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Lahti University of Applied Sciences

DIFFERENCES AND SIMILARITIES IN THE CREATING PROCESS BETWEEN 2D AND 3D DIGITAL PAINTING

Lahti University of Applied Sciences
Visual Communications
Multimedia production
Bachelor´s thesis
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Viestinnän koulutusohjelma: Multimediatuotanto
KOSKINEN, TUULIA: Erot ja yhteneväisyydet kaksi- ja kolmiulotteisten digitaalisten maalausten prosesseissa
Suuntautumisvaihtoehdon opinnäytetyö, 22 sivua, 1 liitesivua
Kevät 2017

TIIVISTELMÄ

Lopputyönäni tutkin virtuaalitodellisuuden mahdollisuuksia kolmiulotteisten maalausten luomisessa.

Käytän kuvituksessa kahta digitaalista tekniikkaa. Toisen kuvituksen teen kaksiulotteisena. Siinä hyödynnän piirtonäyttöä. Toisen kuvituksen teen kolmiulotteisena virtuaalitodellisuuslaitteiden avulla. Vertaamalla näiden kahden tekniikan tekoprosesseja toisiinsa pyrin määrittämään virtuaalitodellisuuden kolmiulotteisen ympäristön mahdollisuuksia kuvitusten tuottamisessa.

Asiasanat: kuvitus, virtuaalitodellisuus, VR, 3D, 2D

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KOSKINEN, TUULIA: Differences and similarities in the creating process between 2D and 3D digital painting

Bachelor's Thesis in …. 22 pages, 1 pages of appendices
Spring 2017

ABSTRACT

As my Bachelor´s thesis I wanted to explore the possibilities of virtual reality as a way of creating three dimensional paintings.

I will create an illustration in two different digital mediums: one in 2D using common graphic display and the other in 3D using virtual reality headset. By comparing their creating processes by each step, I believe I will be able to determinate the possibilities of VR´s 3D space in illustration making.

Key words: illustration, virtual reality, VR, 3D, 2D

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1 Introduction

As my Bachelor´s thesis I wanted to explore the possibilities of virtual reality as a way of creating three dimensional paintings.

For the past couple of years VR has become more popular. Glasses like Oculus Rift, which were designed in 2012 through the help from Kickstarter, brought the VR headset to a consumer price point of 300$ from thousands. (filmora.wondershare.com, 21.4.2017) Ever since the industry has been on a rise through entertainment and games. Numerous models from different companies like Sony, Samsung and Google were launched. And now the cheapest headset is made out of cardboard with the price of 5$. And this is only the start, Gartner estimates….

> *"... in the next 10 years HMDs — across all form factors — will generate $72 billion in device revenue alone. The technology will evolve from pilot projects with modest growth to sustainable business models, market maturity and global availability."*
> *(gartner.com, 26.4.2017)*

And this is the reason why I wanted to explore VR. Through my degree I had come to realise that my assets belonged to the illustration field but I wanted to corporate something innovative for my Bachelor´s thesis. I stumbled upon Tilt Brush program which with VR headset and controllers enabled to paint digitally in 3D virtual space.

I had no previous experience of virtual nor augmented reality but as the opportunity came to loan equipment from school I knew I had to take on it. As a novice I knew I was not going to able to get the best result out of 3D painting as a first timer. This made me turn my

The finished 2D illustration which the 3D version will be compared.

weakness to my asset: If I would compare my knowledge of 2D digital illustration making with first-time 3D painting experience I could focus my thesis on differences and strengths on 3D painting.

I would create an illustration in two different digital mediums: one in 2D using common graphic display and the other in 3D using virtual reality headset. By comparing their creating processes by each step, I believed I would be able to determinate the possibilities of VR´s 3D space in illustration making.

2 What, How and With What?

In this section I am going to explain the process and basic fundamentals on VR. What we are actually exploring, how we are going to solve it and what we are going to use to solve it.

2.1 What are we exploring?

VR, is a computer engined "virtual reality", three dimensional (3D) space that gives viewer a illusion of a environment or 3D object that can be immersive with the audience. Usually referred to a headset that blocks your vision from your surrounding environment giving you through lenses a fictional 3D space. Some of the models include 360' headphones to give more realistic feel. It links not only visually but also emotionally as your actions interact with the space: for example gestures. (Sherman, p. 9)
It is mostly used as a way to simulate scenarios in studies and entertainment but in 2016 Google launched a program called "Tilt Brush": VR painting program that lets you draw/paint inside the virtual world with the help of a special equipment.

> *"Your room is your canvas. Your palette is your imagination. The possibilities are endless."*
> *(tiltbrush.com, 24.4.2017)*

2.2 With what using are we going to solve it?

To give a better understanding what I am going to use as my equipment, I have divided this section to two parts. One for 2D and second for 3D work.

2.2.1 2D illustration

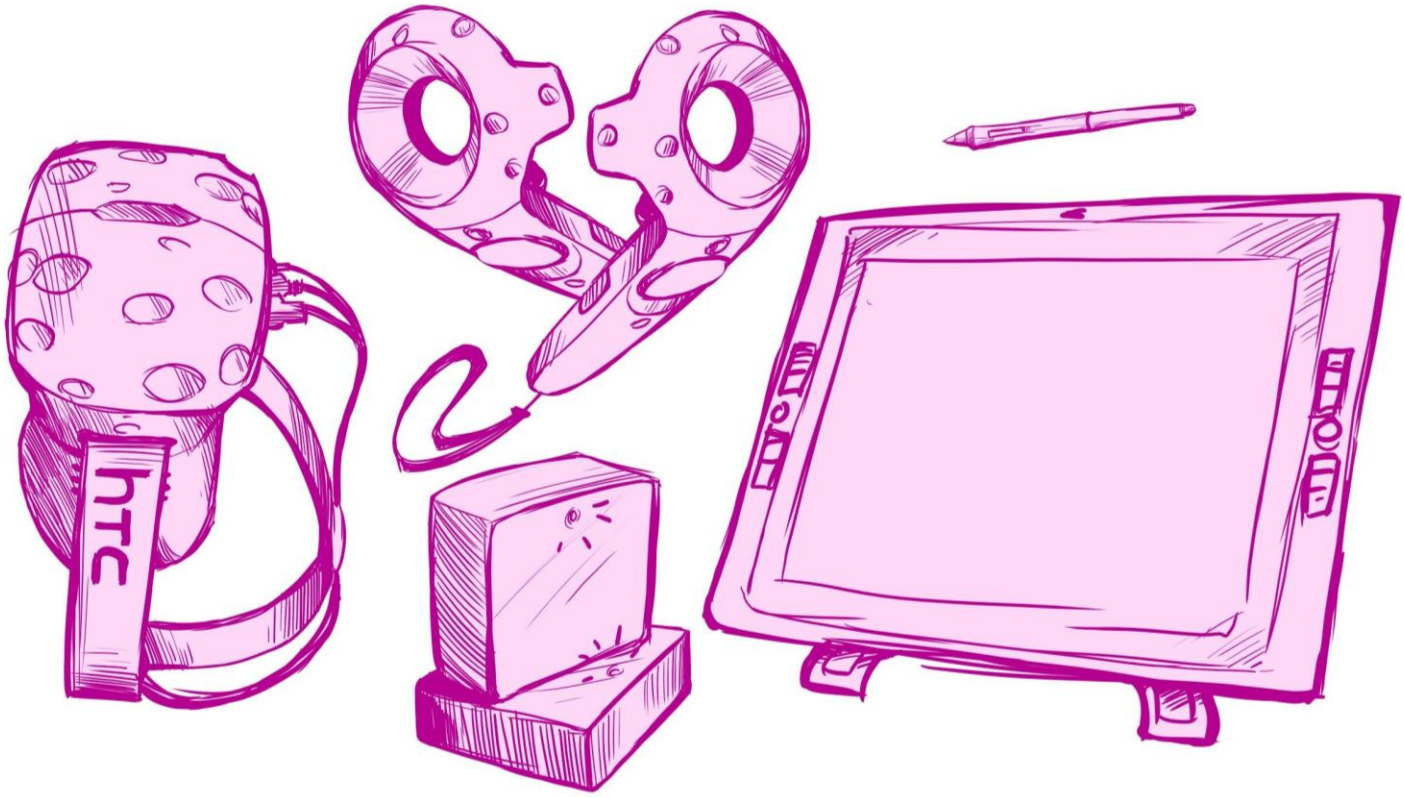
For couple of years I have already been interested of digital painting. Which is why I had already in my possession all the needed equipment. The setup consist usually of computer, graphic tablet or display and a program. In my case I had a old wacom 21UX graphic display and Photoshop.

2.2.2 3D illustration

I was able to use schools equipment for the thesis. The school had the most recent models - Oculus rift and HTC vive - for the headsets but only the last one of the two came with the needed controllers. Because the headset needs a powerful computer and a space to move in I could not take the equipment home with me. I was placed in a school laboratory that had 2m x 2m space to work at. For VR to read your movement there was also two cameras placed on the opposite corners of the room. If I would had afford I would had bought the equipment for myself. Currently there is only two programs to draw in VR and Tilt Brush was the only one that was suitable for the gear. And for my luck the school had purchased the program already. Even though 30e would not have broken the bank.

2.3 How are we going to compare the two?

I will try to create same illustration in VR and graphic display so that I will be able to compare the process between the two. It will be



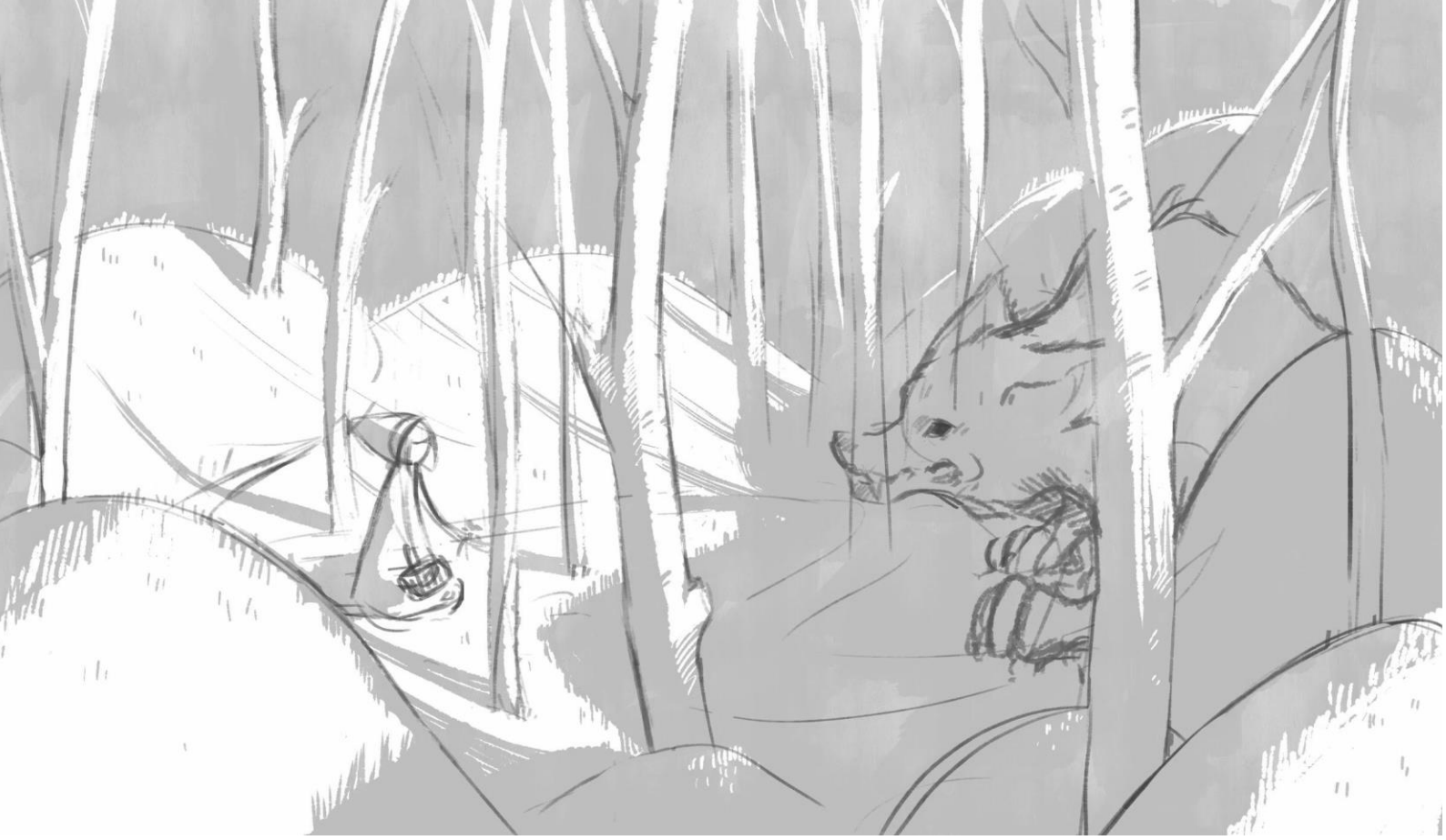
challenging since I have no previous knowledge of VR nor painting in 3D. I had decided to do a illustration of Grimm´s brothers "Red riding hood". I could have chosen anything I wanted as the subject itself was not in point of the focus. But I was hoping that if this experiment would be successful I might be able turn that illustration into series for a ebook.
For the process itself I was going to break the illustrations into sections. My additional thought was to go through the work by basic rules of illustration making: for example, shape, composition, light and shadow etc. But I realised that many of these came acros multiple times during the process, making it hard to write consistently. Instead I decided to break the process into three main parts: Preparation, Painting and Export so I would be able to cover the whole process from start to end.

3 The Process

To give clearer picture of the process I have decided to divide it into three sections. They are "Preparation", "Painting" and "Export and "Publish".

3.1 Preparations

As VR 3D painting is such a new medium, it was hard to find material for my research besides watching videos of people drawing with it. I came to conclusion that it would be best for me to make a simple design of my scene. (polygon.com, 24.6.2017) In my opinion minimalistic style suits nicely to fairytales. In addition to that, trying to create realistic pieces in a first try might be too ambitious. To the scene itself I wanted to include environment and characters that I get to try how the medium handles scale, different shapes and details.



Sketch of the scene design.

3.2.1 Sketching

As I knew I was doing two times the same illustration, I thought there was no need to sketch out the scene twice. I had a clear vision on what I wanted to create which is why I did the first sketches only in 2D. Because minimalistic style wasn´t something I would usually do I focused on character design that in the process I would have a guideline. I had already in mind the scene from red riding hood where the girl is being flaunted by the wolf out from the path to pick flowers. I was pleased with the first sketch which is why I did not make changes to it. It became the foundation to my illustrations.

3.2.3 Test

But I did not forget 3D. To get familiar with the system and controllers I had to make a test file. It mainly consisted of color and brush testing. I noticed straight away that figuring out

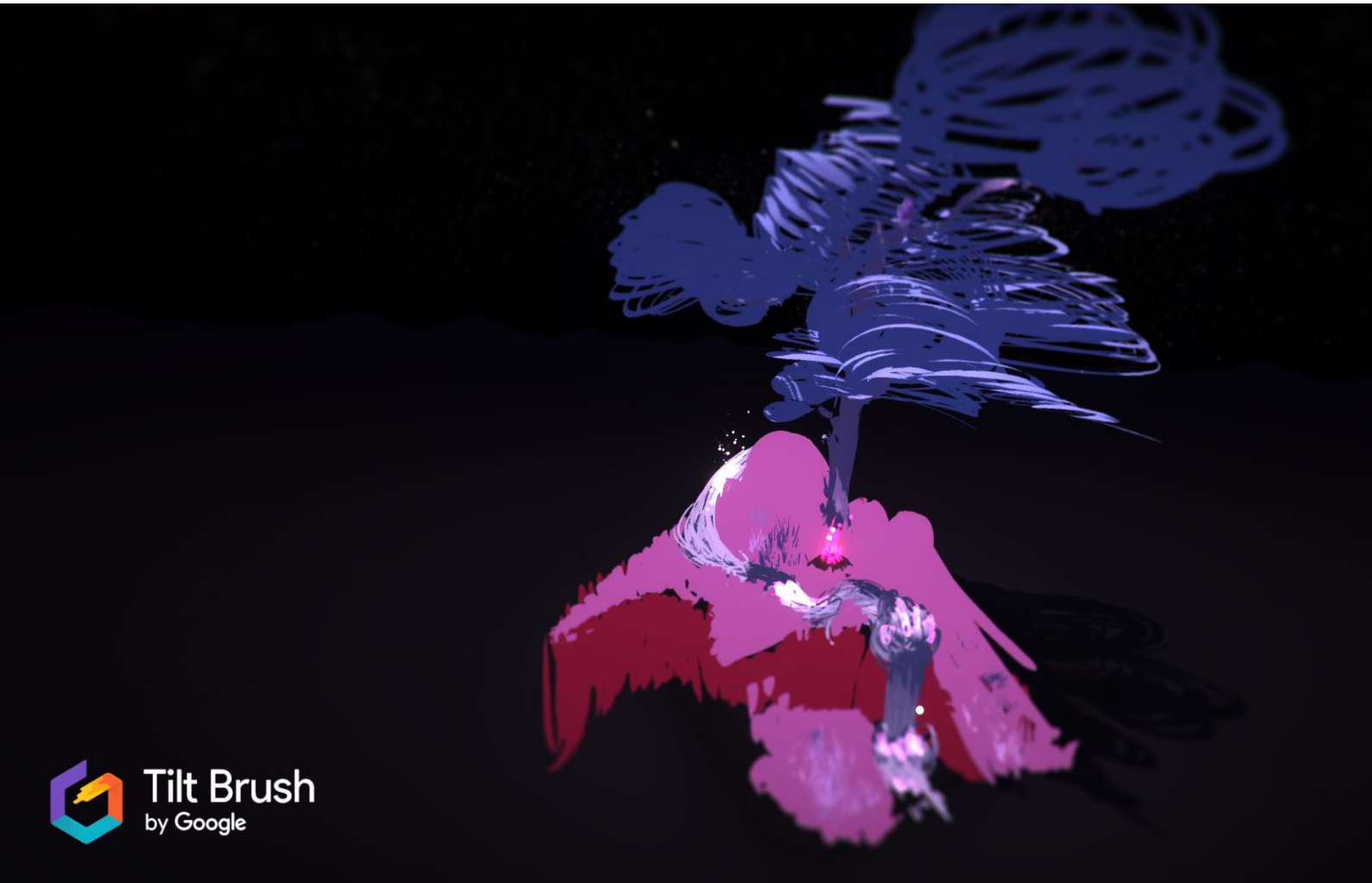
scale inside VR was hard. If you didn´t start in a big enough scale you would not be able to do any details as you are unable to zoom closer. This could be easily solved with ability to scale objects inside the program but

sadly tilt brush lacks it. Hopefully they will make changes to this as Oculus has already made a program called Quill that has infinite terrain which doesn´t constrict. (oculus.com, 26.4.20017) Quill was my first candidate but it only worked with Oculus touch controllers which school did not possess.

3.3 Painting

The painting process has been divided into main sections. I will be focusing on how the 3D painting takes effect compared to 2D work.

Test file. Trying out brushes inside Tilt Brush.



3.3.1 Terrain

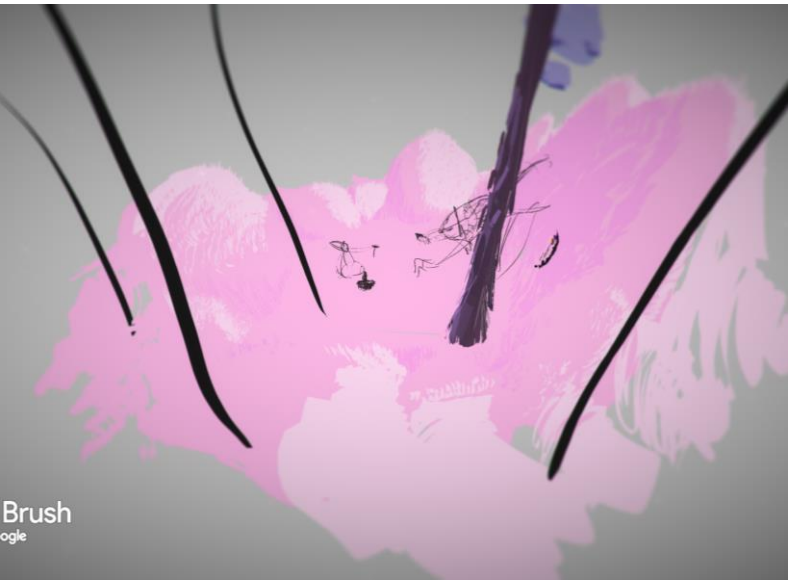
As I started working the base I came across my first problem. In 2D you are able to do easily big shapes because you are able to see whole piece at a one time. Zooming away from the work gives you the advantage to see every inch of it. This helps to make right proportions and reach all corners. In 3D this became a problem. To be able to make big continuous strokes

Left side: 2D Terrain. Right side: 3D Terrain.

you´ll also have to zoom away. Which means that your movement has been given more space. The further you are from the object the less you perceive it. This created tilted stokes and gaps between the strokes which made it difficult to create a flat base. After multiple tries I was able to manage it but some of the gaps still remained. I believe that making the terrain was the biggest part of the painting process.

3.3.2 Trees

In the original 2D version the trees did not have leaves as the picture would have been too crowded. In 3D on the other hand it looked like winter wonderland without them. Because



you can view things from
different angles, it gives you space.

It is one of the great aspects of 3D. I started working upwards from stem making first a long line that I followed with small strokes. To give the tree a cylinder shape I kept changing the viewing angle by going around it. The process was slow and a bug in the program did not help. I lost all data from the trees and needed to start all over. The bug seemed to be caused by the headset going out from camera view. You can easily drift away and loose sense of direction inside VR. I started being cautious and avoided moving. If I needed to change the angle, I used the controllers to flip the space. Making the leaves instead was fast. Because leaves have gaps and different shapes I didn´t need to be so precise In the terrain tilted stokes and gaps were troublesome but here an amazing effect. It gave them more natural, organic feel.

3.3.3 Characters

I had sketched designs for the characters in 2D but to get proportions and composition right I sketched them inside 3D. I had to be sure before I started to paint them as you are unable

to move them afterwards. Still with red riding hood I made that mistake. The skeleton was floating which I needed to cover with grass. Perceiving distance on a base that does not show shadows is challenging. But it was essential for the consistency in style. In 2D I was able to change the size and position of the characters with ease. Because my view is limited in one angle it is a lot harder to not notice such mistakes. Wolf on the other hand was surprisingly easier to make in 3D. I had already designed wolf to consist mainly on texture. In 3D instead of my believes it didn´t turn out to be a blob without shape. The special brush that reflected light gave it an interesting texture which I was looking for. One thing I also realised was that having anatomy correctly made is a lot easier in 3D. In 2D I easily got blind to the proportions and was forced to redraw multiple times the design before I got it correctly. When you change view in 3D you can´t avoid your mistakes.

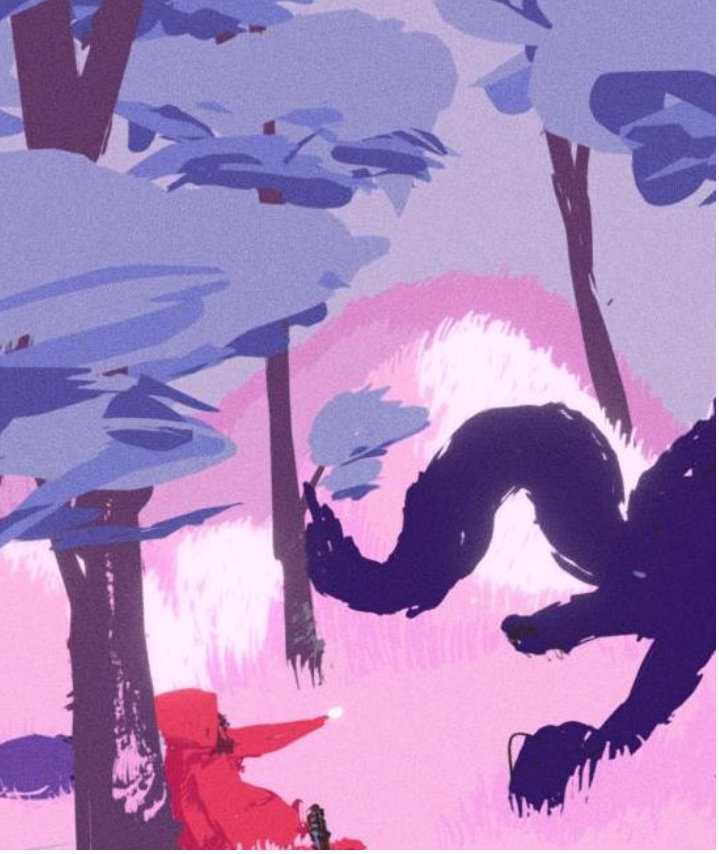
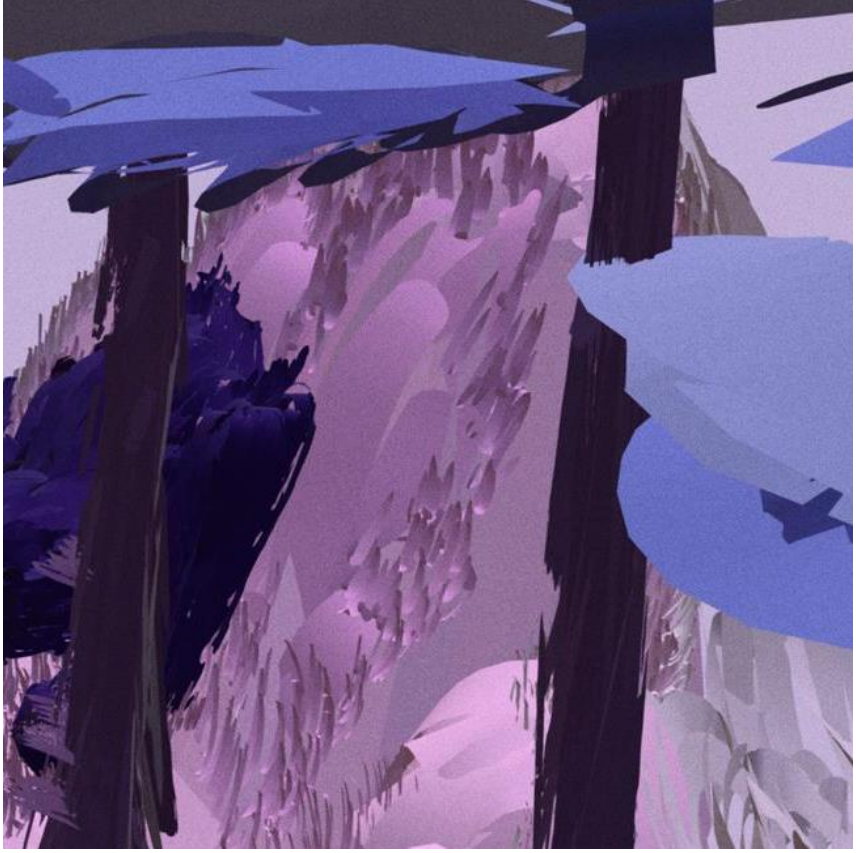
3.3.4 Light and Shadow

The conception of shape can be hard to achieve in 2D because to give something a more realistic view, it has to seem 3D object. In my work I wasn´t looking to give impression on

realism, but I did want the viewer to have impression of space. By giving the hills and trees shadows and highlights the environment seemed to have more shape. In Tilt brush you have two types of brushes: ones that reflect light, and ones that don´t. (Annex 1) I had decided to use the ones that reflect light only in the stems and in the wolf to give them texture. But for the environment I used the ones that didn´t. That meant that I had to hand draw the shadows. It was a conscious choice for the style. As I explained in the terrain section the light would have highlighted every stroke making the end result to look very detailed. The 2D version is minimalistic and to recreate that style I decided to take the long run. The advantage in 3D is that everything has shape if you just draw it. But 3D has also deficiency in it. There is no opacity nor layer control inside tilt brush. It meant that I was unable to recreate "light leaks" from behind the hills.

3.3.5 Atmospheric perspective

To give the 2D version more dimension than just shape the objects have been faded to the background. This is called atmospheric perspective that can be seen in nature. (study.com, 26.4.2017) In art it is an effect to create an illusion of continuous space. In 3D to get such effect you would need to create all individual objects for it or use a trick. In tilt brush you are able to bring photos and 3D models. If you bring 360 degree photo around your design you would get the same effect. I decided to not use this technic as it would have been needed to create in 2D.

Left: Light setup off. Right: Light setup on.

3.3.6 Effects and Texture

Because the work has big shapes of one color I wanted to add texture to it. In 2D version I was able to put noise layer on top to give it more illustration feel. In 3D I did not have such ability inside tilt brush but in sketchfab I did. Sketchfab is a online portfolio website to showcase 3D models in 360 degree format. They have their own 3D editor where you are able to customise and texturise your work when published. (sketchfab.com, 26.4.2017) Thanks to it I was able to add similar noise. I will tell more about it in export section.

3.4 Export and Publish

Finally my work was done. I was pleased and oblivious what a nightmare was ahead of me. In 2D all I needed to do was save the file as .jpeg, .tiff or .png and I would have the illustration in a format that i would easily be able to share to the world. It

took seconds. In 3D this was not the case. In july 2016 Sketchfab started accepting tilt brush files to their website. I had read about this and thought it would be good way to present my work. All I needed was the .fbx file of my work uploaded to their site. But as I uploaded the file, I lost all texture from the wolf and the trees. From all the brushes that reflected light. I went through internet and found out that there was others that had a similar problem. (blog.sketchfab.com, 26.4.2017)

Brushes which had animation or reflective abilities ended up faulty unless you set up light inside the editor. But there is a catch. When the lighting setup is on it affects all brushes. Even the ones that originally did not reflect. Which meant that I would need to choose between the two. Either lose all detail in wolf and trees making them blobs. Or making everything have a light reflective feel filling the image with details. I went with the first one as it resembled the original more.

But I was not pleased. I thought about different options. Inside tilt brush you are able to record video, take photos and gifs but you don´t have the option to export 360 degree footage. Again I searched through the web and found a way. (docs.google.com, 26.4.2017) It involved coding which was not my forte.

Thanks to the help I got from a coder I managed to get one minute long video out after 10 hours of rendering. I was a bit disappointed to the result because it clearly did not showcase all the details. But currently it seems to be the only option as you are unable to walk inside the original file without similar equipment.

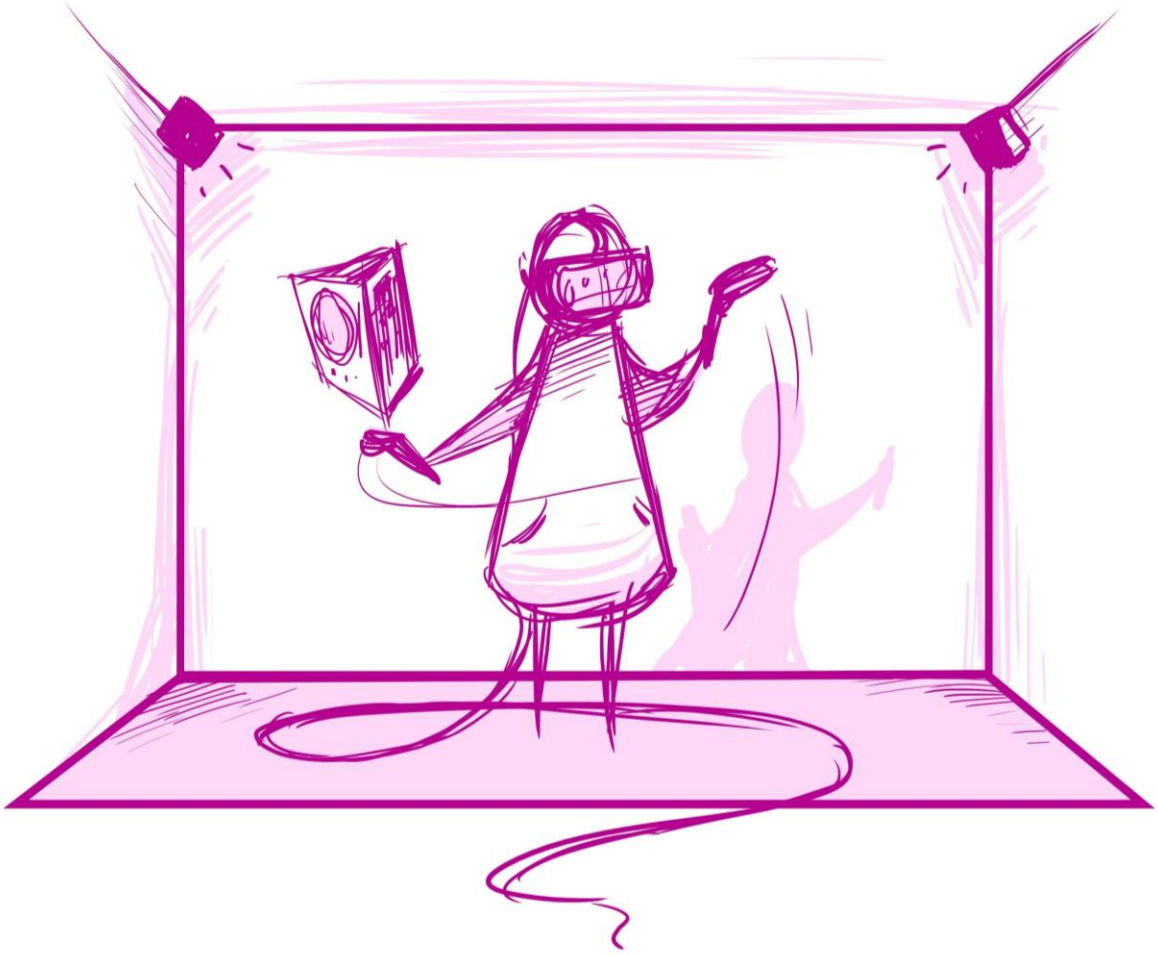
4 Summary

In this section I´m going to go through my final thoughts and obstacles I ran into during process.

4.1 Problems

When I started this project I was aware that I would ran into difficulties. But some of them still came to me as a surprise. Because the system was new to me everything took a long time. The equipment was transported numerous times from class to class. This meant that every time I came to work, I would loose one hour to assembly. Multiple times tilt brush crashed and I lost work progress to bugs. It was frustrating but after awhile I learned to expect these defects.

Drawing with big gestures is harder than you would think. Not technically but physically. After just couple of hours my hands and feet started to get fatigue and my clothes wet from sweat. Painting



in 3D involves your whole body. It is an exercise. Maybe you will built up tolerance or use chair on wheels like i did. But even though you would be able to bare it - your eyes still could not. It is like having reading glasses on for too long which at my case lead to headaches. Someone who is used to working 10 hours straight in front of a screen knows the struggle when someone interrupts your flow.

Walking to a wall. It happens. 2m x 2m space for 3D painting is too small.

Most of the problems that I had still were inside Tilt Brush. But the reality is that this is the first version of it. I cannot compare it to Photoshop that has years of development. It is a fine line between comparing 3D painting medium to 2D medium instead of comparing the two programs. Which is why I won´t go into more details than what I told during the process.

4.2 Final thoughts

Virtual reality is exiting. When I put my glasses on for the first time I could not stop smiling. When I grabbed the controllers and made the first brush stroke: I was like kid in the candy store.

The process was try and error. Everything was new. And I should have stopped there. Because the medium was founded less than a year ago I should have figured that finding sources would be almost impossible.

But I can see why VR has been on a rise. As I believe that we have built up a tolerance to stimulations from media, VR has the ability to give us a new level of immersion. Gartner put Virtual and Augmented reality to their Top 10 Strategic Technology Trends for

2017.(gartner.com, 24.4.2017) And even though painting in 3D is at start level and might not be for everyone, I believe it has a future. Spreading paint to air gives you an odd satisfaction.

This experiment gave me a lot in personal level as I found a new way to express myself. Instead of only watching it, I can now be a part of it. I am glad I took the challenge. And hopefully in the future I have the chance to try them again.

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Annex

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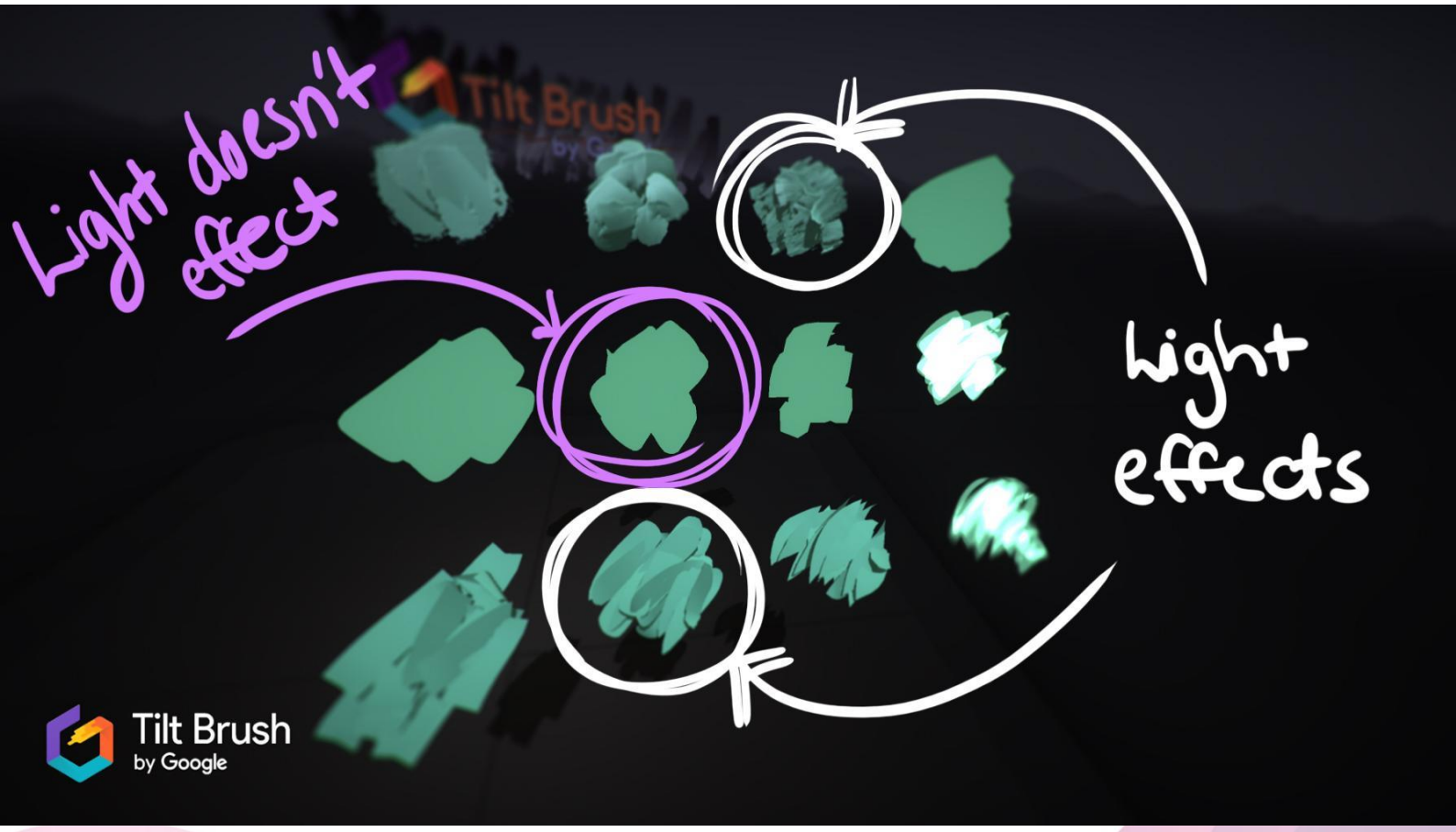

To watch 360 video:

https://www.youtube.com/watch?v=Gn2lRZ7bPaA

To see sketchfab:

https://skfb.ly/67uEE