Burrell is undeniable, that virtual environments are phenomenologically real spaces.[5] There is a contradiction between these two arguments. Yet, I believe that there must be a junction which satisfies both conditions and contributes to further experiments of VR as an aesthetic medium.

4 Brenda Laurel, "What Is Virtual Reality?," Medium, June 15, 2016.

5 Andrew Burrell, "The Present Tense of Virtual Space," n.d., 2.

2.1 SOCIO-POLITICAL NARRATIVE

2.1.1 ACROSS THE LINE

Emblematic Group (2015)

Figure 2.04

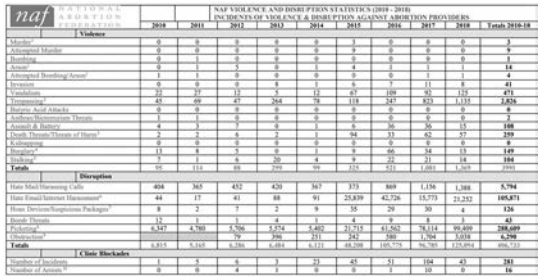
"The Planned Parenthood Clinic in St. Paul, where a fire set on Feb. 23, 1977, caused $250,000 in damages and forced the suspension of abortion services for six months, warns its patients that they may face hostile pickets. [...] But on a half-dozen occasions in the last year, she said, the picketers barged into the clinic, harassed the patients and took over the telephones to tell callers that the clinic was closed.

On Feb. 11 Miss McCann was thrown to the floor, a co-owner, William Longstreth, suffered a knee sprain, a nurse was injured and a woman guest, six and a half months pregnant, was 'trampled on,' according to Miss McCann." [6]

Figure 2.04 Among an Article "Surge of Vandalism Hits Abortion Clinics " written by Janet Battalie in The New York Times in 02. March. 1978 2018

6 Janet Battaile, Special to The New York Times, "Surge of Vandalism Hits Abortion Clinics," The New York Times, March 2, 1978, sec. Archives, https://www.nytimes.com/1978/03/02/archives/surge-of-vandalism-hits-abortion-clinics-vandalism-and-threats.html.

Planned Parenthood Federation of America, Inc. (PPFA), commonly referred to as Planned Parenthood, is a non-governmental organization (NGO) that is the largest reproductive health care organization in the USA. Practitioners and patients alike have for years suffered picketing, harassment, and violence by anti-abortion activists, including arson, bombing and murder. As evidenced by the following news story from 1978 and subsequent table of violent and disruptive incidents from 2018, the organization has been under constant threat from religious zealots going back a half-century.



NAF VIOLENCE AND DISRUPTION STATISTICS (2010 - 2018)
INCIDENTS OF VIOLENCE & DISRUPTION AGAINST ABORTION PROVIDERS

	2010	2011	2012	2013	2014	2015	2016	2017	2018	Totals 2010-18
Violence										
Murder[1]	0	0	0	0	0	1	0	0	0	1
Attempted Murder	0	0	0	0	0	0	0	0	0	0
Bombing	0	1	0	0	0	0	0	0	0	1
Arson[2]	0	1	5	0	1	4	1	1	1	14
Attempted Bombing/Arson[3]	1	1	0	0	0	0	0	1	1	4
Invasion	0	0	0	0	1	6	7	11	8	41
Vandalism	22	27	12	5	12	67	109	92	125	471
Threatening[4]	45	69	47	264	78	118	247	823	1,135	2,826
Battery/ Acid Attacks	0	0	0	0	0	0	0	0	0	0
Anthrax/Bioterrorism Threats	1	1	0	0	0	0	0	0	0	2
Assault & Battery	4	3	7	0	1	6	36	36	15	108
Death Threats/Threats of Harm[5]	2	2	6	2	1	94	33	62	57	259
Kidnapping	0	0	0	0	0	0	0	0	0	0
Burglary[6]	13	8	5	0	1	9	66	34	13	149
Stalking[7]	7	1	6	20	4	9	22	21	14	104
Totals	95	114	88	291	99	325	521	1,081	1,369	3983
Disruption										
Hate Mail/Harassing Calls	404	365	452	420	367	373	869	1,156	1,388	5,794
Hate Email/Internet Harassment[8]	44	17	41	88	91	25,839	42,726	15,773	21,252	105,871
Hoax Devices/Suspicious Packages[9]	8	2	7	2	9	35	29	30	4	126
Bomb Threats	12	1	1	4	1	4	9	8	3	43
Picketing[10]	6,347	4,780	5,706	5,374	5,402	31,715	61,562	78,114	99,409	288,409
Obstruction[11]			79	396	251	242	580	1,704	3,038	6,290
Totals	6,815	5,165	6,286	6,484	6,121	58,208	105,774	96,785	125,094	406,733
Clinic Blockades										
Number of Incidents	1	5	6	3	23	45	51	104	43	281
Number of Arrests[12]	0	0	4	1	0	0	1	10	0	16

Figure 2.05

According to the former Vice President of the International Planned Parenthood Federation (IPPF), Dawn Laguens, "Across the Line" was produced in order to enable supporters involved in the fight to get information and health care with the proven power of VR. [7]

The project is produced by Nonny de la Peña, a pioneer of immersive journalism and the CEO of Emblematic Group; Brad Lichtenstein, an award-winning filmmaker and president of 371 Productions; and Jeff Fitzsimmons, author, artist, technologist and co-founder of Custom Reality Service (CRS). Lastly, Planned Parenthood engaged as an executive producer.

"Across the Line " is composed of three scenes: in an exam room of the clinic, on the way to the clinic by car and walking into the clinic building. The very first two scenes were made by 360° video and the last scene was made up with computer-generated imagery (CGI). In the very first scene, a doctor in an exam room asks her patient some typical medical questions and inquires about her feelings. The patient begins to talk about why she is uncomfortable and the reason for this feeling, an aggressive protest of anti-abortion activists. Soon, the time in VR is winded back and our point of view settles behind the seat of a car with the patient and her friend on their way to the health clinic. The car drives past protesters who are picketing with signs and shouting insults. Blackout, the whole scene changes to a synthetic 3D environment as we, the viewer, take on the perspective of the patient. Anti-abortion activists now hurl insults directly at us,

7 NAF, "Violence Statistics & History," National Abortion Federation (blog), accessed March 13, 2020, https://prochoice.org/education-and-advocacy/violence/violence-statistics-and-history/.

Figure 2.05 2018 Violence and Disruption Statistics

"You're a little whore."
"Start closing your legs."
"God's going to destroy you in a lake of fire."
"Wicked Jezebel feminist"

Insults of anti-abortion activists in VR experience "Across the Line" (https://medium.com/planned-parenthood-action-fund/fewer-political-games-more-vr-games-4b0f9639db73)

invoking the wrath of their god. The viewer experiences the terror of being a patient menaced by shouting, sign-wielding protestors while trying to enter a health clinic.

Even though the being of the user is blurred in the scenes made by a 360° camera, the position of our point of view is clarified as soon as our perspective is reincarnated in the body of the patient. The expression of avatars is not really far away from uncanny valley though. We can perceive and feel that there are several beings behind their fictitious 3D bodies due to real sound montage which was recorded at protests across the USA. [8]

The level of agency afforded the user in "Across the Line", reflecting their ability to make decisions and act, is very low. The user, therefore, remains as a spectator even as this VR experience has the power to make us shocked and startled, because it is still a form of journalism, a news-based story. Despite this limit of navigation on the user, there is a strong power of VR journalism that we should admit: storytelling in the VR environment draws our being closer to the news by putting us next to a person who is suffering, or by putting ourselves in the position of the beleaguered person, unlike the television, which transmits the information to us within its distance and its uncertainty.

8 Angela Watercutter, "With 30 VR Projects Heading to Sundance next Month, the Technology Is Going Hollywood in a Big Way.," Wired, December 3, 2015, https://www.wired.com/2015/12/virtual-reality-sundance-2016/.

Through the traits of conventional and technological media which deliver news-based storytelling, we can take a view of the paradigm as well as its impact. Even a decade ago, the OECD reported a 17 - 30 % fall in the circulation of printed newspapers over a three year period. [9] Once the personal computer market increased along with the development in our private spheres of the internet cable and router, reading news-based articles via the world wide web became a part of our everyday life. Likewise, the innovation of technological development, the number of sharing and private users of VR has increased during the last half decade. [10]

An interesting point is the change of the targeted consumers. As fast as the technological adaptability of younger generation groups, 18 - 44 years old, they tend to access Steam VR more often than other age groups. Thus, it is natural that

9 James Robinson, "UK and US See Heaviest Newspaper Circulation Declines | Media | The Guardian," 06 2010, https://www.theguardian.com/media/2010/jun/17/newspaper-circulation-oecd-report.

10 Sol Rogers, "2019: The Year Virtual Reality Gets Real," Forbes, accessed March 13, 2020, https://www.forbes.com/sites/solrogers/2019/06/21/2019-the-year-virtual-reality-gets-real/.

Figure 2.06

Figure 2.06 The image of experiencing "Across the Line"

the increase of younger consumers of the media affects the content of the media. In this context, "Across the Line" is one of the good examples with the following aspects: the group of targeted people is younger, as the potential customers of Planned Parenthood: men and women, especially young people, who need affordable health care. Also, the contents for the targeted consumers and the characteristics of the medium harmoniously fit each other.

It is also important to mention that the fragmentation level of content in the space of VR stays lower and focuses on a storyline affecting our sensory organs. The effect on sensory organs of the technological medium differentiates the traits of media which influence the position of users. When we assume that both media are a sort of machine, the conventional print medium consists of these components: words, images, statistics and a guideline of twelve columns as a form. Contrarily, components of VR are made up of quite different things: 360-degree video, voice, sound, photography, and computer-generated imagery (CGI) including 3D model and animation. These characteristics, I personally understand, turn the position of the user from readers and subscribers to listeners, observers, and experiencers.

From the analysis of the level of agency to this relationship between the form of medium and the targeting users, there are many similar aspects that the praxis of this thesis should have considered: a method to vary the level of agency and how the form of medium affects the group of potential audience. As we put our body in the position of experiencers, the method of information delivery changes from an indirect to a direct approach. The distance between the medium and our body, simultaneously, decreases, and this shift brings the agora of discussion of embodiment and/or disembodiment of our being in the media.

2.1.2 SITUATION ROOM

Rimini Protokoll (2013)

"Situation Rooms' gathers together from various continents 20 people whose biographies have been shaped by weapons in a film set that recreates the globalised world of pistols and rocket-propelled grenades, of assault rifles and drones, of rulers and refugees, becoming a Parcours of unexpected neighbourhoods and intersections. With the personal narratives of the 'inhabitants', the images start to move and the audience follows the individual trails of the cameras they have been given. They start to inhabit the building while following what they see and hear on their equipment. The audience does not sit opposite the piece to watch and judge it from the outside; instead, the spectators ensnare themselves in a network of incidents, slipping into the perspectives of the protagonists, whose traces are followed by other spectators. One spectator sits at the desk of a manager for defence systems. At the same time, another follows the film of a Pakistani lawyer representing victims of American drone attacks in a cramped room with surveillance monitors." [11]

11 Rimini Protokoll. Situation Rooms: Ein Multiplayer Videostück /// A Multiplayer Video-Piece. Berlin: Rimini Protokoll and Druckerei Conrad., 2013.

In 2013, this complex socio-political story in the labyrinthine film set was premiered by Rimini Protokoll, a theater group founded by Helgard Haug, Stefan Kaegi and Daniel Wetzel. They have been researching the use of point of view to trace a reality using performative installation and audio plays of professionals in different settings. As soon as the twenty participants get into fifteen different juxtaposed rooms which contain eighteen different places related to the history of war, they begin to recognize the former presence of experts associated with both the anti-war movement and the industry of war. In "Situation Room" the following locations represent the reconstructed global architecture of war:

1. ***A military hospital***
2. ***A street in Homs (a city in western Syria)***
3. ***An internet cafe in Jordan***
4. ***A Mexican cemetery***
5. ***A drone control station and a terrace in Pakistan***
6. ***An office in Saudi Arabia***
7. ***A weapons fair in Abu Dhabi***
8. ***A conference room in Berlin***
9. ***An Iranian nuclear plant***
10. ***The hacker club***
11. ***The office of an arms producer***
12. ***The shooting range of the marksman***
13. ***A schoolroom in South Sudan***
14. ***A weapons production hall***
15. ***An asylum-seeker in Germany***
16. ***A cafeteria in Russia***
17. ***An operating tent in Sierra Leone***
18. ***The conference room at the headquarters of Doctors without Borders in Paris***

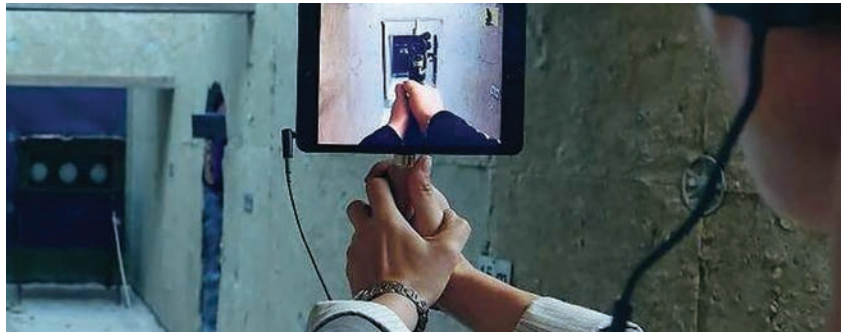


Figure 2.07

Figure 2.07 Image of experience in Situation Rooms

According to the description of the being of avatars/users and architectural elements of Daniel Wetzel and Nikolaus Hirsch, the digitized avatars, who have "flesh and blood", guide the direction and participation of their users. At the same time, by this process, the being of users reincarnates to another presence in warfare and/or war industry and anti-war movements. The accumulation of these sequences lets users naturally cross the architectural threshold, for instance doors, elevators and windows. And then, as a result of this performative movement, juxtaposed different rooms - time-space volumes - "open their own microsystems." [12] [13]

Can this form of work be categorized simply as a video see-through or illusory transparency?[14] I contend that this multiplayer video piece positions itself on both sides of the Augmented Reality (AR) / Augmented Virtuality (AV) divide, because of contradictory traits of the tablet-based guidance system versus the physical environment of the theater.
On the one hand, a virtual instruction video as a guidance system is a simulation of a certain situation. It also contains different chronological time. Each experience of experts would happen in real authentic places, not reconstructed places. It must have happened before the production of "Situation Rooms." Even if it did not exactly happen in an authentic place, by entangling with co-writing of the fictitious story of Rimini Protokoll, the existence of a virtual time-space layer

12 Rimini Protokoll.

13 "Situation Rooms," accessed March 13, 2020, https://www.rimini-protokoll.de/website/en/project/situation-rooms.

14 Steve Mann, "Mediated Reality with Implementations for Everyday Life," August 6, 2002, http://wearcam.org/presence_connect/.

arises. Also, we cannot forget how many people were engaged in this theatre production with their professional knowledge and how many times their bodies moved in front of video recorders. The guidance system can therefore be categorized as an AR, as virtual images in their tablet are an hallucinated simulation overlayed on the man-made construction in the physical world.

On the other hand, the guidance system in the tablet is a physically existing artifact containing the circulation of bits showing the series of videos performed by actors made by living bodies and life experiences. Likewise, unlike the other AR work, the screens of the tablet do not show the actual physical environment which is instantly caught by the tablet camera but shows the previous recording of the film set. That is, the guidance system in the tablet functions as a real physical artifact, which serves as an augmented reality system. The film set which encompasses the spectator's body is, in addition, a temporarily built 1:1 model indicating the synthetic film environment of the stories. Thus, it can also be called a rigid indexical structure pointing out its own truth, as a form of Augmented Virtuality (AV).
As we overview the category of "Situation Rooms" and its paradoxical structure according to the framework of the Reality-Virtuality (RV) Continuum made by Paul Milgram et al., we can acknowledge that there should be further discussion about some works which cross the border of each division, and simultaneously question the meaning of these categories again. The discussion should even go beyond the framework itself.[15] This notion can be exactly applied to the practical part of this thesis as well. Thus, the further examination will be analyzed in 4.1.1 Reality-Virtuality Continuum and the mediated reality.

15 Paul Milgram et al., "Augmented Reality: A Class of Displays on the Reality-Virtuality Continuum," ed. Hari Das (Photonics for Industrial Applications, Boston, MA, 1995), 282–92,

2.1 FANTASTIC NARRATIVE

2.2.1 DRAW ME CLOSE

NT, NFB, and Jordan Tannahill (2017)

Figure 2.08

"A Memoir, blurring the worlds of live performance, virtual reality and animation about the relationship between a mother and her son in the wake of her terminal-cancer diagnosis." [16]

Figure 2.08
Image of "Draw Me Close."

A collaborative lab of the National Theatre (NT) in London and the National Film Board of Canada (NFB) selected four theater-makers from the UK and Canada to experiment with the technological possibility of VR and the new role of it in theatricality.[17] Jordan Tannahill, a Canadian novelist, playwright and director, was also invited to this collaboration.[18]

By extending the sight of the audience through the HMDs of VR, the animated memory of Jordan unlocks as the form of animation drawn by an artist, Teva Harrison. As the audience member moves her/his body, the outline of being and

16 "Draw Me Close | National Theatre," accessed March 13, 2020, https://www.nationaltheatre.org.uk/immersive/projects/draw-me-close.

17 "Draw Me Close: The New Play Experimenting with VR in Theatre," Evening Standard, January 18, 2019, https://www.standard.co.uk/tech/draw-me-close-play-vr-theatre-a4042896.html.

18 "Draw Me Close | National Theatre," accessed March 13, 2020, https://www.nationaltheatre.org.uk/immersive/projects/draw-me-close.

"Draw Me Close begins by taking off your shoes. You are standing on a path of outdoor tiles, like for a garden walkway, with plants beside you. You feel the stone beneath your socks. You are standing in a five-foot square room, surrounded by beige curtains. The attendant helps you put on your Vive and a pair of fingerless gloves that place Vive Trackers on the back of your hands. Then you are in an empty space of white, except for a simple outline of your tracked hands." [19]

19 Kevin Ohannessian, "Draw Me Close Uses VR, Props, And Performance To Evoke Childhood," UploadVR (blog), April 29, 2017, https://uploadvr.com/draw-me-close-childhood/.

artifacts around it arise; yet, soon they evaporate. The story is floating around following the relationship between Jordan and his mother over twenty five years. At the beginning of the journey, the audience reincarnates as a five-year-old Jordan who can be with, talk with, and draw with his mother, who has been an amateur artist. Time flies. The body of the user becomes a teenager, a young adult and leaves home. At the age of twenty five, the user as Jordan hears that his mom has been diagnosed with stage IV cancer.

Meanwhile, the visual narrative opens itself step by step. The experience in "Draw Me Close" does not negate the body of the audience. It turns the body into action, comes across the architectural threshold (door, window and walls between rooms) which could connect the room to another situation, and transmits the value of the materiality of props (carpet,

drawing tools, paper, bed, pillow and blanket) encompassing her/his body. In addition, the one-to-one performative interaction with the mother of Jordan, who is played by actress Tamzin Griffin, shares the very personal memories. The memory is soon expressed and materialized from her utterance, gesture, human commonality between life and death, texture and usage of the architectural thresholds and props, sensation through the warmness and smell of the clean laundry. [20]

As important as the embodiment of the user, the perspective on the affordance of "Draw Me Close" brings considerable discussion. The audience's capability for interaction is clarified and executed by the properties of VR and its physical and virtual environment. Yet, this relationship comes not only from technical materials (VR and its tracking system) and its user but also from many different points of view. Let's look at the example in the next page.

Figure 2.09

Figure 2.09 VR environment of "Draw Me Close"

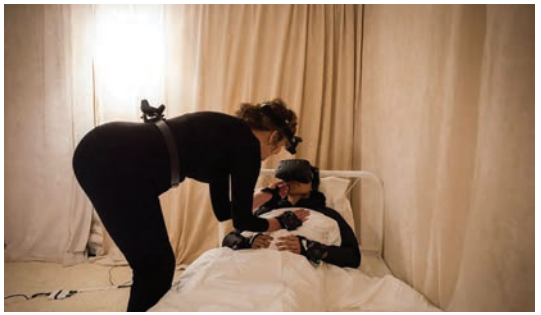


Figure 2.10

Figure 2.10 Physical environment of "Draw Me Close"

20 Lucy Brooks, "Enter a Virtual Reality at the Young Vic," Culture Whisper, January 23, 2019, https://www.culturewhisper.com/r/theatre/young_vic_vr_draw_me_close/13002.

Technical materials : A user

= Technical materials as an extension : A user of an actor

= An actor : A user

= An actor : Another actor

= An actuator : Another cause of the operation

= Story : Interactive / reactive reader

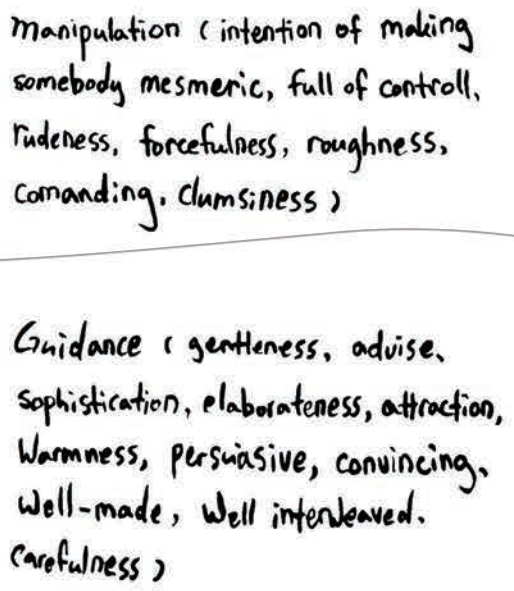
= A guidance : A subject of a predictable act guidline

= A manipulator : A being on a gray zone on

① an object of mesmeric / physical control

② a subject of seduction / attraction

When we contemplate the last part of the equation, a critical question arises: how should we consider the act of being attracted and following somebody and/or something? I personally understand it as a low level of activeness, not full of passiveness. Even though the body of the user needs the guidance of his mother, the completeness of "Draw Me Close" depends on the high level of participation of the audience (having a conversation, drawing something together). At the same time, visceral recognition of the audience immediately makes understandable the differences between the feeling of being guided and manipulated according to how they accept the attitude of the actuator: VR. The terms "manipulation" and "guidance" are the opposite sides of a paper sharing the same pulp, which can be compared with the term "control". Although this characteristic is perceived differently, I personally think that different attitudes shape each term.



Within the descriptive definition of both terms above, the reason for ***'less-than sign (<)'*** in a previous equation now reveals itself. The logic above can be also easily adopted to the practical part of this thesis. Simultaneously, while following the warm voice of guidance and communicating with the mother (a partner of the conversation), the movement of the user's body functions as a form of agency that continues the story, with the outline of their being and architecture of memory in the virtual environment.

2.2.2 CHALK ROOM

Laurie Anderson and Hsin-Chien Huang (2017)

Figure 2.11

"Chalkroom" is a virtual reality works of Laurie Anderson and Hsin-Chien Huang which lets people fly into an enormous structure of words, drawings, stories and freedom.

"Once you enter this space, you are free to fly and explore wherever you want. You can navigate across chasms, follow along narrow bridges, zoom through doors, jump off ledges, sail up, out of and around the edifice. Meanwhile, words float through the air. They fall into dust. They form and reform. It's a world made of language and stories- spoken, written and drawn." [21]

Figure 2.11 VR experience "Chalkroom"

The concept of "Chalkroom" was built by Anderson in a previous installation at the Massachusetts Museum of Contemporary Art in 1996, expressed with several rooms encompassed by her drawings and texts done in chalk, as "an assortment of interactive storytelling devices" (MASS MoCA). In a newer version of this installation, the chalkroom is generated as a double reality painted with glow-in-the-dark white drawings.

21 Laurie Anderson and Hsin-Chien Huang, "Go Where You Look!; Falling Off Snow Mountain, Three Virtual Reality Installations: ALOFT / CHALKROOM / TO THE MOON," Quinzaine Des Réalisateurs – Paolo Moretti, n.d., 15.

"We've kind of made something that is full of shadows and darkness. For me, it's completely a dream come true. Because it's about what I've tried to do in every other thing I've ever made. Music or sculpture or film. To be completely bodiless." [22]

22 Geoff Edgers, "A Laurie Anderson Pilgrimage? Just Don't Tell Her You're Calling It That.," The Washington Post, 05 2017, 4.

The exhibition room is filled with language and symbols. This linguistic medium and its physical material glow in the faint blacklight by reacting to the vivid fluorescent substances, which exist in our world but are barely visible. The room functions as an entrance but also as an extension of the VR space and one of the mutually supplemented places between virtual and physical reality. Within the digitized drawings, writings, and traces of erased presence on a dark and dusty labyrinth, there is only one being, an audience flying around without a map or even a clue. The mysterious labyrinth includes several rooms: The Dog Room, The Water Room, The Anagram Room, The Tree Room and The Writing Room.

Without linear sequences, all rooms connect with the others and have invisible signifiers, which can be compared to some transparent on/off switches. Thus, the user triggers

1. ***The Dog Room is a 3D-abstracted take on a drawing from the "Lolabelle in the Bardo" charcoal series.***
2. ***The Water Room is a surreal scene taking place in a flooded, ceramic-tiled room.***
3. ***The Anagram Room is an interactive visualization and The Sound Room is a space where the viewer records audio that becomes 3D sound waves-virtual objects that look like huge colorful paper lanterns.***
4. ***The Tree Room allows you to fly around an enormous tree that contains several stories.***
5. ***The Writing Room allows words to flow out of physical gestures.***

"Chalkroom" in Presskit, Go Where you Look, Quinzaine des Réalisateurs[23]

23 Anderson and Huang.

a spontaneous and coincidental transformation. The particles of the alphabet spread out in the atmosphere and reform the context, shape and meaning. Words form lines according to the gestures of the user in the writing room. It tries to construct meanings to become a house of its truth. Yet, in the sentence, if the truth cannot dwell with its own freedom, the shape of it soon evaporates.

There is, simultaneously, an interesting relation between presence in physical and virtual environments. In the room of the dog, we see the drawings of "Lolabelle in the Bardo", a drawing series depicting the forty-nine-day process of a soul's preparation for reincarnation. What then are the necessary reasons for the manifestation of the being of Lolabelle in two different media? The key to this question lies within the mapping process of the data from the physical space to the virtual space.

Firstly, the series of three meter high drawings have a different time-space than the emergence of the idea, production and movement of the artist's body. Each drawing is sequential, has contextual information and at the same time contains its raw material: charcoal. Charcoal is an organic drawing material based on carbon. It has been a very old energy resource connected with the meaning of heat and protection.

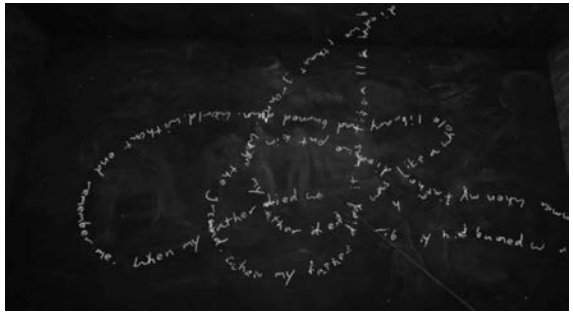


Figure 2.12

Figure 2.12
Image of the writing room

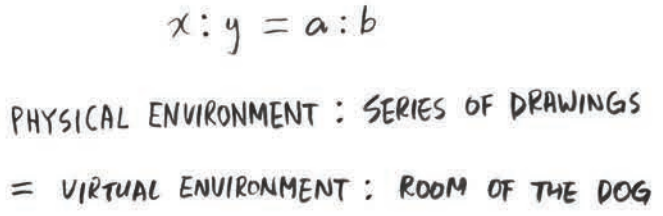
Figure 2.13

Figure 2.13 Lolabelle in the Bardo, June 5: My Birthday, 2011.

Secondly, the production of charcoal requires the absence of oxygen, which is fundamental to the life of living creatures. Within this materiality, we can examine how it strongly bonded with the meaning of life, death and the next level of death.

Finally, throughout the mapping process by transcending the accumulated data and its procedure to the virtual environment, we can examine the fundamental reason for the double existence of Lolabelle. The digitized drawings in the room have different time-spaces than those in the physical environment. They no longer stay in sequential status but are now overlapped, juxtaposed and compounded in volume by encompassing the room. The meaning of their original raw material does not remain anymore. Rather, it exists as a form of electronic simulation containing the contextual information from the series of drawings. That is, the information of Lolabelle formatted as a simulation, achieving a status of plasticity and higher possibility of being omnipresent: the being present everywhere.

At this moment, we can see the intersection between these words: life, death, the next level of death, plasticity of our being, and being present everywhere. Although all of these words have resulted from different materiality and distinctive spatial characteristics, each medium and its meaning pointed out a word, "Bardo": a liminal space between death and rebirth in Tibetan Buddhism. [24]



Due to its journey, we can examine that the placement of a being in two separate environments functions as a movement of mediated translation, which is also applied in the practical part of this thesis, and this process points out the true meaning of each being. Even though we believe we know something through our knowledge, logic and experience, it is undeniable that we are still surrounded in the jail of language consisting of personal and collective experiences, prejudice, custom, culture and history. Therefore, through the mapping process, which can also be called a translation process, the common and higher level of meaning comes out. I do think this is the power of mapping and translation; also a reason why the existence of Lolabelle had to be in both the physical and the virtual room.

24 Centre Phi, "The Art of Letting Go," Phi Centre | For art in all its forms, December 16, 2019, https://phi-centre.com/en/blog/laurie-anderson-art-of-letting-go/.

3. TIME-SPACE IN VR THEATER

"All the 'clocks' used by man, at least until the invention of mechanical time-pieces, were in their way, linked to our bodily location. Time was measured against the visible motion of the stars and the 'rising' and 'setting' of the Sun, that is, movements that only exist in relation to our point of view (indeed, objectively speaking, it was the Earth that was moving, of course, but we did not know it and we did not really care)."

Umberto Eco, The story of time, 1999 [25]

25 Meirelles, Isabel. Design for Information: An Introduction to the Histories, Theories, and Best Practices behind Effective Information Visualizations. Beverly, Mass: Rockport, 2013.

"Language in action is more important than language in general or discourse in general; and speech is more creative than language as a system and - a fortiori - than writing or reading. Language in action and the spoken word are inventive; they restore life to signs and concepts that are worn down like old coins."

Henry Lefebvre in Bauer, 2018 [26]

26 Günzel, Stephan. Mediale Räume. DesignWissen, Band 2. Berlin: Kulturverlag Kadmos, 2018.

"Text refers neither to other texts nor to their contexts; rather, they refer to non-texts."

Henry Lefebvre in Bauer, 2018 [27]

27 Günzel, Stephan.

3.1. LEGITIMACY OF MEMORY

Imagine sitting on a train. Let us assume the train runs from Leipzig to Göttingen. The train follows the same route several times a day, seven days a week, fifty-two weeks a year. The place where you sit was occupied yesterday by someone else, just as it was last week and the year before. There is a window next to your seat. Through the window can be seen unknown figures on the station platform, partially obscured by the reflection of your face and the details of the opposite window.

Generally speaking, we consider the train window to be oblivious, to have no way of recalling the countless fleeting images of others who have come before us, whose likenesses temporarily animate its surface and soon vanish. The few seconds of reflection on glass is unremarkable to us, an expected occurrence arising from a standard characteristic of a common material. Yet, let us take a moment to reexamine our assumption. Consider that screensavers were originally developed to prevent images from imprinting themselves permanently on the computer monitor. Clearly it is possible for glass to have memory.

What if we understand the hypothetical artifacts traveling in our nonlinear time to be able to store memories of what they have seen? Accordingly, if they could express the juxtaposi-

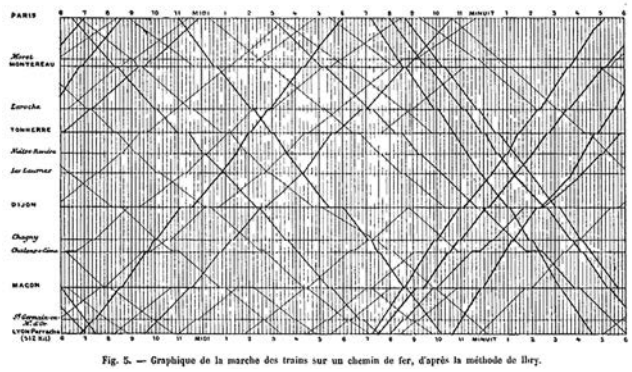


Fig. 5. — Graphique de la marche des trains sur un chemin de fer, d'après la méthode de Ibry.

Figure 3.01

Figure 3.01
Étienne-Jules Marey, Graphic of the progress of trains upon a railway, after Ibry's method.

"The graphic uses a method attributed to the French engineer Ibry, in which lines represent distances traveled in relation to the time taken to traverse them. At a glance, we learn several levels of information, from the micro level of a specific line and time in which trains stop at a particular city, to a macro-level comparison between speed of trains in both directions, to and from Paris." (Meirelles, Isabel. 2013)

tion of what they have experienced, what kind of languages would be uttered? Borrowing the notion of Alex Da Corte, if we carefully look at artifacts from their point of view, if we consider their right to express the nature of their being, then the world looks different. Perhaps virtuality is not really detached from our physical environment, which is normally believed to be a static matter.

The previous notion about trains travelling between Leipzig and Göttingen can also be visualized in the diagram above, indicating micro- and macro-level information about transportation systems between Paris and Lyon. Moving from left to right along the top axis, each downward-sloping line represents a train leaving Paris for Montereau, Dijon, Lyon and points between. Throughout the day, each train, as it moves to its destination, will encounter other trains moving in the opposite direction (upward sloping lines), run and stop next to them, reflecting each other with what they contained and are carrying, what they have seen, what they have heard, what they have touched. If these windows of the train can store their memory about whole beings and scenery that they reflected, while also being able to propose themselves as what they are, how can we define their communication system?

"[...]I think for the food items and the plastic things that I used in Chelsea Hotel, they all are in their own right proposing to be something other than what it is."

Alex da Corte and Ed Atkins in Conversation
(Online: https://youtu.be/ztT2-IrWm0E?t=147)

This question is also about how we see the world and how we understand the other beings who have passed through our life: they still exist as a form of illusion and memory containing various emotions and stories. Simultaneously, it is about the legitimacy of the illusion and memory imagined by one of the attributes of a material: reflection.

3.2. MATERIALITY OF MEMORY AND OUR BODY

Having addressed the legitimacy of memory arising from traits of material, how can we then understand the materiality of memory and our body? In this chapter, the term will be examined according to the understanding of art history, architecture, media and technology. The method of my experiment will be explained afterwards.

In the field of art history, JeeHee Hong argues that the English word "material" has two definitions: "pertains to a matter as opposed to form" as well as "pertains to matter or body; formed or consisting of matter; corporeal." [30] At the same time the term "materiality" is also analyzed as an important feature "framing the characteristics of media."

> *"There was a tendency to associate material with 'worldly' affairs and an attendant distinction, of a class kind, between people occupied with material activities and others given to spiritual or liberal pursuits. Its associations with the notions of "form" and "content" in late eighteenth Century [...]."* [31]

> *"[...] understand media beyond the materiality of them in a literal sense have accelerated inquiries into the relations between different media where often another medium takes its form."* [32]

A definition of the term "materiality" in architecture is presented through the research methodology of the Center for Documentary Architecture (CDA) in the conference "Dust & Data". The practical work process consists of documentary and material research, which are essentially invisible and untouchable material analyses, for example, interviews, testimonies, historical documents and physical material investigations from the molecular level of architectural matter to the macro level in the volume of the city. This fragmented and sometimes vague intermingling of immateriality and

The term material is originated from Late Latin "materialis" and "materia" which means the sense "relating to matter" and "matter." Accordingly, the term "materiality," which is rooted to material (matter), means "the quality of being composed of matter." [28] [29]

28 "Material | Meaning of Material by Lexico," accessed March 24, 2020, https://www.lexico.com/definition/material.

29 "Materiality | Meaning of Materiality by Lexico," Lexico Dictionaries | English, accessed March 24, 2020, https://www.lexico.com/definition/materiality.

30 Jeehee Hong, "Material, Materiality," 2003, https://csmt.uchicago.edu/glossary2004/material.htm#_ftn4.

31 Hong.

32 Hong.

materiality are aiming at the same goal, "a deep memory", and are presented in the same body. [33]

The notion of "materiality" in architecture can be also read in "Tom McCarthy and Eyal Weizam in conversation." In their discussion about the dust and data, they bring up a story about a "crack." In the story, the crack in a bathroom is a medium which connects fragmented and lost memories of the hero of "Remainder", who was physically injured and had to relearn everything in his life. He was trying to remember the forgotten memory and paid architects to rebuild the crack and the whole building, which triggers the whole sense of his being. After the story was told by McCarthy, Weizman explains that he is interested in the physicality of the crack. And he goes on questioning the crack and finding his own answers. One of the most important aspects of architectural materiality is then revealed in his description about the crack:

> *"A crack is not an object. A crack is an event. It is a process of material deformation with the potential for further transformation. It can linger in something for years in a state of potentiality, or it can speed up and tear a building apart. On the other hand, it might be filled. Every restoration is also an act of destruction: a kind of epistemological reduction, or the reduction of the potential for memory."* [34]

Lastly, Paul Leonardi examined the term "materiality" especially for digital artifacts in the field of management, communication study and sociology, also extending human-computer interaction (HCI), science and technology. In his paper "Digital materiality? How artifacts without matter, matter", Leonardi suggests not to define the noun "materiality" but rather to look carefully at how other authors use the adjective "material." Throughout the examples of his research he then discovers that the adjective "material" tends to be used for "some property of the technology (in this case, software) that provides users with the capability to perform some action."[35] What then if we apply this performative notion of materiality to our own memory and body?

33 Ines Weizman, Dust & Data: Traces of the Bauhaus across 100 Years, 2019.

34 Weizman.

35 Paul M. Leonardi, "Digital materiality? How artifacts without matter, matter," First Monday, 2010, https://doi.org/10.5210/fm.v15i6.3036.

Yet, Leonardi also acknowledges that the digital artifact does not have any tangible property, because it is not a physical matter at all.[36] Thus, he asks us to discard the traditional point of view of the term "materiality" as "physical matter" but suggests us to focus on an alternative meaning of "material" based on social interaction.[37]

While the practical parts of this thesis were perceived and produced, my understanding of materiality has been built with some similarities and oppositions to the definition above. In order to materialize the deep memory related to the environment using 3D artifacts, the timeline for animation, and a corresponding physical work of art, I should acknowledge that the following qualities are both important: the role of performativity of the user and the conventional meaning of material and immaterial architectural artifacts. In the construction of "Staging Narrative Space in VR" the main setup is built with 3D models which show the digital artifacts and environment. According to the intended animation of the 3D models, the sound cue is arranged. The elaborated details are then modified depending on the accuracy of either the movement or sound cues. Thus, if the accuracy level of the movement cue is higher than that of the sound cue, the duration of the sound track is modified; otherwise the pitch is modified.

These 3D models are textured by simple colors well-matched with ambient sound or UV map, the latter being made up with a series of photographs captured from the work of art in a physical en-

36 In the context, Leonardi meant the digital artifact - software though, I personally understood that the 3D model in animation or VR can be also substituted.

37 Leonardi.

"We do not believe that the truth remains true once the veil has been lifted" (Nietzsche in Baudrillard 1990:59). [38]

38 Jean Baudrillard, Seduction, English ed, CultureTexts (New York: St. Martin's Press, 1990).

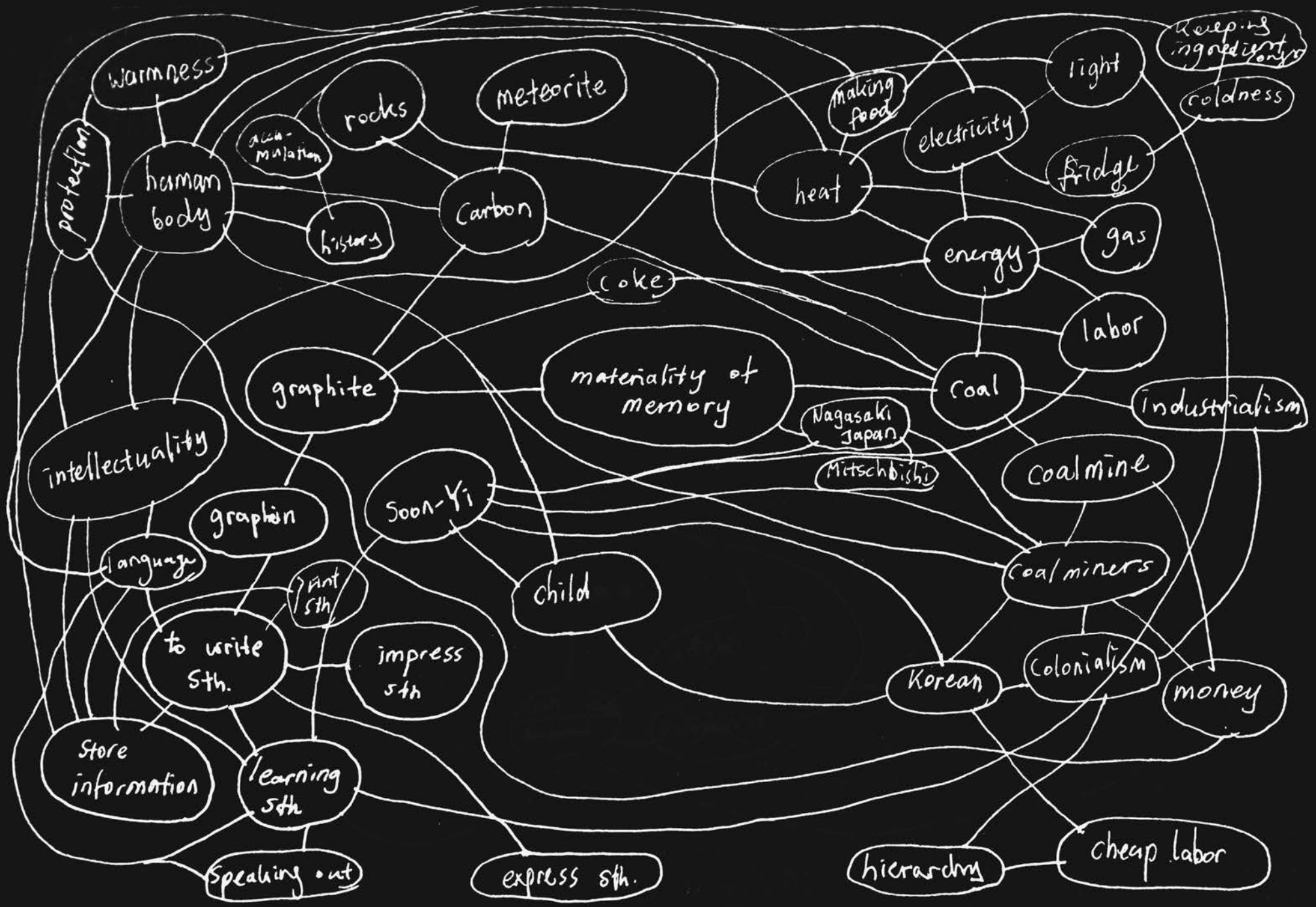


Figure 3.02 Networked map based on graphite and the memory of Soon-Yi's memory

vironment. The virtual environment, consisting of the interaction with the body of the user, 3D artifacts and sound, would be the place to carry out the performativity of the user, even though the level of the performativity is very low. Likewise, although we acknowledge that the photograph itself and the mapping texture are fully virtual, there are meanings conveyed from the history/background knowledge of the source medium (graphite)[39], biological sense of the user (gaze, breath and utterance)[40] and signs accumulated, indexed and recorded[41] as time passes.

These three parts which can be transmitted through the mapping texture are able to vary through the process of node connection in the network map. By connecting each node that contains the metadata, the structure of the map allows different material aspects to be brought forth and the connotations behind them. Through this process, simultaneously, the complexity of the network becomes denser, and the meaning of the whole network becomes clearer. The density and complex connection of nodes in Figure 3.03 indicates a sense of how small the world of mathematics is. Hence, the following networked map (Figure 3.02), which means a harmonious organic totality,[42] based on the traits of the (im)materiality of graphite and the fluid aspects of the accumulated signs, made up with each reciprocality of information attributes: form, material, connection to the body of the user and also a creator. These information attributes network and point out the true meaning of the expression, that which the whole medium can accurately express.

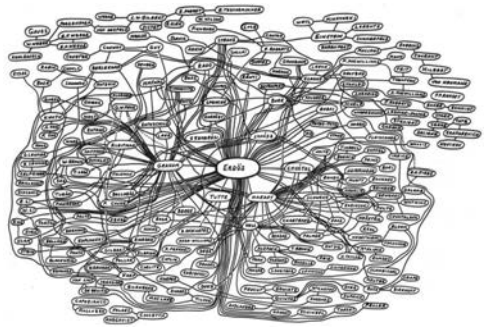


Figure 3.03 The network of Erdös

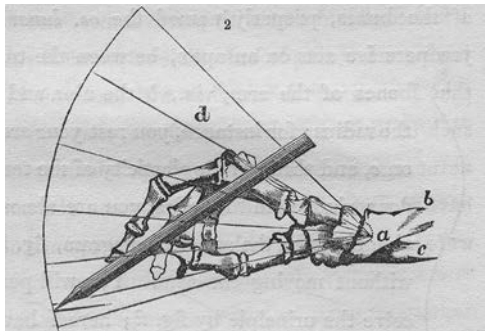


Figure 3.04 Image of pencil and hand

Figure 3.05 Image of Coal Mine

FIGURE. 3.03 Easley and Kleinberg (2010)

"***Paul Erdös published around 1,500 papers during his prolific career in mathematics, including important contributions to graph theory and random graphs. Ron Graham hand drew this diagram in the 1970s to portray the collaboration network of Erdös [...] The world of science is truly a small one in this sense."*** (Meirelles, Isabel. 2013)

39 Katja Davar et al., eds., Dazzling Debt (Ausstellung "How the mind makes forever," Berlin: Revolver Publishing, 2015).

40 Friedrich A. Kittler and Hans Ulrich Gumbrecht, The Truth of the Technological World: Essays on the Genealogy of Presence (Stanford, California: Stanford University Press, 2013).

41 Baudrillard.

42 Byung-Chul Han, Die Errettung Des Schönen, 3. Auflage, S. Fischer Wissenschaft (Frankfurt am Main: S. Fischer, 2015).

3.3. PALPABILITY OF TIME AND SPACE

The role of digital artifacts nowadays is not only limited to the realm of mimesis. The reason for this phenomenon is, I believe, derived from the digitized workflow of today's product design and architecture. Until now, idea-level sketches and collages tended to be presented generally as a primitive form strongly connected to our hand, nerves and brain, functioning as a filter for the raw, floating thoughts and inspirations. Yet, apart from this idea level, the procedure of crafting technical drawings and scaled-down models does not require handwork. All this current workflow has been made possible thanks to the use of a few softwares such as CAD and 3D modeling. This tendency of workflow has resulted in another willingness for digital fabrication, thus, throughout the development of the 3D print and milling system, the lower cost and better-quality machines are produced and sold to the public.

Due to the sophisticated development of modifier tools, especially in 3D modelling programs, the result of our 3D artifact not only imitates hypothetical ideas or mimics nature but also intervenes in the formation of the physical oeuvre and architecture with a strong influence of the traits of 3D modifiers. The speed of this movement has accelerated along with the rising notion about the beauty of smoothness, as South Korean-born German thinker Byung-Chul Han pointed out in his "Saving Beauty (Die Errettung des Schönen)."

"The smooth is the signature of the present time. It connects the sculptures of Jeff Koons, iPhones and Brazilian waxing. Why do we today find what is smooth beautiful? Beyond its aesthetic effect, it reflects a general social imperative. It embodies today's* society of positivity. *What is smooth does not* injure. *Nor does it offer any resistance. It is looking for* Like. *The smooth object deletes its* Against. *Any form of negativity is removed." [43]

43 Byung-Chul Han, Saving Beauty (John Wiley & Sons, 2017).

As a result, 3D artifacts are no longer classified beneath our physical-world objects. The reason is that digital artifacts are not just an intermediate tool for physical modeling which influences our thought process and action. Rather, the 3D artifacts themselves are also an end product for animation, film, and AR/VR products. The 3D artifacts, thus, overcome the hierarchy in which the physically-real artifacts assumed a higher position, and now have an equivalent dignity.

The previous figures provide examples of this. Figure 3.06 is a collection of four photographs of recent projects of the Wet Lab Atelier (WLA). It shows the Silk Pavilion (Pavilion made by the help of 6,500 silkworms and robotically built scaffold), Living Mushtari (a

Figure 3.06

Figure 3.07

Figure 3.08

3D printed wearable organism), the Synthetic Aspirary ('templating" honeycomb swarm construction) and Water-based Digital Fabrication platform.[44] These digitally templated or fabricated samples are built up by a process consisting of bits, codes and algorithms. That is, before the existence of the physical production, the complete electronic plan and structure have already been assembled. This co-existence of virtuality or the virtuality in physical realness can also be seen in Figure 3.07, an experimental investigation: "Thallus Installation." The Thallus made by Zaha Hadid Architects' Computational Design (ZHACoDe) research group is manufactured with computational and automated methods as well as robotic-assisted design.[45] Lastly, in Figure 3.08, through the example of Galleria Department Store in Gwanggyo, designed by OMA, we can see that the size of artifacts can be expanded and reach the level of habitat and architecture.[46]

In VR, unlike the virtuality of physical realness, we often see the purely synthetic simulation or the 3D artificial object with the clothes of UV mapping texture, which reflects a piece of image in the physically-real environment. Particularly in VR or AR environments, the texture of the 3D artifact stimulates the tactile memory of the user, who has an experience of roughness/smoothness, coldness/warmness and the different levels of the solidity of the surface. The trial of physical setup in "Draw Me Close" is a good example. Even though the wholeness in the virtual environment is temporarily real

44 "Wet Lab Atelier on The National Design Awards Gallery," accessed March 25, 2020, http://ndagallery.cooperhewitt.org/gallery/65363267/Wet-Lab-Atelier.

Figure 3.06 Example of previous project: Silk Pavilion, Living Mashtari, Synthetic Apiary, water based digital fabrication platform.

45 "Thallus Installation – Zaha Hadid Architects," accessed March 27, 2020, https://www.zaha-hadid.com/design/thallus-installation/.

46 "OMA-Designed Galleria Department Store Completes in South Korea," OMA, accessed March 27, 2020, https://oma.eu/news/oma-designed-galleria-department-store-completes-in-south-korea.

Figure 3.07 Thallus Installation

Figure 3.08 Galleria in Gwanggyo

and only exists electronically, the senses of our eyes convince us to believe the volume, and the tactility of the objects/rooms are substituted by the surface texture of the whole architectural threshold and props.

It is not that different from the formation of the praxis part of this thesis. In the VR part of "Staging Narrative Space in VR," all the electronic objects and environments in the three stages had their default volumes rescaled in regard to the volume of the user's body, also textured with atmospheric tones or mapping textures. In three different stages of the storytelling, each virtual place consisting of 3D artifacts would present itself like the time as a moving object, which comes towards us (Lakoff and Johnson in Meirelles 2013:59). Especially the third scene (a form of materialization of memory) would come to the user as the compound of the virtual non-gravity in gravity, physics of wind in simulation and accurately distorted physically-real image texture as fluid clothes of the 3D artifact.

"The 'time is a moving object' metaphor is based on the correlation between an object moving towards us and the time it takes to get to us. The same correlation is a basis for the 'time is a container' metaphor [...]" [47]

47 Meirelles

4. VIRTUAL REALITY AND IMMERSION

4.1 VIRTUAL REALITY

4.1.1 REALITY-VIRTUALITY CONTINUUM

With the term Mixed Reality (MR), Milgram et al. set up the framework of the RV Continuum and outlined the definition of Augmented Reality (AR), Augmented Virtuality (AV) and Virtual Reality (VR).

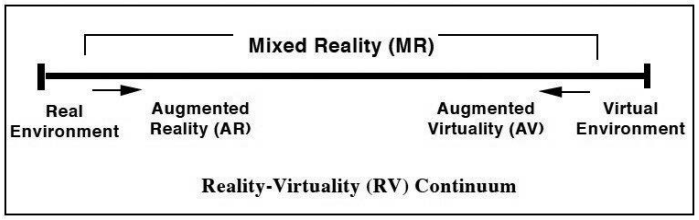


Figure 4.01

Figure 4.01 Simplified representation of a RV Continuum: Conceptual framework of Paul Milgram et al., 1994

The left end of the continuum, Real Environment (RE), is considered to be a composition of physically real objects, including a window or video screen. Whereas the right end of the continuum, Virtual Environment (VE), references purely synthetic objects such as computer graphic simulations, which sometimes do the mimesis of the physical real-world environment with the physical laws, gravity, time and material property of each object. In this polarity, the characteristic of MR is further subdivided into AR and AV according to the modality and the role of the object and surroundings when looking through HMDs.

AR is considered as "a form of virtual reality where the participant's head-mounted display is transparent."[48] Yet, in AV, the transparent surface of mediated goggles - HMDs - is shrunk down, and a very small portion of objects or a hole of environment can be displayed as a video screen or limited range or distorted form of the reflection of the physical environment.

48 Paul Milgram et al., "Augmented Reality: A Class of Displays on the Reality-Virtuality Continuum," ed. Hari Das (Photonics for Industrial Applications, Boston, MA, 1995), 282–92, https://doi.org/10.1117/12.197321.

Therefore, according to this framework, the praxis of this thesis should take place between AV and VE. However, although the definition of AR and VR is well explained and sufficiently categorizes several different MR works within the framework of Milgram et al., there is something missing. This lost thread is usually found during the artistic work

process while pursuing aesthetic and metaphysical goals that do not readily frame themselves in the taxonomy of Reality-Virtuality at the beginning of the production. As we see in the case of "Situation Rooms" of Rimini Protokoll, if the artwork is multifaceted, showing the various silhouettes from a different perspective, some unexplainable points occur within this framework. For instance, how can we categorize the advent of a video screen in a virtual environment containing the recorded footage of what was happening five years ago? Is it then AV or VR or somewhere in between? How can we explain the theatricality expressed through one-to-one tactile contact between the user in VR and another person in a physically real-world environment who interacts with the user?

The Mediated Reality framework conceptualized by Steve Mann expands the RV Continuum by incorporating a second axis representing modulation or "mediation" (i.e. enhancement or diminishment) of the perceived reality.[49] Based on the optical experiments of Stratton, the "taxonomy of reality, virtuality, mediality" was conceived in part to describe projects which cannot be adequately covered by either AR or AV alone.

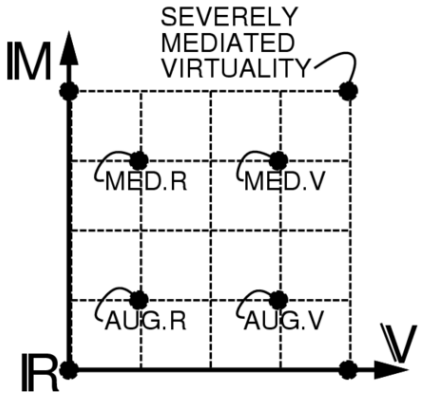


Figure 4.02

Figure 4.02 The Mediated Reality/Taxonomy of Reality, Virtuality and Mediality

In this graph, R corresponds to unmodified reality RE, and V denotes virtuality VE. The points just above the x-axis, AUG.R (AR) and AUG.V (AV) are based on the theory of Milgram et al. Then, as Mann moves up the y-axis, or "mediality" axis representing increased modification of reality and virtuality, a different dimension unfolds. The sensory stimulations of the spectators are increasingly altered, represented by MED.R (Mediated Reality), MED.V (Mediated Virtuality) and, lastly, the point of "severely mediated virtuality". In addition, the mediated reality framework particularizes the importance of the tool/device/machine which (accidentally) modifies our reality. In the practical part of this thesis, the theoretical structure of Mann is employed, but this role of tool/device/machine is substituted for the living creature, a living person having organic biological sensors and transducers, an accumulation of the series of memory and experience.

49 Mann, "Mediated Reality with Implementations for Everyday Life."

4.1.2 VIRTUAL REALITY AS AN AESTHETIC MEDIUM

"As an artist and performer I've become increasingly frustrated with stages and screens and more and more interested in immersive works- music you can walk into and images that completely surround you. I also love long extended drone work that fills the physical space and the imagination. I also like art that is composed and completed by the listener/viewer who walks into it and experiences it viscerally, emotionally and intellectually." [50]

50 Anderson and Huang, "Go Where You Look!; Falling Off Snow Mountain, Three Virtual Reality Installations: ALOFT / CHALKROOM / TO THE MOON."

In the above note on virtual reality from the 2019 Cannes Film Festival Presskit, "Go where you look!", Laurie Anderson describes what kind of ultimate aim she wants to express through VR. Her use of the term "immersive" provides the clearest, most straightforward summary of her conception of VR from her point of view as an artist. It is about the soundscape we can wander around and images that perfectly embrace us. It is also a notion about the form of art which can be achieved by our instinctive and biological senses and physical and metaphysical experiences.

Originally the adjective "virtual" is derived from Medieval Latin virtualis and Late Latin virtuosus, which means "possessing certain virtues and strength."[51] [52] Also, the term "reality" makes it much more complicated because of its broad applications under several different areas and their meta elements, such as philosophy (atomism, epistemology, materialism, metaphysics, etc.), literature, rhetoric, symbolism, religion (Buddhism, Jainism).[53] After the umbrella term "Virtual Reality (VR)" was coined by Jaron Lanier, founder of VPL (Virtual Programming Languages), in the 1980's, the term

51 Lexico powered by Oxford, "Virtual | Meaning of Virtual by Lexico," Lexico Dictionaries | English, accessed March 20, 2020, https://www.lexico.com/definition/virtual.

52 Merriam-Webster, "Definition of VIRTUAL," accessed March 20, 2020, https://www.merriam-webster.com/dictionary/virtual.

53 Encyclopaedia Britannica, "Reality," Encyclopedia Britannica, accessed March 20, 2020, https://www.britannica.com/topic/reality.

was elaborately discussed by many other researchers.[54] These days the definition of VR is often understood as a computer science term. Therefore, VR tends to be categorized in terms of technological hardware which consists of tracking systems, motion-sensing gloves and an HMD. Although this simplified, tech-focused term "VR" has gained wide currency, understanding of the term has at the same time varied and been carefully examined aesthetically and metaphysically by communication researchers, media artists and theorists.[55] In this chapter, the various analyzed characteristics of VR as an aesthetic medium are examined. Also, the particular reason for using this medium in the praxis of this thesis will be explained.

According to communication researcher Jonathan Steuer, this device-focused definition of "Virtual Reality" is wholly inadequate based on the lack of an aesthetic and theoretical dimension. In a thorough examination of several researchers and artists, he redefines VR based on the concepts of "presence" and "telepresence", which respectively mean "the natural perception of an environment" and "the medium-induced sense of presence." Thus for Steuer, the definition of VR is: "a real or simulated environment in which a perceiver experiences telepresence."

Having shifted the focus of "VR" away from hardware and towards the experience of the individual, Steuer continues his research by further exploring the variables which contribute to a sense of telepresence.

Sheridan (1992):
- technological: ***(1) The extension of sensory information.***
(2) Control of sensors regarding the environment
(3) Ability to modify the physical environment

- context based: ***(4) The difficulty of tasks***
(5) The degree of automation

Zeltzner (1992): Autonomy (human control), interaction (real-time control), and presence (bandwidth of sensation).

Steuer suggests two main dimensions along which telepresence can be categorized: vividness and interactivity. Vividness is in turn characterized by breadth and depth, while interactivity is characterized by *speed, range* and *mapping*. With these parameters in mind, any technological media can be mapped and compared based upon the nature of telepresence induced in the user. The following graph is reproduced from Steuer's paper, modified to highlight the relative position of "stereotypical" VR hardware in red. (Notably absent from the graph in 1993: smartphones, tablets,

54 J. Lanier, "Virtually There," Scientific American 284, no. 4 (April 2001): 66–75, https://doi.org/10.1038/scientificamerican0401-66.

55 Jonathan Steuer, "Defining Virtual Reality: Dimensions Determining Telepresence," Journal of Communication 42, no. 4 (December 1992): 73–93, https://doi.org/10.1111/j.1460-2466.1992.tb00812.x.

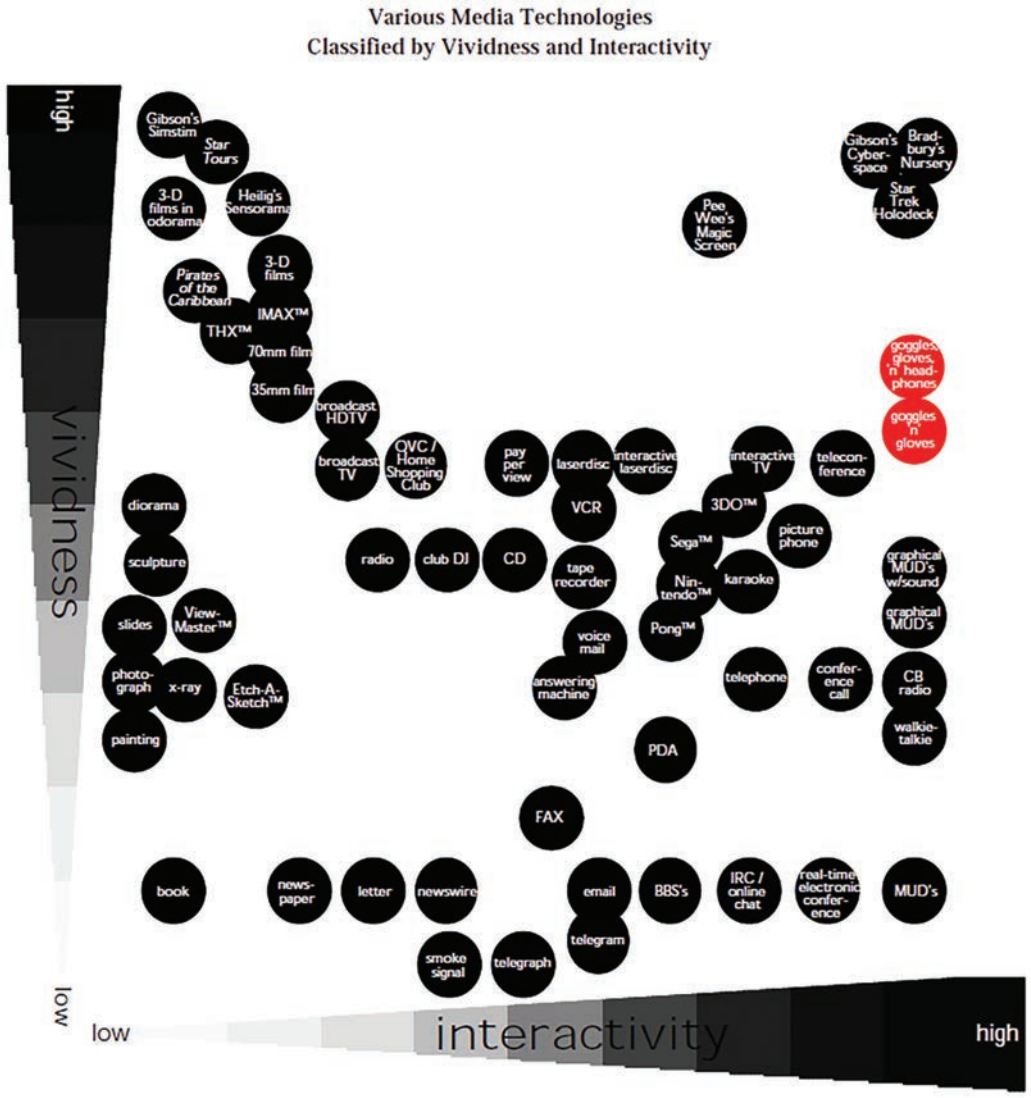


Figure 4.03 Media Technology Classification of Steuer

text message and social media!)

In his review of the 1997 conference "Consciousness Reframed" held by the Centre for Advanced Inquiry into the Interactive Arts (CAiiA) at the University of Wales, Stephen Jones gathers several additional notions of VR. In the "Humanizing Technology" section of his paper, Jones highlights the importance of the biological and emotional part of our relationship to technology through the example of Osmose created by Char Davies. As stated in the title of her paper, "Techne as Poiesis: Seeking Virtual Ground", Davies envisions being in the virtual time-space *Osmose* as a poiesis (creative production[56], formation[57], fabrication, a form of mimesis[58]). In *Osmose*, the navigation system functions by monitoring the breath of the user. Thus the conscious action of breathing (breathe in: rising, breathe out: sinking) and simulation of flying (by balancing in a translucent underwater as well as a stream of words) makes us feel the inexpressible essence in the spatiotemporal bodily-experiential arena.[59] As part of the process of being in *Osmose*, Jones

56 "Poiesis | Meaning of Poiesis by Lexico," Lexico Dictionaries | English, accessed March 21, 2020, https://www.lexico.com/definition/poiesis.

57 "Definition of -POIESIS," accessed March 21, 2020, https://www.merriam-webster.com/dictionary/-poiesis.

58 Alexander Ferrari Di Pippo, "The Concept of Poiesis in Heidegger's An Introduction to Metaphysics," 2000, 33.

59 Maria Antonieta Pereira and Luiz Fernando Ferreira Sá, "Media, Art and Knowledge: Interview with Char Davies," Txt: Leituras Transdisciplinares de Telas e Textos 4, no. 8 (December 31, 2008): 81, https://doi.org/10.17851/1809-8150.4.8.81-87.

Vividness: ***the representational richness of a mediated environment as defined by its formal features, that is, the way in which an environment presents information to the senses.***

- ***Breadth:*** ***the number of sensory dimensions simultaneously presented.***
- ***Depth:*** ***the resolution within each of these perceptual channels.***

Interactivity: ***the extent to which users can participate in modifying the form and content of a mediated environment in real time.***

- ***Speed:*** ***the rate at which input can be assimilated into the mediated environment.***
- ***Range:*** ***the number of possibilities for action at any given time.***
- ***Mapping:*** ***the ability of a system to map its controls to changes in the mediated environment in a natural and predictable manner.***

pays special special attention to merging the procedure between the body of the user and the mechanical perceiver of VR, i.e. the bodily communication based on the biological function.[60]

As Davies describes the definition of VR through the medium itself and the creation of the humanized navigation system and corresponding body of the user, we should notice that there are also other artists who characterize the term "VR" somehow differently. VR is sometimes an active lucid dream, or a journey of exploration and self-reflection. It is also a place of learning how to interact with the environment and recognizing its spatial plasticity (Dolinsky in Jones 2010:216). VR can be understood as a trance state of the shaman in the cyclical understanding of time

60 Stephen Jones, "Towards a Philosophy of Virtual Reality: Issues Implicit in 'Consciousness Reframed,'" Leonardo 33, no. 2 (April 2000): 125–32, https://doi.org/10.1162/002409400552388.

"If virtual reality is defined in terms of telepresence, then its locus is the perceiver. Under this definition, virtual reality refers only to those perceptions of telepresence induced by a communication medium." [61]

61 Steuer.

and mythology, a space of spiritual energy capable of reactivating ancient models of consciousness (Rogers in Jones 2010:127). VR is able to be a creative process of forgetting our ego but also an electronic memory as virtual hallucination. VR can simultaneously be an experience of consciousness propagation (Domingues in Jones 2010:127). Lastly, VR has the possibility to form a poetic construction and a computer-mediated network as an aesthetic medium (Seaman in Jones 2010:128).[62]

Unlike the previous researchers, who define VR as a communication medium or consciousness transmitter/propagator related to our body (the primordial communication interface), art historian and media theorist Oliver Grau interprets VR as "a constant phenomenon in art history characterized by totality."[63] [64] He demonstrates that immersive media can be found in almost all eras, providing examples as far back as the four-walled frescoes of ancient Rome. The use of virtual narrative space in several different communication and artistic media is thoroughly illustrated. The following quote summarizes the compressed interpretation of Grau:

"from the Wagnerian concept of the Gesamtkunstwerk to Claude Monet's immersive Impressionist panorama of waterlilies, Enrico Prampolini's futuristic theater concepts, Sergei Eisenstein's theories about the multi-sensual 3D movie, and Gene Youngblood's expanded cinema of the 1960s.

Technologically, the development of VR continued with the Stereoscope, Cinérama, Stereopticon, Photorama, Stereoscopic Television, Sensorama, and IMAX-Cinema. All had the same aim: to immerse the onlooker deeper and deeper into the image" [65]

62 Jones.

63 Frank Biocca and Mark R. Levy, Communication in the Age of Virtual Reality (Routledge, 2013).

64 Oliver Grau, "Into the Belly of the Image: Historical Aspects of Virtual Reality," Leonardo 32, no. 5 (October 1999): 365–71, https://doi.org/10.1162/002409499553587.

65 Grau.

Grau examines the 18th century invention of the panorama, from its inception as a tool for military reconnaissance to its later embrace as a tool for political propaganda. This has echoes in our current age, as the HMD and the Datagloves are also military inventions. Grau imparts his understanding about the definition of VR: "VR represents the search for an interface which, ideally, appeals to all senses and occupies physiological space as immediately and imperceptibly as possible, as if it were a real experience." [66]

66 Grau

Here I should acknowledge that the definition of VR which was analyzed between 1992 and 2000 is still valid. The trials defining the term from the technological to the metaphysical level have continued to refine the concept of presence/ telepresence, the relationship between biological perceiver and its mediative extensional machine and, lastly, a continual occurrence in the art historical perspective. Current research following this non-technology-driven perspective consists of form experiments, development of the next generation of VR tools based on the relationship between the machine and human body, ceaseless trials to bridge the uncanny valley, artistic expression based on ontological questions, and defining the balance and harmony between the existential meanings of technological gear versus content.

Based on these backgrounds, I would like to examine the position of the practical part of this thesis in between two different notions of Laurel and Burrell who are using an aesthetic medium, VR.

One of the VR pioneers, Dr. Brenda Laurel, refers to what is not VR by pointing out that the term is too broadly over-used:

"[...] people started shopping 360° immersive video as VR. It is not. "Surround" movies are marketed as VR. They are not. "VR Storytelling" is a misnomer; it is not structurally VR. "Second Life" is described as VR. It is not. When the term is appropriated, its meaning disintegrates. Last time around, the same effect spread out across media types that are not VR. There is no such thing as "desktop VR." Application of the term "VR" to a CAVE experience is questionable." [67]

Again, she refers to "feeling of presence and sensory immersion", a perception of being inside of a (virtual) environment, as an ultimate goal of VR depending on how several different factors are interwoven with each other. Additionally, she presents core characteristics of VR:

1. ***Complete surround environment.***
2. ***Affordances for depth perception and motion parallax.***
3. ***Spatialized audio, not just stereo.***
4. ***Affordances for tracking the participant's direction of motion distinct from the direction of gaze.***
5. ***The only "camera" is the participant's sensorium.***
6. ***Natural gestures and movement.***
7. ***Affordances for narrative construction.***
8. ***The principle of action.***

67
Laurel, "What Is Virtual Reality?"

Lastly, Dr. Andrew Burrell, a researcher from the University of Technology Sydney, does not use the term "virtual reality" to describe his investigation in the abstract of his paper, "The Present Tense of Virtual Space." By instead focusing on the phrase "virtual space", he sidesteps conventional analysis and defines the term in relation to his ongoing praxis, regarding memory and imagination. For Burrell, virtual space is an extension of physical reality, where we can perceive physical feedback from other subjects and objects. Therefore, virtual space/virtual environment is "the phenomenologically real space" for him.

"virtual space exists as an extension of physical space, rather than an adjunct to it. [...]. This leads into an exploration of classical mnemonic spaces, as virtual environments, to support an understanding of the functionality of some of the spatial affordances of virtual environments." [68]

Unlike the other VR artists in Jones' research paper and disregarding the core characteristics of VR suggested by Laurel, Burrell works with more broad interfaces, such as the AR marker, screen sensor, web-browser, etc. As he does not adhere to the conventional rules and aesthetics of VR, Burrell seems to enjoy freedom in the form of matter. Likewise, his focus does not stress the theory of virtuality-reality related to human perception in (completely) different surroundings, but rather the level of spatial understanding of virtuality. Therefore, he talks more about the concept of virtual space and its definition related to his peculiar concept of time in a virtual environment, which claims an ever present narrative based on memory and imagination.[69]

Having considered these thoughtful research papers about the true nature of VR, now we can ask: where is the practical part of this thesis positioned? Even though the VR part of this thesis does not strictly ad-

68 Andrew Burrell, "The Present Tense of Virtual Space," 2018.

69 Burrell.

here to the core characteristic of VR stated by Laurel (for instance...), I do agree that the spectator should be able to make free movements to see a completely surrounded environment, and the sound cues must match the movement of the spectator to build up a coherent audio-visual system. Lastly, I think her notion about participant's sensorium being the only "camera" does make sense considering the limit of current VR technology: "VR is a first-person medium for every participant in the same world." However the practical part of this thesis is concerned with the phenomenologically real (virtual) space as an extension of the physical space.

The core of Burrell's notion [of xyz] can be seen in this thesis is as a story based on recent traumatic events experienced by the people of South Korea. As these media theorists and researchers claim, the goal of VR is predicated on the sense of being in a mediated artificial space, immersed deeply inside of images (based on the physical world in different time), sounds (the breath of the spectator, mix of outside world sound, which existed) and atmosphere (a totality of the image, sound and story) as an extension of our life in physical reality.

With an understanding about the theoretical implications of VR as aesthetic medium, we can anticipate the next potential artistic usage of VR and again confront the notion of Laurie Anderson: that through VR our presence can be immersed in music and images that completely surround us; and we, the spectators, should experience it "viscerally, emotionally and intellectually."[70] Feel your being in space, there.

70 Anderson and Huang.

4.2 PANORAMA

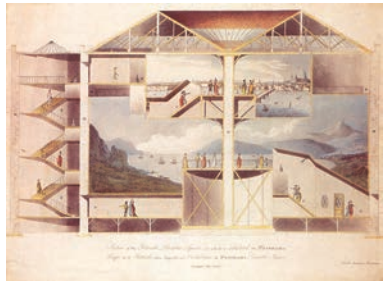


Figure 4.04

The previous notions and discussions (regarding issues and subject matters in the works of art in VR, legitimacy of memory, palpability of time and space, and the dignity of computer-generated artifacts) are all encompassed by the concept and the form of the panorama. The emergence of the panorama, in my opinion, is the beginning of the history of our sensory perception in a synthetically immersive environment.

Since the introduction of linear perspective from Brunelleschi in the Renaissance, beyond the desire of realistic visual recording, there has been an old impulse and ambition of us to dive deeply into the immersive atmospheric image: into the panorama.

Figure 4.04 Plans, and views in perspective, with descriptions of buildings erected in England and Scotland; and ... an essay to elucidate the Grecian, Roman and Gothic Architecture. (Plans, descriptions et vues en perspective, etc.).

Figure 4.05

Following the rise of the panorama in the late 18th century, its ultimate anatomic and aesthetic aim has continuously evolved according to the developments of electricity, electronics, and related technologies. Thus, I understand that the advent of modern VR technology can be seen as the most recent manifestation of the panorama.

The word "panorama" is derived from two Greek words: "pan" (πᾶν "all") and "horama" (ὅραμα "view") from "horan" (ὁράω "see").[71] The term was coined, patented and used by Irish-born painter Robert Barker (1737-1806) for his exhibition "The Panorama of Edinburgh", depicting the beautiful landscape of Edinburgh in a form of circular representation. With great success, he opened a permanent building for the Panorama in London and installed his artworks there. Let's look at Figure 4.04, the "cross-section of Rotunda" created with etching and colored aquatint by architect Robert Mitchell.

Figure 4.05
C. Monet, Water Lilies (1914-26)

71 "Panorama | Meaning of Panorama by Lexico," Oxford Dictionaries | English, accessed March 19, 2020, https://www.lexico.com/definition/panorama.

"Nature can be represented so much better there than in a painting restricted by the normal format." [72]

"The desire to be in the picture, in both metaphorical and nonmetaphorical sense, did not disappear with the panorama but lived on in the twentieth century." [73]

It shows the exhibition of Robert Barker in a panorama building in Leicester Square in 1801. As the audience follows the movement plan of the exhibition design, they can enjoy the depiction of the landscape of Edinburgh and the representation of the Thames in London in the smaller room above.[74] [75]

Unlike the whole construction of the panoramic painting and the architectural structure of Barker and Mitchell, in the famous "Water Lilies" (1915-1917) Claude Monet focused on the image space itself and intensified the direct relationship between the image and the body of the audience member. On each 1,275 cm x 200 cm canvas, Monet depicted a triptych of irises, weeping willows, agapanthus, clouds, fragmented but also continuous "wind-ruffled water" and the reflection of sky which changes its light color according to the flow of time.[76]

In order to make people float around on the water surfaces, Monet intentionally reduced the distance between the image and the body of the observer by drawing the image at a fifteen to twenty centimeter distance from the canvas. That is, the accumulated movement of the painter's gaze is transmitted to the moment of contemplation by the audience

72 Comment, Bernad. "The Panorama - Bernard Comment - Google Books," 1999. https://books.google.de/books/about/The_Panorama.html?id=evOke2eM_bYC&source=kp_book_description&redir_esc=y.

73 Oliver Grau, Virtual Art: From Illusion to Immersion, Leonardo (Cambridge, Mass: MIT Press, 2003).

74 "Section of the Rotunda, Leicester Square | British Library - Picturing Places - The British Library," accessed March 18, 2020, https://www.bl.uk/collection-items/section-of-the-rotunda-leicester-square#.

75 "Kings of the Vast: John Martin II – Tate Etc | Tate," accessed March 19, 2020, https://www.tate.org.uk/tate-etc/issue-23-autumn-2011/kings-vast.

76 Grau.

in the museum. About the effect of these traits of the production method, Grau described: "The synthesis of natural environment and mental impression puts the observer in a bird's-eye view position that overcomes the law of gravity in the image space; in a certain sense, it is disembodiment. The linking of a nondistanced impressionist interpretation of a natural scene with the mechanisms of suggestion found in the image apparatus of the panorama suited the artist's intentions perfectly."[77]

77 Grau.

The nondistanced impression of floating around and into the immersion in the instrumental perspective has also been researched in the stream of technological inventions during the last two hundred years. From the Wheaton mirror stereoscope in the early nineteenth century to the Kaiser-Panorama in the nineteenth to early twentieth century, there have been ceaseless trials and inventions of motion picture machines. After the advent of Sensorama in 1962, the genealogy of sensory stimulating motion picture machines had a critical bifurcation.

Sensorama, which was developed and introduced by Morton Heilig, expands the limit of sensory stimulation for not only visual but also tactile, olfactory and auditory sensations through the integration of a stereoscopic color display, fans, odor emitters, stereo-sound system and movable seat in the device. The most remarkable aspect of the device is that it is neither a small stereoscopic or kaleidoscopic artifact, nor a larger architectural structure with a peephole like "Étant Donnés: 1. La Chute d'Eau, 2. Le Gaz d'Éclairage" of Duchamp. In addition, the device bravely comes closer to the body of the user, covering parts of several sensory organs as a form between the clothes of the spectator and the room which encompasses everything.[78]

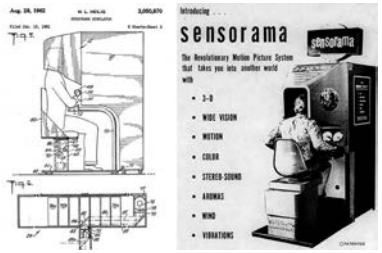


Figure 4.06

78 Marshall McLuhan, Understanding Media: The Extensions of Man, Repr, Routledge Classics (London: Routledge, 2010).

Figure 4.06 The Sensorama, from the U.S. Patent #3050870

The revolutionary point of this bifurcation is that unlike previous tools and devices, sensorama generated a volume by means of a head cover that extended from the main part of the machine. And I personally believe that the distance between this head cover

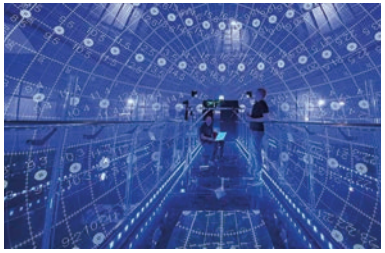


Figure 4.07

Figure 4.08

Figure 4.09

and the body of the user affected the emergence of the next generation of panoramic technology, namely, a seamless 360-degree space and VR. On the one hand, the innovation of the smooth and coherent surface of the "Space 360" spherical theatre at the Gwangju National Science Museum may be regarded as a head cover which has been detached as far as possible from our body. On the other hand, the innovative invention of VR can be read as the modification of the head cover being brought as close as possible to our head, in a dense agglomeration of our senses.

Figure 4.07, 4.08 Space 360 Gwangju

Within this structure of the genealogy of VR, the thesis "Staging Narrative Space in VR" contemplates the very original aesthetic aims of Barker and Monet. In the end, the thing that we can obtain, through research about the roots of VR and the advancement of electrical and mechanical technology, is the level of distance and closeness: How close could we come to the archetypical dream of us and people before us, like Brunelleschi, Barker, Monet and Duchamp? If we could understand the process of achieving unity of the panorama (the perfect end to end attachment of an image) as an allegorical form, the higher level of coherence and the true meaning of the immersion in VR can be, therefore, accomplished in our current works by the thorough contemplation about the primitive dreams of our pioneers. Perhaps, if there were a shape of evolution regarding this pondering of the primitive idea in the middle of cutting-edge technology, I dare imagine that the modality of the transformation process would look like a cross between an ouroboros and a rhizome; for instance, an end to end attached cylinder format map of the paleontological tree.

Figure 4.09 VR

5. THREE DIFFERENT STAGES INTO THE HOLODECK

5.1 SYNOPSIS

When a user wears the VR headset in DBL, she/he sees another place which has the shape of DBL but somehow has a different atmosphere. Soon a warm voice surrounds the place and recites a poem about love and loss. When the user fully concentrates on the voice and its meaning, the room asks us: "Do we stand on a stable floor?" The room moves its volume as if it is following the cosmic power.

The being of the user falls through the surface of the water which blocks the time in 2014 like a secret. There is a screen/window which has memory of that time. Time rewinds. The lost shoes of highschool girls and boys are sunken in the deep water. Soon the scene of the sinking ferry appears, more than half of its body already sunken. The sounds of helicopters, fishing boats and marine police ships surround the sinking body. Simultaneously an urgent voice asks again and again: "Is everybody rescued?"

Time rewinds again. The body of the user goes into a cabin of the ferry. The water surface reaches the ceiling of the cabin, then recedes and vanishes. The body of the user is objectified and laid on the cabinet of the cabin. The ship slowly lists to one side. Crying terrified voices. At the time, there was a security announcement which should have been spoken, but did not happen at all. And the voices of crew members giving instructions to come up to the deck.

The objectified body is soon floating on the top of the high dive platform of the Schwanseebad. A voice in the air explains how to fly to the compounded memory of Soon-Yi and myself. Breathe in and breathe out. And fly away. While the body of the user is flying into the memory, her/his gaze makes wind. And then, as if the wind is speaking, Soon-Yi's elderly voice talks about the eight-year-old korean girl, Soon-Yi, in Nagasaki, Japan. About the picnic with her daddy. The lunchbox that her mom prepared. And the very first impression from the tactility and the scent of the blue water. When the last sentence of the memory of Soon-Yi is spoken, the flying body arrives at the floor of the memory. Soon I will ask her/him a question: "I would like to talk about Soon-Yi with you. Please take off your headphones." And, then I would like to have a conversation with the user about Soon-Yi's life in imperial Japan, the profession of her parents, her life after the liberation of Korea, the relationship between her and I. Lastly, how much I miss her.

5.2 SCRIPT

ACT 1: HERE, NOW

(A spectator wears the VR HMD and headphones)

An empty room, which resembles the physical room where the user stands now. Traces of work of other people are spread out all over the table, but there are no people present.

"Ambient background sound on"

"Reciting of a poetry on"

A warm Voice: Ich hielt mich überoffen, ich vergaß
dass draußen nicht nur Dinge sind und voll
in sich gewohnte Tiere, deren Aug
aus ihres Lebens Rundung anders nicht
hinausreicht als ein eingerahmtes Bild;
dass ich in mich allem immerfort

The body of the spectator is slowly and secretly floating.

looks into myself looks, opinion, curiosity.
Blicke hineinriss: Blicke, Meinung, Neugier.
Wer weiß, es bilden Augen sich im Raum
und wohne bei. Ach nur zu dir gestürzt,
ist mein Gesicht nicht ausgestellt, verwächst
darkly,
in dich und setzt sich dunkel
endlessly, into your sheltered heart.
unendlich fort in dein geschütztes Herz.

When the body of the spectator reaches the edge of the ceiling in the room, the hallucinated body comes across the room. The room vanishes.

"Sound of water splash"

"Ambient background sound off"

TRANSITION 1: UNDERWATER SURFACE

"Sound of wind on"

The spectator is floating in between water surfaces. In the

middle of space, there is a video image of the sinking Sewol ferry (flashback).

"Sound of Helicopter on"

When the body of the spectator comes closer to the screen, the sound of the helicopter becomes louder.

"Sound of water splash"

ACT 2: SEWOL

"Sound of water and shouting of students"

A cabine of the Sewol ferry is filled with water. Soon the water level recedes and vanishes. Blankets, backpacks, shoes stay on the floor without their owners. Suddenly, the cabin starts to list.

"Announcement of Captain: quotation below."

Captain: This is the captain speaking. This is an emergency situation. All passengers please follow the instructions of our crew and come up to the deck with your life jacket. This is an emergency situation. Please come up to the deck with your life jacket and as few personal belongings as possible.

"Instruction of crew: quotation below"

Crew: Did everybody receive a life jacket? Please come up to the deck carefully with as few personal belongings as possible .

Wear your life jacket, but wait until you are on the deck to inflate it. We are going to inflate the life jackets on the deck.

(Repeat until the scene is finished)

"The strong arguing voice of a highschool boy."

"The sound of the footsteps of passengers, who are going to the

upper deck”

Sea horizon in the window begins to be tilted. The objectified perspective of the user falls down on the floor.

“The sound of falling down”

“The screaming and frightened voice of the crowd”

Slowly, the color of the cabin is darkened and saturated. The whole interior fades out. (White out)

TRANSITION 2: ON THE DIVING PADDLE

“The sound of wind”

“A voice of guidance”

Guidance: Welcome to the compounded memory of Soon-Yi and I. You are standing on the high dive platform of Schwanseebad now, which is a good summertime memory of my dear friends, my husband and I. This diving paddle is an entrance to the memory of Soon-Yi, the eight-years-old Korean girl in Nagasaki, Japan, in the late 1930s. We normally offer our passengers elevator service every two minutes. Yet, unfortunately, due to mechanical difficulties, it is currently out of order. Please be relaxed and follow the instructions, so that the breeze carries you into the panorama. Please come close to the edge of the diving platform. And please open your arms slightly so that the breeze covers your body and makes you fly.

“The sound of breathing”

Breathe in and breathe out.

Now, fly away.

“The sound of wind”

The being of the spectator falls down rapidly. After a short time the body flies into the materialized memory.

ACT 3: INTO THE MEMORY

Guidance: Make wind with your gaze.

"The voice of Soon-Yi (KR)"

"The translation of the voice of Soon-Yi"

Soon-Yi: strand beim Vater.mp3
1,00 MB (1.057.273 bytes)
Monday, 21 October 2019, 13:10:56

The translation of the voice of Soon-Yi:
One day my dad brought me to the seaside with Masahichi and his grandfather. My mom made a lunchbox with Onigiri for us. Masahichi's grandfather brought only Masahichi and my dad brought only me. My little sister and brother could not come because they were too small and young. We went to the sea. It was so scary because there were waves and water splashes. Yet, my dad dragged me to the shallow waterside and we swam. He said it is good for health. Yes, it was a good memory with my dad.

(The user's body arrives at the floor of the materialized memory.)

Guidance: Well, finally you arrived here. In the middle of this materialized memory, I would like to talk about Soon-Yi with you. Now, please take off your headphones.

(The spectator takes off the headphones.)

(Timer on)

"Ambient background music"

The user and I start to have a conversation.

A voice:

"About her parents"

"About her life in imperial Japan and after the liberation of Korea."

TRANSITION 3: EXPLOSION

"Part of slow, ambient sound"

"Sound of explosion"

The whole entangled spaces explode and float around in the cosmos.

"About the death of her dad"

"Being a mother and grandmother."

"Love and loss"

(Time out)

A voice: Now, please put the headphones back on.

The wireframed space of DBL comes close to the body of the user. After the coordination fits with the very first scene, the vector texture transforms into the color surface.

ACT 4: BACK TO THE ACT 1

5.3 SOUND-CUE-SHEETS | SCENE CHANGE-CUE SHEETS

Act 1

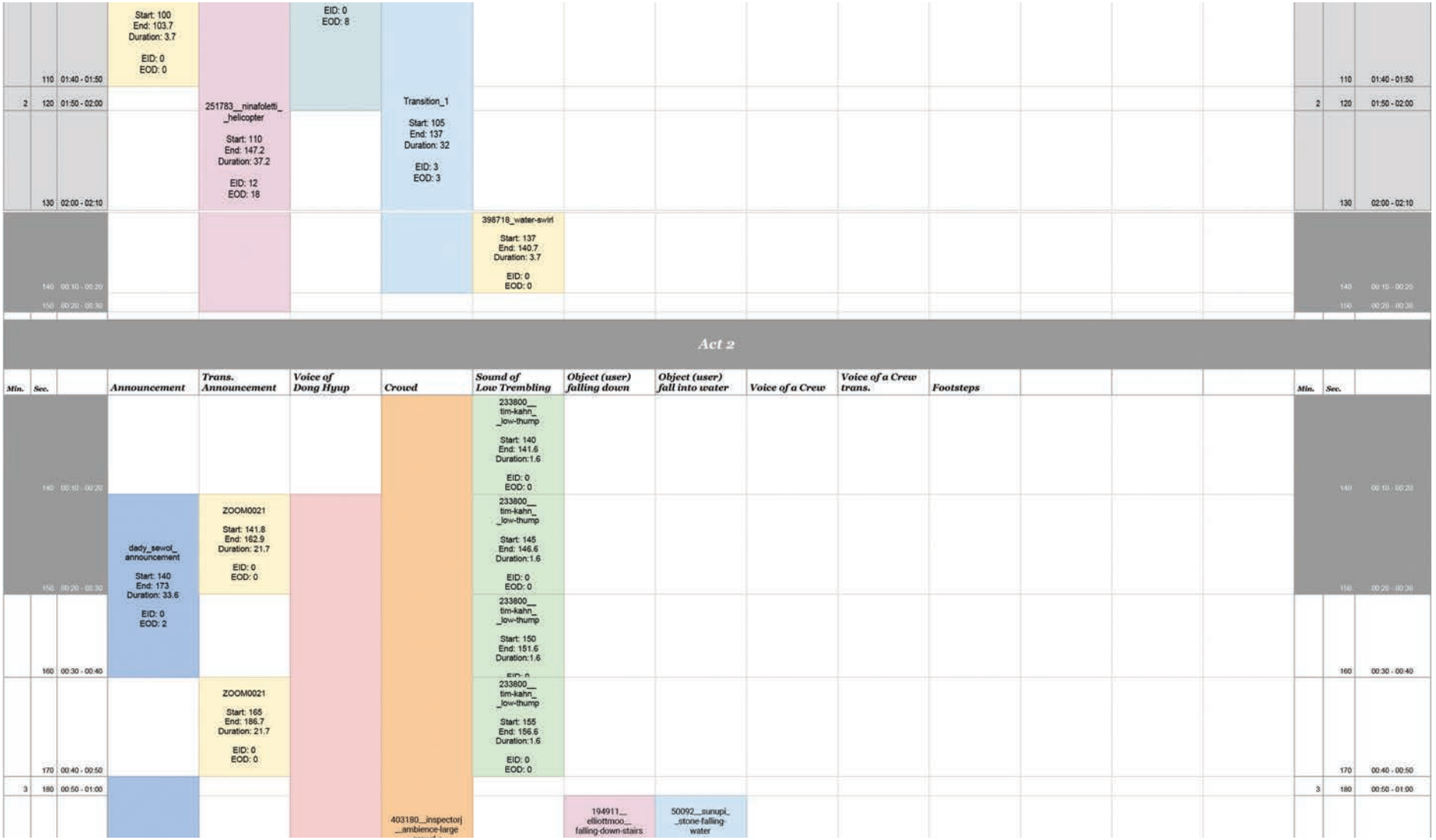
Min.	Sec.		Opening Ambient Sound	Voice (Sophie) DE love and lost	Voice ENG some words
	10	00:00 - 00:10	Ambient Sound_ S1 (3) Start: 00:00 End: 126.192 Duration: 126.192 EID: 0 EOD: 30		
	20	00:10 - 00:20			
	30	00:20 - 00:30			
	40	00:30 - 00:40		S_Neue Aufnahme 4 Start: 35 End: 81.6 Duration: 46.6 EID: 0 EOD: 3	
	50	00:40 - 00:50			looksopinion curiousity(3) Start: 56 End: 63.4 Duration: 7.4 EID: 0.5 EOD: 1
1	60	00:50 - 01:00			
	70	01:00 - 01:10			
	80	01:10 - 01:20			sheltered heart(4) Start: 75.85 End: 80.9 Duration: 5 EID: 0.1 EOD: 1
	90	01:20 - 01:30			
	100	01:30 - 01:40			
	110	01:40 - 01:50			
2	120	01:50 - 02:00			
	130	02:00 - 02:10			

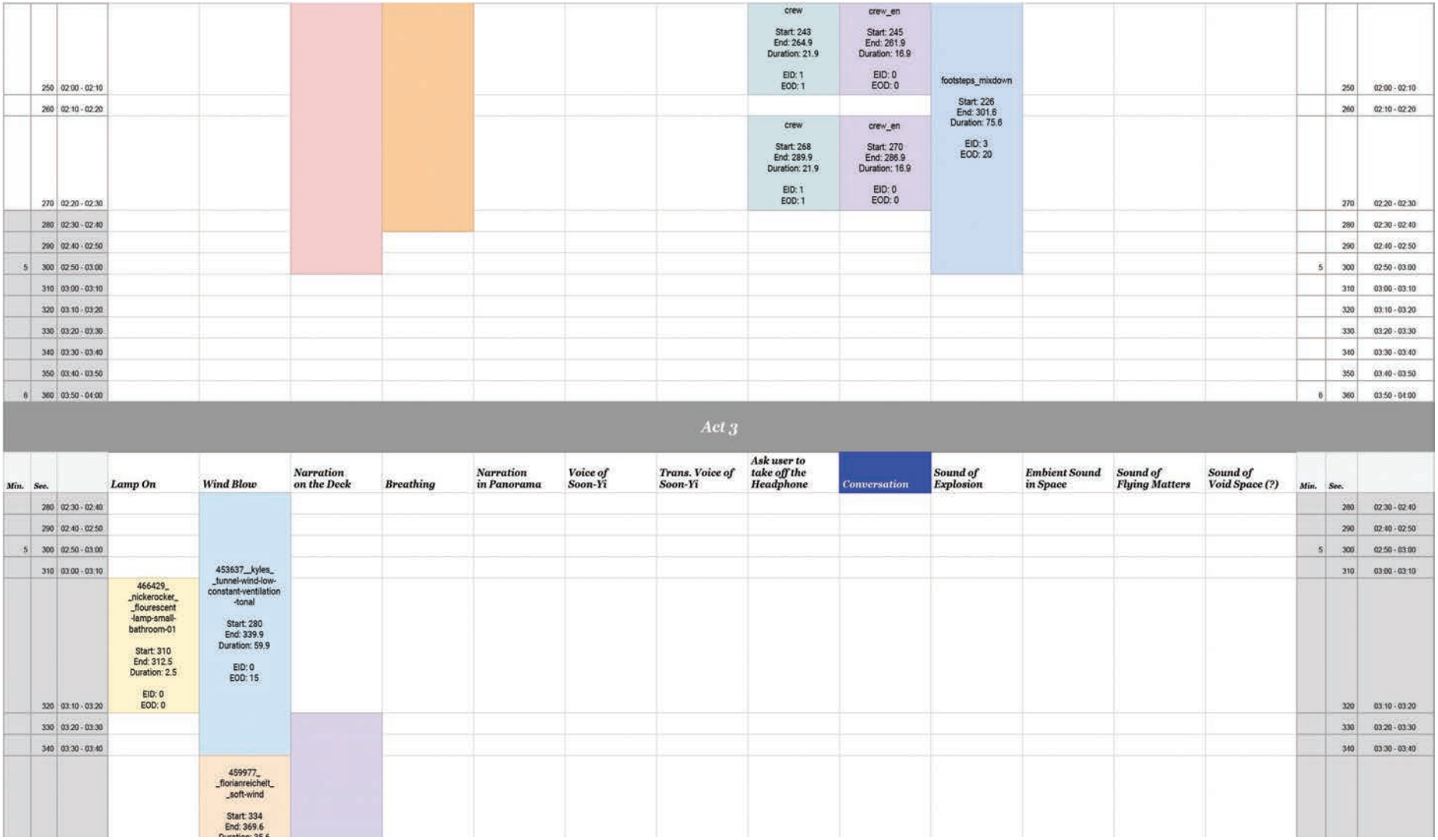
Min.	Sec.		Opening Ambient Sound	Voice (Sophie) DE love and lost	Voice ENG some words
	10	00:00 - 00:10			
	20	00:10 - 00:20			
	30	00:20 - 00:30			
	40	00:30 - 00:40			
	50	00:40 - 00:50			
1	60	00:50 - 01:00			
	70	01:00 - 01:10			
	80	01:10 - 01:20			
	90	01:20 - 01:30			
	100	01:30 - 01:40			
	110	01:40 - 01:50			
2	120	01:50 - 02:00			
	130	02:00 - 02:10			

Transition

Min.	Sec.		Into the water	Hellicopter	Wind	Sound of Video Sequence	Out of the water
	90	01:20 - 01:30			459977_soft-wind Start: 85 End: 120 Duration: 35		
	100	01:30 - 01:40					
			398718_water-swirl				

Min.	Sec.		Into the water	Hellicopter	Wind	Sound of Video Sequence	Out of the water
	90	01:20 - 01:30					
	100	01:30 - 01:40					


Start: 100
End: 103.7
Duration: 3.7
EID: 0
EOD: 0
EID: 0
EOD: 8
110 01:40 - 01:50
2 120 01:50 - 02:00
251783__ninafoletti_
_helicopter
Start: 110
End: 147.2
Duration: 37.2
EID: 12
EOD: 18
Transition_1
Start: 105
End: 137
Duration: 32
EID: 3
EOD: 3
130 02:00 - 02:10
398718_water-swirl
Start: 137
End: 140.7
Duration: 3.7
EID: 0
EOD: 0
140 00:10 - 00:20
150 00:20 - 00:30
Act 2
Min. Sec. Announcement Trans. Announcement Voice of Dong Hyup Crowd Sound of Low Trembling Object (user) falling down Object (user) fall into water Voice of a Crew Voice of a Crew trans. Footsteps
233800__
tim-kahn_
_low-thump
Start: 140
End: 141.6
Duration:1.6
EID: 0
EOD: 0
233800__
tim-kahn_
_low-thump
Start: 145
End: 146.6
Duration:1.6
EID: 0
EOD: 0
dady_sewol_
announcement
Start: 140
End: 173
Duration: 33.6
EID: 0
EOD: 2
ZOOM0021
Start: 141.8
End: 162.9
Duration: 21.7
EID: 0
EOD: 0
233800__
tim-kahn_
_low-thump
Start: 150
End: 151.6
Duration:1.6
160 00:30 - 00:40
ZOOM0021
Start: 165
End: 186.7
Duration: 21.7
EID: 0
EOD: 0
233800__
tim-kahn_
_low-thump
Start: 155
End: 156.6
Duration:1.6
EID: 0
EOD: 0
170 00:40 - 00:50
3 180 00:50 - 01:00
403180__inspectorj
__ambience-large
194911__
elliottmoo__
falling-down-stairs
50092__sunupi_
_stone-falling-
water

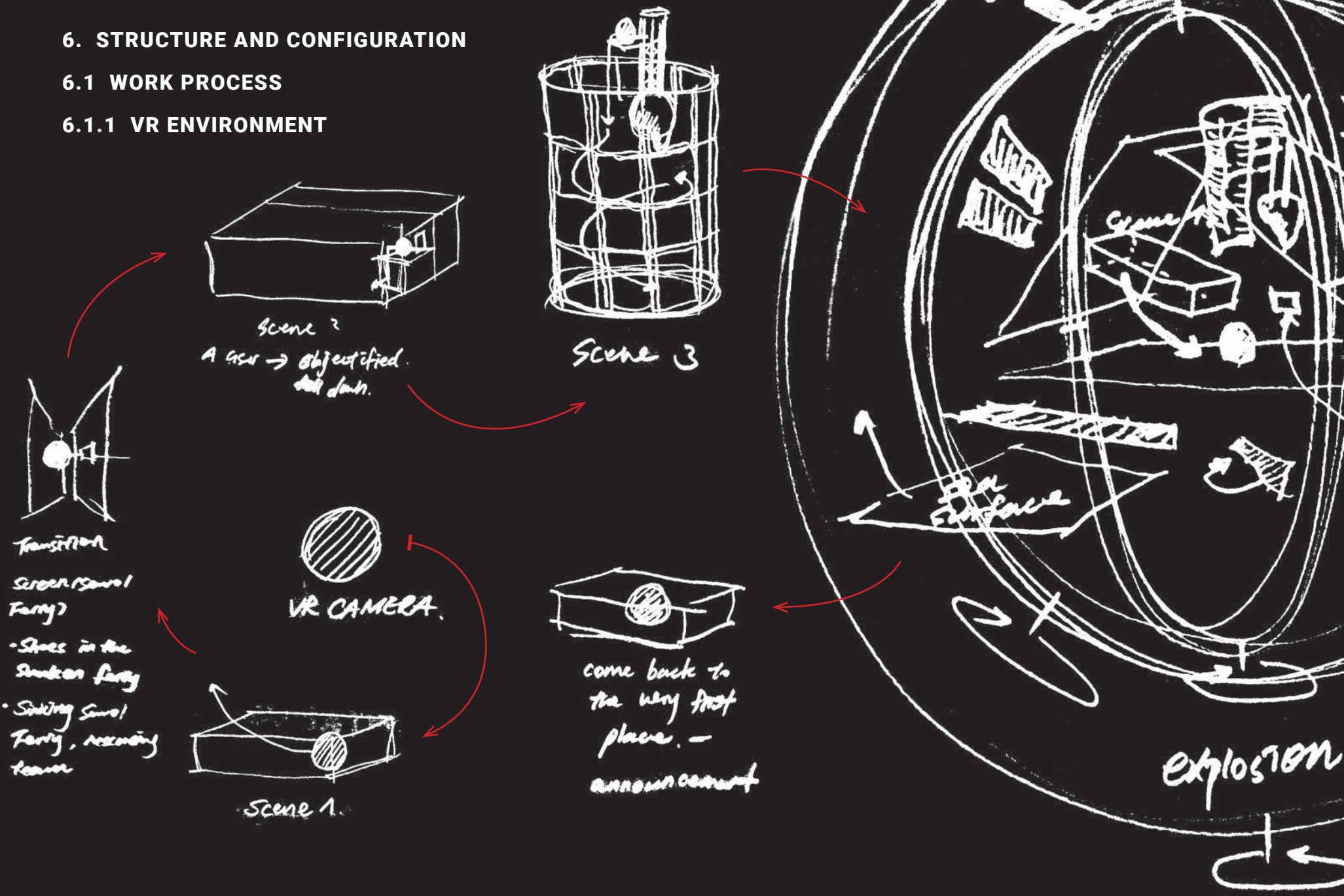

crew
Start: 243
End: 264.9
Duration: 21.9
EID: 1
EOD: 1
crew_en
Start: 245
End: 261.9
Duration: 16.9
EID: 0
EOD: 0
footsteps_mixdown
Start: 226
End: 301.6
Duration: 75.6
EID: 3
EOD: 20
crew
Start: 268
End: 289.9
Duration: 21.9
EID: 1
EOD: 1
crew_en
Start: 270
End: 286.9
Duration: 16.9
EID: 0
EOD: 0
Act 3
Min.
Sec.
Lamp On
Wind Blow
Narration on the Deck
Breathing
Narration in Panorama
Voice of Soon-Yi
Trans. Voice of Soon-Yi
Ask user to take off the Headphone
Conversation
Sound of Explosion
Embient Sound in Space
Sound of Flying Matters
Sound of Void Space (?)
466429_ _nickerocker_ _flourescent -lamp-small-bathroom-01
Start: 310
End: 312.5
Duration: 2.5
EID: 0
EOD: 0
453637__kyles_ _tunnel-wind-low-constant-ventilation -tonal
Start: 280
End: 339.9
Duration: 59.9
EID: 0
EOD: 15
459977_ _florianreichelt_ _soft-wind
Start: 334
End: 369.6

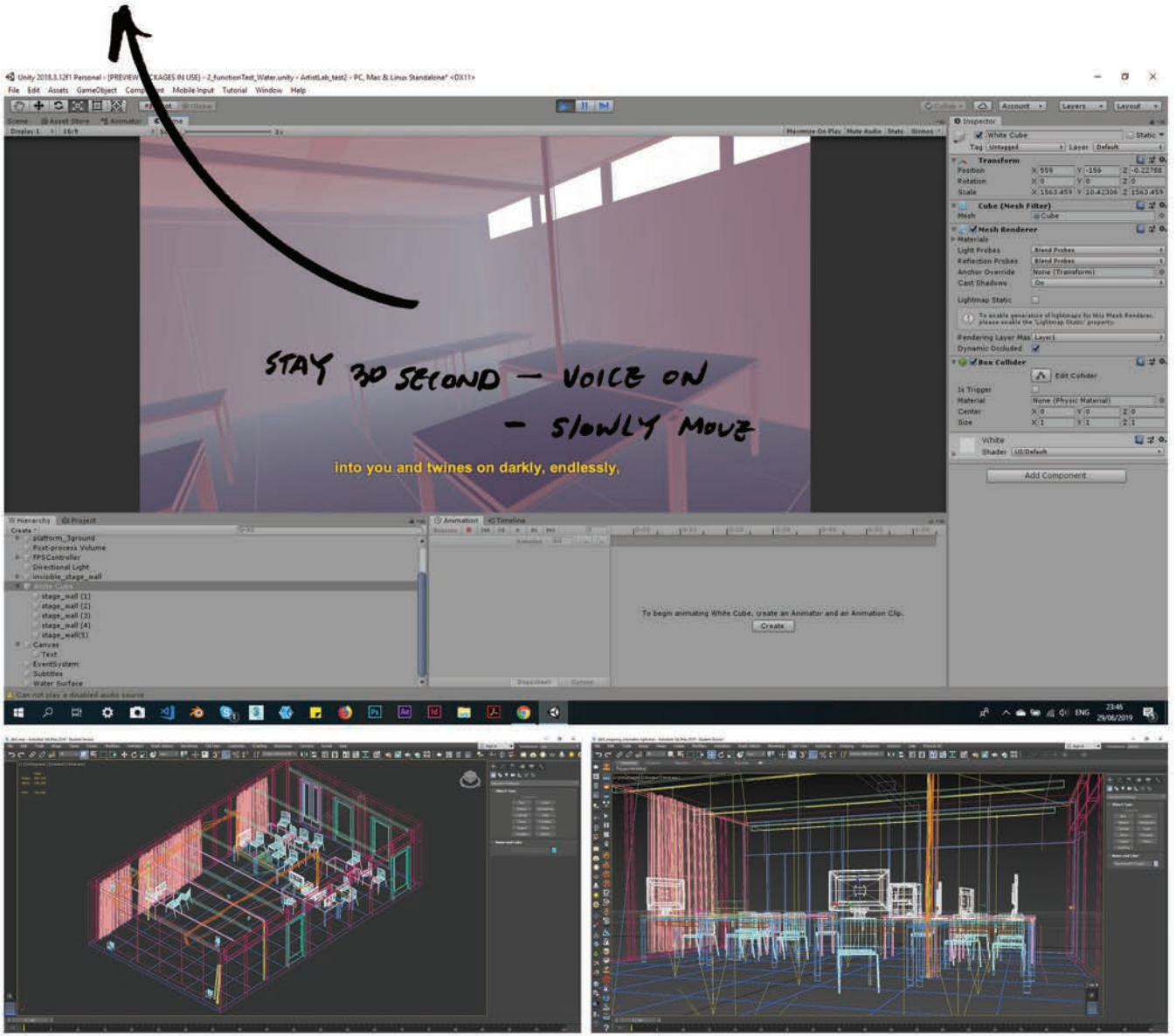
	390	04:20 - 04:30																390	04:20 - 04:30
	400	04:30 - 04:40				325880_ _lizanejordaan_ _breathing Start: 400 End: 404.7 Duration: 4.7 EID: 0 EOD: 0									Start: End: Duration: EID: EOD:		400	04:30 - 04:40
	410	04:40 - 04:50																410	04:40 - 04:50
7	420	04:50 - 05:00		fast wind Start: 406 End: 465.9 Duration: 59.9 EID: 5 EOD: 10														7	420	04:50 - 05:00
	430	05:00 - 05:10																430	05:00 - 05:10
	440	05:10 - 05:20																440	05:10 - 05:20
	450	05:20 - 05:30																450	05:20 - 05:30
	460	05:30 - 05:40																460	05:30 - 05:40
	470	05:40 - 05:50																470	05:40 - 05:50
8	480	05:50 - 06:00																8	480	05:50 - 06:00
Fin.																			
Min.	***Sec.***		***Ambient Sound***	***Announcement about Exit***	***Breath***													***Min.***	***Sec.***	
	490	06:00 - 06:10	Ambient Sound_ S1 (2) Start: 00:00 Duration:82 sec																490	06:00 - 06:10
	500	06:10 - 06:20																	500	06:10 - 06:20
	510	06:20 - 06:30																	510	06:20 - 06:30
	520	06:30 - 06:40																	520	06:30 - 06:40
	530	06:40 - 06:50																	530	06:40 - 06:50
9	540	06:50 - 07:00																9	540	06:50 - 07:00
	550	07:00 - 07:10																	550	07:00 - 07:10
	560	07:10 - 07:20																	560	07:10 - 07:20
	570	07:20 - 07:30																	570	07:20 - 07:30
	580	07:30 - 07:40																	580	07:30 - 07:40
	590	07:40 - 07:50																	590	07:40 - 07:50
10	600	07:50 - 08:00																10	600	07:50 - 08:00

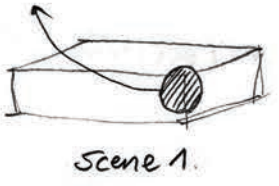
6. STRUCTURE AND CONFIGURATION

6.1 WORK PROCESS

6.1.1 VR ENVIRONMENT





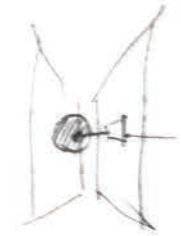


6.01

6.02 6.03

Figure 6.01
The very first place where the user wears VR goggles and the 3D modeling process.

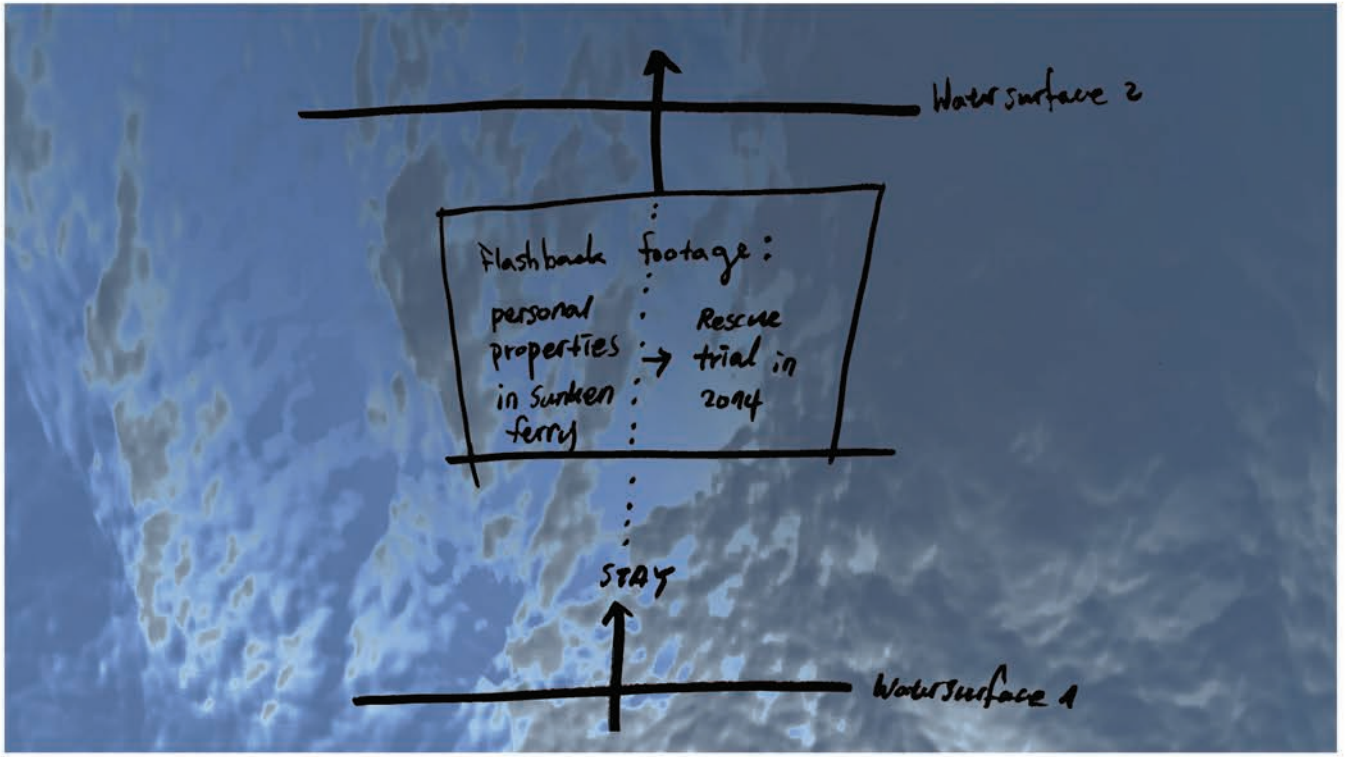
Figure 6.02, 6.03
The 3D modeling process.



Transition

Screen (Sewol Ferry)

- Shoes in the Sunken ferry
- Sinking Sewol Ferry, rescuing team



6.04 6.07

6.05 6.06

Figure 6.04 In Between water surfaces (shader graph).

Figure 6.05, 6.06 The footage images from a documentary produced by The New Yorker (https://www.youtube.com/watch?v=5_A8dq2fA5o).

Figure 6.07 A screen in between the water surfaces.

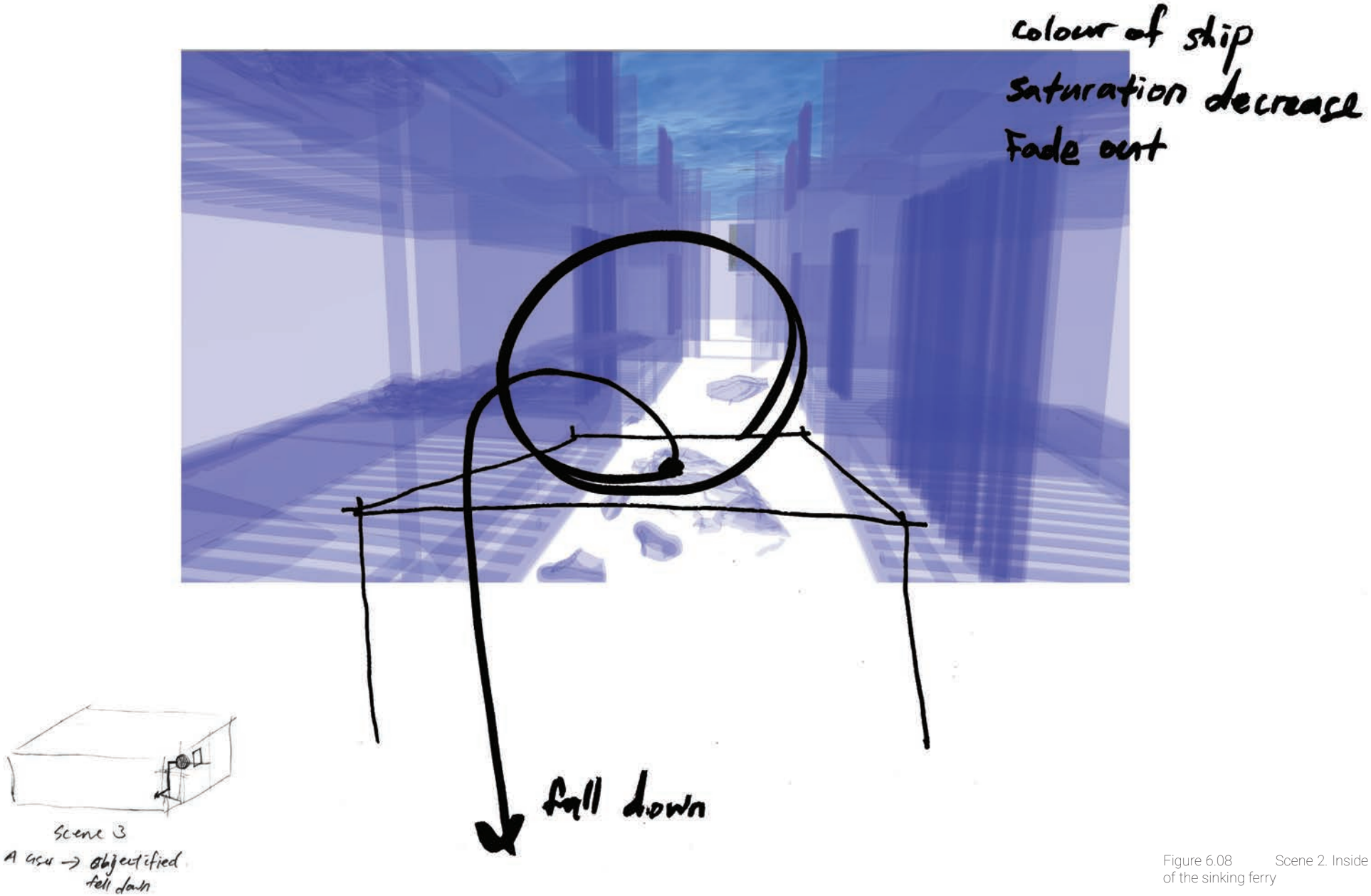
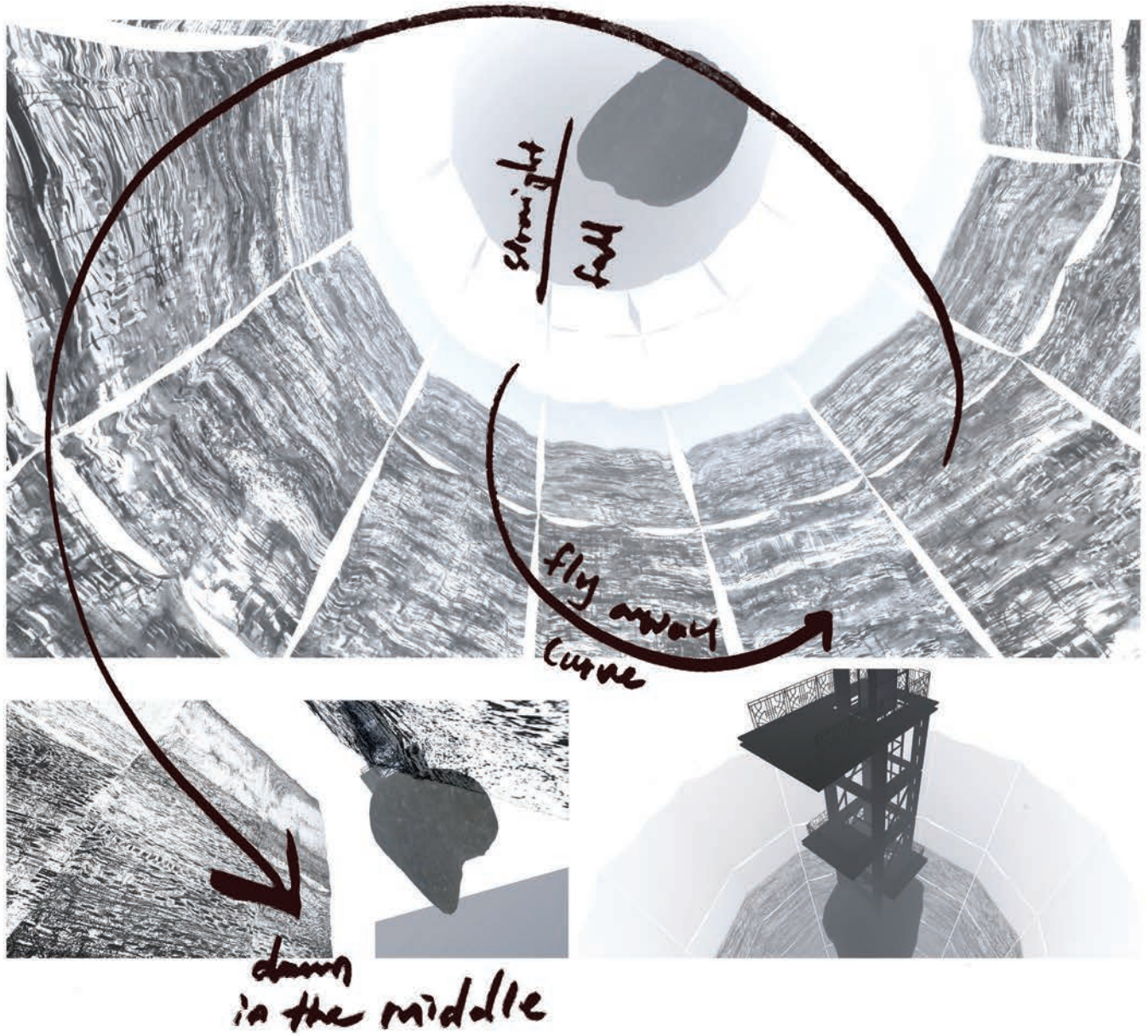
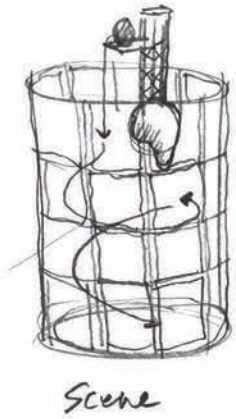


Figure 6.08 Scene 2. Inside of the sinking ferry





6.09

6.10 6.11

Figure 6.09
Scene 3. Diving in to the voice and memory

Figure 6.10, 6.11
Scene 3. Test image

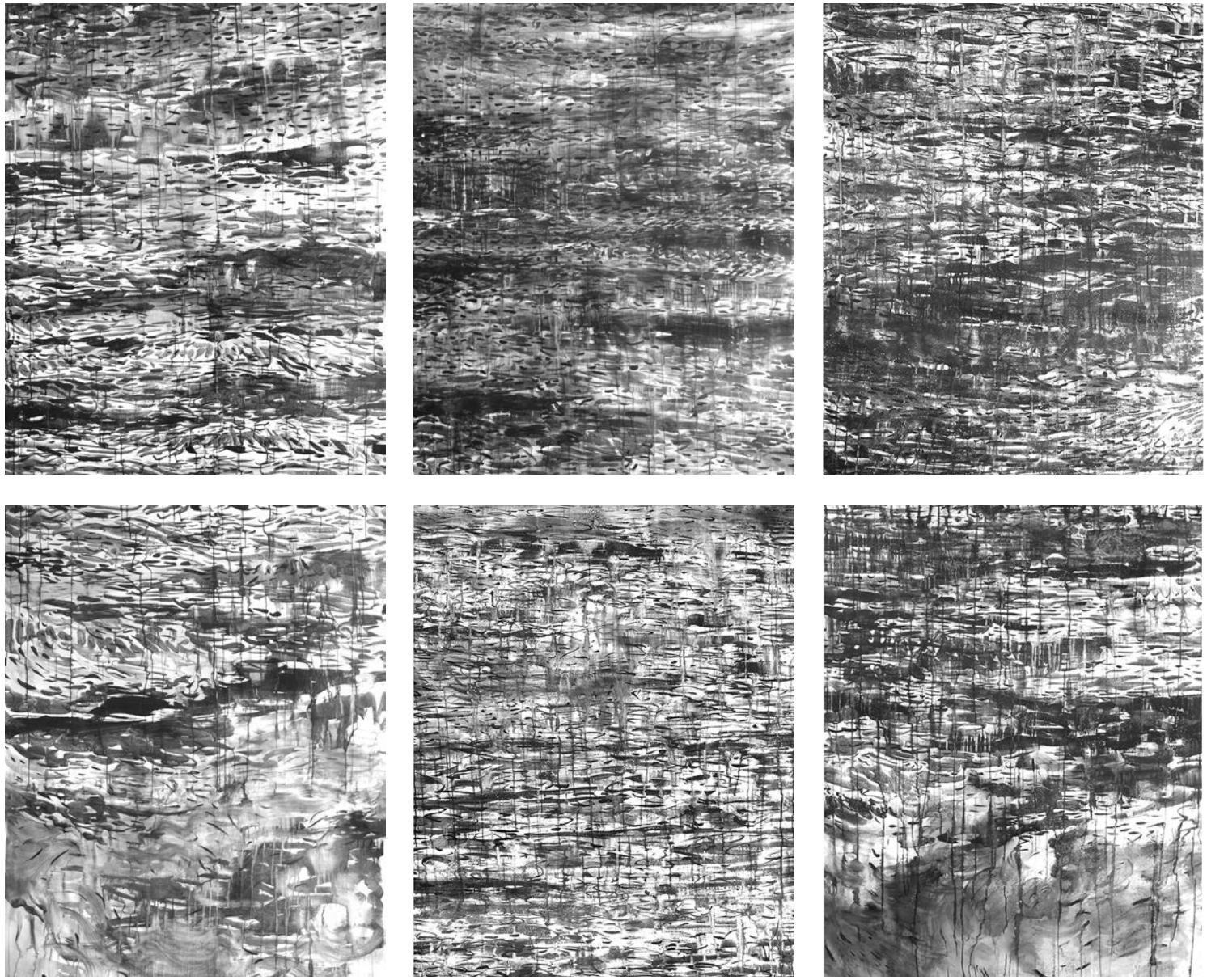


Figure 6.12
Digitized images of drawings

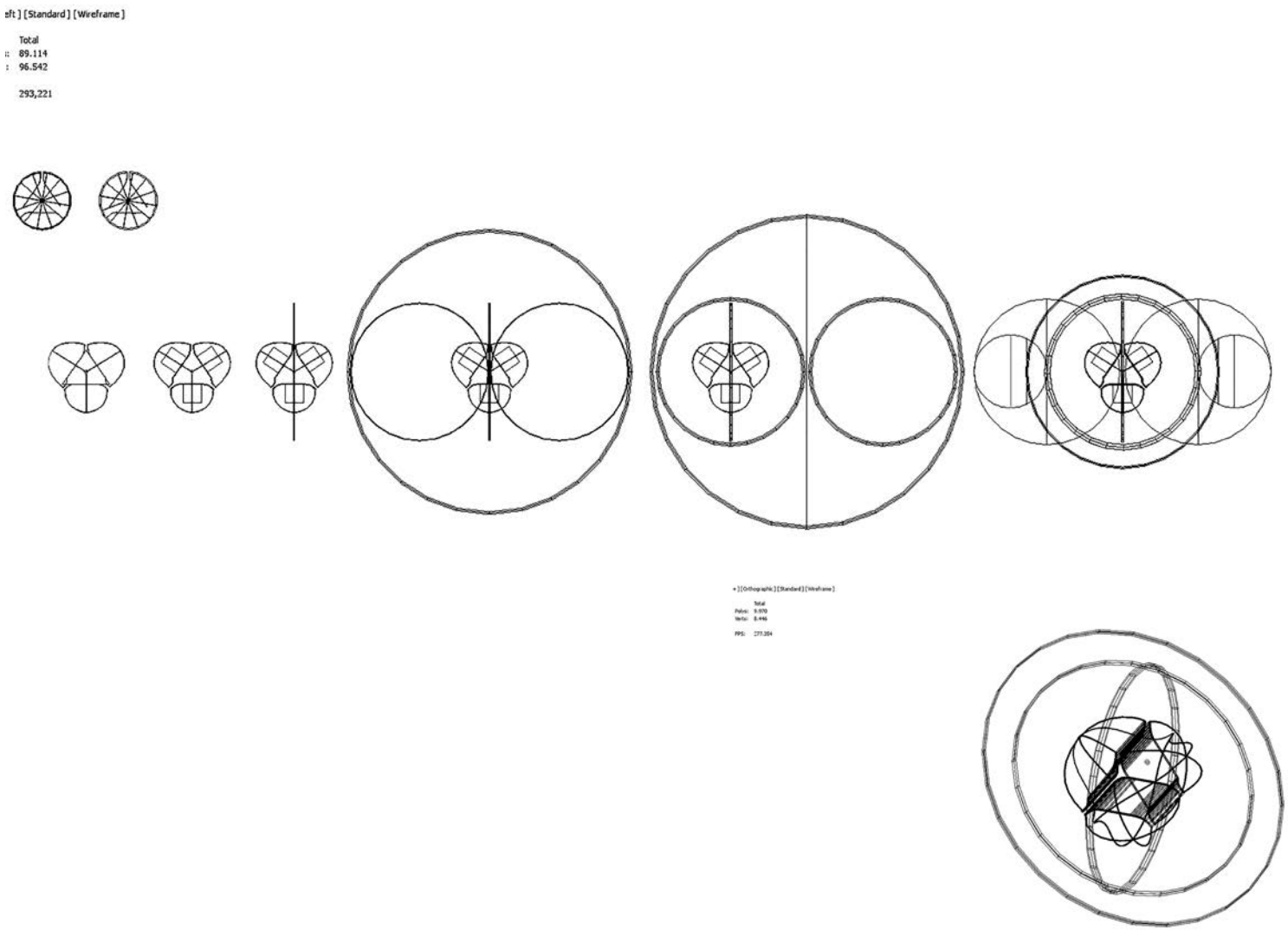
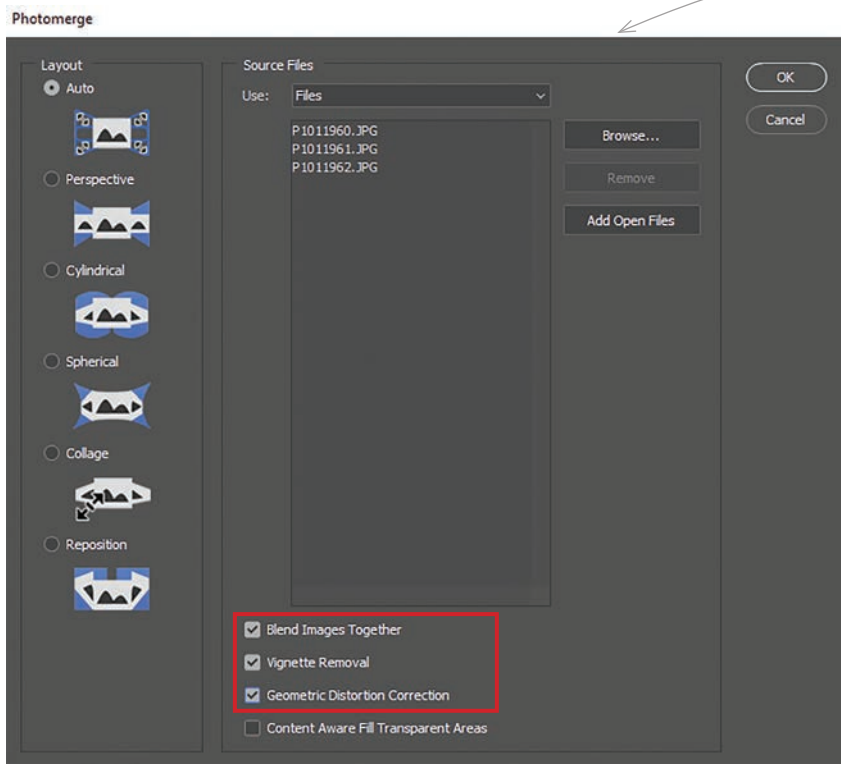
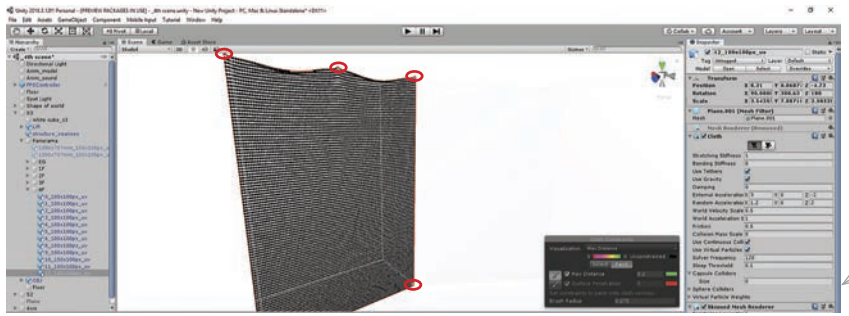


Figure 6.13 Test images of the rotating three-sided platform containing three different time-spaces. The rectangles are the hidden pockets for each stage: (1) DBL, (2) Sewol and (3) Soon-Yi's memory. Also, each thin torus has an invisible axis like the earth.





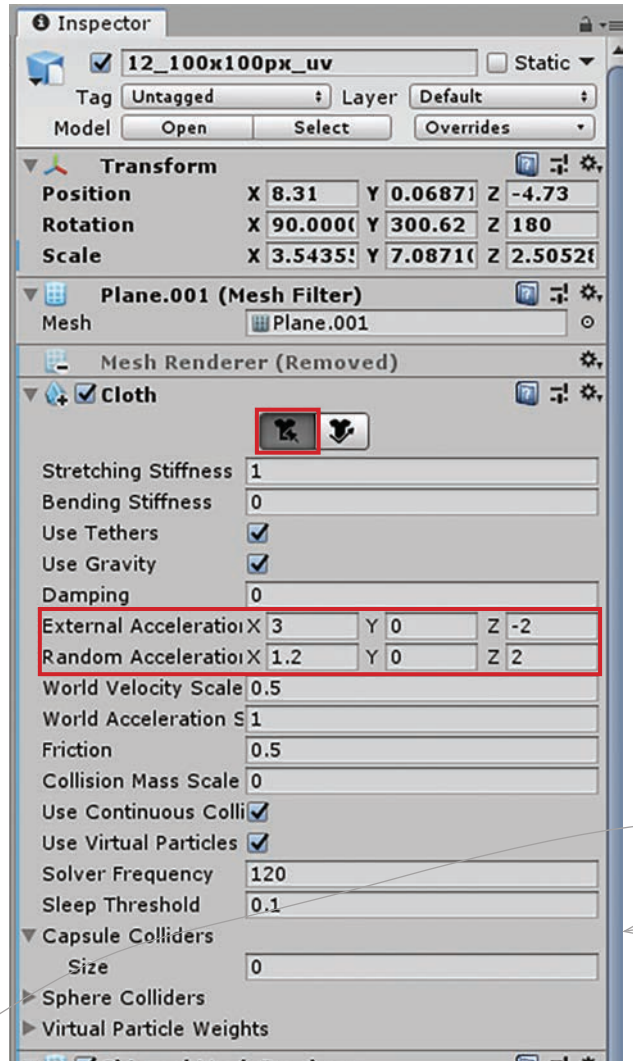


Figure 6.14
Photomerge process in Adobe Photoshop. Every two meters of the drawing was taken as twelve pieces of photographs (raw file, JPEG). And then, each fragmented image merged together through this process(File/Automate/Photomerge...). Vignette should be removed and the geometric distortion should be corrected. The layout should be selected depending on the status of photographs. In my case, Auto was usually taken, but sometimes the result of Spherical had better quality.

Figure 6.15
Physics - Cloth in Unity3D. The hanging points should be set in Cloth Constraints/Max Distance (0,2 -> 0). Wind is generated by External/Random Acceleration level (-3 ~ 3).

6.1.2 PHYSICAL ENVIRONMENT

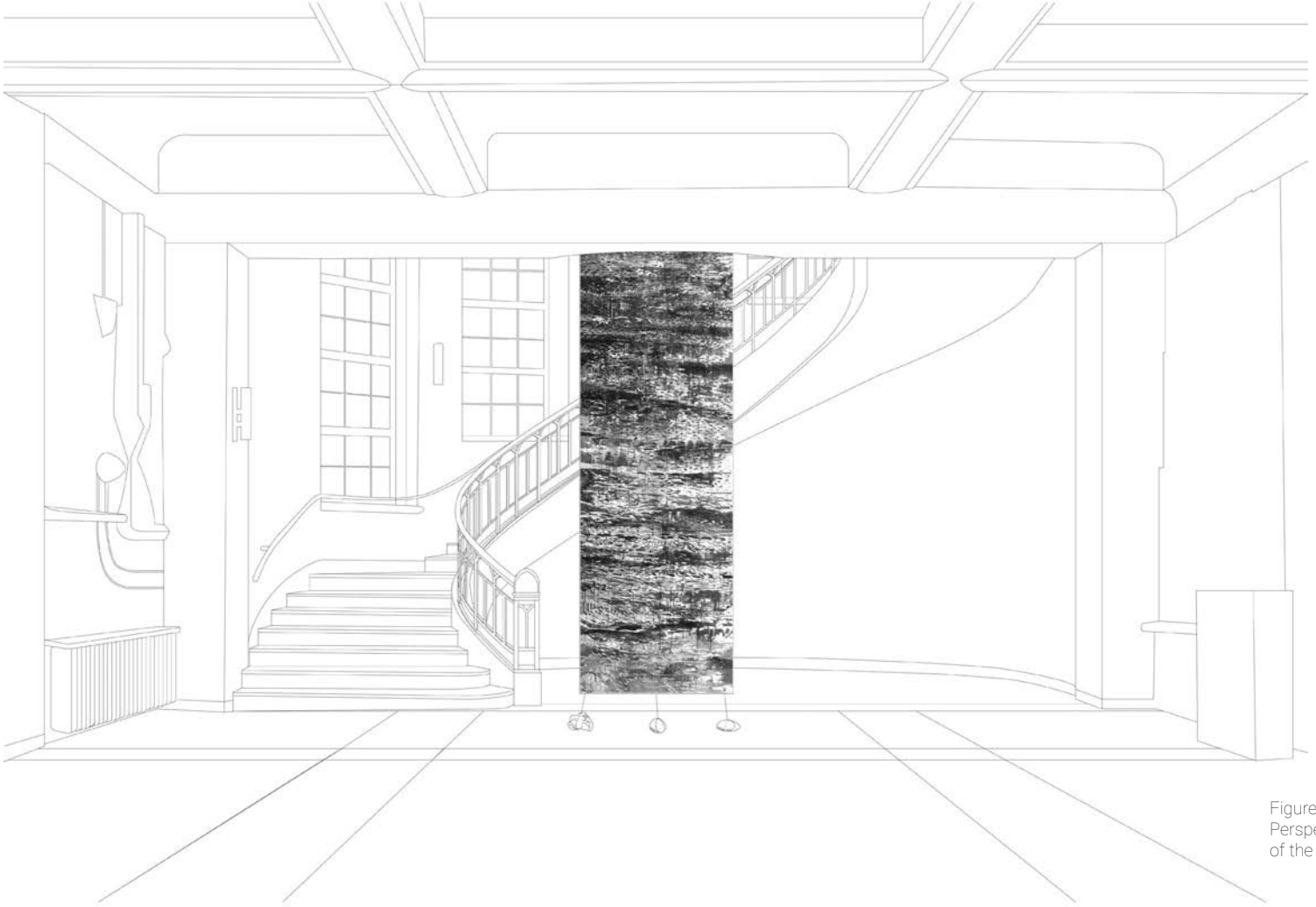


Figure 6.16
Perspective from the main door of the building.

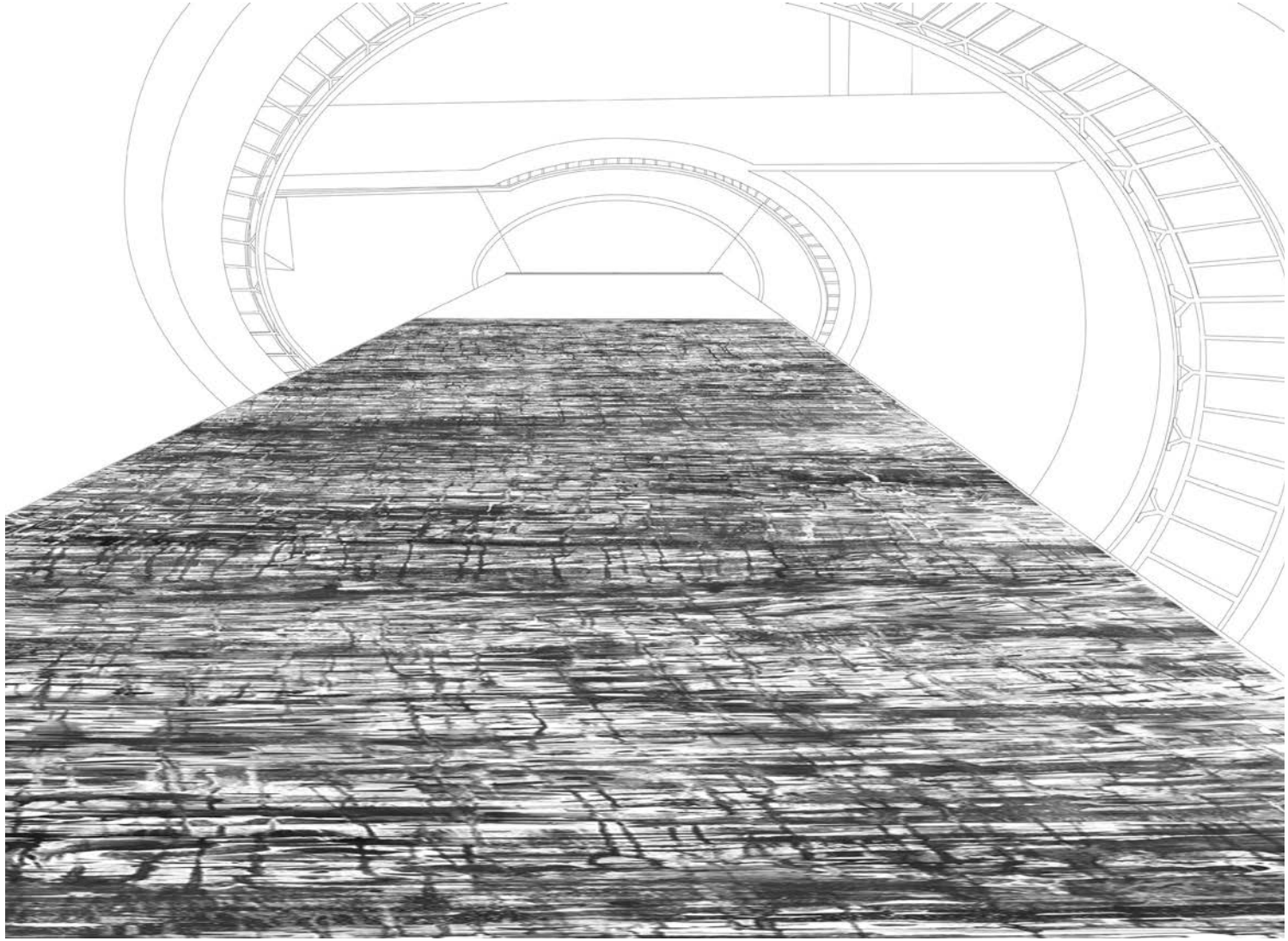


Figure 6.17 Perspective from the foot of the drawing looking up.

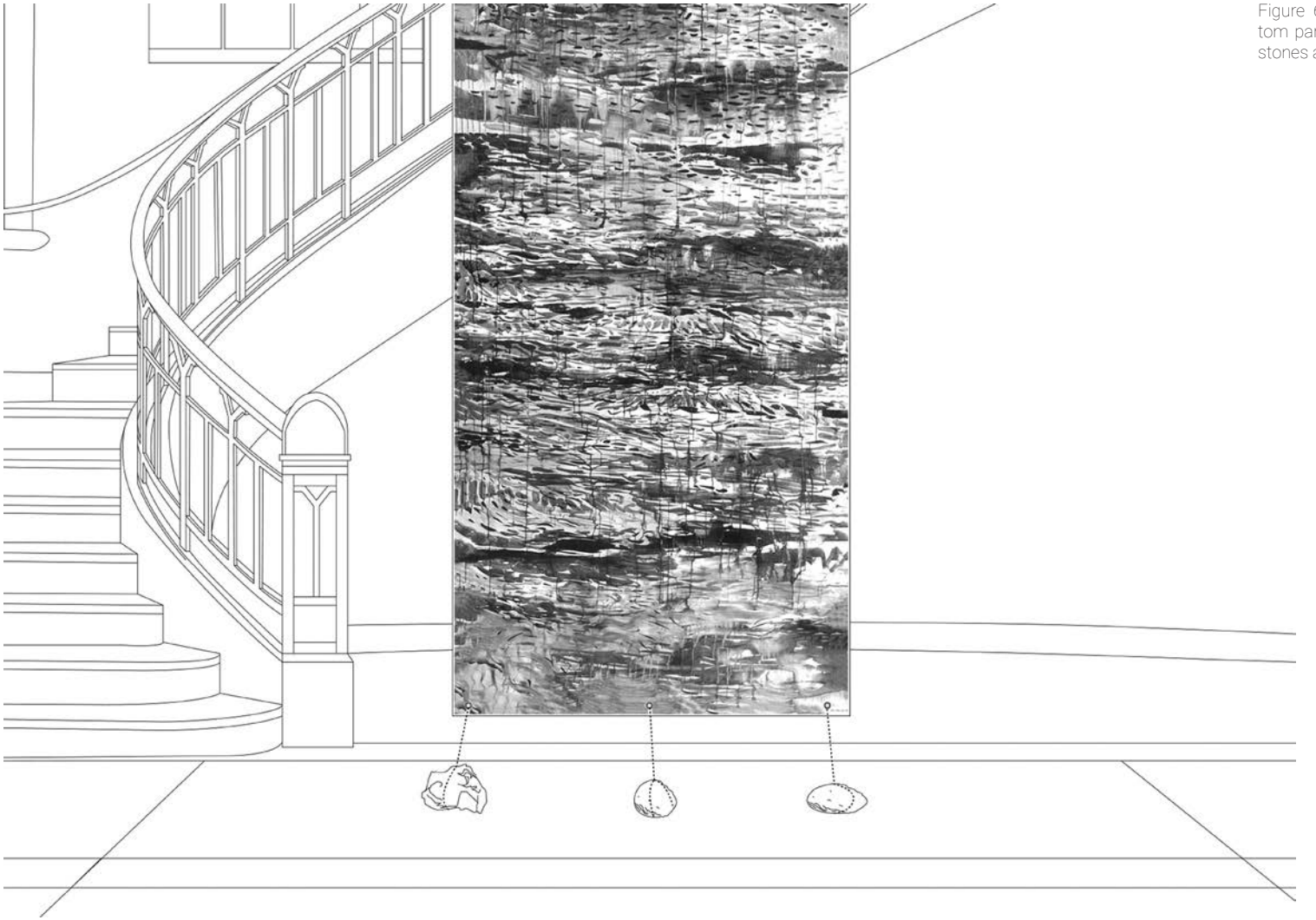


Figure 6.18 Detail of the bottom part of the drawing fixed by stones and twisted grass strings.

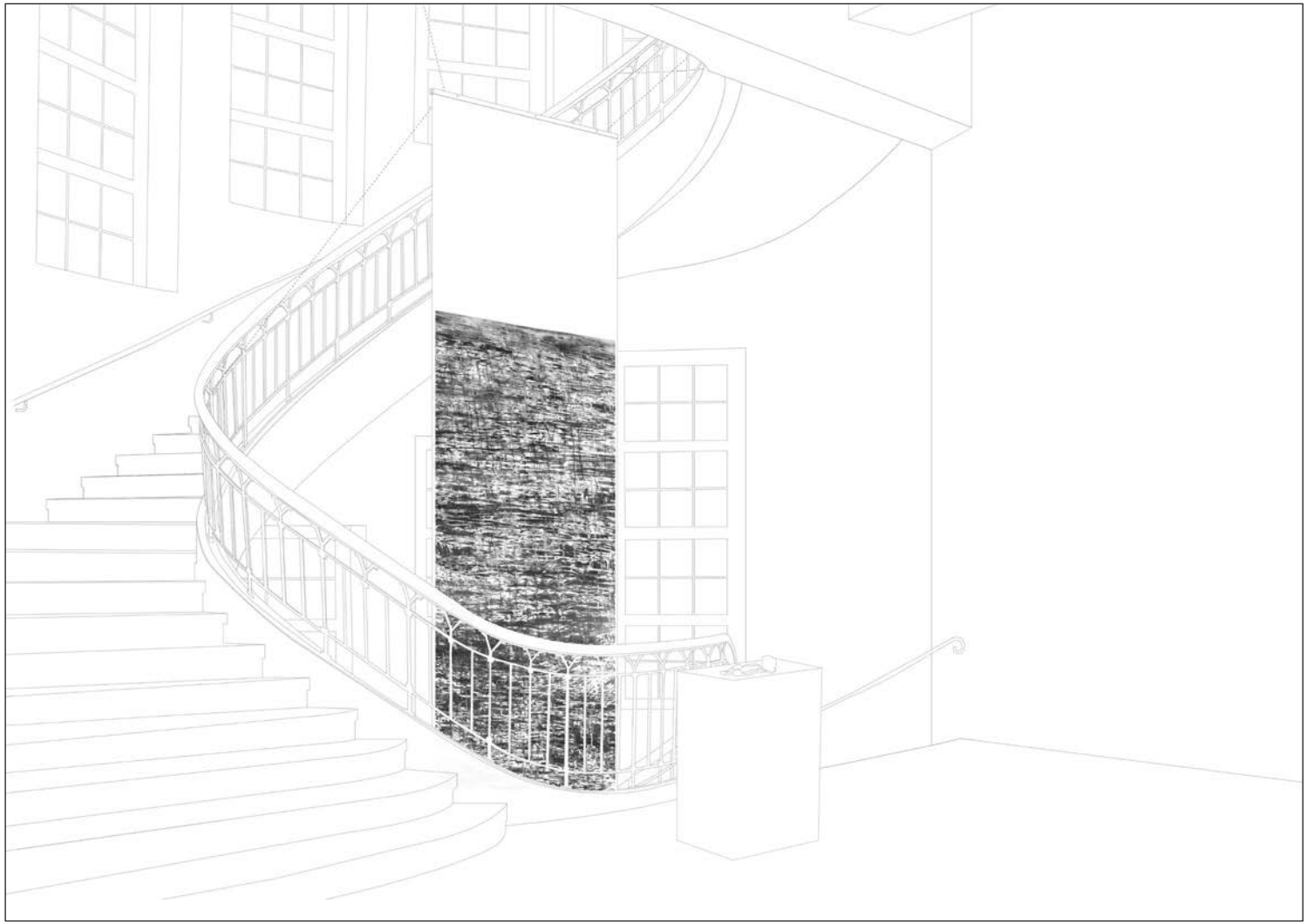


Figure 6.19
Sound and information deck for the installation.

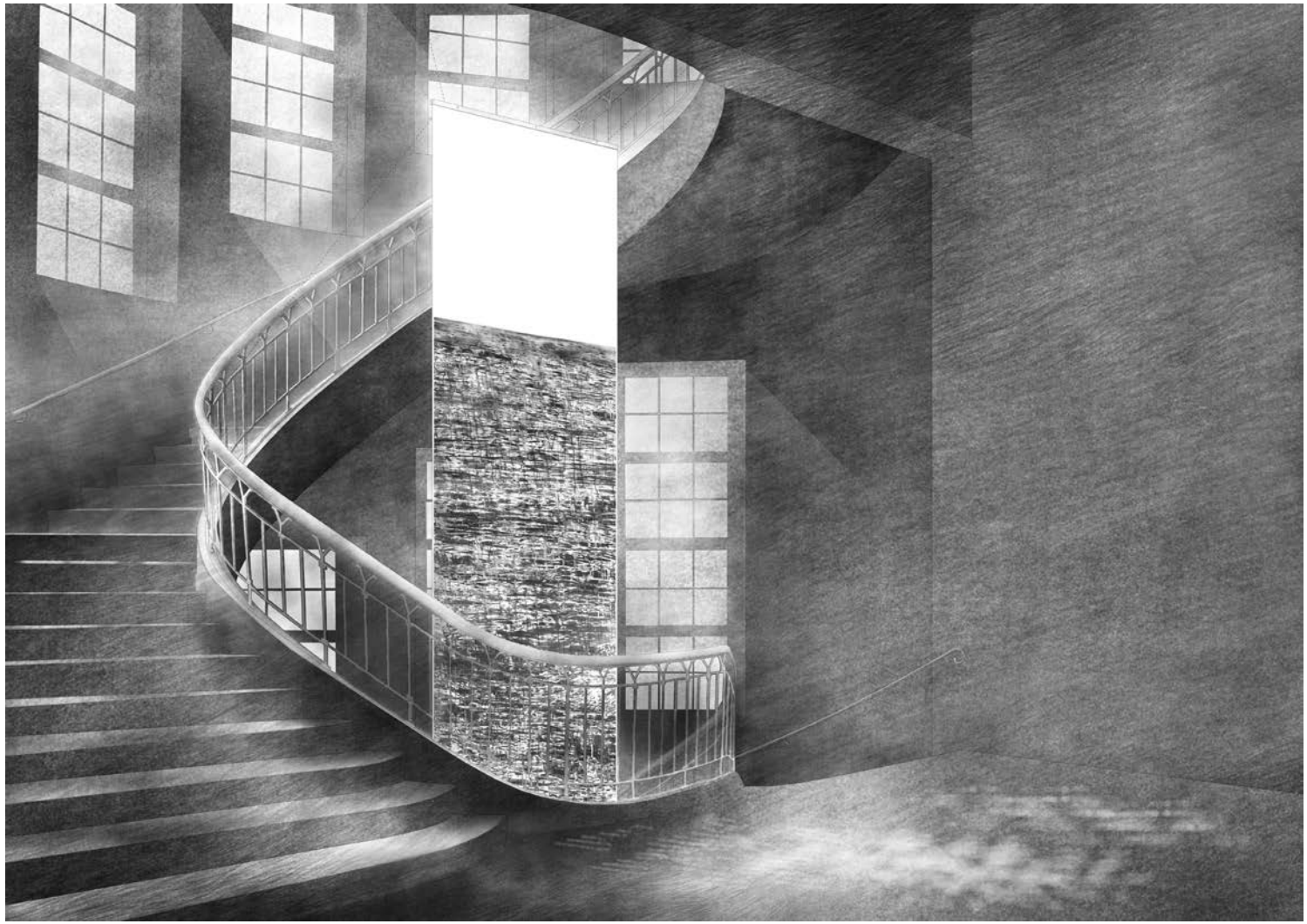
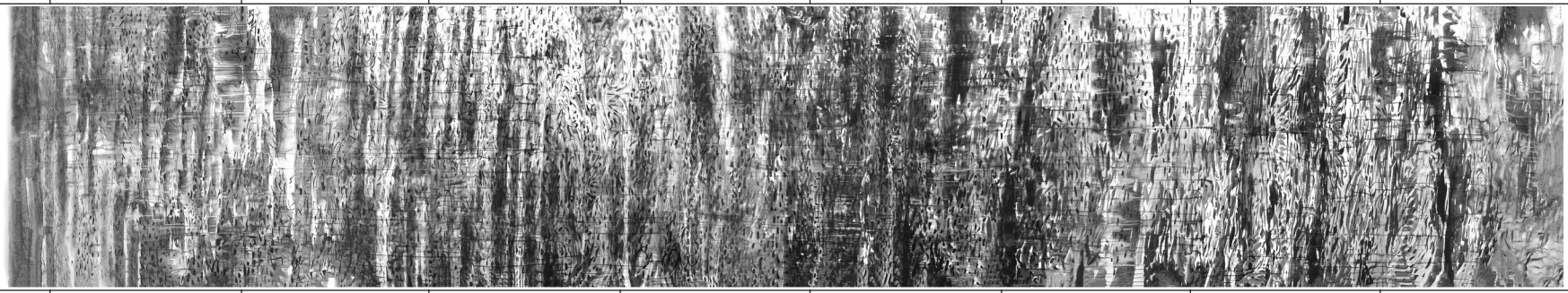


Figure 6.20
Light sketch of the first floor of the building.

10 m 9.5 m 9 m 8.5 m 8 m 7.5 m 7 m 6.5 m 6 m 5.5 m 5 m 4.5 m 4 m 3.5 m 3 m 2.5 m 2 m 1.5 m 1 m 0.5 m 0 m



10 m 9.5 m 9 m 8.5 m 8 m 7.5 m 7 m 6.5 m 6 m 5.5 m 5 m 4.5 m 4 m 3.5 m 3 m 2.5 m 2 m 1.5 m 1 m 0.5 m 0 m

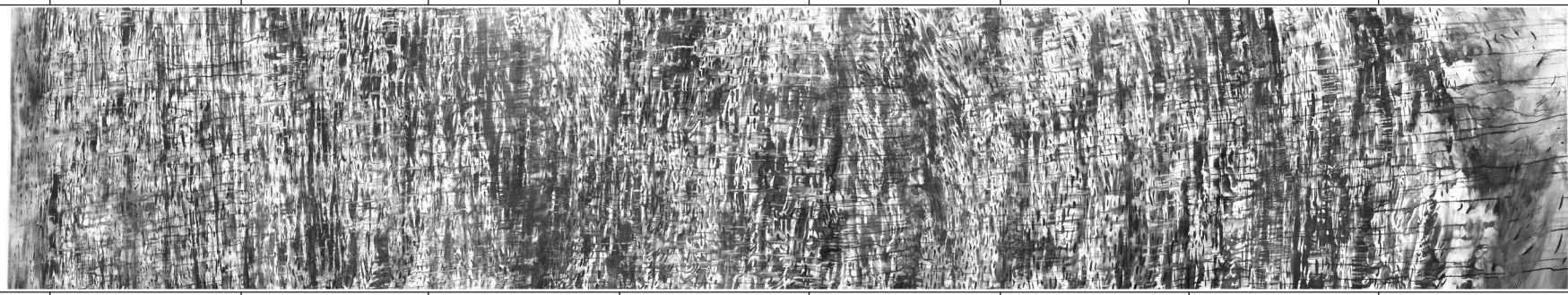


Figure 6.21

6.2 CONSTRUCTION

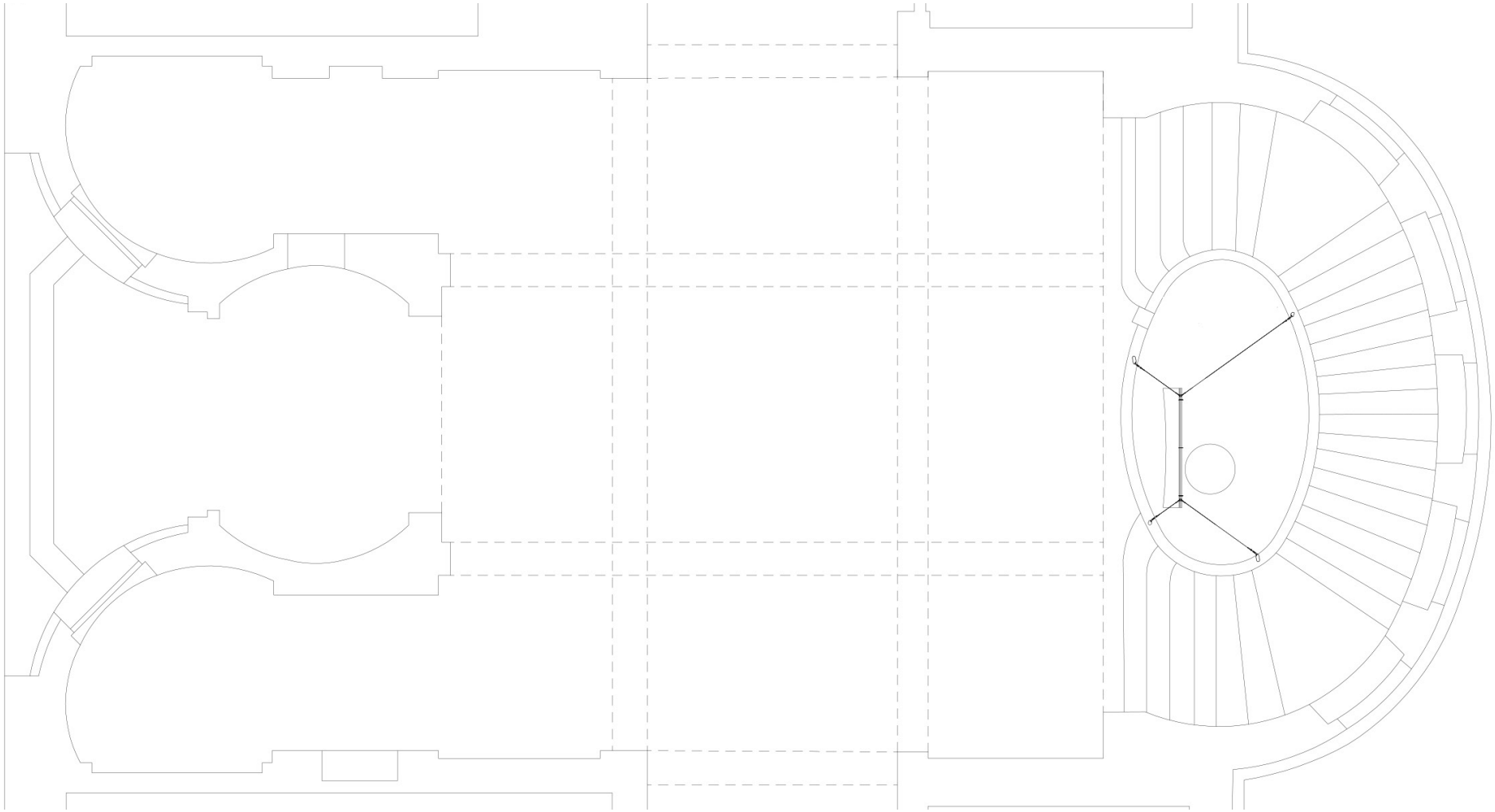


Figure 6.22 **PLAN 1:100**

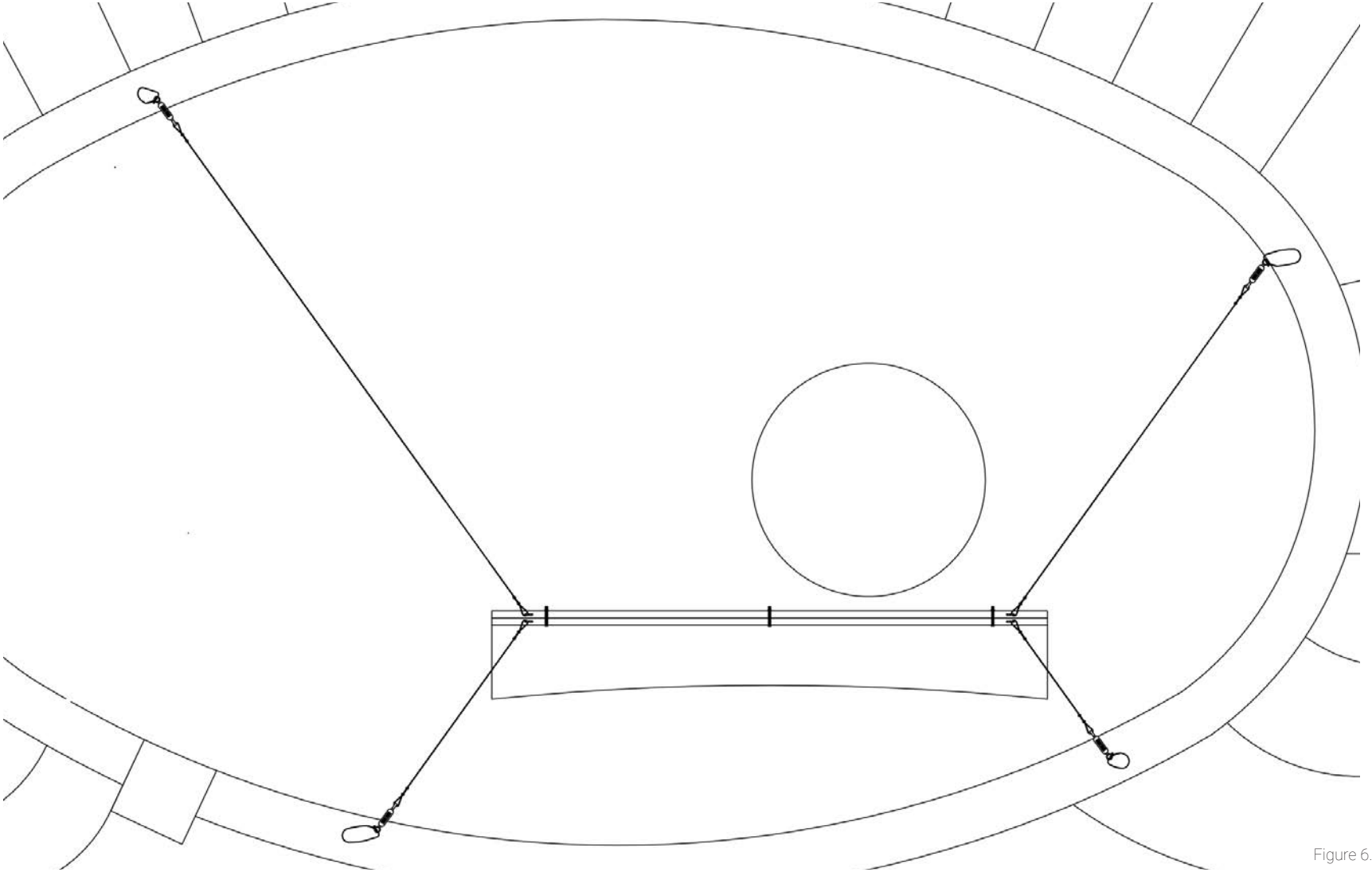


Figure 6.23 **PLAN 1:20**

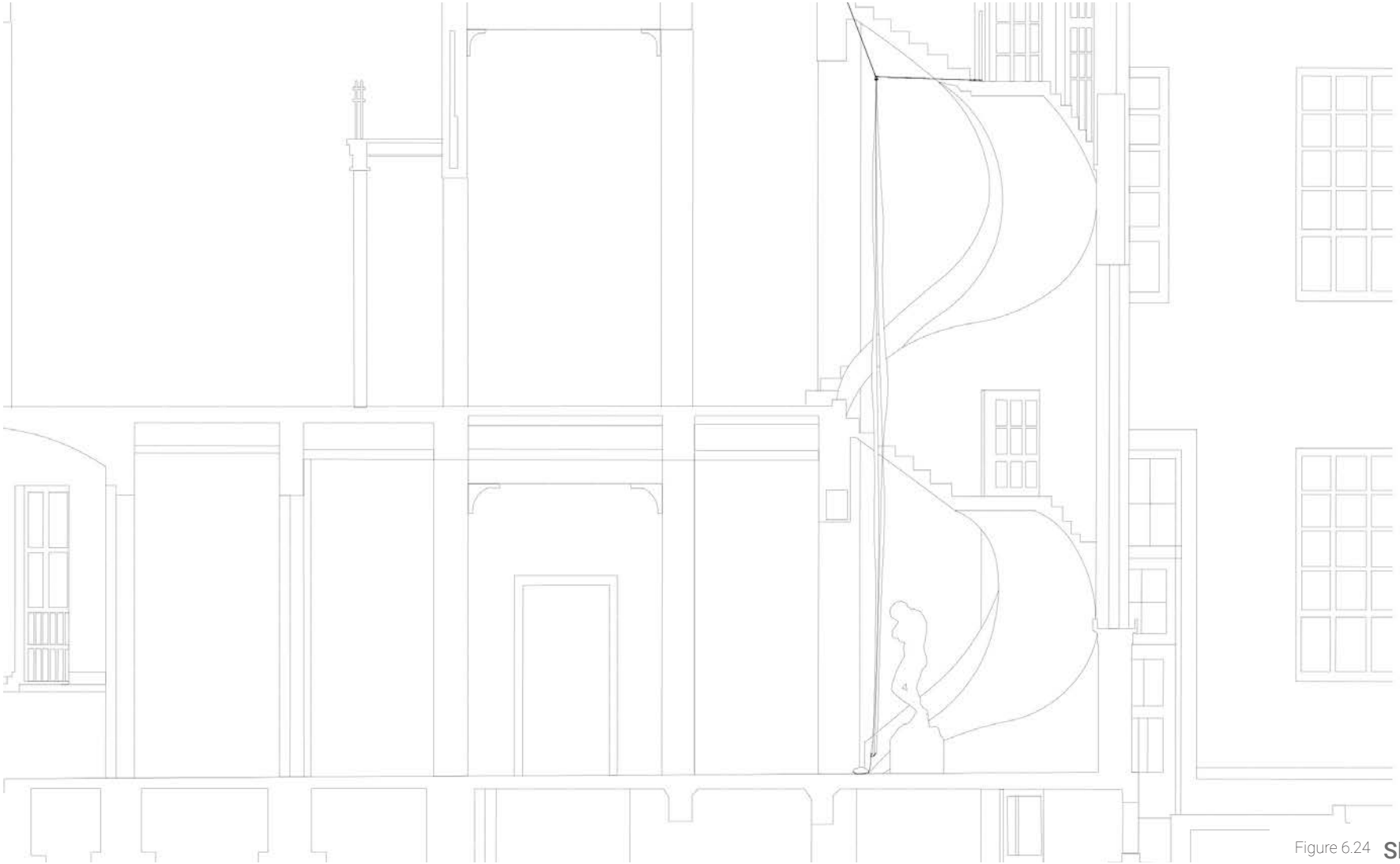


Figure 6.24 **SECTION 1:100**

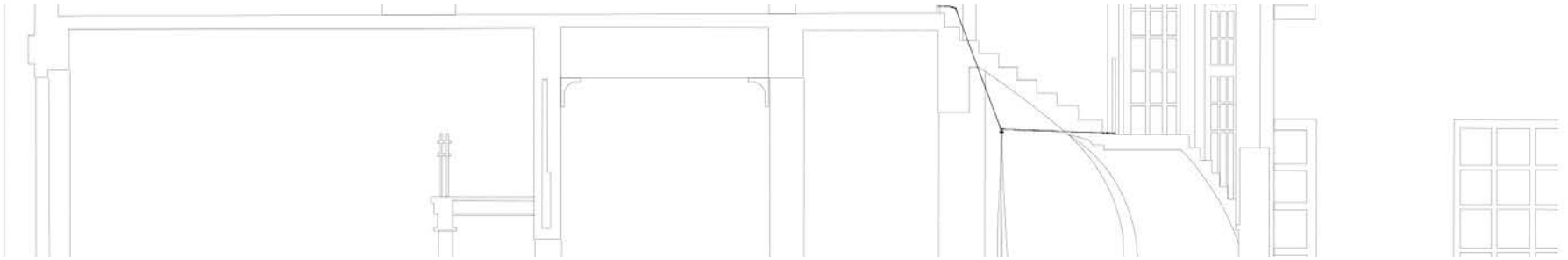
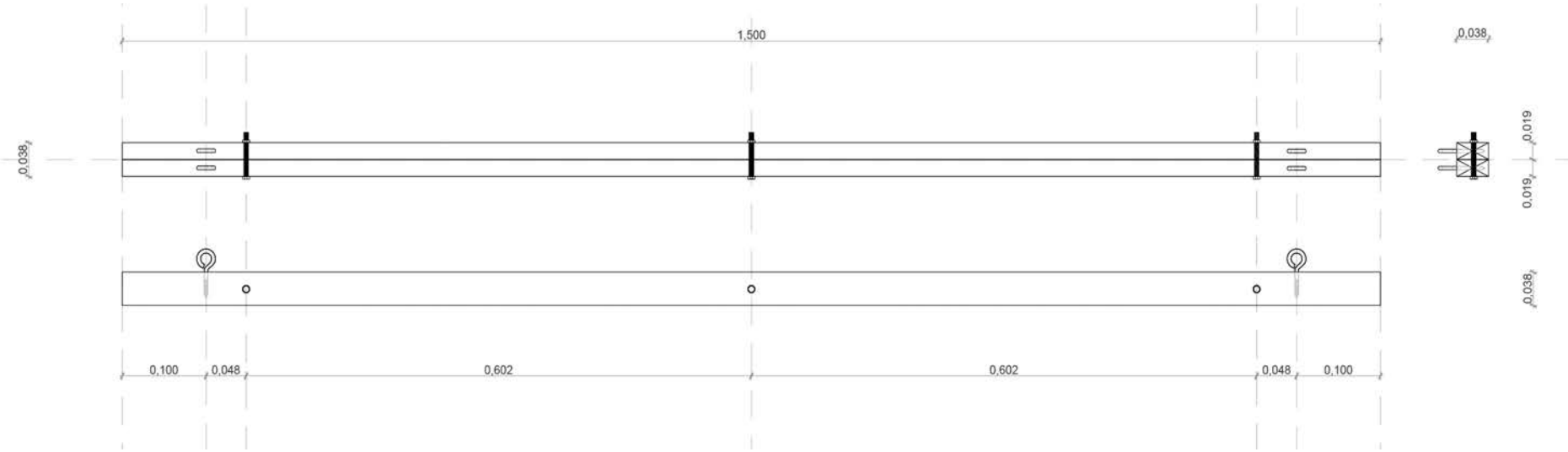


Figure 6.25 **SECTION 1:100**

Figure 6.26 **INSTALLATION DETAIL 1:3**



Ringschraube Ø 4 mm Weiß	30 mm
Maschinenschraube M8	50 mm
Mutter	8 mm

Figure 6.27 **HANGER 1:7**

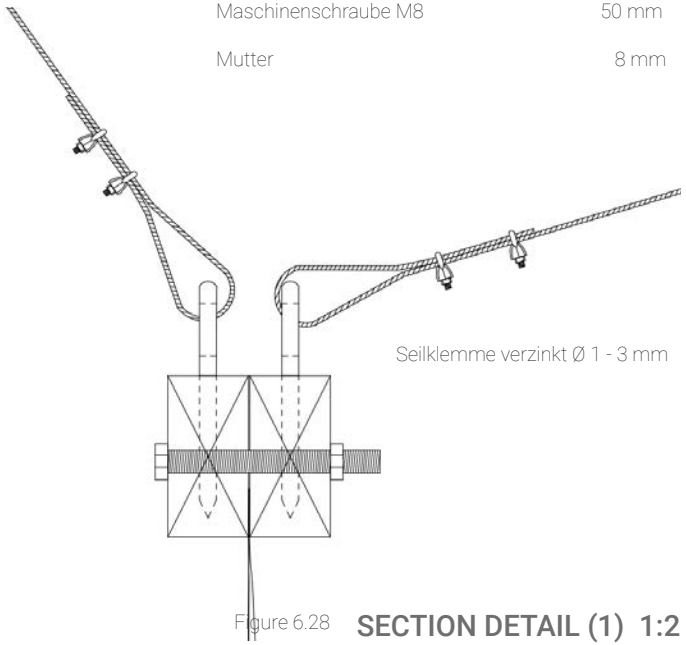


Figure 6.28 **SECTION DETAIL (1) 1:2**

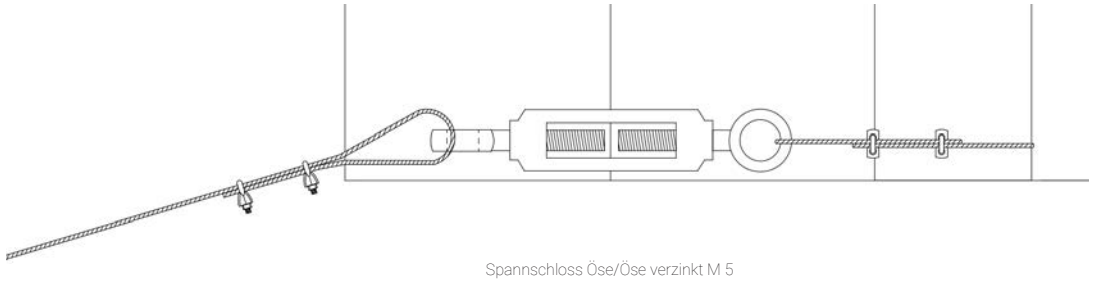


Figure 6.29 **SECTION DETAIL (2) 1:2**

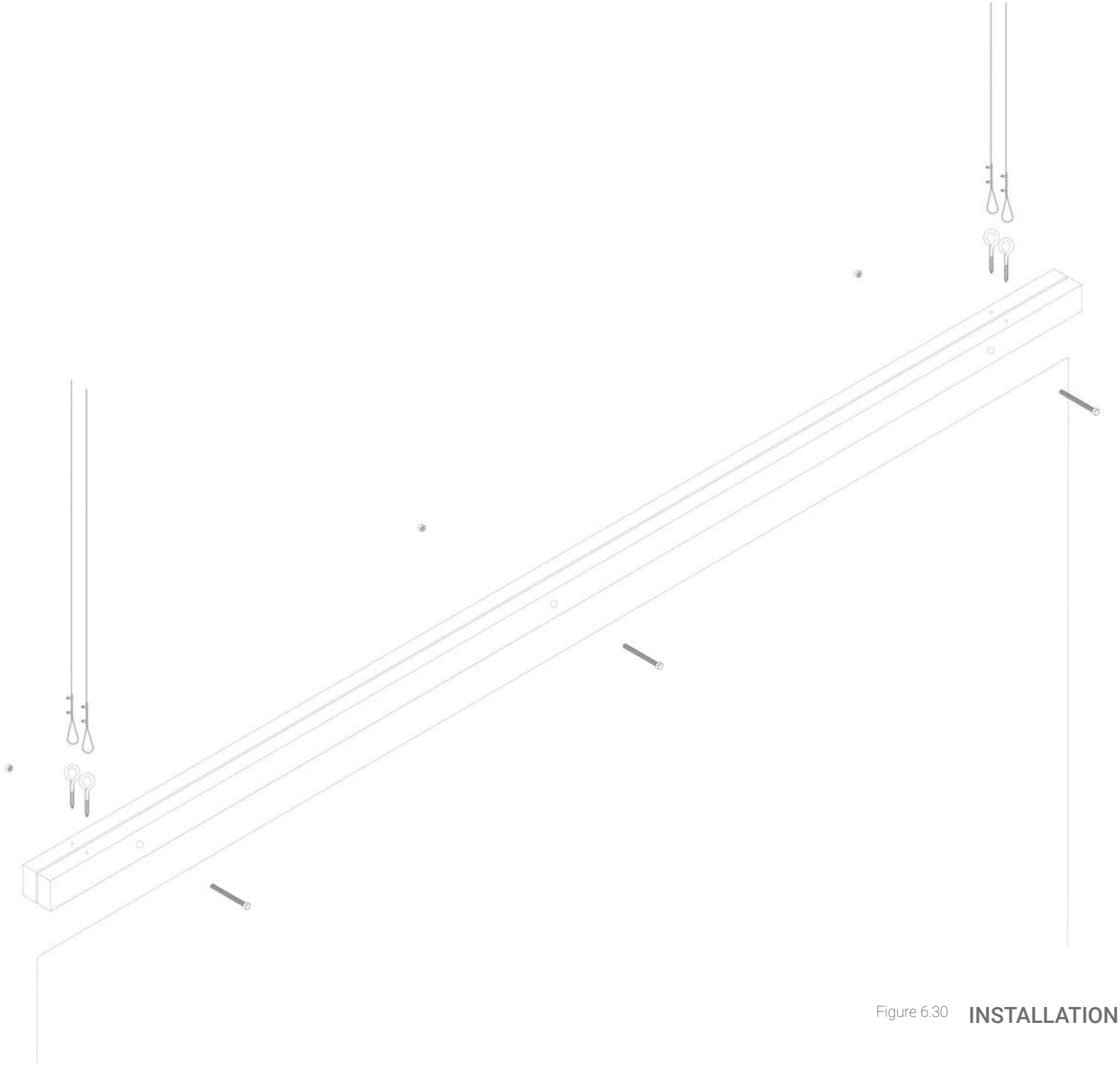


Figure 6.30 INSTALLATION DETAIL ISOMETRY 1:6

7. CONCLUSION

Why are we constantly fascinated by stories, whether ordinary or marvelous? Why do we never stop developing brand-new tools/machines which stimulate our sensory organs better and better? Perhaps the reason is that we never forget the liveliness of a parent's voice when s/he reads a book until we fall asleep. The trembling of the voice, the warmth in the bed and the story about a day or a life of somebody. In the beginning, that somebody was just an unknown stranger, but after some time the person became us as we put our feet in her/his virtual shoes.

Could our media technology reach the lightness of a container (voice, warmth, deemed light in a dark room) of a story that transmits intense emotion and curiosity? In this era of VR, I would like to say that the weight of the medium has the possibility to become lighter. This is also a reason why this materialized memory of Sewol Ferry and Soon-Yi deserved to be realized as a form of VR. The lightness of VR is now quite similar to the mellifluous voice of our parents during childhood. At this moment, the medium, VR, is not just a game but can talk about something deep inside.

Because the memory and experience of Soon-Yi were real, this fragile sparkling of the materialized memory had to become a tangible print that Soon-Yi would have seen before. Throughout the examination of the reason for mapping and translation, the legitimacy of memory and the palpability of time and space, it became clear that there is virtuality in physical realness, and vice versa. The tangible print (a piece of the drawn scene, 10 meters in height) together with the VR (Staging Narrative Space in VR: On A Tilting Floor) are more than just a static artifact and an experience containing information value, respectively. Rather they are also nodes of a network oscillating their accumulated, indexed signs and their metadata, in order to light up the whole circuit of the network.

8. GLOSSARY

1. Affordance: One of the fundamental principles of interaction. "The term affordance refers to the relationship between a physical object and a person (or for that matter, any interacting agent, whether animal or human, or even machines and robots). An affordance is a relationship between the properties of an object and the capabilities of the agent that determine just how the object could possibly be used."

- Norman, The Design of Everyday Things, p.11

2. Agency: One of the aesthetics of the medium, the sense of agency is experienced in our electronic environment. "Agency is the satisfying power to take meaningful action and see the results of our decisions and choices"

The pleasure of Navigation under the category of Agency: "All of them allow us to experience pleasure specific to intentional navigation: orienting ourselves by landmarks, mapping a space mentally to match our experience, and admiring the juxtapositions and changes in perspective that derive from moving through an intricate environment."

- Murray, Hamlet on the Holodeck, p.126-129

3. Agent: A person or thing that takes an active role or produces a specified effect. Origin: Late Middle English (in the sense 'someone or something that produces an effect'): from Latin agent- 'doing', from agere.

- Oxford Dictionary: Online

4. Transformation: is also one of the characteristics of the aesthetics of the medium. "Anything we see in digital format - words, numbers, images, moving pictures becomes more plastic, more inviting of change. The transformative power of the computer is particularly seductive in narrative environments." The ways of transformation can be varying the texture of experiences and shape/shifting.

- Murray, Hamlet on the Holodeck, p.154-155

5. Mapping: Mathematics Linguistics: An operation that associates each element of a given set (the domain) with one or more elements of a second set (the range).

- Oxford Dictionary: Online

"Mapping is a technical term, borrowed from mathematics, meaning the relationship between the elements of two sets of things"

- Norman, The Design of Everyday Things

6. Performativity: is a complex concept that can be thought of as a language which functions as a form of social action and has the effect of change.

- Cavanaugh, Performativity, 2017

Performative: Linguistics Philosophy Relating to or denoting an utterance by means of which the speaker performs a particular act (e.g. I bet, I apologize, I promise).

Perform: 1. Carry out, accomplish, or fulfil (an action, task, or function)
2. Present (a form of entertainment) to an audience.

Origin: Middle English from Anglo-Norman French parfourmer, alteration (by association with forme 'form') of Old French parfournir, from par 'through, to completion' + fournir 'furnish, provide'.

- Oxford Dictionary: Online

"A general definition provided by Cavanaugh(2015) maintains, "Performativity is the power of language to effect change in the world: language does not simply describe the world but may instead (or also) function as a form of social action."

Startling point of the discourse was John L. Austin, who tried to define the term 'performative' (1967/1955)."

- Schneeberger, Case study of textual performativity, Handbook of Pre-Modern Nordic Memory Studies: Interdisciplinary Approaches, p.421

"The convergence of ideas of performativity and fluidity within discourses around identity, gender, sexuality, culture, and ethnicity permits an escape from canons of all sort (Butler 1988, 1990; Braidotti 1994a; Diprose 2002)."

7. Poesie: (engl. poetry) Literary work in which the expression of feelings and ideas is given intensity by the use of distinctive style and rhythm; poems collectively or as a genre of literature.

Origin: Late Middle English from medieval Latin poetria, from Latin poeta 'poet'. In early use the word sometimes referred to creative literature in general.

- Oxford Dictionary: Online

8. Poiesis: Literary. Creative production, especially of a work of art; an instance of this.

Origin: Mid 19th century; earliest use found in The North British Review. From ancient Greek ποίησις creation, production from ποιεῖν to make, create, produce + -σις.

- Oxford Dictionary: Online

9. Rhizome: Botany. A continuously growing horizontal underground stem which puts out lateral shoots and adventitious roots at intervals.

Origin: Mid 19th century from Greek rhizōma, from rhizousthai 'take root', based on rhiza 'root'.

- Oxford Dictionary: Online

"[...] Gilles Deleuze's "Rhizome", a tuber root system in which any point may be connected to any other point (Deleuz and Guattari in Murray 2001:132). Deleuz used the rhizome root system as a model of connectivity in systems of ideas; critics have applied this notion to allusive text systems that are not linear like a book but boundaryless and without closure."

- Murrayl,Hamlet on the Holodeck: The Future of Narrative in Cyberspace, p.132

10. Method: A particular procedure for accomplishing or approaching something, especially a systematic or established one.

Origin: Late Middle English (in the sense 'prescribed medical treatment for a disease'): via Latin from Greek methodos 'pursuit of knowledge', from meta- (expressing development) + hodos 'way'.

- Oxford Dictionary: Online

11. Methodology: A system of methods used in a particular area of study or activity.

Origin: Early 19th century from modern Latin methodologia or French méthodologie.

- Oxford Dictionary: Online

12. Metadata: A set of data that describes and gives information about other data.

- Oxford Dictionary: Online

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10. LIST OF FIGURES

IMPRESSUM

STAGING NARRATIVE SPACE IN VR:
ON A TILTING FLOOR
INTERSECTION BETWEEN CLASSIC AND NEW MEDIA

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