



This documentation describes the practical part of my bachelor thesis. After having arrived at a conclusion in my theoretical work *“Vieweing all: Can a point of view movie together with a panoramic screen increase immersion in movies?”* I now show the full process of me going from initial idea to finished multiscreen video installation. I go into detail about my thought process and elaborate why the final product looks the way it does. Finally, I describe the execution and results of the screening experiment, during which I showed my video on the multiscreen installation to a total of 34 test persons and collected their feedback in a survey. Building on this data I find my initial hypothesis from the theoretical part validated and conclude this report by giving a prediction for the future of cinema as a medium.



Valeria Garci-Crespo López

IMMERSIVE CINEMA VISION

Multiscreen projection and point of view style movie "Eternity"



Documentation Bachelor Thesis

IMMERSIVE CINEMA VISION

Multiscreen projection and point of view style movie "Eternity"

Valeria Garci-Crespo López

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To my beloved parents and boyfriend

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1. Declaration of Independent Work

I hereby declare that this thesis contains only my own independent work and that I have not received any help from other people. All citations, whether literal or by meaning, are clearly marked as such and their sources are listed in the bibliography. I also declare that I have read and understood the regulations for the bachelor thesis of the BTK-Hochschule für Gestaltung.

Berlin, 14.03.2017

Valeria Garci-Crespo López
..... (Signature)

2. Abstract

In my initial proposal, I wanted to find a way of giving the audience a new type of cinematic immersion. I intended to analyze which type of screen could give more immersion to the audience and find the advantages and disadvantages of different screens with 360°, 270° and 180° of field of view. Also, I wanted to see if the use of point of view might have any advantages for the immersion of the audience.

Later, in the theoretical part of my thesis I tried to determine whether the use of a point of view style movie together with a panoramic screen can increase the immersion in cinema compared to the current widescreen format and the common Hollywood visual storytelling. To do so, I first saw how screens have developed in order to understand the difference and relation between panoramic screens and widescreens. I understood the importance, meaning and different types of immersion. Then I looked at what point of view is and when it appears as well as reviewed some movies that have used it as their principal way of visual narrative. I analyzed the key characteristics of widescreens and panoramic screens in terms of immersion and saw which advantages and disadvantages point of view has as a visual narrative. Finally, I analyzed how the combination of point of view and a panoramic screen could increase immersion and if one or both of them could be the future of the entertainment industry.

Now in the practical part of my work I wanted to actually prove my hypothesis, that a panoramic screen with a point of view style movie could increase the immersion for the viewer. For this purpose, I explored different ways of showing a movie, including Virtual Reality and I ended up building a small-scale version of a multiscreen panoramic cinema. Then I wrote and recorded a text and filmed video material to build a point of view style movie. This movie was then shown on the multiscreen panoramic setup to multiple test persons who gave their feedback in the form of a survey. The results of the survey prove that the original hypothesis is in fact correct and the multiscreen projection does increase the spatial immersion of the audience, but, a point of view style movie does not significantly increase immersion.

3. Results of the theoretical part

Stories, emotions and immersion are some of the key reasons why we go to the cinema. All of these have to be conveyed with the use of sound and a screen. The utilized widescreens cover our center of gaze and are therefore very well suited to convey information or a story. But we still perceive our surroundings with our peripheral view and therefore cannot forget where we are. Movie theaters counter this by darkening the room and having only the bright screen visible to the eye, thus making us “lose the frame” and ignore our unfilled peripheral view. The next evolutionary step for screens would be the panoramic screen, which does the extra effort to also project information in our peripheral view. This can be achieved by in various ways, from a curved screen to a multiscreen, where a main screen in the middle is complemented by two additional ones on each side. That way the audience can keep their attention focused on the center screen and still have their full field of view covered.

The combination of a point of view style movie, where we see the action from one character’s perspective, and a panoramic screen has the potential to bring an experience to the audience that can take them to a different reality. By covering the full field of view and projecting a point of view image the sensory input is basically the same as in everyday life, which should create high levels of immersion. It is basically the closest one can get to virtual reality with a cinema screen.

4. Related Works

To put my work into context, the panoramic multiscreen construction that I built can be related to the Escape screen and ScreenX. The point of view movie which I created can be related to movies like *Hardcore Henry* (Naishuller, 2015), *Enter the Void* (Noé, 2009), *Maniac* (Khalfoun, 2012) and *Lady in the Lake* (Montgomery, 1947). My overall work however should prove to go beyond the existing applications and therefore should add new knowledge to these areas.

5. Collecting ideas

So far, the assumption that panoramic screens are more immersive than widescreens is purely hypothetical. To validate my thesis, I had to do an experiment. For this, there were two possible options:

- A. Build a panoramic type screen that allows one or more viewers to have their peripheral view covered.
- B. Make a simulation using Virtual Reality in order to make people feel and believe that they are sitting in a cinema with the multiscreen setup.

In the following I outline my thought process while considering the two options:

5.1. Building a screen

The first idea was to build my own panoramic type screen. I figured out, what do I need and how different types of screens could be built.

Possible material for the Screen:

- White cloth
- Reflective paint
- Vinyl
- White Spandex

Material for the Support of the Screen:

- Wood
- PVC

Extra material:

- Velcro
- Hammer
- Screws
- Etc.

Requirements for the screen

- movable/transportable
- tall enough to cover an average person's field of view while sitting (about 1,75 m)
- The screen should fit in an area of 20 m²
- The material of the screen should be reflective enough to be able to project a good image

Other things to think about:

- How long does it take to get the material?
- Which material is the best for what I want?
- How are the calculations for building a screen?
- How many projectors do I need?

- Where will the projectors be placed?
- Where can I construct the screen?

Example pictures of possible constructions:



Figure 1: Barco Escape Screen [Img1]s

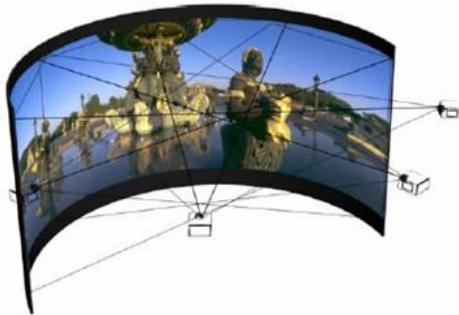


Figure 2: Cinema Screen 180° [Img2]

5.2. Using Virtual Reality

The idea is to show a cinema with a panoramic type screen in a VR environment. On the virtual screens will be projected a 3-minute point of view style movie.

Which VR headset could be used to realize this?

- HTC Vive
- Oculus DK2 / Rift
- VR Glasses + Phone

What does it have to do?

The setup has to create an immersive environment. There is no need for much interactivity, as long as I can show the video and make people believe they are in a cinema. The goal is to put the viewer in one position in a virtual cinema, so they can look around and see the screens, but are not able to move around. This should hold the attention on the screen in front of them and also reduce the amount of necessary code.

Choosing the Hardware

- Since my computer did not have the capacity to handle an Oculus Rift or a HTC Vive I decided to use some basic VR Glasses and a Phone.
- Also there was no need for using one of the more advanced Headsets, since the experience was purely for showing a 360° experience, but included no interactivity.

What do I need to do for this project?

- Film a POV movie for a panoramic screen
- Have VR Glasses and a Phone
- Cut the video and make the sound

Which material and software do I need for this project?

- GoPros
- VR Glasses
- Phone
- Unity
- Cinema 4D
- After Effects
- Premier Pro

What has to be done?

- Testing
- Filming
- Cutting Video
- Making Sound
- Searching Music

Possible Problems:

- Cutting a video for a curved screen or cutting three different videos for the three screens
- Having the Videos projected in Unity at the same time

- Having Sound and Video synchronized in Unity
- Creating projector and light projector in Cinema 4D and bring it to Unity

Things to figure out

- How to film and edit a 270° video
- How big of an angle does a GoPro film?
- Which VR Glasses to buy
- Which software to use
- Can I have a Drone for filming?

Example pictures of possible cinema views:



Figure 3: Barco Escape Screen [Img3]

6. Choosing the display medium

6.1. First attempt: Virtual Reality

First, I decided to take option B, create a cinema simulation to see if the hypothesis of the theses is correct. I thought it would be easier to test my hypothesis in a virtual cinema than building a screen. Another reason for option B was to try something new and see what is possible with Virtual Reality. So I ordered a Google Cardboard VR Headset and created the environment in Unity.

I started by creating a room with four walls a floor and a ceiling and gave them a basic texture. Then I made a chair form basic box shapes and multiplied it to create the seating in the cinema. They got a fabric-like texture. Then I made three planes and arranged them in the way that the three screens would be arranged in the cinema. I imported three short test videos into Unity, which required QuickTime to be installed, because of the file format conversion. The imported video files were then dragged onto the screens as a so called "movie texture". Onto the middle screen I also dragged the respective audio file, to have sound to the video. Into all screens I then dragged a script called "Play Movie" which starts and stops the video and the sound when the space bar is pressed.

To get the VR functionality I downloaded the Google VR package and imported it into my project. Then I used the "GvrMain"-Object as my main camera and placed it in the middle of the seating rows. This resulted in me being able to display the cinema in VR view with the two images for the left and right eye.



Figure 4: Gigantic Curved Screen [Img4]

Since I didn't have an Oculus Rift I couldn't stream the image from the computer to a VR Headset. A Phone however is unable to process movie textures in Unity. So I had to find a workaround by creating a 360° Video and upload it to YouTube to then be able to play it with a phone using the Google Cardboard Headset.

To make the video I used a tool from the asset store called "360 Panorama Capture", which creates a series of images which then have to be converted into a movie file by combining them frame by frame using a Command line tool called "ffmpeg".

Before uploading to YouTube the video file still had to be injected with the correct metadata, so YouTube knows that it is supposed to be a 360° video. This was done with a small program called "Spatial Media Metadata Injector".

After uploading the video to YouTube and testing it on the Google Cardboard I realized, that the image did not cover my peripheral view and the image quality was very poor.



Figure 5: Cinema Model in Unity

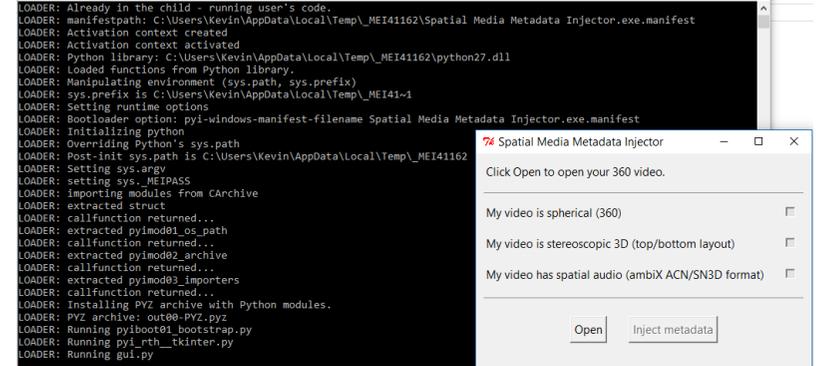


Figure 6: Spatial Media Metadata Injector

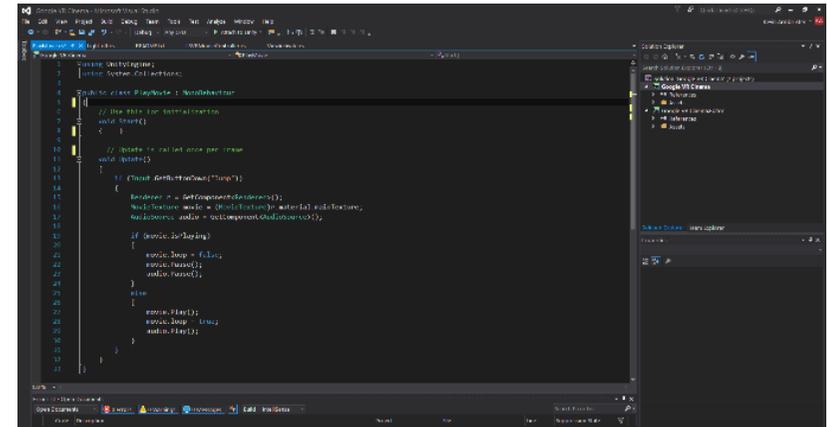


Figure 7: Unity Code

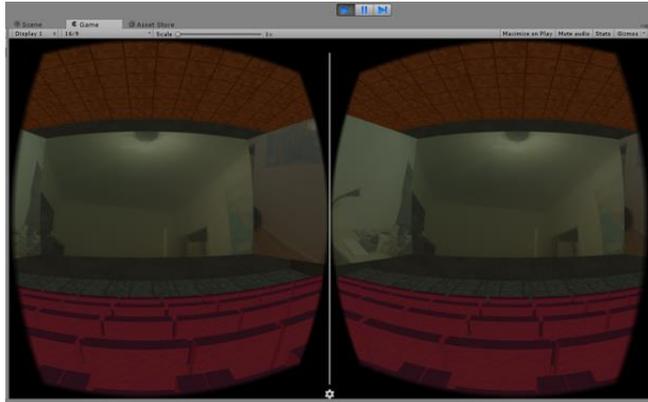


Figure 8: In-Game view of Unity with VR settings



Figure 9: Me trying the Google Cardboard

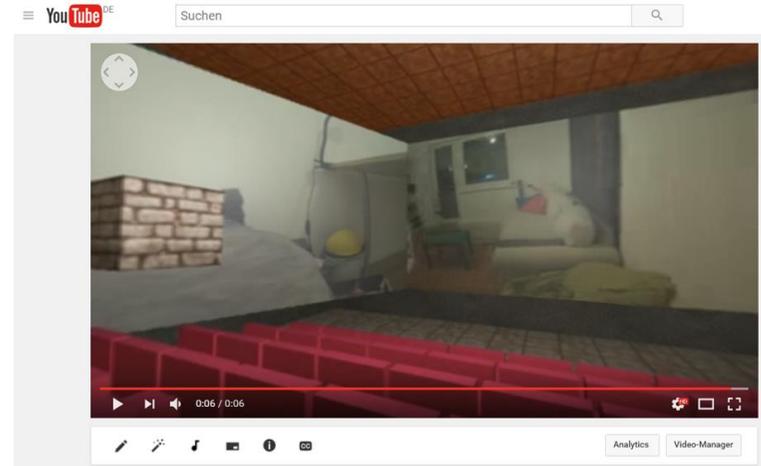


Figure 10: YouTube Experiment with Unity Video

VR-PRIMUS Bobovr Z4 mini + Bluetooth Fernbedienung - Virtual Reality VR Brille - Einstellbar - Knopf zum Steuern des Bildschirms - Kopfgurt - für Android und iOS Smartphones wie iPhone, Samsung, HTC, Sony, LG und weitere. Kompatibel mit Google Cardboard Apps - 3D Videobrille. Für Smartphones von 4,7 bis 6,2 Zoll Bildschirmgröße.

von VR Primus GmbH
 ★★★★★ 1 Kundenrezension

Preis: EUR 33,45 **Prime**
 Alle Preisangaben inkl. USt

Auf Lager.
Lieferung Montag, 13. März: Bestellen Sie innerhalb 5 Stunden und 43 Minuten per Premiumversand an der Kasse. Siehe Details.

Verkauf durch VR Primus und Versand durch Amazon. Für weitere Informationen, Impressum, AGB und Widerrufsrecht klicken Sie bitte auf den Verkaufsmenü. Geschenkverpackung verfügbar.

1 gebraucht ab EUR 31,06

Größe: mit Fernbedienung
 mit Fernbedienung EUR 33,45 **Prime** ohne Fernbedienung EUR 28,45 **Prime**

Für größere Ansicht Maus über das Bild ziehen

Figure 11: Second VR Glasses that I bought

In an attempt of improving the peripheral view I ordered a better pair of VR Glasses. Sadly, they did still not provide a big enough field of view. This led me to the conclusion that it would be better to physically build a multiscreen and use projectors for showing my video.

6.2. Second attempt: Building the screen

Since the Virtual Reality approach did not work I decided to build a panoramic screen. The main reason why I decided to take a multiscreen projection instead of a curved screen was to see if ScreenX and the Escpape screen are going in a good direction. Can this type of screen be another entertainment solution besides 3D? Do the borders of the screens disturb the audience? And, can the people imagine this type of installation in cinemas?



Figure 12: Screen X [Img5]

Another reason why I decided to take a multiscreen projection is because the two screens on the sides of the cinema can be used for complementary images, but the filmmaker is not obligated to use them all the time. The visual narrative on the main screen doesn't have to be changed unless the filmmaker wants to create something new. If I would have taken a curved screen the storytelling would probably changed and it would have taken some freedom away, because I always would have to fill the entire space that the curved screen offers. I also wanted to see what possibilities could a multiscreen projection offer and see if a panoramic screen is indeed more spatially immersive in comparison to a widescreen.

For building the screen I got help from Kevin Armbruster, who proposed the following sketch for the construction.

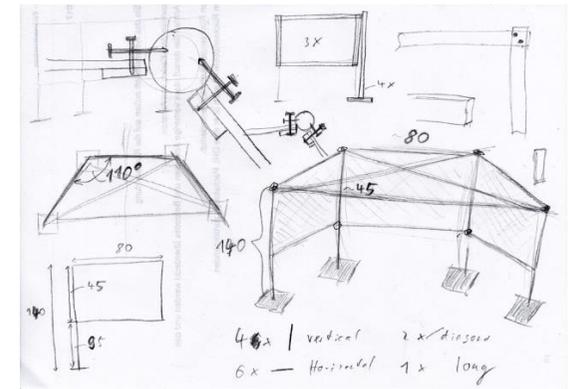


Figure 13: Sketch of Screen Construction

The screen should be easily transportable for the test and for the exhibition but it should also create a good immersion for the viewer. The material we used was: wood for the frames and poles, polymer foil as screen material and cable binders to fix the screens to the standing poles. To seal off the bottom and top of the construction I used black paper so the viewer could feel more isolated.



Figure 14 : Kevin cutting material for the construction



Figure 15 : Fixing the poles to the standing plates

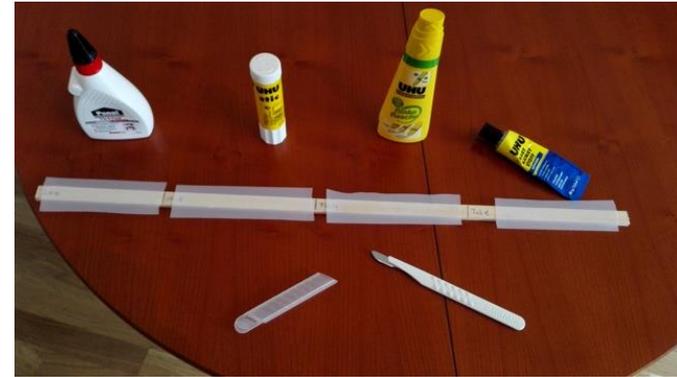


Figure 16: Testing different glues



Figure 17: Letting the paper dry

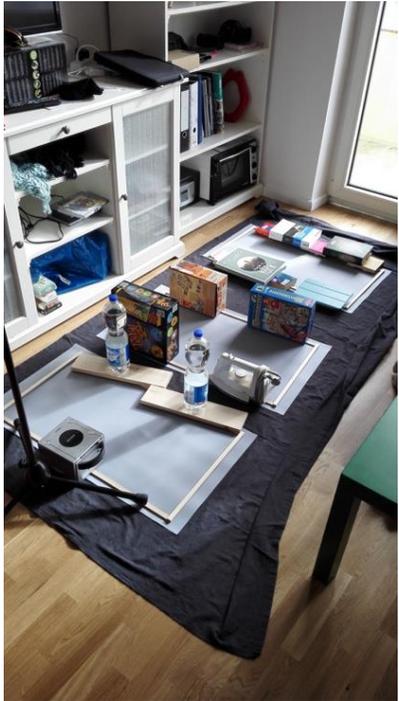


Figure 18: Gluing everything firmly



Figure 19: Painting the construction



Figure 20: Screen finished without painting

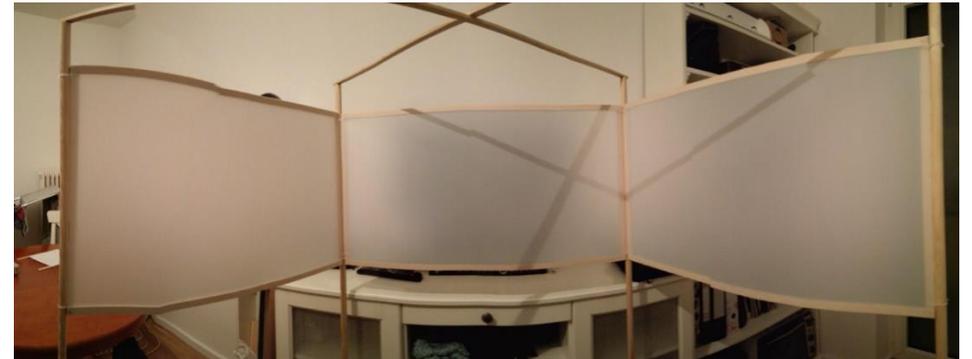


Figure 21: Inside view of the screen

7. Creating the video

7.1. Production

For the production of the video, I first had to plan the look of the movie, film the material, write the text and record the voice over and choose the background music.

7.1.1. 360° Camera or GoPros

Since the video had to be in a panoramic format that covers about 270° field of view I couldn't just use a normal camera. So I had two choices: Using a 360° Camera or record simultaneously with 3 GoPros mounted next to each other.

The advantage of filming with a 360° camera is that I only need one camera to film and I only have one video file to edit. However, after trying to film and edit the 360° information, I realized that the fish eye was extremely visible and the manual stitching would be problematic. Any available Plug-Ins that would remove the fish eye were pretty expensive and even then, the resulting image quality was rather poor.



Figure 22: Fish eye in 360° video

Using three GoPros would give me three different videos to edit at the same time. This was doable, since I could use three separate tracks in Premiere Pro to display and edit the videos next to each other.

In the end, I decided to use three GoPros and one normal camera. That way I could get material for the three screens. Also I wanted to work with a POV style movie to test if people would feel closer to the character through the use of this shot. To film with three GoPros at the same time I got a helmet and attached the cameras to the front and sides of it to get information for the 3 screens. I chose the widest angle they could offer and tried to position them so that they would just barely overlap. I used two “GoPro 3 Black Edition”, one “GoPro 3+ Black Edition” and Canon 6D.



Figure 23: Helmet construction with GoPros



Figure 25: GoPro 3 and GoPro 3+ [Img6]



Figure 24: Testing the angle of the cameras

7.1.2. Planning the plot and filming

For the movie plot I got “inspired” by the recent death of my grandfather and I decided to transmit the feeling that I had after this loss in my movie. So I wrote a text that expressed my emotions. It should be narrated in the style of a man who has a dream in which he thinks about his life, the passing of time and how ephemeral but also joyful life is. The whole movie should be in POV style.

Last night I had a dream...

How with time we fade away... Nobody tells us how do we come and how do we go...

Caught up in a reality that doesn't belong to us.... consumed by time.

Without looking back... compelled to go forward.

One moment to breath... air.

*In the dream I was observing... I couldn't talk... shout... but I loved...
I was searching you...*

What happened?... Where did I go? The sky... the earth... where did the sea go?

*It seemed like a countdown... and with step and step one steps away from the beginning,
approaching the end... That line on the horizon*

*But still, despite the pain... despite the traces left... what is learned remains...
the memory survives...*

The joy of the lived. Love... Life... Happiness.

*Last night I had a dream... an ephemeral dream... rapid... and slow.
A deep dream... a dream that was...*

eternal.

Then I searched for locations to film that might fit the mood of the text. I found multiple spots, which I collected in a list and I planned the recording in my calendar.

Picturesque places Berlin/ Hamburg

Oberbaum Bridge at sunrise



The Molecule Man on the Spree



Soviet War Memorial in Treptower Park



Museum Island



Tiergarten



Viktoriapark



Sony Center



Holocaust Memorial (early morning)



Schloss Sannssouci



Insel der Jugend



Wannsee/ See



Wannsee Conference



Brandenburger Tor



Friedrichshain Abends/ Boxi /



Humboldt Bibliothek



Kreuzberg



Weissersee



Hakeburg (probably with tour)



Kudamm empty at night



City in the afternoon when is getting dark or in the morning when the sun is coming out with the car!



Extra: Take some takes in the balcony and play with the shadows in the room.

U-bahn station walking to the train

--- **INFO**

Sun rises at **7:35**

Sun goes down at **17:04**

Wake up at **6:00 - 6:30** for early takes

For afternoon takes start at **16:30**

Temperatures:

Minm: -3 Day - 8 Night

Maxm: 2 Day.

--- **Material**

Canon, Sound, Bateriaes, Charges, GoPros, Helmet.

Work with natural light

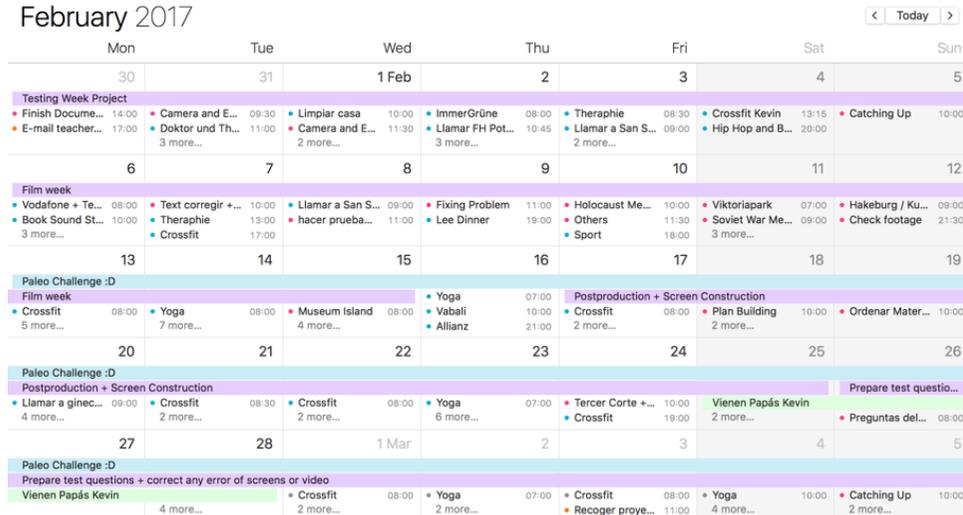


Figure 26: Calendar for February

The filming itself took 6 days, with an average of 4 hours of filming work outside. I always tried to keep the grey light and cold feeling. Kevin Armbruster was assisting me again. He wore the helmet with the GoPros so that I could get the POV shots and I used a Canon 6D with a tripod to collect panoramic images by moving the camera from left to right.



Figure 27: Me in the Holocaust Memorial filming



Figure 28: Kevin with the GoPros Helmet

From the initial list of locations, we ended up actually filming in the following ones:

- Holocaust Memorial
- Viktoria Park
- Soviet War Memorial
- Insel der Jugend
- Neue Hakeburg
- Tiergarten
- Schloss Sansoucci
- Museum Island

During this experience, I noticed that it is necessary to go to public places really early to find them empty enough for filming without constantly having people walk into the shot. But eventually we collected a total of 5 hours of raw video material, which I could then sift through to cut the video.

7.1.3. Audio recording and choosing music

With the video material captured I still had to give a voice to my text and also find a suitable background music. The music should convey a similar melancholy as the text and I ended up choosing the song “Death of Ase” by Edvard Grieg from the play “Peer Gynt”. I downloaded a public domain version from this website:

http://imslp.org/wiki/Main_Page

The voice recording was done in the sound studio of the BTK using Adobe Audition. I got Kevin Armbruster as a speaker to read the text.

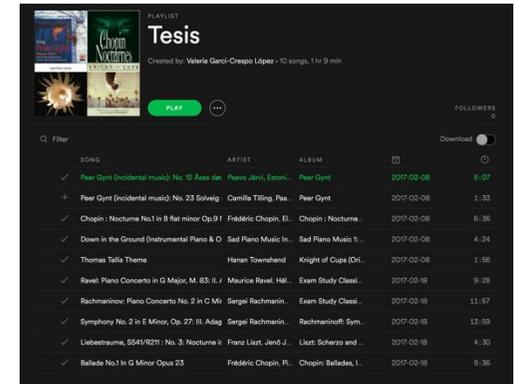


Figure 29: My Spotify Playlist Inspiration

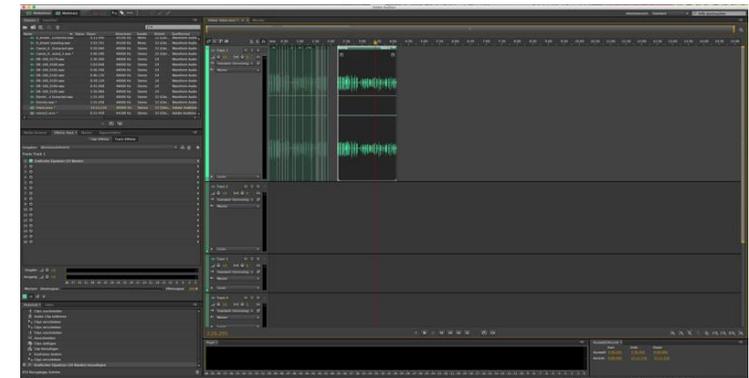


Figure 30: Audio Correction in Audition

7.2. Postproduction

7.2.1. Video postproduction

The video postproduction was done with Adobe Premiere Pro. I searched the video material that I had for scenes that would fit with to the narrated text. In that way I slowly assembled the whole video.

Since I had to produce material for three screens I ended up putting the videos for left, right and front on three different tracks, scaling them down to 1/3 the size and then positioning them next to each other on the frame. That way I was able to see and edit them all simultaneously. I was glad that I had already decided on the final look of the shots during production, so I didn't have to do any cropping during the postproduction.

The sound was also done in several layers consisting of the background music, the narrator voice and other sound effects. The final step was to do color correction.

The only problem that I encountered during the postproduction was how to render the video without ending with an aspect ratio of 16:9. My video had a proportion of 48:9 with a resolution of 5760x1080, what I figured out that I could do, it was simply click on the rendering window "match sequence settings". During the first part of the postproduction it didn't occurred to be to make a special aspect ratio, that is why I scaled them to 1/3 of their size to make them fit in a 1920x1080.

For the color correction, I had to make the videos looks as similar as possible to one another, the problem of different tonalities between them came due to using two different cameras.



Figure 31: Watching all Canon Footage

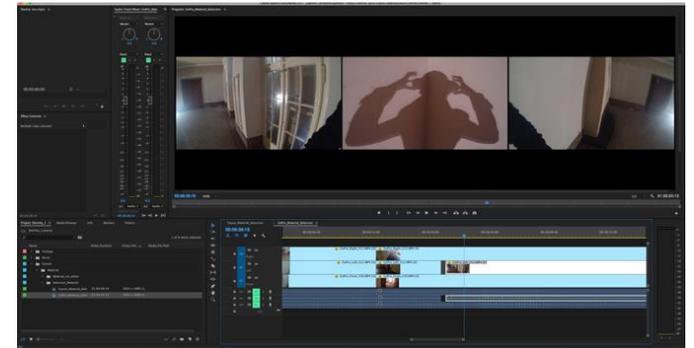


Figure 32: Watching all GoPro Footage

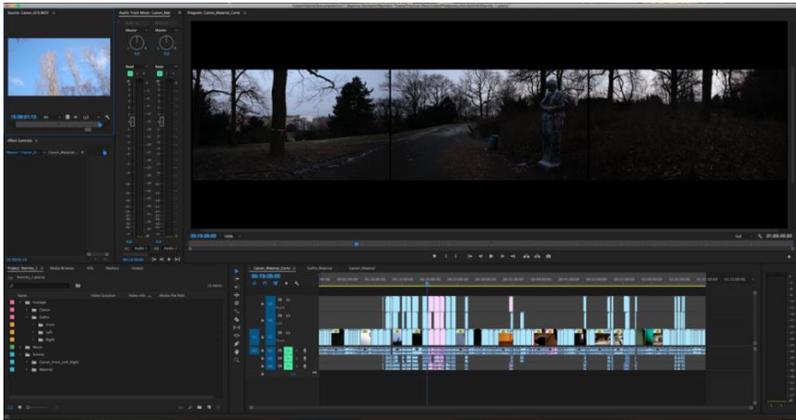


Figure 33: Editing with 16:9 Aspect Ratio

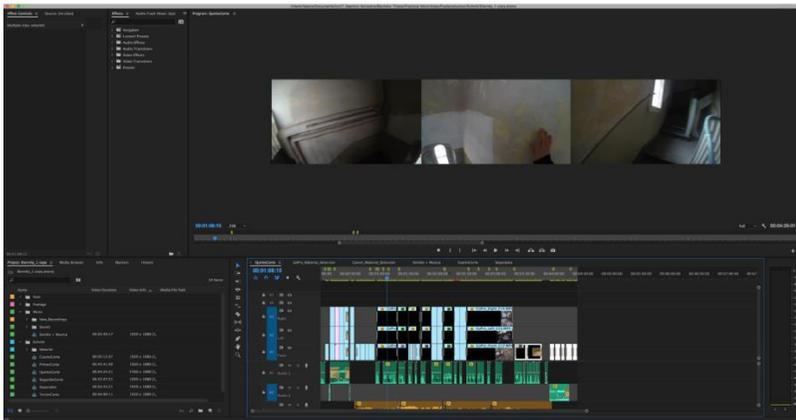


Figure 34. Editing with 48x9 Aspect Ratio

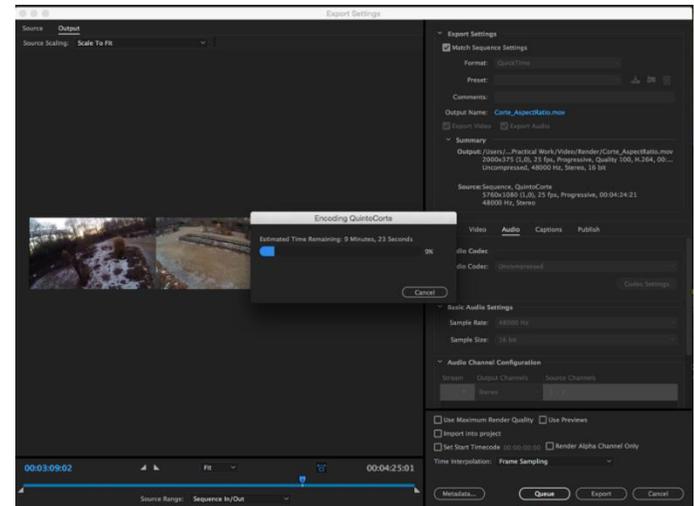
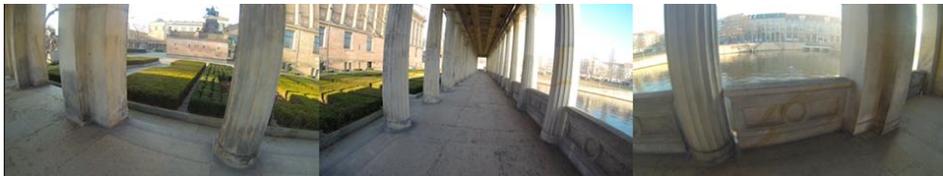
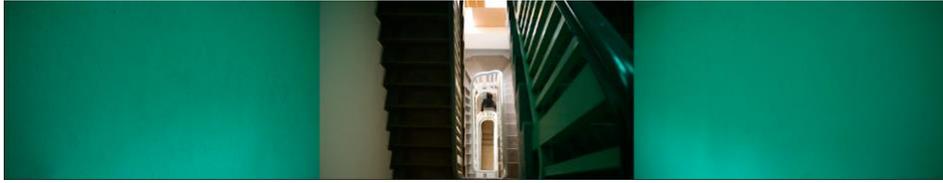


Figure 35: Rendering with Sequence Settings

Without Color Correction



With Color Correction



7.2.2. Testing the screen

Before presenting the video to the public, some tests were done in order to see how the video can be displayed on the screen. I found out, that I couldn't project very dark images and that very bright images were blinding to watch, because the projector was behind the screen, shining directly at the viewer. But in general the results were very positive and only a few changes were necessary.



Figure 36: Testing Projectors with Wallpaper



Figure 37: Provisional Projector Pedestal



Figure 38: Testing Video in Multiscreen Setup



Figure 39: Testing Video in Multiscreen Setup

7.2.3. Cinema simulation

After completing the video and testing it once more on the multiscreen, I also created a cinema simulation in After Effects. The only purpose of this After Effects simulation is to show people how the video would look on a big cinema installation. It also allows the people who did not come to the experiment to get an impression of how the video looks in a multiscreen environment. For this cinema simulation, I took an existing picture and deformed the video so that it would fit into the surface of the screens.



Figure 41: After Effects Video Editing

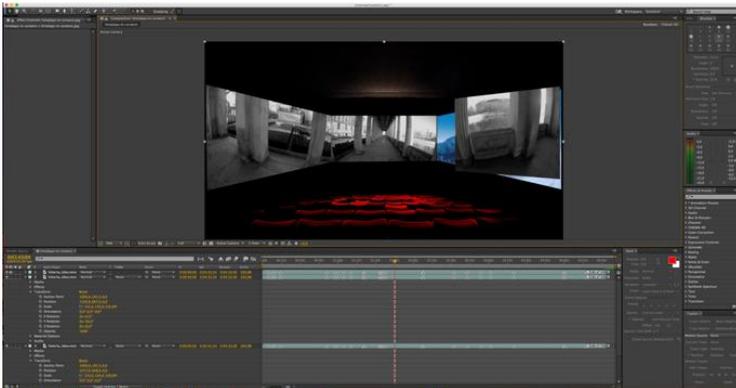


Figure 40: After Effects Video Editing



Figure 42: Cinema Simulation showing "Eternity"

The final video can be seen in different versions in the Digital Appendix and under the following links.

Video for multiscreen projection: <https://youtu.be/NbDROyOdZ70>

Video for Widescreen: <https://youtu.be/zSXeLttzeR0>

Cinema Simulation: <https://youtu.be/ut1prz3pumE>

8. The Experiment

To finally verify the hypothesis of my thesis, that a panoramic screen with a point of view style movie increases the immersion for the viewer, I designed an experiment where I show my video on the multiscreen construction to a number of people and then get their feedback in the form of a survey. To give the people something to compare the multiscreen version with, I showed the same video twice, once with all three screens and once with only the center screen active. That way the people could see, which setup they prefer.

8.1. Planning the Experiment

The screening was done in a room of the BTK over the course of two days. For the organization I created a Facebook event, a WhatsApp group and I also invited all the students of the BTK via Email.



Figure 43: Facebook Event



Figure 44. WhatsApp Invitation Group

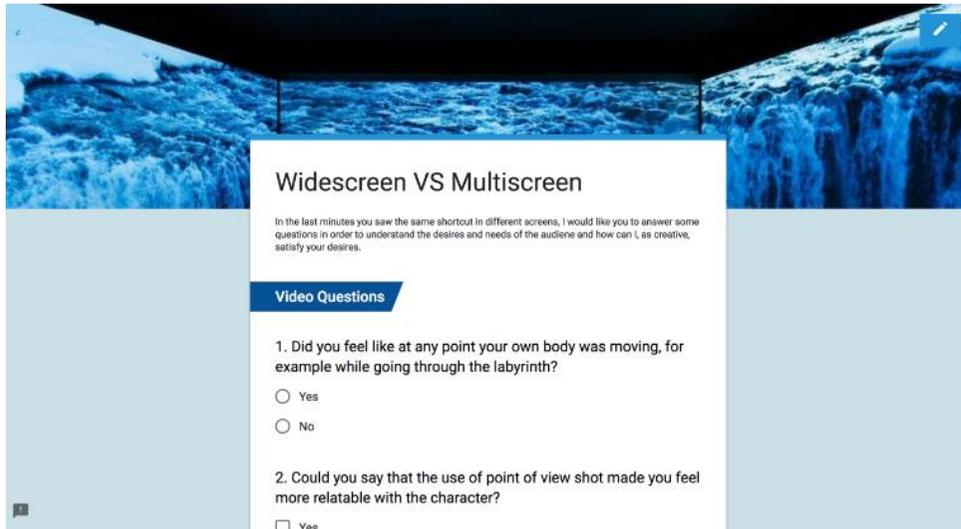


Figure 45: Survey Image

The survey was done with Google forms and can be found in the digital appendix and under the following link:

<https://goo.gl/forms/1xizLT09kEiITeP83>

The answers of the participants can be found in the digital appendix as diagrams and as Excel sheet or under the following link:

<https://docs.google.com/forms/d/1on3g-kf7G3iXsw9CiSiMQ8pBCLhlypr58k0-cNmUkbY/viewanalytics>

The following questions were asked in the survey:

- A. Your age
 - B. Your gender
 - C. Your profession / background / studies
 - D. Are you wearing glasses?
 - E. In which order did you see the videos?
-
1. Did you feel like at any point your own body was moving, for example while going through the labyrinth?
 2. Did you feel sick or dizzy at any point?
 - If yes, at which point and which screen setup?
 3. Would you say that the "point of view"-shot made you feel more relatable with the character?
 - Why do you think so?
 4. Would you have liked more first person shots?
 - Why do you think so?
 5. How strong of an emotion did the video convey to you?
 - Which emotion was it?
 6. Was your peripheral view covered by the screens?
 - How did that feel?
 7. Could you imagine this type of multiscreen projection in cinemas?
 - Why do you think so?
 8. Do you think multiscreen projections could be a valid alternative to 3D in cinemas?
 - Why do you think so?
 9. Did it disturb you that sometimes during the multiscreen projection only the center screen was used?

- Why?
10. Did you feel you were more spatially immersed with the multiscreen projection than with the normal widescreen?
 - What made you feel that way?
 11. Were you aware of the gaps between the screens while watching the multiscreen projection?
 12. Did those gaps disturb you?
 13. Which setup do you prefer?
 14. Do you see any advantage in using this multiscreen projection in cinemas?
 15. Do you see any disadvantage in using this type of multiscreen projection in cinemas?
 16. Do you have anything extra that you would like to share with me?

8.2. Conducting the Experiment

When the people came to the room, they had to sit and watch the movie one at a time due to the limited space in the screen construction. After watching the videos they had to fill out the survey. I offered snacks and drinks for hospitality.



Figure 46: Participant about to watch the video



Figure 47: Participants answering the survey



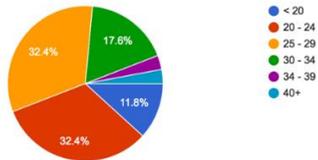
Figure 48: Participant watching the widescreen video

8.3. The Results

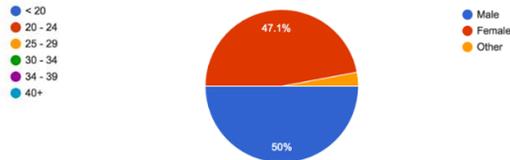
The survey was filled by a total of 34 test subjects. Their age ranged from under 20 to over 40, but was concentrated in the range from 20 to 34. They were about half, half male and female and they had a wide range of different backgrounds. About half of them were from Art, Film and Design and about one quarter was from Engineering and Natural Sciences.

The experiment was held on two days: 06.03.2017 and 07.03.2017
 On the first day 16 people came which makes up 47% of the total subjects. They viewed first the multiscreen projection and then the widescreen.
 On the second day 18 people came, which makes up 53% of the total subjects. They viewed first the widescreen and then the multiscreen projection.
 The decision of switching the order of the videos, was made to discover if showing the videos in a certain order would play a role in the preference of the subjects or if this didn't matter.

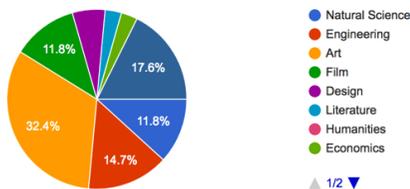
A. Your age (34 responses)



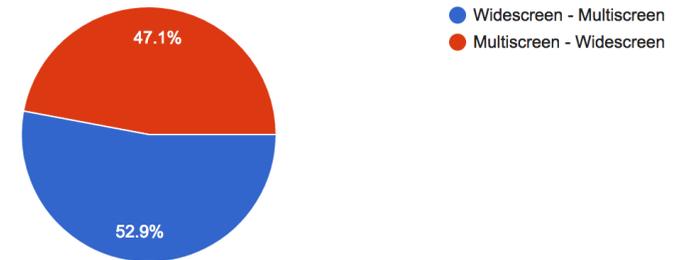
B. Your gender (34 responses)



C. Your profession / background / studies (34 responses)



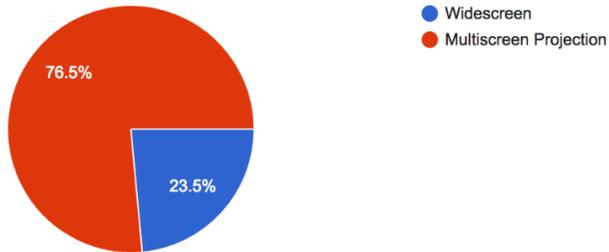
E. In which order did you see the videos? (34 responses)



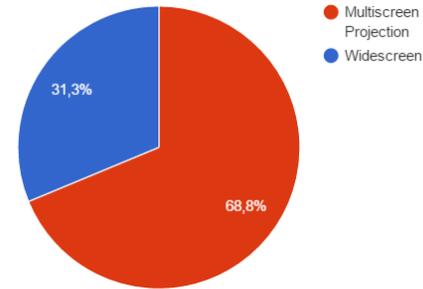
8.3.1 Screen Questions

I found out, that in total $\frac{3}{4}$ of the people preferred the multiscreen projection over the widescreen. The data of the single days indicates that the order in which the video was shown might have an influence on the preference of the people. Which would mean more people prefer the multiscreen if they see it *after* the widescreen. However, the absolute number of preferences only differs by 2 people from day one to day two, which means that this might still be due to statistical uncertainty.

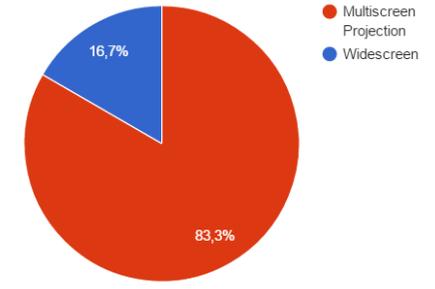
13. Which setup do you prefer? (34 responses)



First day: Which setup do you prefer?

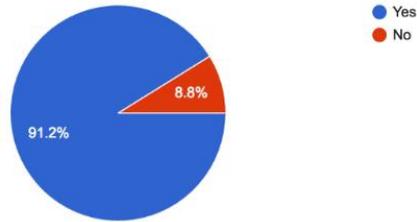


Second day: Which setup do you prefer?



Furtheron, 91% of the subjects had their peripheral view covered. The 8% that didn't have it covered, where three subjects. One of them wrote in the comments "The view was indeed covered but the 3 shots were not synchronized", which means, that he actually had his field of view covered but he wanted to point out something else. That leaves us with two other subjects which have both been observed rotating the office chair they were sitting in left and right while watching the video. This might have led them to move away from the middle of the screen.

6. Was your peripheral view covered by the screens? (34 responses)



I was curious to know whether the subjects could see this type of multiscreen projection in cinemas, and if they could also see it as an alternative to 3D. The results were quite positive. 73% of the subjects can imagine seeing it in cinemas and 61% think it would be a valid alternative to 3D in cinemas. The reasons they gave can be summarized as follows:

Multiscreen Projection in cinema:

- Increase of immersion
- Enrichment of Cinema
- New experience that feels more real and intense

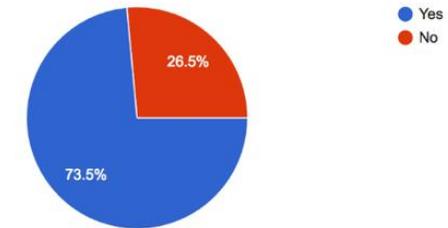
Multiscreen Projection as alternative to 3D:

- Chance of using orientation leading to interactivity
- Re-invention of cinema moving towards VR
- Placement of the viewer in the middle of the action

However most of them said that the two technologies are very different and cannot be compared. Many also asked for a combination of the two.

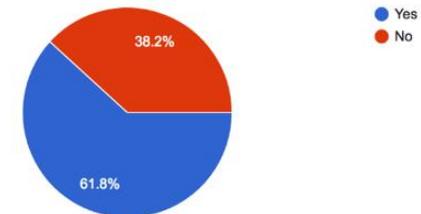
7. Could you imagine this type of multiscreen projection in cinemas?

(34 responses)



8. Do you think multiscreen projections could be a valid alternative to 3D in cinemas?

(34 responses)



Out of the 26% who could not imagine a multiscreen projection in cinemas, 66% also didn't see it as a valid alternative to 3D.

The reasons why people couldn't see the multiscreen projection in cinemas can be summarized as follows:

- Cost of production
- Getting distracted by the additional two screens
- Seating many people in a cinema like that could be problematic

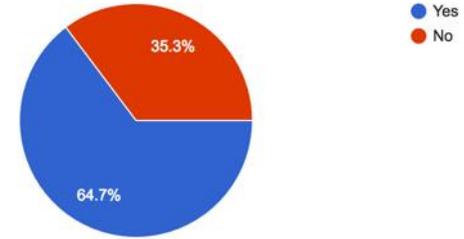
The reasons why people couldn't see the multiscreen projection as a valid alternative to 3D were an be summarized as follows:

- The technologies are so different that they cannot be compared
- The people think that 3D and multiscreen should be combined (which is a particularly interesting remark since the same person was talking about financial limitations and difficulty of installation before)

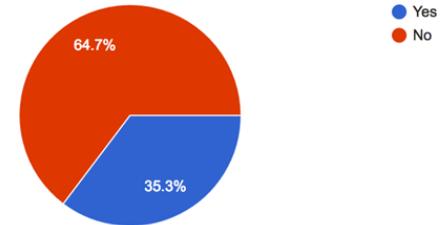
Another thing I checked, is whether the gaps between the screens would disturb the audience or if they were even aware of them. What I found is that even though the majority of the audience was aware of these gaps, only 36% of them were disturbed my them. Leaving a very positive reaction of the public towards this type of setting.

11. Were you aware of the gaps between the screens while watching the multiscreen projection?

(34 responses)



12. Did those gaps disturb you? (34 responses)

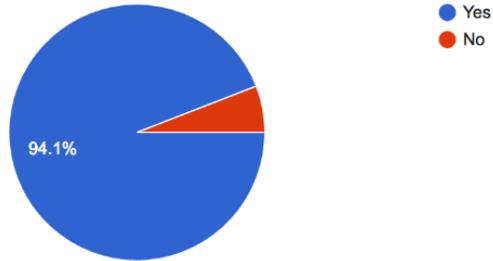


One of the most important questions was if the people felt more spatially immersed with the multiscreen projection than with the normal widescreen. With a positive feedback of 94% my hypothesis of the multiscreen projection being more immersive than a widescreen is confirmed. This proves the conclusion to which I came at the end of my theoretical part.

The 6% who did not feel more immersed by the multiscreen projection both also preferred the widescreen in general and they both said that they felt distracted with the additional two screens.

10. Did you feel you were more spatially immersed with the multiscreen projection than with the normal widescreen?

(34 responses)

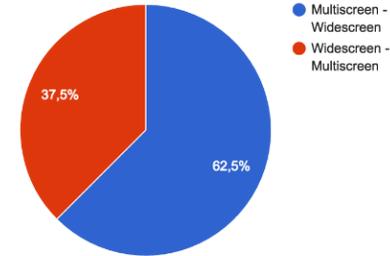


8.3.2. A closer look at those who preferred the widescreen

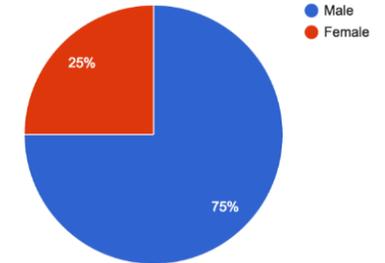
To understand better why people did not like the multiscreen projection I took a closer look at the 23% that preferred the widescreen.

They were in the age groups from <20 to 34. 62% of them saw first the multiscreen and then the widescreen. 75% of them were Male.

In which order did you see the videos?

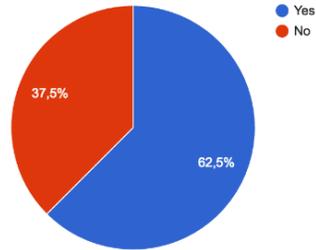


Prefers Widescreen

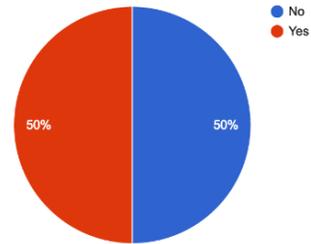


Even though they would prefer to have a widescreen over a multiscreen projection, 62% of them can still imagine seeing multiscreen projection in cinemas. But only half of them could see a multiscreen projection as real alternative to 3D in cinemas.

Could you imagine this type of multiscreen projection in cinemas?

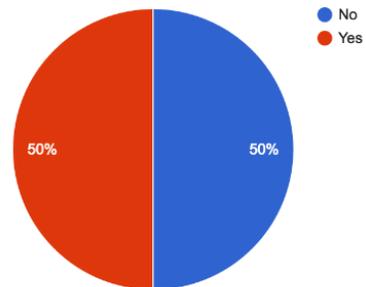


Do you think multiscreen projections could be a valid alternative to 3D in cinemas?



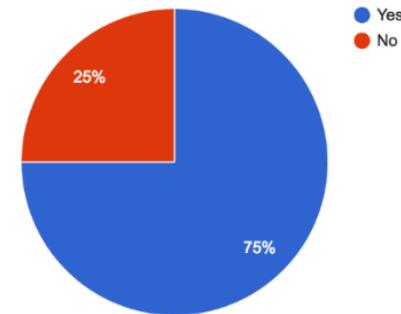
In the group which preferred the widescreen, 50% didn't like that sometimes the three screens were used and other times only the center one (compare to 38% overall). The reason was that they don't like the lack of consistency.

Did it disturb you that sometimes during the multiscreen projection only the center screen was used?



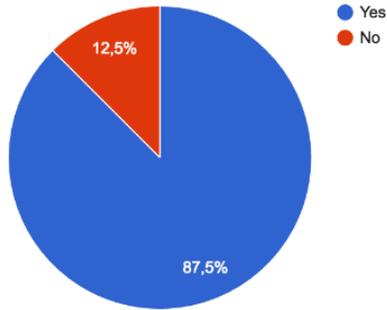
Another interesting point to observe is that, even though they preferred the widescreen over the multiscreen, most of them were still more spatially immersed in the multiscreen projection. The 25% among them who preferred the widescreen and were not more spatially immersed by the multiscreen, said it was due to the multiscreen being distracting. They also find the screens on the side unnecessary, because the main information was happening in the middle anyways.

Did you feel you were more spatially immersed with the multiscreen projection than with the normal widescreen?

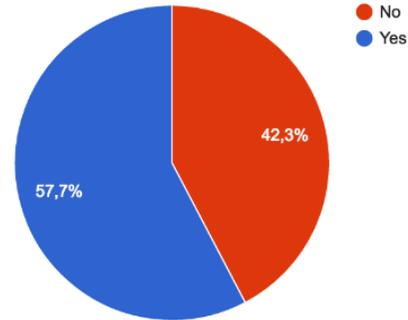


Looking at the gaps between the screens shows a strong difference between the groups who prefer the widescreen and those who prefer the multiscreen projection. 87% of the subjects who prefer the widescreen (left figure) were aware of the gaps between the screens. Much more than the 58% of the ones who prefer the multiscreen projection (right figure).

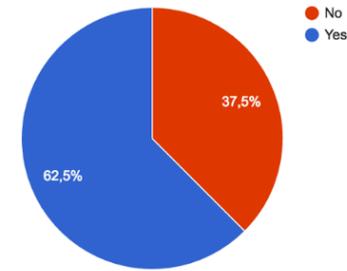
Were you aware of the gaps between the screens while watching the multiscreen projection?



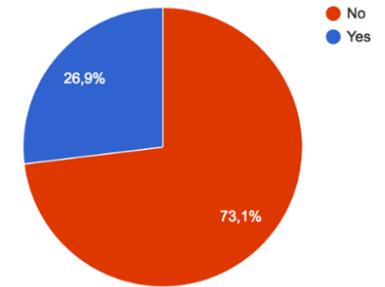
Were you aware of the gaps between the screens while watching the multiscreen projection?



Did those gaps disturb you?



Did those gaps disturb you?



The biggest difference however can be seen in how disturbed they felt by the gaps of the screens. Among the people who prefer the widescreen and are aware of the gaps 62% were disturbed by the gaps (left figure). While among the people who prefer the multiscreen projection and are aware of the gaps only 27% were disturbed by the gaps (right figure).

Also, two of the three people who didn't have their peripheral view covered preferred the widescreen.

Finally, the preference might be due to their demands as spectators. While asking for advantages and disadvantages they were asking for a screen which would look like one and a camera that would move like one. So they would probably prefer a continuous curved screen instead of three separate screens.

8.3.3. Video Questions

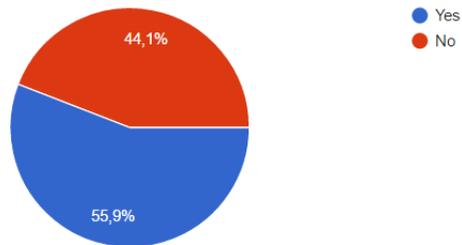
Besides the hypothesis of the multiscreen projection being more spatially immersive than the widescreen, I also checked whether I was right with saying that the POV shot helps the audience empathize with the character. Additionally, I wanted to find out if the use of the POV style together with the multiscreen could make people feel like they were moving or if they felt dizzy at any point.



Figure 49: The labyrinth

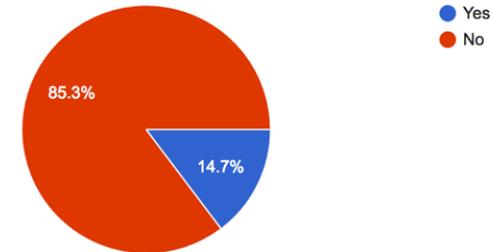
1. Did you feel like at any point your own body was moving, for example while going through the labyrinth?

(34 Antworten)



It was interesting to see that it was almost an equal split between the people who felt a sensation of moving and those who didn't. When asking if they felt dizzy, the majority didn't feel dizzy at any point, and the ones that did feel a bit dizzy occurred when the camera was moving fast through the labyrinth.

2. Did you feel sick or dizzy at any point? (34 responses)

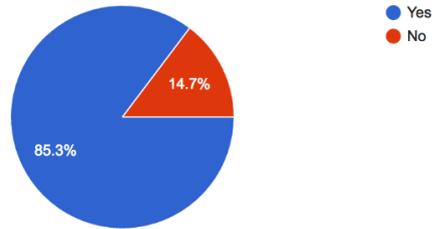


It is also good to see that 85% of the subjects found the point of view shot made them feel more relatable with the character.

The 15% that didn't feel that way explained that they felt obligated to be this person and they felt a lack of identification or empathy. So we are talking of very personal criteria.

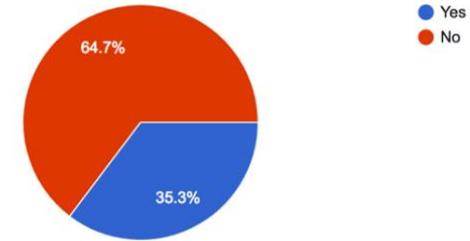
3. Would you say that the "point of view"-shot made you feel more relatable with the character?

(34 responses)



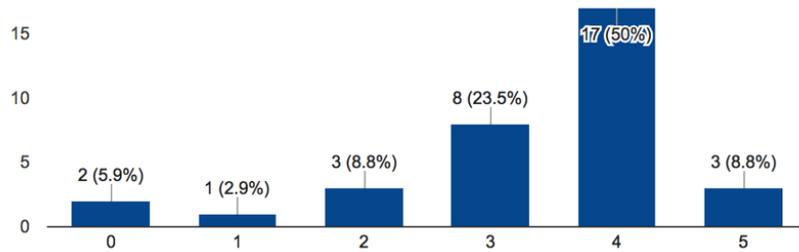
Is very interesting to see that with 65% the majority of the people did not want more first person shots. So in this case, it was good that I decided on a POV-style movie with subjective camera and subjective shots and not an entire movie shot exclusively in POV, such as Hardcore Henry, which even I find hard to watch.

4. Would you have liked more first person shots? (34 responses)



Next I wanted to ask what type and how strong of an emotion the video I created evoked in the subjects. The scale went from 0 to 5, with 0 being no emotion and 5 being extreme emotion. What I found is that the average emotional strength is at 3,35. Females had an average of 3,88 and males had an average of 2,76. So, as one might have predicted, females feel stronger or the movie leaves a stronger emotional imprint on females. Another possibility is that females are more aware of their emotions or they rate them higher than males.

5. How strong of an emotion did the video convey to you? (34 responses)



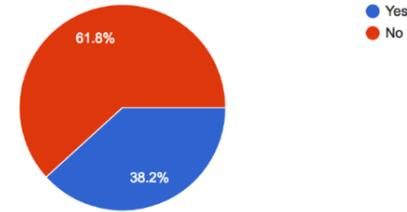
Besides seeing how strong of an emotion the video evoked I also asked what type of emotion the people felt. This was interesting to me, to see if I managed to express my own feelings of the passing of life, death and melancholy.

The feeling that was named the most (6 times) was melancholy. Other common namings were calmness, thoughtfulness, dreamy and hope.

The last question which lies somewhat between the screen and video categories was whether they felt disturbed when in the multiscreen projection sometimes only one of the screens was used. Turns out with almost 62% the majority of the people does not mind that occasionally the screens on the side are not used.

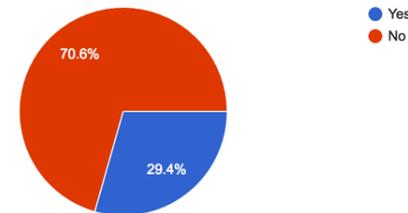
9. Did it disturb you that sometimes during the multiscreen projection only the center screen was used? (34 responses)

(34 responses)



Overall there were no relevant differences correlated with the background of the subjects or their gender (besides the intensity of emotions). Also, the immersion and the coverage of the peripheral view was not affected by whether the people were wearing glasses or not.

D. Are you wearing glasses? (34 responses)



Finally, the people were asked to give their thoughts on possible advantages and disadvantages of the multiscreen projection in cinemas. Their answers can be summarized as follows:

Advantages:

- Creates bigger immersion
- Covers the view of the audience
- New experience
- New chances to create different storytelling
- More freedom to the viewer

Disadvantages:

- Dizziness
- Maybe not for long movies
- Costs
- How to seat people
- Confusion of the spectator not knowing where to watch

8.4. Summing it up

What I can conclude from seeing the results, is that the Escape Screen and ScreenX can be successful, if the content they provide doesn't cause dizziness and if the side screens don't distract from the center one. The content that is to be shown on this type of screen has to be carefully thought through in order to give a great experience to the audience.

I was very glad when seeing that the majority of the audience had their peripheral view covered, preferred the multiscreen projection over the widescreen and especially, were more spatially immersed by the multiscreen projection than by the widescreen. Also, the POV shots allowed them to feel more relatable with the character. But, it didn't play a role for immersion and to some of them it felt a bit forced. It is important to note that most people prefer to have the POV shots only occasionally and not 100% of the time.

9. Final thoughts

I can truly say, that I learned a lot through the process of this work. After seeing in the theory that panoramic screens could be a great option for cinemas and that a POV movie could be a way to go, I wanted to try it for myself and also test if my conclusions were right, or if on the other hand, it would be better to concentrate the evolution of cinema in another direction. There are some things that I learned, advantages and disadvantages that I found and of course, a prediction for the future that I would like to share.

On the first hand, giving my final thoughts about POV, I can say, is not the best option to take. Visual storytelling is already very well thought through and I don't think the implementation of more POV style movies will ever take place. As I mentioned in the theory, POV in movies obligates us to be someone else, without having any influence. In videogames by contrast, which can be seen as interactive movies, the ego perspective works very well because we are the ones taking the decision for our character.

Another point to add is that, as I saw in the survey, people didn't want more POV shots because they also felt it would make it look dull. People like change and also to be in the comfortable position of the outsider unless they can have an influence.

While it was very interesting trying to film the first-person shots during production, I noticed that looking up and down didn't work properly, because the horizon tilted. People also complained about this during the survey.

The problem comes from the way the cameras were mounted on the helmet and the way our brain and eyes interact. The cameras were firmly stuck to the helmet, so when the actor looks down, the side cameras just rotate, because there was no way of keeping them horizontal when the helmet was moved. This does accurately depict what our eyes see, but our brain is smart enough to know that the horizon is still horizontal. So showing the tilted camera footage on the side screens irritates the viewers, because they don't want to see what our eyes see, but instead they want to be shown the images that our brains perceive.



Figure 50: Video Screenshot - Problem with the Horizon



Figure 51: Video Screenshot - Problem with the Horizon

On the second hand, panoramic screens can be looking forward into a bright future. During the experiment, people approved of the new experience and were even excited about the idea. It should however still be mentioned that some of them were not very pleased with the gaps and would like to see a more unified screen.

Many of the participants also commented that they wished for a combination of panoramic screen and 3D. I think this could be a very interesting study field, since panoramic screens like the Escape screen or ScreenX are already being accepted and visited in cinemas.

So, what's next?

I think the next step could be really looking into what type of visual storytelling can work on a continuous panoramic screen with blended edges and if indeed the addition of 3D could be a good option.

For the upcoming ways of entertainment, I think it is important to take the way we perceive our surroundings into consideration, in order to give the audience a more realistic and immersive experience.

10. References

Images

- [Img1] *Barco Escape Screen* (2015) Available at: https://i.kinja-img.com/gawker-media/image/upload/t_original/jypdbiuacximxq8opg6e.jpg (Accessed: 3 February 2017)
- [Img2] *Cinema Screen 180°* (2013) Available at: <http://5d-kino.com/en/spdisp.html> (Accessed: 3 February 2017)
- [Img3] *Barco Escape Screen (2016)* Available at: <http://www.fortbendstar.com/barco-escape-takes-star-trek-beyond-a-normal-viewing-experience/> (Accessed: 5 February 2017)
- [Img4] *Gigantic Curved Screen* (2014) Available at: <http://www.fubiz.net/2014/11/24/gigantic-curved-screen-exhibition/> (Accessed: 5 January 2017)
- [Img5] *Screen X* (2013) Available at: <http://filmmakermagazine.com/76652-introducing-screen-x-cinema-in-270-degrees/2/#.WMey6xLyvUo> (Accessed: 10 February 2017)
- [Img6] *GoPro 3 and GoPro 3+* (2013) Available at: <http://wideopencamera.com/wp-content/uploads/2013/10/Screen-Shot-2013-10-04-at-11.52.23-AM-1024x552.png> (Accessed: 10 February 2017)

