



IONIAN UNIVERSITY
AUDIOVISUAL ARTS DEPARTMENT

THESIS

Animation short film

“In and Out”

PHILIPPE MISTRIOTIS DUMONT

TX 2012063

Supervisor : Konstantinos Tiligadis

Corfu

September 2021

Brief Summary

The subject of this thesis is a short film animation using 3D graphics and digital effects. The film is a story of psychological content within abstract and surrealistic environments. The title of the work is "In and Out" and the plot follows the evolution of situations within the mind of the main character. More specifically, the story follows a black doll, which represents the main character, as he travels through the unconscious of his mind. The action unfolds without dialogue, with an emphasis on the chaotic nature of the unconscious, culminating in the symbolic death of the doll. The style and themes of the work are inspired by two-dimensional artists such as Jordan Wong¹, The web series of Mr. Freeman², Jake Fried³ and musicians such as Oneohtrix Point Never.⁴

Beginning with a psychological Rorschach⁵ test, with each image the unconscious mind of the protagonist awakens more and more and with it, the black doll. In a dream-like state, the doll begins a quest. At first it finds itself in a strange town with white dolls, symbolizing how it sees society and the people in it. Moving on, it enters a door that leads inside this city, which forces it to conform. After escaping, it finds herself a passenger on a train that takes it deeper into its imagination. Its next destination is a desert landscape where it sees several lost and misshapen dolls like it. Crossing the landscape it finds itself facing a tall mirror which plunges it further into the unconscious by bringing it face to face with a giant eye, suggesting that the final destination will be found in itself. Thus it comes to the realization that the black doll is merely a mold and is not its true self.

1 <http://www.okjordanwong.com/>

2 <https://www.youtube.com/c/mf0/videos>

3 <http://inkwood.net/>

4 <https://www.youtube.com/user/OneohtrixPointNever/videos>

5 https://el.wikipedia.org/wiki/Τέστ_Ρόρσαχ

Abstract

The object of this thesis is a short film animation with the use of three-dimensional graphics and visual effects.

The film is a story of psychological content taking place in abstract and surreal environments. More specifically, the story follows a black mannequin, which represents the main character, while he travels inside his unconscious mind. The action develops without dialogue, with emphasis on the chaotic nature of the unconscious and climaxes with the symbolic death of the mannequin. The style and subject matter is inspired by 2D artists such as, Jordan Wong, the internet series of Mr. Freeman, Jake Fried and musicians like Oneohtrix Point Never.

We begin with a Rorschach test, where with each image the unconscious awakens more and more and with it, the black mannequin. In a dream-like state, the mannequin starts a search. In the beginning, he is in a bizzare city with white mannequins, which symbolizes his view of society and the people in it. Next, he enters a door that leads inside this city, where the city tries to bring him in line. After he escapes, he is a passenger in a train that leads deeper in his imagination. The next destination is a barren landscape where he sees other lost and disfigured mannequins like himself. While crossing this landscape, he will find a giant mirror, suggesting that the last destination is inside him. The end comes with the realisation that the black mannequin is nothing but a husk and it is not his real self.

Summary

The first chapter presents the power and evolution of 3D graphics in our time and more specifically in the field of art. Examples of the use of 3D graphics by independent artists are also given. Then some technical terms related to 3D graphics and 3ds max are listed for easier reading of the text. Finally, the topic and purpose of this thesis is given and the steps followed are briefly discussed.

The second chapter lists the pre-production stages, starting with a theoretical description of the stages and continuing with the general theme and concept of the project along with its theoretical influences. In particular, the ideas for the character and environments to be designed are categorized and recorded, and finally the final storyboard is presented.

Chapter three develops the stages of production. More specifically, the chapter analyses the various ways in which the characters, scenes and environments were modelled. Then, with reference to the drawings, the recorded ideas and the storyboard of the previous stage, the process of composing the scenes and the animation techniques are described together with some examples.

In chapter four we reach the final stage of post-production, where the processes of editing the final image to achieve a complete result are presented. In the mentioned stage the development of effects creation, editing and music composition will be developed.

The fifth chapter discusses the difficulties encountered during the development of this project. Then, several conclusions are recorded regarding the creation of an abstract three-dimensional work and finally some suggestions are given on the use of 3D graphics in storytelling.

Table of contents

1. Εισαγωγή.....	7
1.1 Αντικείμενο της Πτυχιακής.....	7
1.2 Λεξικό Ειδικών Όρων.....	8
1.3 Στάδια Εργασίας.....	9
2. Προ Παραγωγή.....	10
2.1 Σύλληψη ιδέας.....	10
2.2 Carl Jung και Herman Rorschach.....	10
2.3 Σύνοψη ιδέας.....	13
2.4 Σχεδιασμός χαρακτήρα.....	14
2.5 Σχεδιασμός περιβαλλόντων/σκηνών.....	14
2.6 Εικονογραφημένο σενάριο (Storyboard).....	18
3. Παραγωγή.....	20
3.1 Μοντελοποίηση χαρακτήρων.....	20
3.2 Μοντελοποίηση Περιβαλλόντων.....	21
3.3 Εμπύχωση.....	30
4. Μετα-παραγωγή.....	35
4.1 Οπτικά εφέ.....	35
4.2 Μοντάζ.....	36
4.3 Ηχητικά εφέ και ηχητική επένδυση.....	37
5. Συμπεράσματα και Προτάσεις.....	37
6. Βιβλιογραφία.....	39
7. Ιστογραφία.....	40

1. Introduction

1.1 Subject of the Thesis

The field of digital animation and especially 3D graphics has grown significantly in the current era. With their application continuing to spread to disciplines such as science, education, medicine, advertising, architecture and obviously art, many new specializations are created as well as the need for the continuous evolution of technological tools. These, together with the current power of personal computers and the internet, enable independent users to familiarise themselves and test their skills in the world of 3D graphics.

As far as art is concerned, this phenomenon seems to be particularly influential because it has brought to the surface modern works created by one person or very small groups of people with minimal equipment, something that a few years ago technology did not allow or required large teams of specialized people. An illustrative example of 3D graphics is Astartes of Syama Pedersen.⁶ A project that shows how impressive and qualitative results can be achieved by one person using today's technology. This inspires many young artists to create and enrich their toolbox in this new digital age.

In the context of this paper, the stages of production of an independent 3D audiovisual narrative will be developed. Starting from pre-production, where the conceptualisation of the idea and the themes of the project will be described, we will continue with the storyboard production and the subsequent processes such as the design of the 3D models and the creation of the 2D assets to be used in the production. The stages and methodology followed for the final composition will then be presented.

Finally, conclusions will be drawn about the production, in terms of the difficulties and demands that the creation of an abstract work by independent artists brings. The obstacles encountered will be analysed, both at the technical level and in the general realisation. In addition, the adaptation of 3D work to illustrate the idea of an audiovisual project will be examined, with the aim of extracting the disadvantages and advantages of the usefulness of 3D graphics in storytelling.

6 <https://www.youtube.com/watch?v=DVXEYksoE6c>

1.2 Glossary of special terms

Script and Plug-in: The term script means an automated sequence of commands that is executed by a specific command. By plug-in we mean a small computer program that makes a larger program faster or gives more functionality to a larger program.

<https://en.oxforddictionaries.com/definition/script>

<https://dictionary.cambridge.org/dictionary/english/plug-in>

Texturing: refers to the process by which the characteristics of a surface of a 3D model are given. In the field of 3D graphics this process is done by using 2D images to capture surface properties such as colour, bumps, reflection and refractivity.

Charles Finance, Susan Zwerman , *The Visual Effects Producer : understanding the art and business of VFX*, Oxford 2010, σ -27.

Maps: are two-dimensional images, the majority of which are black and white and which are used to process various parameters, for example in the texturing process.

Ami Chopine, *3D Art Essentials : The fundamentals of 3D modeling, texturing and animation*, Oxford 2011, σ -151.

Displacement maps: is the use of black and white images to change and modify the geometry of a 3D model.

Ami Chopine, *3D Art Essentials: The fundamentals of 3D modeling, texturing and animation*, Oxford 2011, σ -160.

Rendering: is the process by which a 3D or 2D editor outputs a two-dimensional image consisting of pixels.

Ami Chopine, *3D Art Essentials : The fundamentals of 3D modeling, texturing and animation*, Oxford 2011, σ -219.

Rigid bodies: in 3d animation, when we want to simulate the laws of physics we call rigid bodies the models that will receive and exert forces. Models that also have elasticity are called soft bodies.

Ami Chopine, *3D Art Essentials : The fundamentals of 3D modeling, texturing and animation*, Oxford 2011, σ -128.

Modifiers (Inside 3ds Max): are various modifications that can be made to a three-dimensional model. By using them we can change its geometry and parameters. 3ds Max allows stacking of modifiers giving full dynamic control during modeling.

<https://knowledge.autodesk.com>

1.3 Project stages

Below is the usual order of tasks that must be completed to produce a 3D project.

Pre-production:

- Preliminary drafts and illustrations (Concept Art)
- Character Blueprints
- Storyboard

Production – 3D graphics:

- Modelling
- Texturing
- Lighting
- Rigging (if required)
- Animation
- Scene composition
- Rendering

Post-production:

- Composition
- Sound Design
- Editing

2. Pre production

2.1 Idea conception

The initial step that needs to be taken to create a basic concept is to record the idea and the themes of the project along with indicative illustrations, so that there is a basis on which to build the script and storyboard. The form and order of these steps may vary from project to project because they involve a creative and free process, which is different for each creator. The requirement for a more rigorous and more structured preparation occurs later in the production process, when the stages of

the production need to be well understood, especially when the production is to be carried out by a group of people.

The title of the project is In and Out and relates to the exploration of the unconscious in relation to feelings of alienation, detachment and cynicism. The plot concerns a man who begins a Rorschach test during which he sees various abstract shapes, and his reaction to them. At first he thinks nothing but slowly his imagination awakens, first with simple abstract images and then with complete ideas and thoughts, so that he begins a free association with himself as a passenger on a journey through his imagination. His imagination, however, draws inspiration from the unconscious, which betrays his state of mind and tries to provide an answer to his quest. The world is presented as an absurd theatre consisting of inexpressive white dolls. Traversing this dream-like world, he is confronted with his own thoughts with the final "opponent" being himself.

2.2 Carl Jung and Herman Rorschach

Great inspiration came from Herman Rorschach's Rorschach test. The psychological test is a very popular projective test of the 1960s. The test usually consists of ten pictures depicting abstract symmetrical shapes and their interpretation by a human being. The subject's reactions are then analysed using various psychological methods and sophisticated algorithms. The test has been used for various purposes, for example to diagnose symptoms of schizophrenia, such as thought disorders, as well as for research on the phenomenon of pareidolia.⁷ Over the years the test has been subjected to several criticisms regarding its usefulness as a diagnostic tool. This is mainly due to the limited number of psychological conditions it can accurately diagnose and the fact that the original ten images of Herman Rorschach were published, which may invalidate the validity of the test for those who have come into contact with the images. However, the use that was the inspiration for their inclusion in the project is the exploration of personality, a person's emotional functioning and imagination. Despite the criticisms, the Rorschach test has remained popular to this day, largely due to its visual aesthetic, resulting in it being depicted in artwork, cartoons and films.

⁷ People's tendency to interpret vague stimuli as familiar. For example, when observing faces in abstract shapes. <https://el.m.wiktionary.org/wiki/%CF%80%CE%B1%CF%81%CE%B5%CE%B9%CE%B4%CF%89%CE%BB%CE%AF%CE%B1?fbclid=IwAR1utcwKjQWkeKpglTKPgIp2hxJic5DA8Lpi6POgQLNdl7fmzhbxIglhkmU>

Examples of Rorschach's images in art



To the left, a character from the movie *Watchmen* 2009. The movie is based on a comic by the same name by Alan Moore, Dave Gibbons and John Higgins in 1986. To the right, a work of Andy Warhol, 1984.



A frame from the video clip of the song Crazy by Gnarls Barkley, 2009.

An important characteristic of Rorschach images is symmetry, which Rorschach has commented on with the following: "Figures without symmetry are rejected by the subjects. Symmetry added a part of the necessary artistic composition. The disadvantage is that it tends to make responses stereotypical, but on the other hand symmetry creates the same conditions for left-handed and right-handed subjects. Finally, symmetry makes it possible to interpret entire scenes."⁸

The theme is also influenced by a plethora of Carl Jung's ideas on the unconscious and dreams. Particular emphasis is placed on the idea that one's unconscious can be used to better understand oneself, provided there is a will and good judgment because the interpretations of the unconscious can be many and contradictory.⁹ The uncertainty of interpretation is particularly evident in the bizarre nature of dreams, which are dominated by the unconscious mind, and only with intense attention and introspection can one extract the message of the dream. This idea of the dream message, or in other words that the dream has a goal and a message to convey, was very different from earlier theories of dreams. Sigmund Freud for example thought that dreams were only about hidden desires and fantasies or just incoherent memories of the previous day. Carl Jung was one of the first psychoanalysts to suggest that the dream tries in its own symbolic way to bring to the surface important aspects and concerns of a person's psyche, a process he calls the process of individuation.¹⁰ Jung also warns that dialogue with the unconscious can be dangerous because it confronts us with hidden aspects of ourselves, which he personifies as the shadow self.¹¹

In the film, the black doll is based on the idea of the "shadow self" as a personification of the central character's feelings of alienation, confinement and powerlessness.

2.3 Summary of the idea

The environment of the film is designed to resemble mainly dreams and abstract thoughts related to the character's emotional state without any self-evident interpretation. More specifically, the aim was to create a sense of alienation from the world and the main character and, in a second stage, to present the world as imagined by him. In other words that he is just a passenger in his imagination, which is why the idea of a train was used to further the plot. Based on all the above ideas, the purpose of the script became to depict a Rorschach test from the subjective point of view of the subject where we watch as his imagination is slowly triggered. The interpretation of this fantasy is the role of the psychoanalyst on the other side of the test, in which a picture of the subject's

8 Rorschach. H., *Psychodiagnostics; a diagnostic test based on perception : including Rorschach's paper; The application of the form interpretation test*, Grune & Stratton inc, New York, 1942, σ- 15.

9 Carl Jung, *Memories, Dreams, Reflections*, New York: Vintage Books, 1965, σ- 209.

10 Carl G. Jung, *Man And His Symbols*, New York: Dell Publishing, 1968, σ- 160.

11 Carl G. Jung, *Man And His Symbols*, New York: Dell Publishing, 1968, σ- 168.

emotional state and personality is formed. Thus, in *In and Out* the viewer is asked to interpret the content of the protagonist's fantasy in order to form an idea of his personality. More specifically, the character in *In and Out* is personified as a black doll in a world full of white dolls, with the result that his idea of himself and the world around him is already betrayed. People seem hollow, pointless and wander around, reminiscent of a theatre of the absurd. He stands out from the rest and does not fit into this world. By exploring this world, it is suggested that the unconscious is trying to show something to the black doll, approximating Jung's process of individuation. In the film, the purpose of the unconscious is to present the protagonist with his external world as he imagines it, and then to turn his attention to himself and how he imagines it, in order to make him realise that his world is hollow and ridiculous because that is how he sees himself.

2.4 Character design

The concept of the character as well as the human models in the story is based on the clothing display mannequins because of their faceless and expressionless appearance, giving the impression that they are insignificant, disposable and hollow. The simplicity of the main character was chosen to put more emphasis on the environment and the sense of unfamiliarity, as opposed to the personality that a more concrete and complex character would express. More specifically, the aim was to give the impression that the plot would continue without the presence of the protagonist, just as one's imagination functions without one's conscious control. The choice of the black doll is also a development of the idea of the black sheep, the one who does not fit into the flock. The color black also symbolizes the negative emotions and the dark side of the protagonist.

2.5 Environment/Scene design

The project's environments were divided into five parts:

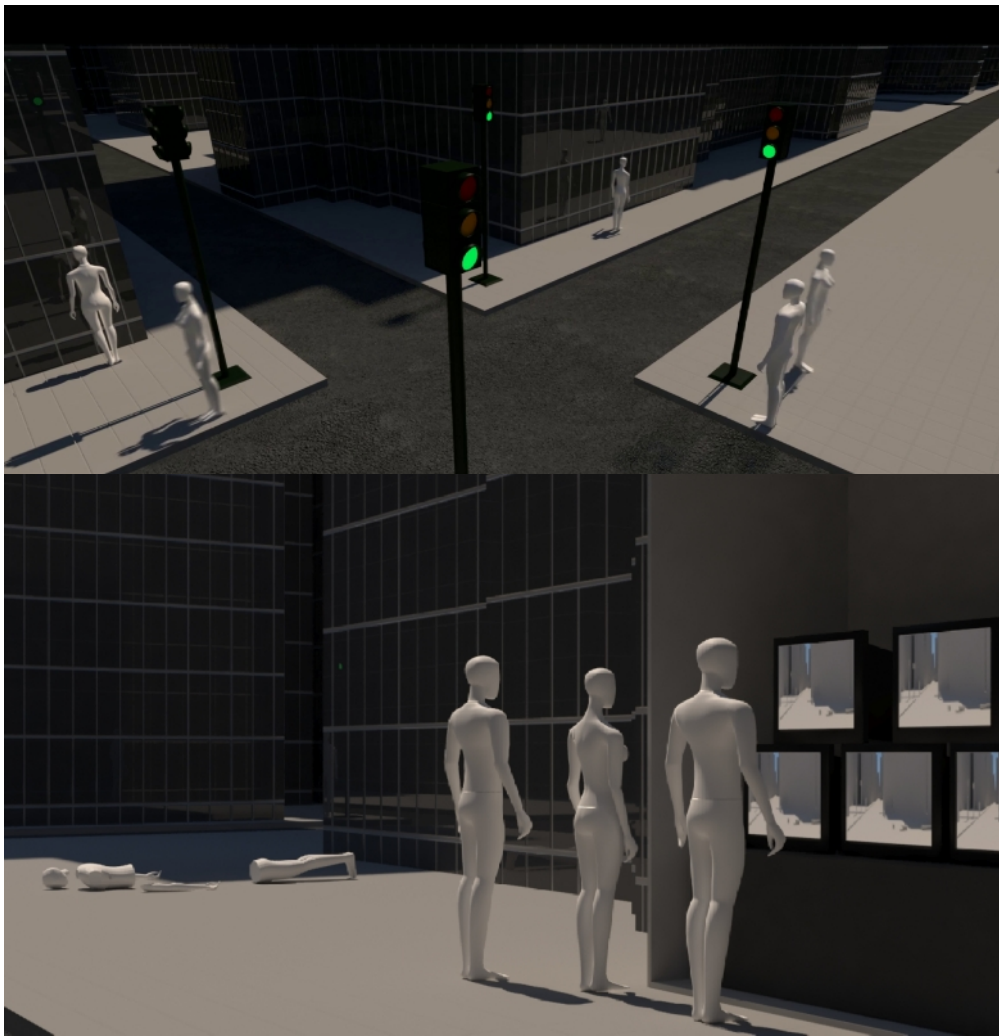
- Rorschach images
- The city
- The inner city
- The desert
- The train

The Rorschach images follow the format of Herman Rorschach's well-known psychological test where abstract symmetrical shapes appear on a white background. The purpose of the test is to form

a picture of a person's mental state based on their instinctive reaction to the images. In the project they were used to initiate the journey through the protagonist's imagination. In other words, with each image his unconscious is triggered where we see that his reaction to them starts with simple shapes and colours until his imagination takes over. Moreover, as the story progresses, the images come to life and take on the role of the protagonist's consciousness. Alongside the chaotic and seemingly vague unconsciousness presented, the images indicate his consciousness' attempt at order and understanding. The purpose of this dynamic is to balance the imagination (along with the black doll) and the "waking" character, i.e. the subject taking the Rorschach test. For without it, fantasy would dominate the script and could not be separated from a mere dream.

Aesthetically, the city follows the same logic as the dolls, where the emphasis is on the form of a city rather than the detailed description, and consists of identical skyscrapers and streets where doll-people wander, reminiscent of a puppet show. The idea here is the theatricality of urban life and the sense of absurdity that occurs when one distances oneself from it. All of society seems to him staged, ridiculous and absurd. For example, we see the suicide of a doll next to other dolls watching the same suicide on televisions and other dolls going up walls only to change direction without any purpose. Also the appearance of the city dolls starts with the green indicator of a lantern, emphasizing the theatricality of this society.

Still frames from In and Out



The style of the city is influenced by Albert Camus' *The Fall* where he characterizes the aimless life of people, who come alive only for the spectacle of social urban life.¹²

The next environment that appears to our protagonist is the continuity of the city, or better, its inner world. The idea was to present society on a deeper level, showing its darker side. We see dolls in lines with cell phones attached to their faces, pieces of dolls falling from a pipe, showing how expendable they are to society and at the same time we see the black doll start to turn white. The environment was visualized as a horizon hidden by darkness and a room with desks and clocks on the walls. The design was based on a Kafkaesque interpretation of modern society, with people being moved to their respective positions reminiscent of a factory. The symbolism here is a more dramatic approach to the character's detachment from the world. The black doll tries to conform and integrate into society, but fails and continues on her journey.

Before the play escalates, the protagonist is transported to a desert inhabited by lost and misshapen dolls. Here the idea is to move away from the previous society and into a new environment where the protagonist finds people exiled and lost like himself. The lost place is a symbolic idea often used in narratives. Usually the hero after a defeat finds himself in such a landscape and has to find a way out, which often occurs after some realization and development of the hero. In the present story, the development occurs when the character finds the big mirror or when he looks at himself. In the scene the black doll arrives on a train, stating that the desert is the next stop on her journey. Again, the purpose was to give the feeling that his unconscious or imagination is guiding him with a final destination. In other words, the unconscious presents him with surface society, its underworld and finally takes him out of it. In all these environments the black doll still shows that it does not belong here. The only solution left is to look within itself where it discovers that her world is "hollow" because that is how it is.

The train, having special significance in the plot as a means of transportation from scene to scene, is used as a symbol for the uncontrolled flow of thought. It also establishes the idea that the

12 Albert Camus, *The Fall*, Αθήνα: Σ.Ι. Ζαχαρόπουλος, 1988, σ- 28

protagonist is merely a passenger in his imagination. The use of a train as a metaphysical device was inspired in part by the Japanese series *Mononoke* (2007) where a ghost train transports characters to imaginary environments, and in part by *The Matrix Revolutions* (2003) which depicts a train that transports the protagonist between worlds.



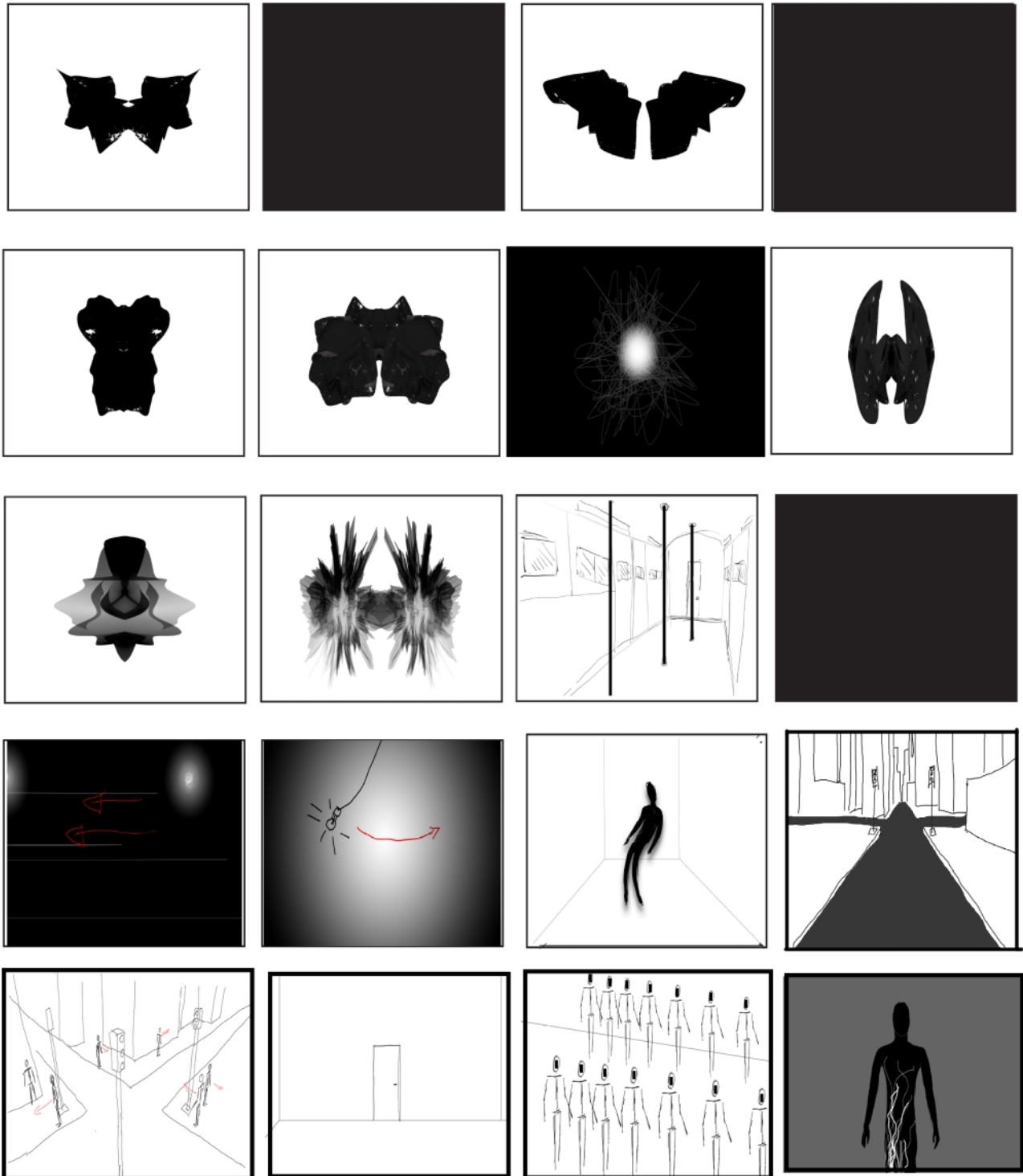
Mononoke.

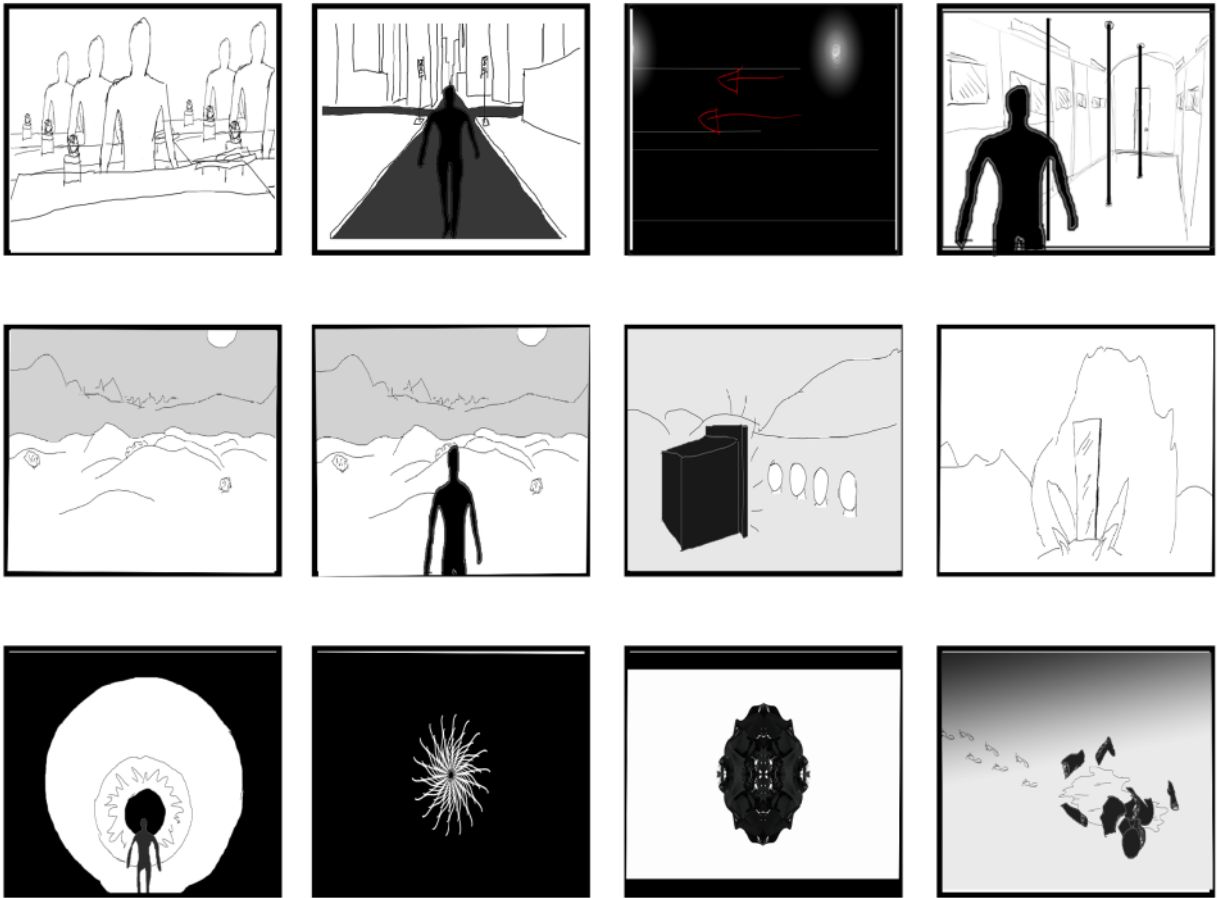


The Matrix Revolutions.

2.6 Storyboard

The storyboard was then designed to make it easier to organize the scenes before production began. The design was done with an emphasis on scene layout and shot layout rather than visual aesthetics. The storyboard was created using Adobe Photoshop.





Storyboard of In and Out.

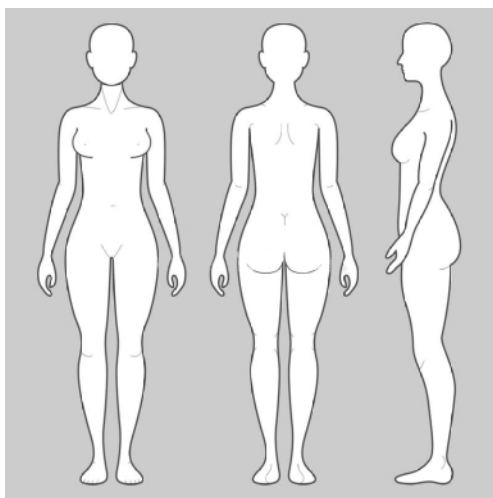
3. Production

All models were created using 3ds Max 2018.

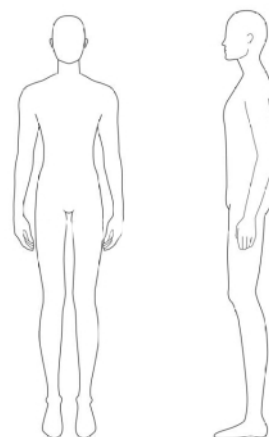
Renderers: Vray and Quicksilver Hardware.

3.1 Character modelling

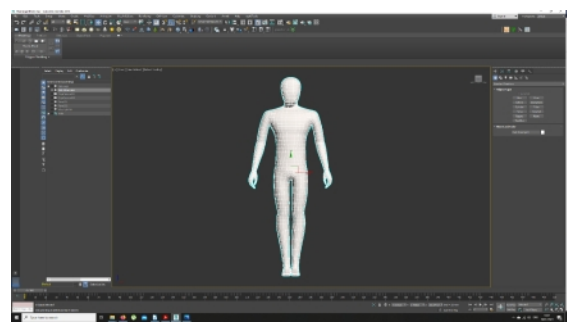
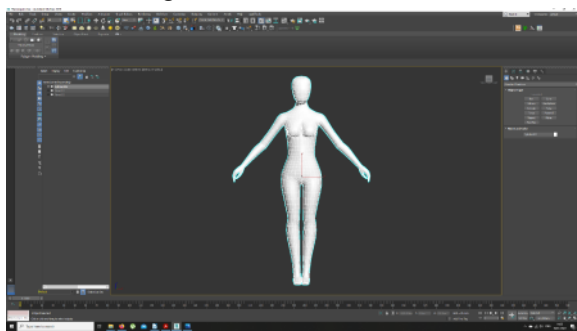
The process of creating a 3D character varies in complexity depending on the purpose of the model in the project. For example, if the model is intended for full animation, such as realistic body movement, facial movement or even clothing, then the modeling of the model is divided into several stages, starting with modeling and texturing, then rigging where the model's skeleton is created to determine the movement of each part of the model, and finally the physics simulations needed for the movement of clothing or hair. In this thesis the mannequin models were not intended for realistic movement beyond moving in space and rotating their limbs, so the creation is simplified to the texturing stage. A common way of creating a model is to draw the character in front and side sketches which are used as references on which to start to model.



Female draft figure



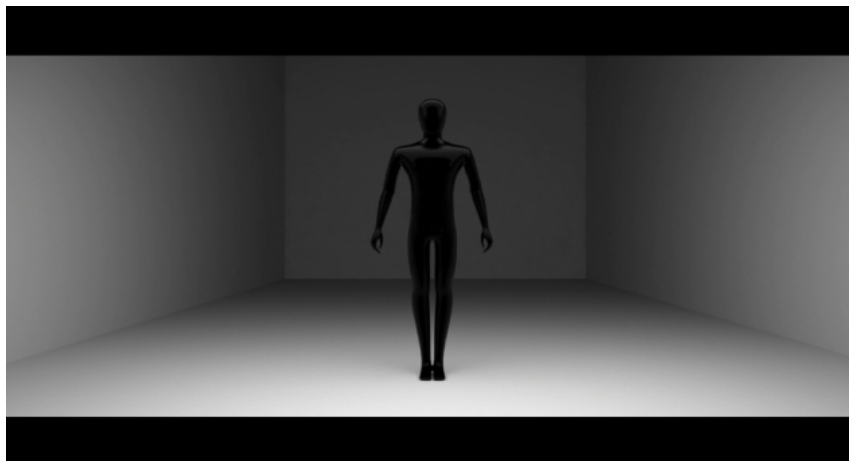
Male draft figure



Final female model

Final male model

The most practical method is symmetric modelling, where half of the model is created, mirrored in the middle using a Symmetry modifier and then small changes are made so that the two sides of the model are not identical. The above models were used for all scenes where mannequins are depicted with appropriate manipulations. The male model is also the central character of the work with the only change being the colour.



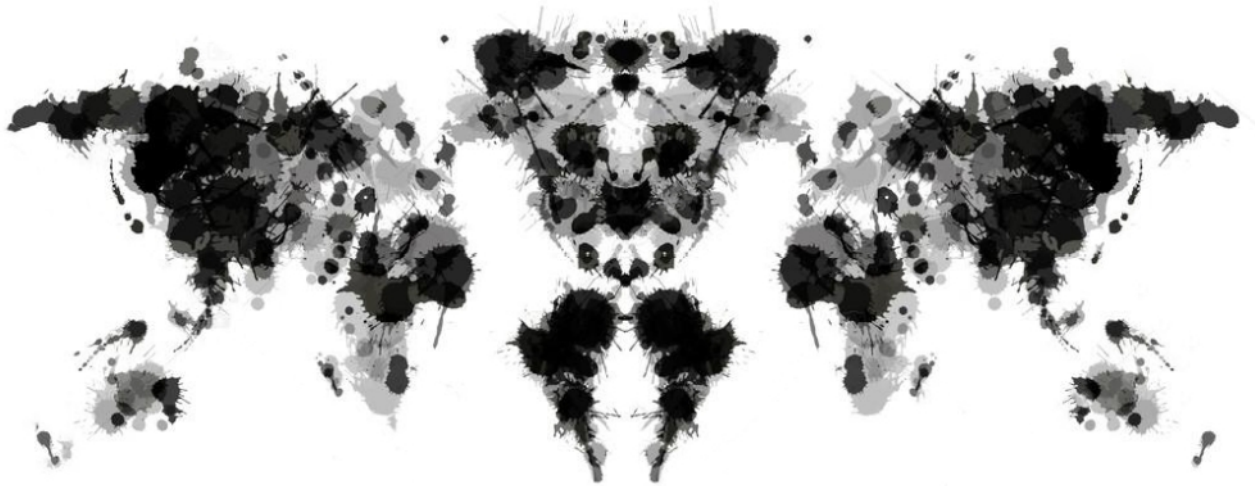
Central character.

3.2 Environment modelling

The environments were designed in order of complexity from the most complex and longest to the simplest and shortest.

- 1) The Rorschach test images were among the first materials created because they were intended for repeated use in the final project. In addition, because of their abstract nature, the design could be made using many different methods and experimentations to find a desired result. Initially, research was conducted and material was gathered from various Rorschach images for use as reference points.

Example of Rorschach images.



The creation of these images is usually done using ink on thick paper. First, drops are dropped and abstract shapes are drawn with liquid ink and then the paper is folded in half, mirroring the design so that symmetrical shapes appear. The implementation of this technique in this project prevents further processing of the images for animation, so it was avoided. Another technique tried was in a 2D design program such as Photoshop or Illustrator, but again the desired animation presented difficulties because it was not easy to capture the organic movement and flow of the shapes. In the end the design was done in a 3D environment using 3ds Max, starting with a simple geometric shape with many polygons and then stacking two modifiers, a Noise and a Symmetry modifier. The Noise modifier creates random elevations on the geometry of the model using noise and the Symmetry modifier mirrors the model on an axis of our choice. By doing this and experimenting with the parameters of the Noise modifier, shapes that approximate the desired result begin to appear.



Rorschach shapes prototype.

But the shape remains very simple. To make the result more interesting, a black and white image with ink drops and shapes was found to control the transparency of the model, showing the places where the image is white and hiding the places where the image is black.



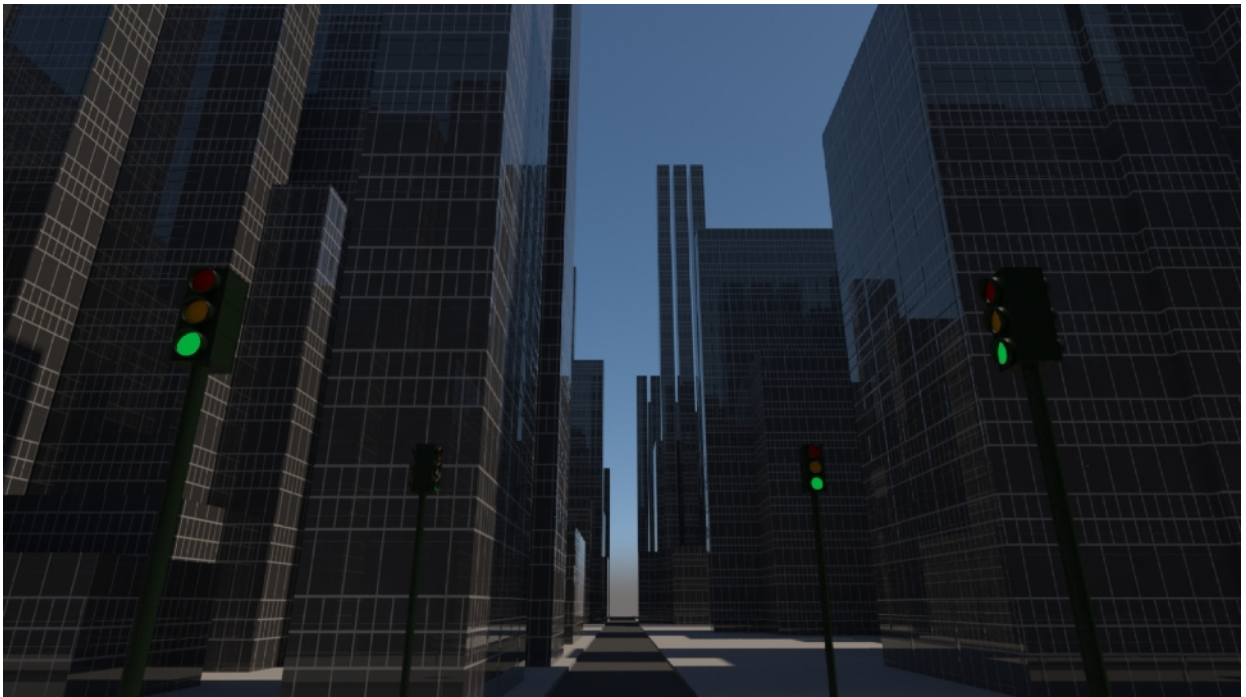
Result with the use of an Opacity Map.

This added an additional layer of complexity to the shape. By combining the above images, as well as animating them, the desired result was achieved.

Final images.



- 2) For the design of the city, a basic structure was created using the "Greeble" script, which creates random square elevations from a flat geometry, reminiscent of buildings. It was then further processed to create streets and sidewalks as well as lanterns. For textures, images of asphalt and pavements were used for the corresponding surfaces. Regarding the texture of the buildings, a tiles map of 3ds max was used to create a two-dimensional grid of rectangles with many editing parameters to resemble skyscraper windows. Finally, a lot of reflectivity was added, but at this stage it only reflected the neighbouring buildings. For more realistic and rich reflections a panoramic city image of .hdr(High Dynamic Range) type was used. This image can illuminate a 3D scene thus giving information about lighting and reflections from a real environment. The .hdr image used was found at <https://polyhaven.com/hdris>.



City without HDRI.



- 3) The design of the city's interior environment started with the office scene, because the other scenes were minimalist environments with few models so less modelling and composition was needed.



Office scene from *In and Out*

Important in this particular scene was memory management due to the number of models to be rendered. For this reason an office with its phone, small cactus and doll was designed and a Proxy was created where a model or group of models can be stored in an external file so that the memory of the project in question can be reduced. In this way the multiplication of this model can be done with minimal impact on the performance of the program. In addition, this technique also reduces the time the final render takes for each frame, because the model is loaded into the program only during the render.

In addition to the modelling, more emphasis was placed on the colour palette of the scene. The aim was to create a cold and colourless feel, so shades of grey and beige were chosen.

The remaining scenes involve the use of models already designed, in a black limbo environment, so the production is more about animation which will be discussed in the next subchapter.

4) The desert environment was aesthetically designed as the opposite of the city. More specifically, a desert environment was designed with rocks and hills on the horizon. More earthy and warm colors were chosen without much intensity so to not affect the style of the project.



Desert scene from In and Out.

To create the terrain, the Noise modifier was again used on a large flat surface to create hills and valleys. Then the same process was done to show smaller changes in the terrain giving it a more natural shape and finally by choosing a suitable soil texture. The same model was copied and enlarged to create the distant mountains on the horizon. Then various sizes of stones were added to the scene along with the misshapen mannequins, which consist of the two original models, but cut at their individual ends to allow for the appropriate deformation of each member.

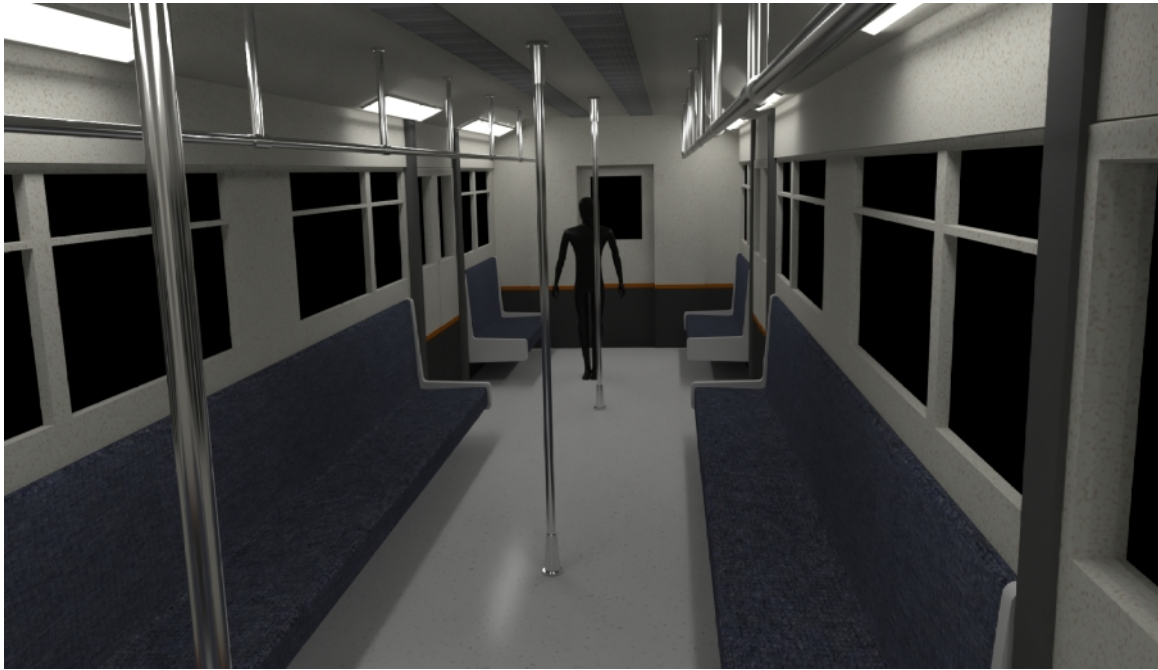
In this particular scene, particular attention was paid to the positioning of the sun because, depending on its position, hue and intensity, the composition of each frame changed noticeably. But what helped in the final grouping of all the elements was the Environmental Fog, which makes the models far away from the camera look duller, giving a more realistic feel to the environment.

5) The last model designed with special attention was the train carriage. The first stage was the collection of photographs of wagons from which the basic structure and individual details were selected. For example, the layout of the seats, windows and support columns.



Original train design.

After the basic model was designed, the selection of colours and textures began, including the creation of the metal surfaces and the fabric of the seats. In order to design the textures correctly, the possible light sources that would illuminate the carriage in each scene had to be selected, so that the surfaces could be visualized in each situation.



Train model with textures.

3.3 Animation

In the animation stage, various techniques were used to achieve the desired result. Some of them will be mentioned below as well as some examples of their application in this project.

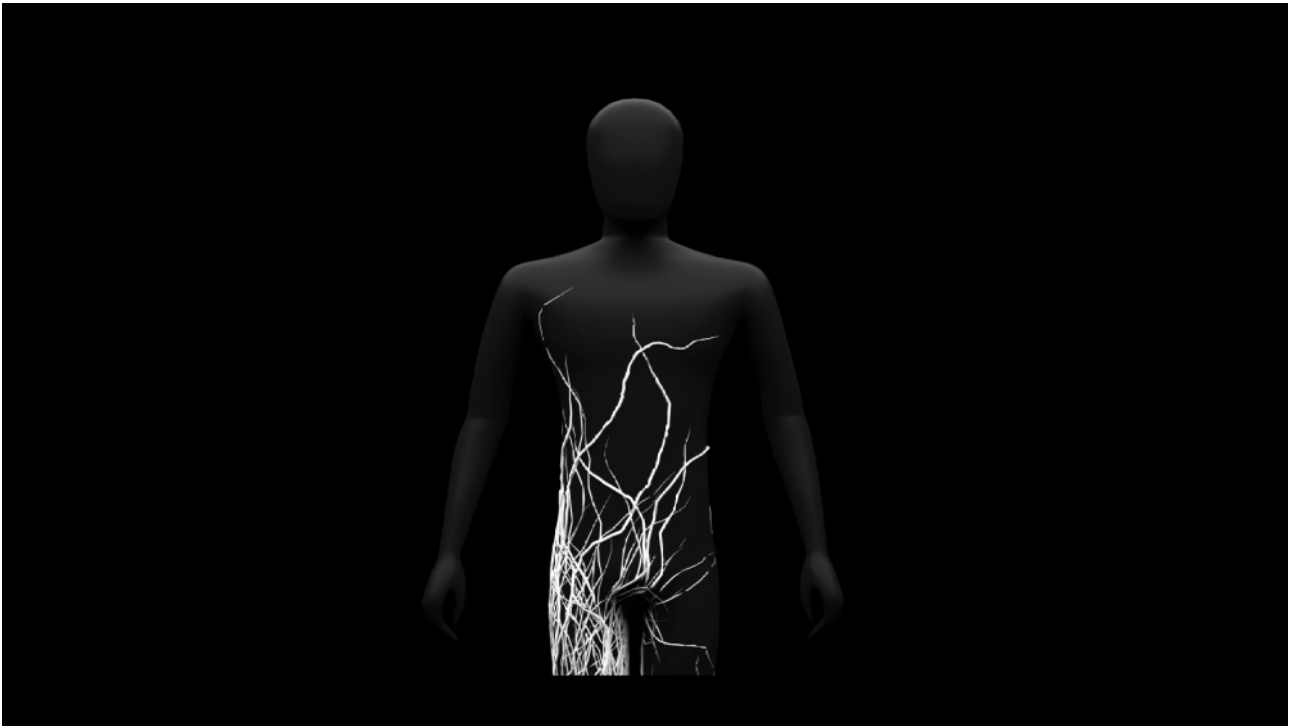
The creation of motion in design programs is mainly done using key-frames, i.e. the creation of specific frames in which an element is modified (e.g. the position of a model) and the program calculates the transition of this element from one key-frame to the next¹³. In addition to this method, in a 3D environment there are additional ways of animation, such as particle systems, cloth simulations and physics simulations. Particle systems involve simulations of a mass consisting of many particles or points in space, which we can replace with a model, and apply forces to them such as gravity, wind, etc. The most common uses of particle systems are the visualization of dust, energy or grass¹⁴. Cloth simulations are used for the realistic movement or design of a textile material, for example the creation of a flag or a sheet. Finally, physics simulations involve using rigid or soft bodies together with some force and simulating these over time, for example the free fall of an object or the collision of two models¹⁵. Of all the above animation techniques, particle systems and cloth simulations provide the least processing capability because they involve systems that, once executed, the only way to modify the final result is to execute them again.

¹³ Andy Beane, *3D Animation Essentials*, Indianapolis 2012, σ- 41.

¹⁴ Andy Beane, *3D Animation Essentials*, Indianapolis 2012, σ- 214.

¹⁵ Ami Chopine, *3D Art Essentials : The fundamentals of 3D modeling, texturing and animation*, Focal Press, Oxford 2011, σ- 128.

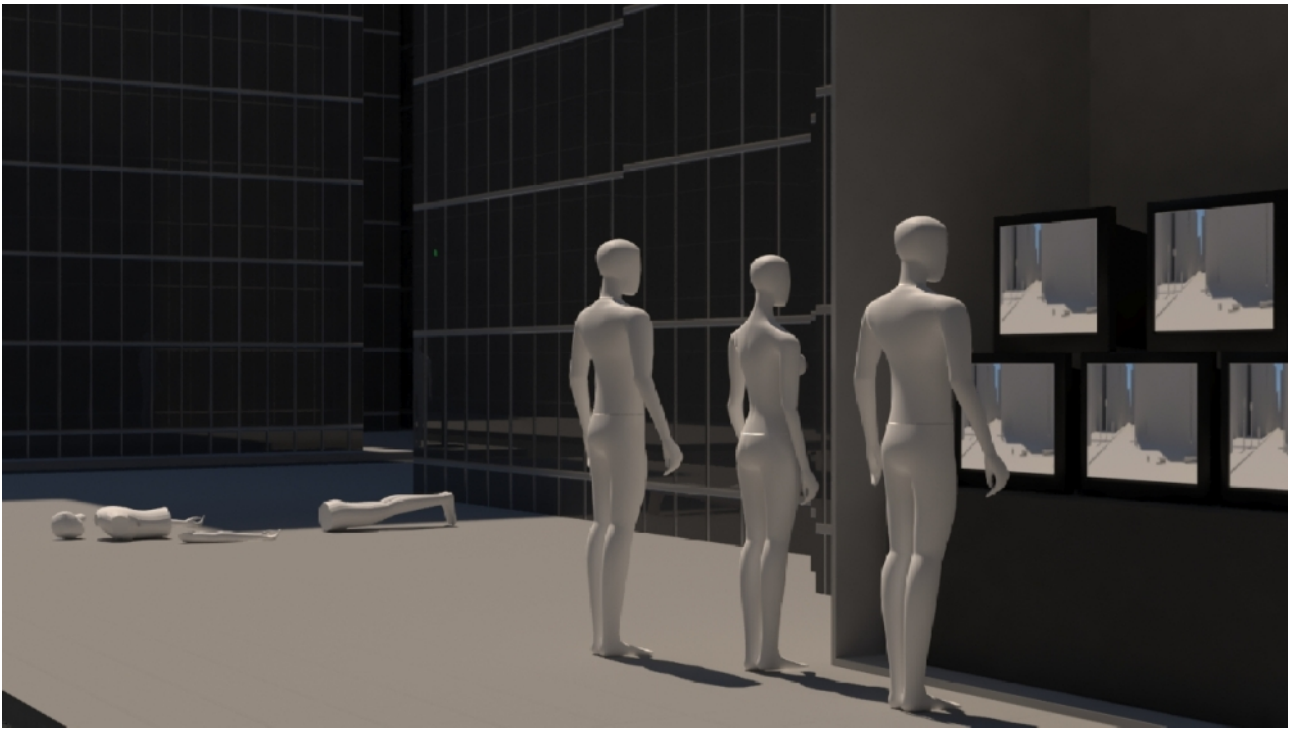
In and Out was animated using rigid bodies, key-frame animation and an external plug-in (ivy generator)¹⁶. The ivy generator was used to create the scene where the black doll is wrapped in white roots. Its function is to select a point as the "initial seed" from which the simulated spreading of branches begins, which stick to the models in the scene, resembling a climbing plant. The program is mainly intended for the creation of branches and leaves on aged buildings but it also offers the possibility of animation, which was used for this particular scene.



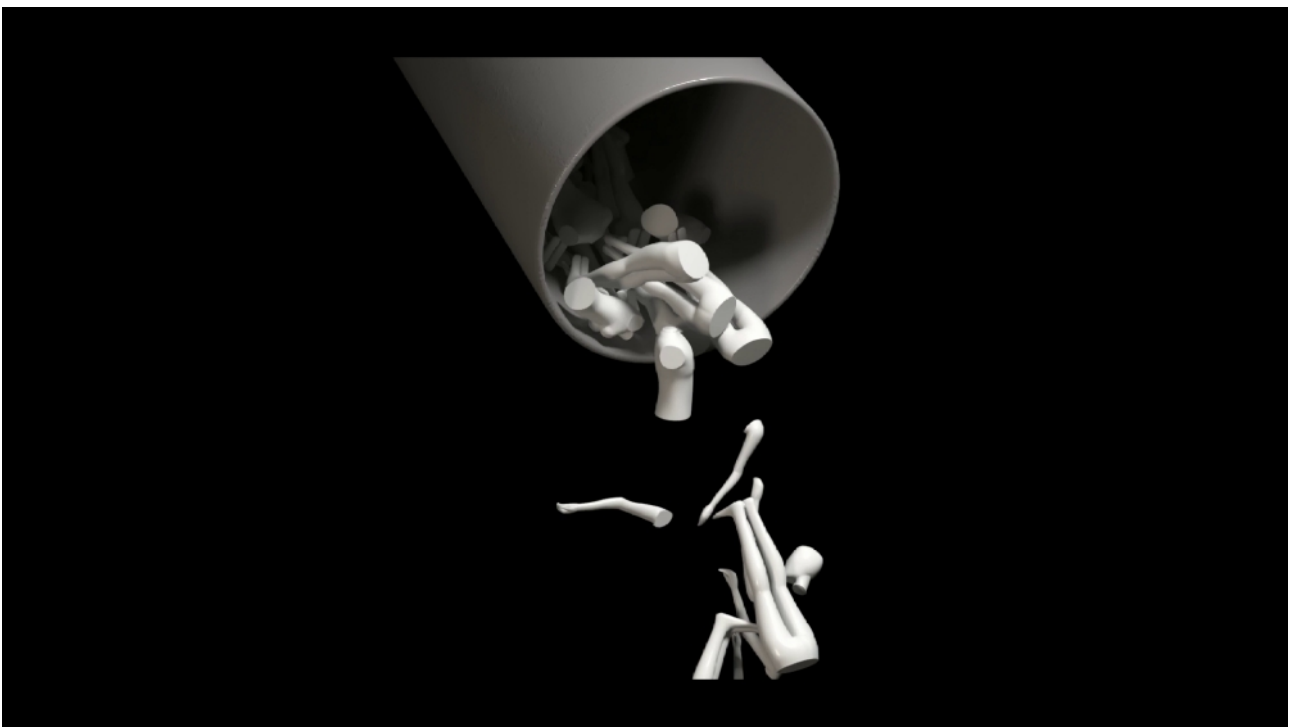
Frame with the use of Ivy Generator from *In and Out*.

Two examples where Rigid bodies were used are the doll suicide scene in the city environment and the scene where doll pieces fall through a pipe.

¹⁶ <http://www.evvisual.com/ivy/>



Frame from the doll's suicide.



Frame from the doll parts falling from a pipe.

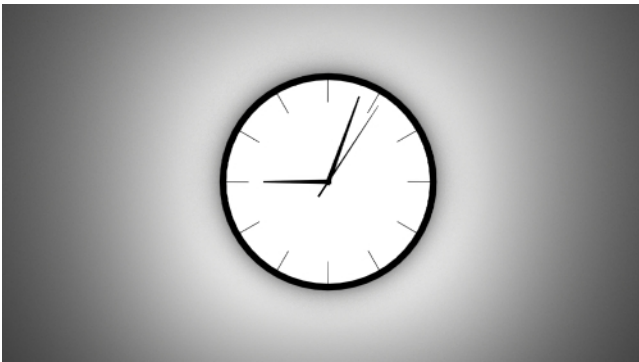
In the scene of the suicide, the aim was for the doll to be in free fall until the moment it touched the ground and then to split into its individual pieces. To achieve this, the free fall had to be created using simple key-frames because using rigid bodies the doll would split into pieces before it reached the ground. Therefore the activation of the rigid bodies was done at the moment the model

touches the ground, creating the illusion that the pieces of the doll react to the collision with the ground and gravity.

For the scene with the pipe, the use of a particle system was initially tried but due to the particular shape of the pieces, it was not easy to realistically collide with each other. Furthermore, particle systems are particularly useful when it comes to simulating a large number of models as opposed to the small number of models that will be depicted in this particular scene. The easiest and most practical solution was to use rigid bodies. More specifically, instead of creating a huge number of models via a particle system, a group of pieces were created, placed inside the tube without being visible to the camera and a simple gravity simulation was performed.

The animation in the remaining scenes of the project was done by creating key-frames in the desired parameter.

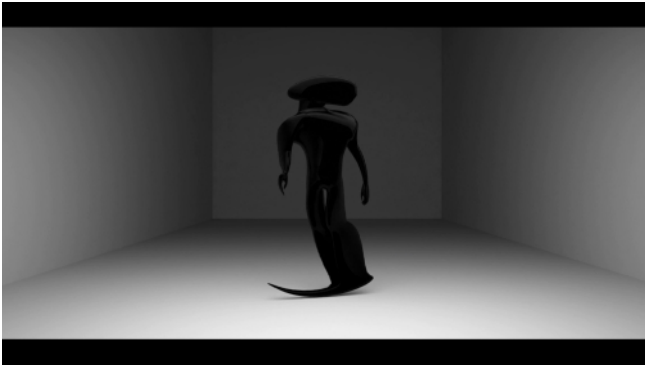
Some examples



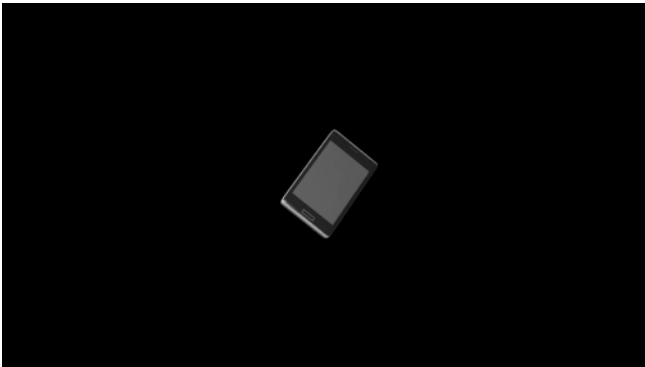
Moving the hands of the clock by modifying their rotation.



Chaotic grid motion by creating key-frames at the intensity value of a noise modifier.



The deformation was done by applying the twist modifier, which deforms a model by twisting it around an axis. Animation was done with key-frames on the deformation intensity.



Random mobile rotation. A random rotation was repeatedly applied and a key-frame was created at that location.

4. Post production

After the scene compositions in 3ds Max are completed, which are rendered as multiple images instead of one video file for easier editing and correction, post-production begins.

The most common stages are the creation of visual effects, editing, color grading and music scoring. For this project, Adobe After Effects was used for creating effects and Adobe Premiere for final editing. The two programs were chosen because they have excellent compatibility with each other, which helps a lot with any corrections and repetitions of actions from one program to the other. The majority of the music for the project was created in Ableton Live which was also used for the final sound editing.

4.1 Special effects

At the initial stage, after all the shots and scenes of the project are organized, the creation of the visual effects begins. The only visual effect used in this project is depth of field (DoF) using

Adobe's After Effects. DoF refers to the field where a camera displays content in focus rather than blurred. This technique can give a lot of realism and sense of space to a shot.

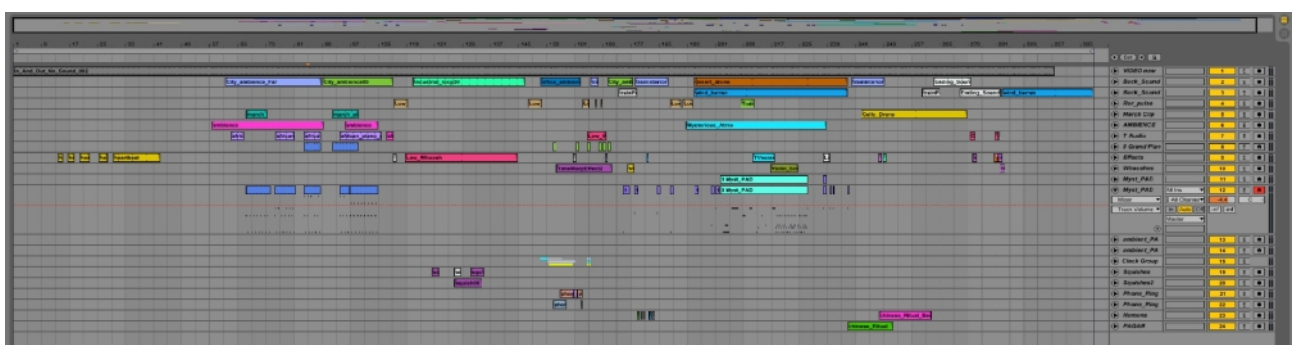


Scene without DOF.



Scene with DoF.

The reason it was the only effect, with the exception of using effects to transition from scene to scene, was to reduce post-production time as much as possible and to focus on producing 3D content within the 3ds Max environment.



5. Conclusions and proposals

The purpose of this project was to create an abstract film using 3D graphics. An analysis was done from the pre-production to post-production stage with emphasis mainly on specific techniques used for the desired result rather than on the theoretical background of a 3D project production. It is important to note that throughout the entire production process, an effort was made to continuously evolve and mutate the project as much as possible at each stage, in order to reinforce the idea of free association, which was the main theme of the script. The implementation of this methodology in a three-dimensional project presented difficulties because the impulsive change or addition of an element in the production stage required a long time to be implemented. Regarding the use of 3D graphics in storytelling, it is obvious that their main advantage is the space or third dimension as opposed to the 2D canvas of 2D projects. This advantage brings the creator closer to the position of a cameraman/director of an actual shoot with the ability to choose the camera position in each shot. Also, the dynamic texture and lighting design brings with it a level of realism and a sense of intangibility that is difficult to capture in 2D content. Of course, all of the above is useful when the purpose and style of the project in question requires it. In the end, the final conclusion regarding 3D graphics as a tool is to analyze in what way it will serve the style and narrative of the work.

During the course of the project many problems had to be addressed. Chief among these was the workload brought about by the number of scenes that had to be created. In particular, in order to convey the free association and chaos of the character's thoughts, it was apparent from the outset that there would be rapid changes of frames and scenes. Consequently, they took much longer to plan than the time they would be depicted in the final work. The next problem that arose with the large number of scenes was organizing them so that they could be more easily edited. The solution was to create a strict system of folders, sub-folders and file naming, which greatly aided future editing. These, along with the specialization required by 3D graphics as a whole, were the biggest difficulty. Especially getting familiar with the many subcategories of 3D content production, as a

first look, proved to be extremely difficult for one person. It is therefore evident that a skilled team of people is required to achieve a high quality result.

6. Bibliography

- Rorschach. H., *Psychodiagnostics; a diagnostic test based on perception : including Rorschach's paper, The application of the form interpretation test*, Grune & Stratton inc, New York, 1942.
- Andy Beane, *3D Animation Essentials*, Wiley, Indianapolis 2012
- Ami Chopine, *3D Art Essentials : The fundamentals of 3D modeling, texturing and animation*, Focal Press, Oxford 2011.
- Charles Finance, Susan Zwerman , *The Visual Effects Producer : understanding the art and business of VFX*, Oxford 2010.
- Carl G. Jung, *Man And His Symbols*, Dell Publishing, New York 1968.
- Carl Jung, *Memories, Dreams, Reflections*, Vintage Books, New York 1965.
- Albert Camus, *The fall*, Σ.Ι. Ζαχαρόπουλος, Αθήνα 1988.

7. Webography

<http://inkwood.net/>

<http://www.okjordanwong.com/>

<https://www.pluralsight.com/>

<https://knowledge.autodesk.com/>

<https://www.chaosgroup.com/>

<https://www.cgreco.net/>

<http://www.guruware.at/main/ivy/>

<http://max.klanky.com/plugins.htm>

<https://www.verywellmind.com/>

<https://www.youtube.com/channel/UCSLLdTBwLMfTKWS56tOiQpw>

<https://www.youtube.com/watch?>

<v=DwjtKcGHSy0&list=PLIX1sKIV4qu9O1nBs9yoNnDLqehotya8Y>

<https://polyhaven.com/>

<https://3dtextures.me/>

www.freesound.com