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Differences between Japanese and Western anatomical animation techniques applied to videogames

Bachelor's Thesis Degree in Videogame Design and Development

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Plan: 2014

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Abstract

This Project intends to analyze and explain the differences between the anatomical animation techniques used in Japanese and Western narratives and how they convey emotions, and lastly, apply this to animations provided in video games. It also provides a framework on how to use these techniques, and some examples of animations following this framework.

Key words

Animation, narrative, video game, Western, Japanese, anatomy, facial expression.

Links

Video 1 - <https://youtu.be/7TYFQHeYovY>

Video 2 - <https://youtu.be/29Pj9N1sI1c>

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Glossary

Cartoon: Type of illustration, which style revolves around caricatures or non-realistic characters. Can be animated.

CGI: Computer-Generated Imagery. Images created by a group of techniques inside computer graphics.

Chibi: Illustration style where characters have the anatomy proportions of a toddler, no matter their age. It is also the word for kid in Japanese.

Computer animation: Animation technique where the movement is obtained via the use of computers.

Frame: Still image. The combination of many of these still images create a moving picture.

Framework: Standardized group of concepts, techniques and criteria that people follow in order to solve a very specific type of problem.

Kanji: Japanese word for the Chinese characters used in the Japanese writing system.

Live-action: Term to describe an audiovisual creation that has been recorded in a real set with real people.

Machine learning: Data analysis method that automatizes the process using an Artificial Intelligence.

Mecha: Science fiction big vehicle piloted by a human. This vehicle has normally arms and legs, and resembles the shape of a humanoid.

Photogrammetry: Technique to measure distance in real environments using photographs as reference.

Pictocentric: Something that revolves around pictures or images.

Texture: Image that defines the qualities of the surface from a 3D model, like color, material or detail.

Traditional animation: Animation technique where every frame is drawn by hand, normally on a physical medium.

Storyboard: Sequence of images or illustrations with the purpose to serve as a guide for the plot of a story, or as a way of previsualizing an animated sequence.

1. Introduction

1.1 Motivation

In 1981 Donkey Kong was released by Nintendo. It was a primitive platformer game, where Jumpman (now known as Mario) has to save a princess from a giant ape called Donkey Kong. It is considered to be one of the first games that had a story attached to the gameplay. Thanks to that, these characters earned an identity and grew until they became the most popular characters of Nintendo, and for a while, from the whole video games industry.



F 1.1.- Frame of Donkey Kong (1981).

Since then, narrative in video games has been changing and evolving, and video games have become one of the most popular ways of explaining a story. We can even find people from other media outlets such as cinema, photography or literature coming to video games to contribute in the growth of storytelling of video games.

Also, thanks to the rise of popularity of video games, more and more people have become interested in sharing stories through this particular and creative outlet, which has a lot of possibilities. And thanks to internet and globalization, it is extremely easy for anyone in any part of the world to create a story and share with the entire world.

It is from these two premises that this project comes alive. I am very interested in the way video games explain stories and convey emotions through their narrative. I am also captivated by the rise of new forms of expression that I have been exposed to lately thanks to the possibility of consuming content from anyone, no matter where I am in the world. In fact, I am particularly interested in the rise of Japanese storytelling in Western cultures and how it is influencing Western productions more and more.

Since video games have a very strong visual component, it is important to take that into account. I will focus not only talk about story and narrative, but their way of showing it, which is, in this case, animation. Thus, this project will address the differences on how Japanese and Western animations in video games convey emotions and analyze which techniques are better depending on what we want to explain.

Also, the lack of information available regarding this topic has given me the opportunity with this project not only to execute a personal journey in order to obtain new knowledge, but also to be able to create something that, hopefully, will help anybody that it is interested in these same topics.

1.2 Problem formulation

The intention of this project is to analyze and explain the differences between the anatomical animation techniques used in Japanese and Western narratives and how they convey emotions, and lastly, apply this to animations provided in video games. It is

important to have in mind that anime can have Western anatomic narrative approaches, as well as Western animation can have Japanese anatomical approaches. The important problem to solve is to define these narrative differences in animation.

There are some sources that talk about characteristics of Western animation or Japanese animations, and some sources that talk about animation in video games, but there are very few sources that try to connect them in a single topic.

What this project proposes is not only the analysis of the different narrative techniques within the frame of both cultures, but it also proposes a framework to be to understand and apply these techniques in different cases scenarios depending on the video game characteristics and needs.

1.3 General objectives

The three main objectives of this project are:

- Determine the differences between how Japanese animation and Western animation convey emotions.
- Create a framework that defines which type of techniques, from both Japanese and Western animation, are better for each case.
- Create different animations trying to convey different emotions following the previously done framework, and prove that it works.

1.4 Specific objectives

Each one of the general goals can be divided in several specific objectives.

Determine the differences between how Japanese animation and Western animation convey emotions.

- Analyze and explain the qualities of the Japanese narrative.
- Analyze and explain the qualities of the Western narrative.
- Identify the techniques used in animation that go accordingly with the two types of narrative.
- Identify and explain the co-relation between the animation techniques and Japanese and Western narrative.
- Create a framework that defines which type of techniques, from both Japanese and Western animation, are better for each case.
- To define what anatomical animations function better depending on the narrative that they want to adopt, or the emotions that they want to provoke.

Create different animations trying to convey different animations following the previously done framework, and prove that it works.

- Below, can be found the specifics of each one of the animations that will be created in this project:

| Animation | Duration | Explanation |
|---------------|-------------|---|
| Walking cycle | ~2 sec. | <p>Simple animation of a character walking.</p> <p>The goal of this animation is to compare the differences between the Japanese and Western animation narrative, respect body anatomy.</p> |
| Dialogue | ~3 - 4 sec. | <p>Animation of a single character saying a sentence. Since the focus must be the emotions conveyed by the visuals of the animation, no audio track will be required.</p> <p>The purpose of this animation is to compare the main differences on facial expression between Western and Japanese animation techniques.</p> |
| Fight scene | ~5 sec. | <p>Short clip of two characters fighting. Since doing a full fighting scene would too big for the scope of the project, the clip will represent a portion of the fight, placed more or less in the middle of the full shot.</p> <p>The objective of this animation is to mix body anatomy and facial expression in a more complex example, in order to show them combined. And also to compare the differences between Japanese and Western animation narrative.</p> <p>Since body anatomy and facial expression would be already covered with the first two tasks, and this task would be only to expand the results, this task is optional and will be done only if there is no problem during the development.</p> |

T 1.1.- Specific objectives in each animation

- Run a validation test, studying the reactions of people to the animations following the framework to prove that it works.

1.5 Scope of the project

Since the vast extension of this topic, and considering the resources that I have available, especially time, it would be unrealistic to try to create a framework for every single aspect of animation. This is why it is very important to notice **I am only going to focus**

in one particular feature of animation, which is anatomy, and accordingly, facial expression.

Thus, this project is mainly addressed to students from the animation realm, especially to the ones that want to understand better how different ways there are of conveying emotions depending on the different approaches from Japanese and Western cultures. Thanks to the framework and the example animations the project provides, this can be used not only as a theoretical resource, but also as a reference for future projects, in case of wanting to follow the theory.

But also, thanks to being a specific topic, even people with experience in animation will be able to find some insight that they might find useful to incorporate in their new creations.

2. State of the art

In this section, we will focus in the current state of animation from both side, Japanese animation (anime) and Western animation. We will explore their history, to understand the full context and then, we will take a look at the present to see what the referents from each industry are and take a look at their latest creations. Finally, we will also take a look at the most used animation techniques in video game development.

2.1. The 12 basic principles of animation

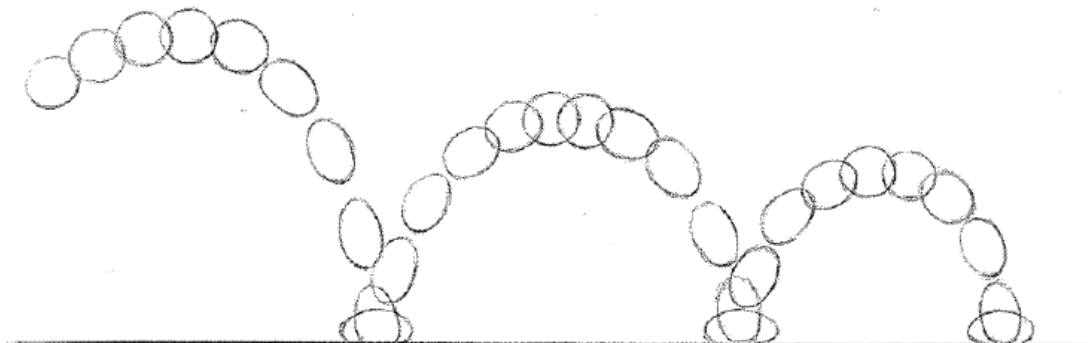
In 1981, Ollie Johnston and Frank Thomas would create a book called “The Illusion of Life: Disney Animation”, which would contain some of the most relevant information in how to create an appealing animation until now. One of the most notorious pieces of knowledge they introduced were the 12 basic principles of animation. These principles depicted how to create animations following the laws of physics, without making them boring. Other great artists would touch these same concepts later on, such as Richard Williams in his book “The Animator’s Survival Kit”.

Despite the fact this book was written almost 40 years ago and it was originally thought for traditional animation, the 12 principles are still relevant and very used in computer animation, and therefore essential to understand modern animation.

2.1.1. Squash and Stretch

One of the most important principles, since is one of the most effective. The purpose behind of this principle is to grant weight and mass to an object or a character. Depending on the velocity of the object we are animating, we will stretch it or squash it. If our object is traveling very fast, we will stretch it in the direction of the movement. If it decelerates abruptly, we will squash it.

It is important the volume of the object remains the same, thus stretching the object should make it thinner and vice versa.



F 2.1.- Squash and stretch example. Photo from the “Animator’s Survival Kit” from Richard Williams.

2.1.2. Anticipation

Again, this principle is about laws of physics. In order to do an action, it has to be a previous one where the character gains the enough force to finish the main action. It also prepares the viewer for what is about to happen, making the animation clearer and appealing to the eye.

Some examples would be bending your knees before jumping or pulling back your arm before throwing a punch.

2.1.3. Staging

This principle is much related with cinema. It defines how the different elements of your composition should be placed among the scenery, what it is in the focus and keep the motion of everything non-important to a minimum. It also involves the point of view of the camera. In summary, everything that define how your viewer perceives the action showed in the scene.

2.1.4. Straight Ahead Action and Pose to Pose

There are two main techniques when drawing animation, as explained in this principle. First of all we have the “Straight ahead action”, and how its name indicates, you draw each frame one after the other, with no planning previously done. This results in a more organic movement, but it can resolve in errors or strange motions since it is not based in any structure.

In the other hand, “Pose to pose” is exactly the opposite. In this method, the first thing that needs to be done is to define the key poses of your animation. These key poses or key frames will be the ones that define the movement. The action trying to be portrayed should be already understandable, just looking at the key poses. After having this structure, the only thing left to do is to draw the frames between the key frames. This results in a more well thought animation, but it could lack originality or be boring, since we are following a framework.

In computer animation, the most common technique is “Pose to pose”, since every professional software in the market will create smooth interpolations between the two poses you give it, but for other movements a bit more organic it is still necessary to follow the “Straight ahead action” method.

2.1.5. Follow Through and Overlapping Action

As it has been stated before, one of the focus of this framework it is to create animations that follow the laws of physics. This principle is focused on that too. Follow through is the effect of different parts of an object stopping or starting to move at different times whenever there is a very abrupt change in the speed. For example, when a character starts running, their feet will start moving before their clothing, which will follow after.

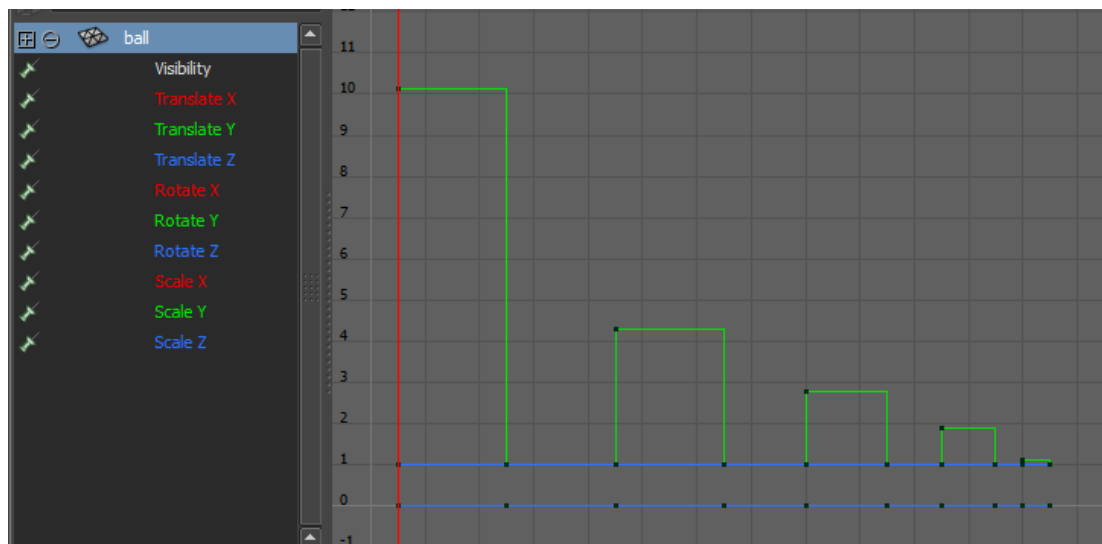
Overlapping has a similar concept to it. It states that not every part of an object or a character will move at the same rate when this object is experimenting motion.

2.1.6. Slow In and Slow Out

This principle explains how to change acceleration in a credible way. In order to accelerate (Slow Out) an object it is important to have a small change of position in the first frames, and increase this distance gradually until we have the desired velocity. This will result in a lot of frames of the animation close to the starting point, and only a few closes to the destination.

In order to decelerate (Slow In), the process is the same but inverted. Instead of putting more frames close to the starting point, they will be put on the later stage of the motion.

To be able to modify this effect in a comfortably way, computer animation software normally include a curve editor that allows to modify the distribution of frames along the motion.



F 2.2.- Curve editor in the animation software Maya.

2.1.7. Arcs

Most objects, when moving in real life, they follow an arc on their motion. Animation should reflect that arc in order to look more believable, and even more pleasing to the eye. Again this is caused by physics, in this case momentum. A very stiff movement could look anti natural, and make the spectator disconnect from the action.

2.1.8. Secondary action

Secondary actions are small gestures that support the main action to add more dimension to character animation. They give more personality and insight to what the character is doing or thinking, so the viewer can understand better what is happening. Some examples would be the subtle movement of the hair of your character while it runs. Even if it is nothing very noticeable, in the end will help the overall animation.

Despite secondary actions are very useful, it is important to not overflow the animation with them. As the name indicates they are secondary, and the focus should remain in

the main action. Whatever the case may be, secondary actions should not distract the viewer from the primary one.

2.1.9. Timing

For this principle of animation we need to look to the laws of physics again. Before animating something we need to look how it reacts in the real world, specially focusing on timing. It is important that our creation and the reference move more or less at the same ratio or speed. If not done like this, it could result in undesired effects, such as unbelievable movements. Using the correct timing allows you to control the mood and the reaction of your characters and objects.

This timing could be exaggerated in case the goal was something that belongs to an imaginary situation, but in that case, it is important to keep consistency in the timing through all the animations that would exist in this fictional world.

2.1.10. Exaggeration

It is important to remember that animation is not live-action. Sometimes too much realism can make the animation look static and boring. This can be avoided by adding distortions in the facial features, body types, and expressions. Another way of adding exaggeration is within the same motion of the character. This increases the appeal of the character, and it makes the action more appealing for the viewer.



F 2.3.- Frame from "The Simpsons" with a very clear example of exaggeration.

Sometimes these exaggerations need to be almost indistinguishable. For example, if the animation belongs to an extremely realistic production like a video game, it could be hard to fit exaggeration without making it look too odd.

2.1.11. Solid Drawing

Even if the animation that needs to be done is in two dimensions, is extremely important to give the sensation of volume, weight and anatomy, as well as light and shadow.

Without good knowledge in how to draw in a three-dimensional space, the characters can look flat, and the spectator will find harder to believe the action.

Computer animation has done this easier, but it is important to keep on mind some factors such as lighting. This explains why light has become one of the most important parts of realistic animation, since it gives more life to a computer generated character.

2.1.12. Appeal

The final principle in the book is probably the most difficult to apply. There is not an exact formula to this principle. What this rule states that in order to have an appealing animation, the first thing you need to have is an appealing set of characters, objects and world. Some things that can be implemented in the creations surrounding this animation is an easy to read design, solid drawing and a clear personality.

2.2. Western Animation

In the last years, animations has seen a significant rise in popularity. This has translated into creators and companies getting interested in the sector. Because of this reason, more and more animated content is produced in Western countries. The mix of different ideologies, cultures, nationalities and personalities of these creators have resulted in very different products, where it is nearly impossible to define a style. Also, the influences from other types of media, have made harder this task.



F 2.4.- Adventure Time (left), The Incredibles 2 (center) and The Simpsons (right). Despite the very different styles of animations, all three would be under the umbrella of Western Animation

First of all, we have 2D animation. This type of animation is mostly produced for television. Most of these shows are targeted to kids, but despite the old stigma that animation is only for children, we can find very popular shows recently that are intended for mature audiences, such as “Rick and Morty” who has gathered a large fan base becoming one of the most popular animation shows in the last years, passing in popularity to other very big live-action shows. The animation style of these shows normally involve very bright colors, smooth animations that revolve a lot around curves and arches, and simple but appealing characters.

On the other hand, we have 3D animation. The most powerful companies in this specialization are Disney and Pixar and Dreamworks, and they are focused primarily in cinema. The stories they explain in their movies are thought to be enjoyable for all ages,

and this can be seen in their style. Their character design resembles a lot to “cartoon” style, especially in the anatomical approach. Despite this more simplistic approach in characters, everything surrounding them have an extremely realistic feel. From particle simulation, to very high resolution textures. Especially Pixar has been very vocal about all the different techniques innovations that they are introducing to upgrade the look and feel of their creations. It is important to point that it is very uncommon to see motion capture in fully animated movies with this “cartoon” aesthetic, but extremely common to see in more realistic animations. Normally these realistic animations are part of a CGI process, to incorporate imaginary characters in live-action movies.

2.3. Japanese Animation

2.3.1. The word “anime”

Japanese animation is often referred as “anime”, but what is the exact meaning of the word? To define what means anime is a tough task. It is difficult to define it with Western standards, because there is nothing that like that in the American continent, or Europe. Essentially, anime works include everything that Western audiences are accustomed to seeing in live-action movies. But also, anime would be everything from animated advertisements, to animated television shows. So we could define anime as the word for “Japanese animation”, but as Ian Condry argues in his book, “The Soul of Anime”, it is important to keep in mind the vastness of this media category and cultural phenomenon, and not to reduce it to an oversimplification of “Japanese Cartoons”.

2.3.2. A bit of history

Japan is a country that has been traditionally very pictocentric, as is exemplified in its use of characters of ideograms, but animation was not always such an important part of the Japanese popular culture industry. Western animated movies appeared in Japan in 1909, but it was not until 1915 when Japanese animators started to create their own work. One of the first companies to really try to push Japanese animation in the media world was Toei, a company that was famous already for its live-action movies.

At the beginning, anime was overshadowed by the superb live-action Japanese cinema. This relegated it to an entertainment form only for kids. But in the 50s, when American cinema and television started to penetrate into Japan, the competition started to arise, making Japanese live-action cinema to take a big hit. In 1963, anime had his first big milestone with “Astro Boy”, the first animated television series in Japan, created by Osamu Tezuka. Since then, the popularity of Japanese animation started growing in the country, making possible, and interesting for other media companies, to create more similar content. And despite the popularity of American animation, such as the movies from Disney Studios, virtually from the start, postwar Japanese animation went into a very different direction, not only in terms of its adult orientation, but also in its overall structure. This was due to the fact that most of the productions were done for television, so they emphasized in long-running episodic plots.



F 2.5.- Frame from the original Astro Boy opening from 1963. In the picture, it appears Astro Boy, the main character, as well as his name written in kanji (鉄腕アトム, Tetsuwan Atomu).

The popularity of these first animated shows brought anime to the limelight, and more companies started to produce animated content. There was a wide range of stories. From “Heidi, Girl of the Alps”, a story of a little girl that lived in the mountains with her grandfather, to “Mazinger Z”, a show that revolves around a mecha pilot that has to save and defend the world. Thanks to this and the low price required to buy the rights to be able to play these shows on your television station, some Europe countries started to have interest in anime.

But the big screen was still dominated by live-action movies, especially from Western countries. It was not until the 80s this changed. With the appearance of Studio Ghibli in 1985, and super productions such as “Akira”, which beat out “Return of the Jedi” to become the number one film in Japan, the barrier was broke and anime became the mass phenomenon is now. The impact was so big, that in 1988, roughly 40 percent of Japanese studio releases were animated, and in 1999 it raised until 50%.



F 2.6.-Akira (left) and Spirited Away from Studio Ghibli (right).

2.3.4. Style

On the contrary to Western animation, anime seems to have a more constant style, and although we can find infinity of variations, most of them share the same characteristics in the style of drawing and animation.

Something that is very noticeable about the anime style is how they play with exaggeration. It is common to see elements from the face, such as the expressions of the character or the colors, very exaggerated. One of the most prominent physical feature that goes often through this process are the eyes, as it can be seen in the figure

F 2.7. They can represent, in some cases, almost half of the face of the character. This provides a very useful outlet in animation to portray emotions clearly for the viewer. Another feature that often gets exaggerated is the hair. But in this case, the exaggeration does not happen with the size, like the eyes case, but with the color. It is common to see characters with abundant and unnaturally colored hair. But despite big head, the other body proportions stay relatively balanced, except in extreme cases, like for example in “chibi” style.



F 2.7.- Frame from Attack on Titan.

The actions of the character are also often exaggerated. Normally breaking the anatomy in very extreme motions, or representing some very subtle actions, like blushing, with very visual and clear depictions.

Also, a final characteristic of anime is the technique used to create it. Because they need to deliver pieces of content relative small intervals of time, they need to work fast. This is one of the main reasons why anime uses limited animation. This technique involves re-using common parts of frames in other frames, instead of redrawing them. The reason behind this technique is to reduce the amount of drawings needed to create something animated, which results in faster and cheaper results, but obviously takes realism from the animation. Despite this common technique, some of the most popular anime shows nowadays are famous for their very high animation quality, like “Attack on Titan”, which takes an average of two years to produce each season.

Even though anime is in two dimensions in almost its totality, some studios have been trying to implement some techniques that involve the implementation of three-dimension graphics. But at least from now, the results are poorly executed and the reception of the public has been poor.

2.4. Animation in video games

It is a common misconception that animation for movies or television and animation for video games are the same thing. The principles and the tools are shared among both

mediums, but it does not happen the same with techniques and processes, which differ greatly from the one to another.

One of the main differences between the two is the possibility that video games give you of being interactive. With movies or television shows the camera dictates what the spectator is seeing. This makes easier to control some aspects of the animation, for example the fact that there is no need to have an animation that looks good for every angle. But in video game this needs to happen. It is very important the motion is visible and understandable from each one of the angles, or this could cause frustration in the player. For instance, when implementing the principle of arcs into an animation, the animator needs to ensure these arcing motions can be perceived from everywhere.

Another difference with movies, is that video games animations, especially for characters, revolve around “cycles”. A cycle is an animation that loops and gives the sensation of continuous motion. Some of the most essential cycles within games are the running or walking cycle or the idle cycle (often referred just as idle). It is important to notice that meanwhile movies last for approximately two hours, a game can range between ten and twenty-five hours in average, thus the creation of original animations for that time would be impossible. Cycles allow the artist in charge to create animations that will be reused during the game, cutting significantly the time of production a game would need.

Also, the types of animation in games and in movies are slightly different. Often you can find games that have a lot of acting scenes, like the ones you would find in a movie, but almost any video game is driven by body mechanics. And one of the more important factors in these animations is the timing. Because all the actions in video games of the characters need to be connected to gameplay it is important to have everything timed perfectly. If the timing is too fast, the motions will not feel realistic, but if the timing is too slow, it can cause frustration into the player and lack of involvement.

Since the appearance of three-dimension graphics in video games, the animation style strove towards realism. With the rise of the indie market in the latter years, some games have broken the mold and avoided this tendency of trying to be more and more realistic. But despite the indie market and some other exceptions, the industry is still looking for that photorealistic appearance. Considering that normally the development stage of a game is around two or three years, and that the results need to be identical to the reality, the use of technology to speed the process of creating these animations is mandatory. A lot of technology has arisen in the latter years. Some of it, comes directly from other media platforms, like motion capture that comes from the cinema.

Motion capture is a technique that consists in, first capturing the movement of a live person acting, and then translate that same movement to the digital model. It is based in photogrammetry, and if it is the standard in the industry to get realistic animations, especially for facial expression and acting scenes.



F 2.8.- Example of motion capture. Ellen Page acting for the video game Beyond Two Souls.

Finally, we can find other tools that automates the whole process to make it faster. For example, companies such as Mixamo which uses machine learning methods to automate the steps of the character animation process.

2.5. My approach from here

As seen in the previous sections, despite there are narrative differences and different ways between the two types of animations, the differences are diluted because of the multiples crossed influences. Since anime can have western anatomical narrative approaches and vice versa, the importance here is to define these narrative animation differences. This way, it will be easier to understand the core qualities of each animation.

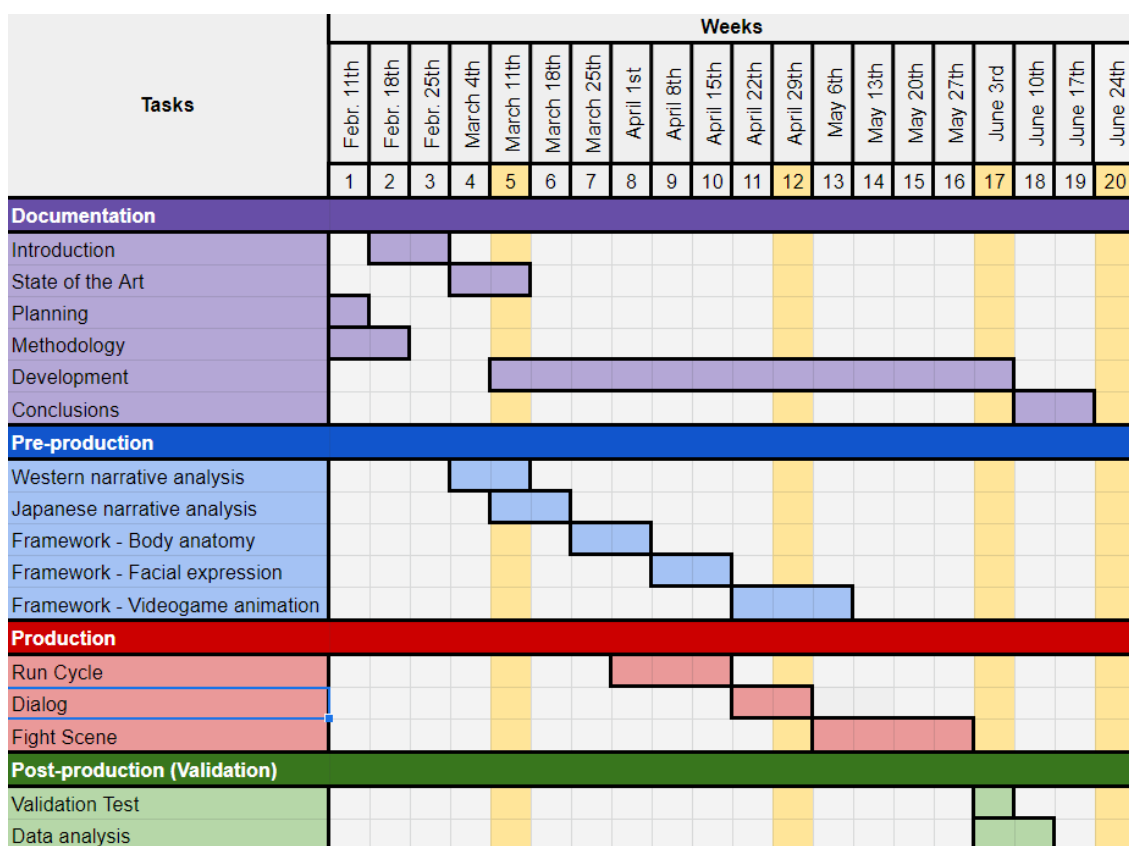
3. Project management

3.1 Procedure and tools for monitoring the project

3.1.1 GANTT Chart

In order to distribute the tasks needed for the completion of the project, I have created a Gantt chart where every phase of production is divided in the different parts that will compose it. It also points which tasks will be presented in each one of the milestone and in case of failure in the approximations of how much time each task will take, I will be able to re-schedule the remaining tasks as fast as possible.

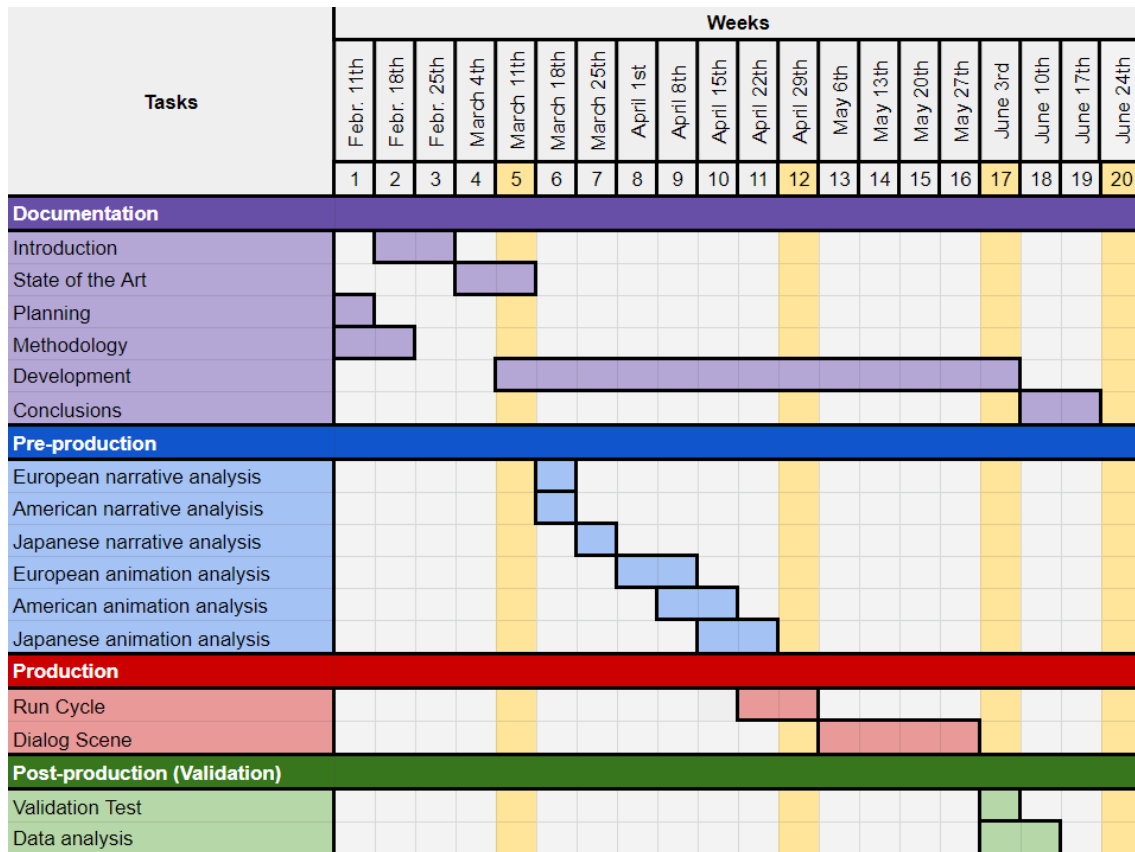
Below we can see the Gantt chart:



T 3.1.- Gantt Chart

Second version (Updated in 03/26): A couple of weeks after starting the development, the Gantt Chart had to be updated in order to match the new discovered necessities of the project. When the planning was done, the narrative analysis was divided in two main tasks, one for Japanese narrative and one for Western narrative. But, in the end, Western narrative had to be divided in two tasks, in order to cover American narrative and European narrative. Also, after some work it was clear that making a difference between body animation and face animation made no sense. Instead of this, it was decided to make a complete breakdown of animation techniques between the three different styles to see how they matched their narrative properties.

Because of these two reasons, the pre-production phase had to be longer and the tasks had to be rearranged to fit the schedule. In consequence, the fight scene was removed from the scope, but in order to compensate this, the dialog scene will be longer so it will be able to prove the premises that needed to be corroborated. The methodology did not change.



T 3.2.- Second version of the Gantt Chart

Third version (Updated in 06/05): When the production phase started it became evident that the time stated to create the animations was not enough. The animation process is long, especially adding all the extra tasks that need to be minded such as filming the references. Also, since the animations were crucial for the final part of the project, where they were going to be the tool used to validate all the hypothesis exposed along the project, they need to be well done. Therefore, it was decided to postpone the final delivery of the project until the summons happening in September.

3.1.2 Tools used for monitoring the project

During the development of the project I will use the tools discussed in this section. They will help to maintain everything under control in any given moment of the development, and to help me perceive any deviation of the original schedule in case there are any.

First of all, I will be using Trello to ensure every task is finished, validated and delivered in the established time on the planning. The reasoning behind this choice is mainly the already acquired experience in previous similar projects. Thanks to the familiarity I have

with the tool, I will not be spending time on learning how Trello works and I will be able to put this time towards tasks that are more critical for the development of the project. Also, its versatility and possibilities are good enough for what it will be needed to manage all the work.

I also will be using Google Docs and Google Drive. Google Docs is a good platform to have all the documentation all times available, and the possibility of saving documents into the cloud will help me to avoid problems caused by unexpected circumstances. Also, its version management will be crucial to monitoring the development of the project. Google Drive gives the exact same possibilities, but instead of documents, it will be used to save all the different files generated in order to create the animations that will be used in the latest stage of the development to validate the project.

3.2 Validation tools

There are two main tasks in this project that will need to be validated.

First of all, it is important to validate the animations done in the production stage. In order to validate this work done, it will be critical that these animations follow the framework established in the pre-production phase. In order to make sure the techniques explained are correctly represented in the animations, I will be counting with the opinion of two of my teachers, Elías Xan Borrás Borrell and Marc Ripoll Tarré who have been professionals in the artistic branch for video games and other types of media for years.

On the other hand, the framework needs to be validated. In order to do this, I will expose a group of people to the animations created by me and study their reactions. Since the study will be done with the animations created following the framework, the reactions of people should match with the reactions we are looking for. If not, this could mean that the framework is wrong or that the quality of the animations is not good enough in order to represent the research done.

3.3. SWOT

In a project of this magnitude it is important to analyze the team in order to have an overall view of which risks could appear during the process. It is also useful to understand which the weak and strong points are, so I can reinforce these points with tasks appropriate to them in order to have a project more remarkable and complete.

| | Helpful | Harmful |
|-----------------|---|---|
| Internal Origin | Strengths Solid knowledge on the principles and basics of narrative. Experience with animation project on previous projects. | Weaknesses Not being a professional in the matter can reduce my credibility, even if everything is well researched. Being a student working alone, the animations will inevitably have less quality than the ones done by a professional animation studio. |
| External Origin | Opportunities There is little information on how narrative, animation and videogames intersect between them. Flexibility and capacity to take risks because the nature of the project. | Threats Great sources of information about specifics of animation or narrative alone, done by professionals in the matter. |

T 3.3.- SWOT

3.4. Risks and contingency plan

Below is a table stating which are the riskiest factors in this project, the solution designed in order to avoid these situations, and the protocol to follow in case of facing one of them.

| Risk | Solution |
|---|---|
| In the researching phase, not being able to find all the information needed to understand and reproduce the animation needed for the validation test. | <p>In the first part of development I am going to focus on the theory behind everything I want to test and/or prove. Theory is tied inevitably to research. This means the first weeks of work will be focused in finding the information needed to perform the following parts of the project.</p> <p>These following parts are extremely dependent on the information obtained during the research. And despite the fact there is a good quantity of sources with information about the basics, it could be difficult to find more specific data.</p> |

| | |
|--|---|
| | <p>In order to avoid a situation where the second phase of the project is affected by a lack of information, the tasks regarding this topic have been placed the first ones in the schedule to have the most quantity of time possible. Also, the usage of tools such as Google Scholar will be critical to make sure the data is found has enough rigor to be taken in account.</p> |
| <p>Not being able to match the quality expected in the animations in order to run a valid test.</p> | <p>In the last part of the development, a group of people will be exposed to several animations done by myself, and they will have to answer questions regarding on how they feel when they watch these clips. It is important the animations follow very specific criteria determined in the research phase. If the animation done by me does not replicate these distinct characteristics the test would not be considered valid.</p> <p>These situations could happen because two reasons: lack of time or lack of skill. To avoid this, the animation clips that need to be done are short and concise, and I dispose of several weeks to create each of them.</p> <p>The most complex shot would be the one that reproduces a fight scene. If the creation of this content was going to be impossible due to the reasons I stated before, the task would be removed since the scope of the animation part (facial expression and anatomy) would be covered already with the other two clips.</p> |
| <p>Not being able to find the required target or quantity of people needed to run a valid study</p> | <p>One of the most common problems of doing a study in how people react to something is finding the people. Also, it is not only important to find people, but to find the correct target of people that will represent the audience we are interested in.</p> <p>In order to solve this, the task has been defined since the beginning in order to have more time to find a satisfactory group. In case this was not enough, I have a list of venues focused in networking and social activities where I could go to find more people.</p> |

T 3.4.- Risks and contingency plan

3.5. Analysis of initial costs

Lastly, I have broken down all the initial costs in different sections in a budget. Notice that this project is not full time, so the initial cost, specially in labor costs, could vary if done under other circumstances where the people in charge of the development were working more hours.

The budget can be found hereunder:

| Subject | Price | Type | Total Price (after depreciation) |
|------------------------------|------------|----------|----------------------------------|
| Labour costs/HR | | | |
| Myself | 8,75€ | Per hour | 2.625,00 € |
| Office | | | |
| Rental | 500,00€ | Monthly | 6.000,00 € |
| Production expenses | | | |
| <i>Software Licenses</i> | | | |
| Adobe Photoshop (1 licenses) | 12,09€ | Monthly | 145,08 € |
| Open Toonz (1 licenses) | 0,00€ | Monthly | 0,00 € |
| <i>Equipment</i> | | | |
| Computer | 1.000,00 € | Unique | 138,89 € |
| Screen | 100,00 € | Unique | 13,89 € |
| Keyboard | 50,00 € | Unique | 6,94 € |
| Mouse | 20,00 € | Unique | 2,78 € |
| HUION KAMVAS Pro 22 | 750,00 € | Unique | 104,17 € |
| Books | 500,00 € | Unique | 500,00 € |
| TOTAL COST | | | 9.536,75 € |

T 3.5.- Budget of the project

4. Methodology

For this project I am going to follow the methodology used among a lot of media creations in the production process based in three main stages: **Pre-production, production and post-production**. This tool is very used in film making as a way of avoiding unnecessary costs and to be able to have different teams working in the different phases of the project.

The reason behind this choice is simple. It has been stated this process is very popular among media productions because how effective is. Since one of the main goals of this project is the creation of several small animations, it falls under this umbrella. Also, because I have already had experience following this framework I have considered this methodology will fit the best me and the creation of this project.

Since I will have to be working in various tasks at the same time, thus I can fit everything in the schedule, the pre-production and production of each animation will be independent of the other ones. That means during the project development, there will be three pre-productions stages and three production stages. This solves the solution of the schedule, but it also respects the hierarchy of tasks and it still has all the benefits of this methodology.

Next is detailed an explanation and the intention for each phase.

4.1. Pre-production

This is the most important phase of the whole process. It defines all the details of the product you are going to create, and only looking at the results of this stage you should be able to determine if this is going to work or if it is going to be a complete failure. This way you can modify the most flawed parts, or even cancel the project if it is not going to work. Thanks to this we can avoid to make changes in the following stages, what would mean high wastes of money and time. Pre-production involves everything that the actual creation of the product starts.

In my case, the pre-production phase will represent, first of all, the research needed to create the animations later in the production stage. But also the planning and scripting of these short animations.

4.2. Production

Production is when all the planning during pre-production comes together. It is important to follow the instructions given by the previous stage but is also important to give room for change and improvement during this phase. The structure already established should not be modified in order to avoid drastic changes that would mean another pre-production phase. We can say during the production is where the actual product is created.

During production, will be when I will be doing the animations that later I will be showing to I people to do the final study.

4.3. Post-production

Post-production is the stage where the team assembles everything created in the production phase, in order to create the final result. It takes in account everything established in pre-production as well.

Since a regular post-production phase in this project would be useless, because the final product will almost be done after production, except for some tweaks, this time will be used to run the final validation test. This is also the reason why this phase is the shortest in the schedule.

5. Project development

5.1. Differences in narrative

Before analyzing which are the different styles of animations, it is important to see where they come from. Since animation is just another medium to tell a story, the way different cultures have been expressing their narratives it is not only interesting but crucial to the development of this method of articulating specific messages and conveying specific feelings through moving images.

Hereunder can be found the breakdown of the different three narrative schools. It is important to notice, how the Western narrative has been divided in two, American and European, since they have details that make them unique from each other.

5.1.1. European narrative

European school of narrative is a style of narrative that focuses in the main plot, and all the features surrounding it, like the world where this story is happening. Normally, focusing on the plot translates to focusing in events. These events are often pushed by the main characters making quick decisions during the story. As a result, character development is secondary to plot development.

In European narrative, plots points have to meticulously tie together to create a cohesive story. It focuses on ideas instead of people and their motivations. World-building is also a main trait of European narrative, and generally needs to be explained at the same time the main plot line advances.

This type of narrative is specially used in historical plots, where there are a lot of data that needs to be exact, or at least as real as possible. Normally the development of the characters is dismissed in favor of making sure everything within the plot is being well explained. This does not only happen with real historic stories. It can also happen with fiction. For example, fantasy and science fiction normally focus in the creation of a vast and profound backstory that explains every single aspect of the world where the story happens.

5.1.2. American narrative

American school of narrative focuses in the narrative arc of a story and the managing of its main elements in order to create an entertaining experience. Of course, all stories, even the ones belonging to other narratives, will have to eventually go through the main elements of the narrative arc, but the particularity with American narrative it is that entertainment is the focus, so in the end, the main plot and the characters are only tools to keep the viewer interested through the whole duration of the story.

The narrative arc is the path the story follows. It gives a story a backbone by providing a clear beginning, middle and end. This arc normally is composed by five main elements, spread through the whole story:

- Exposition: The part where the setting and the background of the story are established.
- Rising action: Also known as conflict. It is crucial in a story. It represents an obstacle that needs to be overcome, normally by the main character.
- Climax: It represents the height of tension. Typically, the climax requires the main character doing something important.
- Falling action: The result of the action the main character did. It is when the tension from the climax starts to dissipate.
- Resolution: The final conclusion of the story. Explain the consequences, and the situation after all the action.

This type of narrative is specially used in action or mystery movies. The nature of these types of stories normally relegate characters and plot to a second level, and make viewers only keep watching to see the next big moment or climax in the story.

5.1.3. Japanese narrative

Japanese school of narrative cannot be considered one type itself, but it belongs to Asian narrative. Asian narrative school is considered as the one that focuses in character-driven stories. A character-driven story is one focused on studying the characters that make up the story. Normally, in character-driven stories the plot progresses through inner transformation or the relationships between characters, and not through events in the actual plot line.

Whereas American and European narratives focus on a set of choices that a character must make, Asian narrative focuses on how the character arrives at a particular choice. When zooming into the internal conflicts, it is normal to focus less on the external conflicts. The plot in an Asian school story is usually simple and often hyper-focused on the internal or interpersonal struggle of the character(s). That is why, the plot is used to develop the character, since by itself it has no strength to keep the spectator interested.

One specific characteristic of Asian narrative is the implementation of specific archetypal characters. Archetypal characters are characters that represent a very specific stereotypical way of acting or personalities. They tend to have similar traits and flaws. Some examples could be the mysterious recluse, the childish girl, the chosen one, etc. People like these type of characters because they can feel represented by them, and by the same reason, empathize with them. When empathizing, a bond is created and it is easier for the viewer or reader, to feel more emotionally invested in the plot. However, characters do not need to be archetypes, since many authors tend to put a premium on developing realistic, flawed, and human characters. Spectators can see themselves or someone they love in these characters too and, as a result, connect emotionally. Also, Asian stories tend to feature a vast number of characters to make sure the story appeals to everyone, and there is at least one character the viewer can feel connected with.

This type of narrative is specially used in TV-Shows, where often the duration of the story is long enough so the viewer can expect characters evolving, and therefore, affecting the main story line.

5.2. Differences in animation

Now that the different types of narrative have been explored, the next step it is to see how animation fits in this all along, and how the characteristics of different styles change depending on the requirements of the production. It is important to notice that, as well as in narrative, most of the products created nowadays, they do not tie themselves to only one of the schools. In fact, this is more noticeable in animation, since it is easier to mix characteristics from the different styles and blend them together. Again, in order to fit the previous section, Western animation is going to be divided amongst American and European.

5.2.1. European animation

As stated before, European storytelling is driven by the main story. This usually results in very precise work around the different variables that the main plot implies, and a very well-rounded backstory. The story needs to appear real for the audience, even if it is about fantasy or science fiction. When talking about animation, of course, this translates into “realistic animation”. As its name indicates, the purpose of this animation is no other than to portray the motion of our characters in the closest way possible to reality. It is important to point that despite having an extremely cartoon character, it is possible to still use this style of animation, since the only aspect that matters here is how we convey the movement. This is especially relevant in 2D animation, where having a very realistic character can be more harmful than helpful, just because the huge complexity it represents. When animating very complex characters in 2D it is easier to make mistakes, and these mistakes will, inevitably, take realism from the movement.

This type of animation is very used when the focus of the product is the main plot. The reason why this animation is successful at helping the viewer understand the story, it is because it is the less intrusive animation for the eye. Flashy animations, or movements that are obviously over the top will captivate our eye and obligate the brain to spend resources assimilating the action. If the animation is well performed and resembles reality, the brain will utilize these resources in other parts of the animation, such as the narrative. However, realistic does not mean discrete, and powerful scenes should be presented in such a manner, but never breaking physic or anatomic laws that exist in the real world.

When analyzing other media productions that use European animation, and focus in realistic movements, it is very noticeable how they all have a very clear similarity. The main story line revolves around adult topics. This is mainly because the similarities to live-action movies. But even if the characters are caricatures, realistic animation is the style of choice. This is due to the fact that people watching the animation will feel the

characters more like real creatures, and they will have an easier time establishing an emotional bond with them. This makes some feelings like empathy or sadness easier to obtain. Thanks to this, productions following this style will normally focus on serious topics, like moral dilemmas, social matters or politic issues.

Because the huge advances in photo realistic 3D computer modeling, realistic animation has become the norm for all the productions trying to emulate the real world as close as possible. In media such video games this is especially evident, where live action is not a possibility. In some cases, using simulations in order to achieve the most precise results without spending too many resources. However, realistic animation is not exclusive from computer animation, and it can be found spread through a lot of different short movies, shows and video games in 2D, where the main plot and the story line has a big importance.



F 5.1.- Frame from “The Breadwinner” (2017). A clear example of realistic animation in a 2D production. In this case to favor the serious plot that talks about political and social issues in Afghanistan.

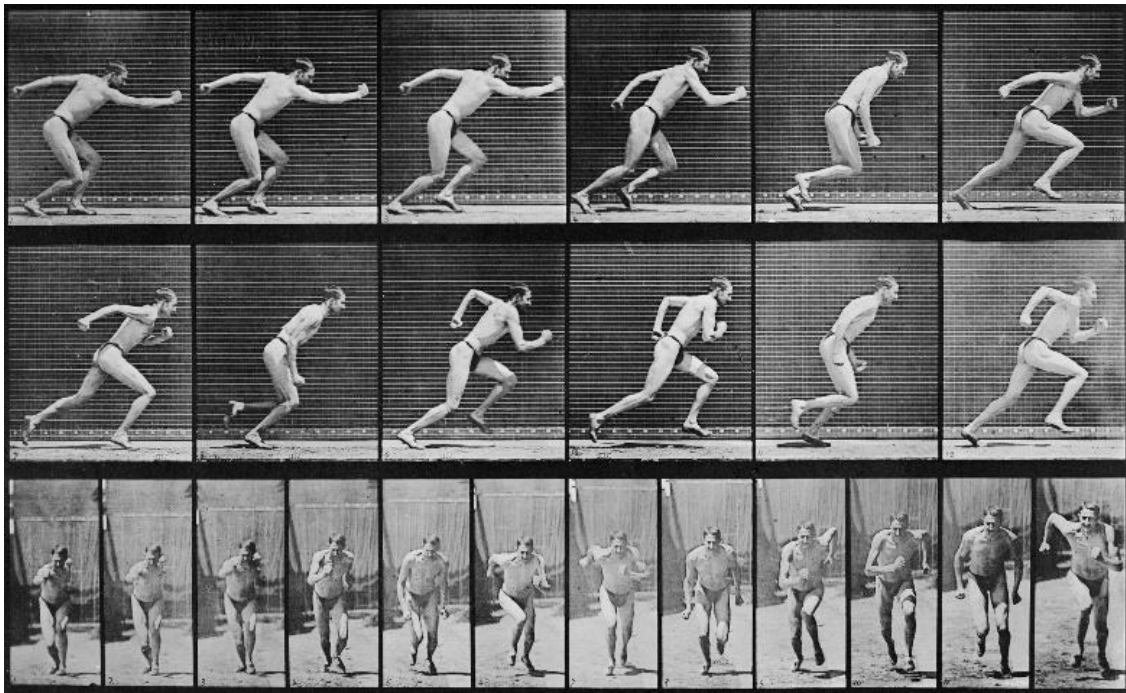
How to do it

References are the first thing we have to consider. This is not something exclusive for realism. References are always important, even if we are doing something associated with cartoons. But it is true, that when we are animating something that needs to resemble reality, references are not important, but crucial. One of the most useful references we can find is live action footage. This gives us the possibility of analyzing the specific movement we want to represent, and understand it before starting drawing. This becomes especially handy with weird or complex body movements that we are not familiar with, for example dancing, but also with the most basic ones as walking or running. It also helps to frame the body in the shot, and understand perspective and composition.

Normally, these references are taken by the own animators that need to do the actual animated shot, since they know better than anyone what they will need. It is important to have a basic script of what you want to represent, and then act accordingly. This way

you will be able to check the reference and see the problems and the virtues of the shot before spending time animating. This makes everything faster and easier.

But recording yourself is not the only way of getting good references, especially if you want to do an animation of a very common movement. There are some other resources that can be handy to animators. For example, there are a lot of providers of high quality references, such as Rhino House, or the books from Eadweard Muybridge. These books have photo references of how animals and humans perform certain movements. These books have been praised from great artists and animators, like Milt Kahl, one of the best realistic animators at Disney.



F 5.2.- Shot from Eadweard Muybridge book "The Human Figure in Motion"

But references are not only for inspiration, but also can be used in other ways. Rotoscopy is a technique very useful if we want to give our animation the most realistic look possible. This technique consists taking one reference and tracing the figure frame by frame until we have the whole motion with drawings. As said before, this technique is very useful to help with complex movements, but it is also dangerous. Even if we are tracing from a video we have to consider and keep in mind the principles of animation. Reality has too much complexity and it is just impossible to translate that to a drawing. This loss of information will result in many undesired effects, but the most common one is the appearance of a character with no weight floating on the screen. It is important to keep in mind that a rotoscopy in the end is still a reference, and it should not be used as the final product.

However, rotoscopy is mainly used in 2D since in computer animation there are more advanced techniques, such as motion capture, that give better and faster results.

But the main part for achieving realism in the movement of a character it is to replicate how anatomy works in the real world. First of all, we have to analyze the range of motion of our character, and how their body type will affect this. This is especially important with joints. In animation, it is very normal to “break the joints” in order to give more dynamism to the animation, or simply to make it more appealing. “Breaking the joints” is giving more range of motion to the main joints of the body, like the elbows or the knees, to exaggerate the action. It is critical to avoid this technique in order to deliver a more realistic approach.

It is also important to not introduce squash and stretch in our anatomic animations, even if it is a main principle of animation. Squash and stretch removes immediately any realism that the animation could have, since it gives the effect the body is made of rubber. All the other principles are still important, but they should work accordingly to how they work in reality.

Finally, it is important to notice that realism has an added complication, “the uncanny valley”. The uncanny valley is the phenomenon that happens when a viewer is looking at an almost real animation. Because our brain is so good at detecting what is real and what is not, if we are faced with something almost real we feel uncomfortable, or we find what we are watching creepy. So it is important, that even if we are trying to achieve realism, we keep this in mind to avoid an unappealing animation.

5.2.2. American animation

The relation between narrative and animation style may be more diffuse in this case, but they share the same basic principles in their core. American narrative is about managing the story curve of the story, and make sure the viewer enjoys it and sits all the way through. In the other hand, if American animation had to be defined with just one word, this would be movement. In the end, both of them focus in one single thing: entertainment. The focus of American animation is just to captivate the eye of the viewer and make them enjoy the whole product without looking away, and it relies on movement to pander to this idea. One of the main pioneering company in the world using this animation style was none other than “Walt Disney Studios”.

One of the main tools that movement grants to the creator is the ability of expressing the personality of a character through their motions. Thus, the personality of a character is shown by showing how the character moves around. One of the most relevant and clear examples is “The Beauty and the Beast” by Disney Studios. In the movie there are two completely opposite characters, and the animation helps to understand the personality of each one. First, there is Belle, a very delicate young girl. Her movements in the movie are graceful, resembling a ballet, with a lot of economy of motion. Then we have the Beast, a violent creature who is always angry. Inside his movements we can find a lot of turns, and he moves very violently jumping all over the place.



F 5.3.-“The Beauty and the Beast” from Disney (1991) it is one of the most representatives examples of American animation style. In the movie both personalities can be easily understood only by their movements, and the contrast between of them makes it even clearer.

This makes the animation not only very appealing but also very easy to understand. This combination works especially well with children, who have a shorter attention span and who will get lost with the plot, especially if they are very young. Even if the characters are creatures they have never seen, their brains will relate the motions these characters are doing with people in the real world, and this will help kids to understand better the different personalities of each character. Also, the more fluid animation will allow people to feel like there is a lot of action in the screen, and they need to keep their eye in the screen. This is also supported by interesting character design and a consequent color palette.

However, American animation is not inherently connected to content made for children. In fact, it has been proven to also appeal to a more mature audience, because it panders nostalgia. This is one of the reasons because some cartoons are labeled as “Family Cartoons”, since it is not only targeted to children, but also to their parents who will feel this sentimental bond with what they are watching, just because their past.

It is normal to see this animation used in a very broad range of different productions, but because the appearance is already associated with specific feelings, they normally belong to lighthearted productions, that even if they talk about serious topics they try to do it in a more humorous style. That is also why in the current landscape of animation, it is very used by a lot of big companies, such as Disney or Pixar, in their biggest productions. Therefore, they can not only focus in one target, but all of them.

How to use it

In a previous paragraph it was stated that in realistic animation it is needed to dismiss some of the most fundamental animation principles in order to give more realism to the animation. In order to create a traditional animation, we have to do the complete opposite. The principles we have to focus specially on are squash and stretch, anticipation, timing, exaggeration, secondary actions and arcs. Especially arcs, will result in a more appealing animation, since simple curves are more appealing to the eye because they look more natural than complex shapes or straight lines. The intention of traditional animation is never to produce a realistic animation, but a believable one, so

the principles of animations can be pushed until we feel is necessary, if the effect is the desired and it supports the action we are trying to portray.

One of the most important things to consider when making traditional animation are lines of action. Action lines are imaginary lines that define the main action of the figure. This concept is fundamental to understand animation in general, but it is especially important with traditional animation. They convey a better sense of effect, gesture, depth and liveliness within characters and keep things flowing as opposed to them seeming stiff. First, it is important that action lines are well-defined, and support the main action of the character. It is important to notice, that despite being imaginary lines, they will define the shape of our character. So the pose of the figure should be clear enough to recognize the line of action. The second thing that it is important to keep in mind it is the shape of the line. In this case, it happens the same with arcs. Curves will always look more natural than straight lines so normally, straight lines are avoided, apart from some exceptions where we want to give a very rigid effect. Other lines of actions that are not recommended are “S” shaped curves. As stated before, the main purpose of the line of action is to support the movement and give more information about it just with a quick glance. In this case, “S” shaped lines create confusion, since each extreme points to a completely opposite direction. As a final observation in the matter, lines of action do not always belong in the middle of your character. They need to be placed where the action is focused. This becomes very important when two or more characters interact between them, since then action lines will interact with one another. For example, if a character is punching another one, the action line of the one throwing the punch will be on the arm. This straight line will deform the punched character action line, to give more strength to the action, and make it more obvious and readable.



F 3.4.- Frame from “Mickey’s Christmas Carol” (1983). In this scene, lines of action have an important function. Both lines are curved, but the one that guides Goofy (right) is leaning towards Scrooge (left), making Goofy looking intimidating, and Scrooge scared.

But the human figure is made by straight lines, which are bones. So in order to create curved lines of action we must distort the human figure, and in order to still maintain believability we have to be careful with how much flexibility we give to our character. If we give no flexibility at all to our characters, they will look very stiff, but giving too much it is not a good option either. The movement could be too flickering on the screen because the extreme movement we have created. In order to avoid both of these situations it is important to take care of one important art of the animation: the breakdown or middle position. If a motion of an object is defined, such as a face turning from right to left, the breakdown would be the frame that is exactly in the middle of such movement, in this case a face looking to the middle of the screen. This is especially important because this traveling position has a profound effect on the action of the character. So the movement will not be defined by the extreme positions, the first frame and the last frame, but with the middle one. And just tweaking this small detail of the animation, the message that the action is conveying can be changed drastically. In such wise, in order to grant flexibility to a specific motion, it is important the breakdown suggests it.

One of the most common techniques in order to achieve the desired effect is the “simple overlap”. This main property of this technique is to result in an action within another action, which results in a stronger vitality in the movement, even if it is done only slightly. The technique is based on drawing the breakdown frame, but tilting it to the direction that supports the intended outcome. Depending on how strong the tilt is, the effect will be more exaggerated provoking a more energetic animation or less exaggerated, inducing a subtle and gentle movement.

Another technique very used among traditional animations to give flexibility to the body is to “break the joints”. Breaking joints is a common term used to define the action of bending human joints whether they would bend in reality or not. This allows the animator to be able to achieve curves and arcs at the same time as the structure of the bones is respected. If the animation is greatly exaggerated, it is possible to ignore anatomy and draw bones like literal curves. However, this procedure will result in a very rubbery movement, removing any believability the character could have. Thus, this could be useful when working with cartoons, it is recommended to break the joints instead of just ignoring anatomy. This method is used mainly with elbows and knees, but it can be found also in the hips, shoulders, ankles, wrists and neck.



*F 5.5.- Frame from “How to Play Baseball” (1942).
Example of a “breaking joints” situation. In this
case, the elbow.*

But flexibility is something that not only belongs to the body expression. The face is also one of the main elements used to portray flexibility. In fact, there is a tendency to forget how mobile a face is in action. But even in live-action there is a lot of distortion in the proportions of the face when an actor is trying to convey an emotion. Especially with everything that surrounds the mouth cavity. This allows the animator to give the sense of elasticity by stretching or squashing the cheeks. This is especially useful to give a much clearer sense of what is going on with very subtle actions like chewing or whistling. However, it is important to keep in mind that the only mobile part in the mouth is the lower jaw, which moves through a hinge placed in the bottom of the skull. The upper jaw and notably the teeth should not be moving in odd manners in order to maintain a sense of believability at all times. Other parts of the body that can be distorted without looking strange, are eyes, and nose.

Finally, it is impossible to talk about facial animation without taking lip-syncing in consideration. With everything stated before, the animator has a wide range of possibilities when animating a mouth representing a dialogue. Notwithstanding that most animators following these rules keep it simple in the majority of cases, in order to allow the character, transmit a clear message without looking too exaggerated. But it is true, that in certain circumstances, it is interesting to add a bit of exaggerating to a conversation. This is done through “accents”. Accents is the inclusion of sharp physical actions, mainly in the head and neck, ahead of a mouth modulation, during a lip-sync scene. This allows the animator to give emphasis to certain parts of the sentence, and after all, sending a more evident message. These accents are normally included 3 or 4 frames before the important sound in the scene, and is mostly used with vocals, since it is more natural to highlight them.

5.2.3. Japanese animation

When describing the main traits of Japanese animation, or anime, there is a main problem that makes this task very difficult. Anime is such a broad medium, that to group all the Japanese productions under one single umbrella that defines them all, it is almost impossible. However, there is one thing that is consistent amongst them, which is a focus in drama. This goes back to the classical theater of Japan, where all the different disciplines were focused in the drama between different characters, especially in “Kabuki”, which is known for the stylization of its drama and including choreographies and make-up to the performance.

In contrast to American animation, which, as it has been explained before, is focused in movement, Japanese animation strives to a completely different direction. Anime grew up under very different pressures and so it favors dramatic still images as opposed to a lot of time spent on animation. Now obviously anime does have animation, but it does try to make individual images stand out as opposed to trying to convey emotion and expression entirely through movement. And despite the fact that there are many other elements to anime style that makes it distinctive, it tends to come back to the striking single visual image which is then supported by the surrounding animation. There are

many reasons for this specific way of producing animation, but the main one it is to provide a dramatic scene and give the viewer enough time to assimilate everything. It is also very useful to transmit specific emotions, especially with characters. In comparison to American animation, since characters are constantly moving, they will tend to move from one emotion to the next one quickly. However, in Japanese animation it is common to let the viewer dwell on a particular emotion for a longer time. And here it is where the still frame comes into place, since Japanese animators will often cut to a still drawing of just that one character with a particular expression on his or her face to further draw out and help the viewer dwell on that emotion.



F 5.6.- Frame from “JoJo’s Bizarre Adventure” (2012). Example of a still frame in anime. Even if there is some animation in the hair, the character(s) hold their position to give more drama to the action.

This also connects with the fact that Japanese storytelling is based in characters. Drama dwell within the emotions of different characters, and of course, it makes sense this is supported by a narrative backing this premise. When analyzing any Japanese animated productions, it becomes very clear how character driven they are. There are normally a great deal of different characters representing various archetypes. The animation also favors their emotions and feelings, and the dialog between different people. Often, reaching the point of expressing thoughts as an actual dialog, with the character talking to themselves.

Finally, it is interesting how a lot of anime productions are done in very small intervals of time or with tight budgets. Or even with both. Thanks to limited animation, this style of animation gives very good results fairly quickly, tricking the viewer with some techniques into believing the animation looks more curated than it is in reality. So this animation is perfect for when there is a lack of time or money.

How to use it

As stated before, anime tries to focus on still frames and static images. Nonetheless, there is plenty of animation in anime obviously. In fact, animation it is used to highlight

or to hide specific parts of the animation. This is done by using many animation approaches, but the two main methods are extreme exaggeration and limited animation.

As American animation, anime also relies on exaggeration to attract the viewer eye to certain parts of the screen or to convey different feelings. However, in anime this is not the norm, and this practice it is done primarily for two kinds of situations, which are comedy and action. Comedic exaggeration includes super-deformed animation as well as exaggerated comedy poses. Super deformation is interesting, because when it is used the characters tend to not move much and when they do it is very simplified. The creator should spend this extra time focusing in facial expression. Despite this situation is true of anime in general, it is particularly evident in super deformation. But anime does not always go to the extreme of super deformation. Another expression of exaggeration in Japanese animation is to draw in intentionally over-the-top and exaggerated poses, similar fashion to American animation. People cannot actually stretch their bodies that far but the magnification of the poses magnifies their emotions. This is especially relevant for action scenes. A more exaggerated motion for a blow or reaction, intensifies the action and the reaction of the characters and can thus intensify how the audience reacts to that. Of course, this can be taken too far. Characters can be drawn in such extreme poses that it is impossible to tell who is who, or who is doing what. Sometimes it is important to keep some degree of realism to help understand the action. It is also critical to define what level of exaggeration it is going to be used since the beginning and be consistent, since it can be a decisive process in order to discern the difference from a subtle movement to a strong one.

Japanese animators also utilize the face of a character as a canvas to paint the emotions they want to convey. Normally, anime characters have big faces and big eyes, what results in a lot of possibilities. In fact, eyes become a mirror of the character emotional mood, resulting in the strongest link between the viewer and the character feelings. This is accomplished thanks to the exaggerated feature the character show. The mouth, also can be completely deformed in weird shapes, or just making it bigger than possible, just to produce a similar effect.

However, the limited budget, and specially the narrow amount of time anime studios possesses to make their creations, force them to use limited animation in order to save resources in some less important parts of the different sequences. But despite this sounding like a burden, some of these studios have leveraged this situation. For example, in character animation, instead of explaining the personality of a character through movement as American animation does, anime focuses on posture. This is part of the general focus of anime on still images. And although this could be considered a limitation, in the reality a lot of times works better than other more complex processes of animating. In fact, the relation between posture and personality it has been proven to be so strong, that it has created something called “anime visual clichés”. These are stock expressions and poses that can be seen over and over in anime. They are

shorthand for certain strong emotions or character archetypes. Some of these have roots in certain aspects of Japanese culture, such as the “pointing pose” which was a common pose in traditional Japanese theater, used to make strong accusations. There are other examples, such as “throbbing anger veins”, “nosebleeds” or “sweat drops” that are used as the norm to express particular feelings, which have more modern origins.



F 5.7.- “Ace Attorney” (left), Bleach (middle) and Pokémon (Right) frames. The pointing finger pose, anger veins and sweat drops are some of the most common anime visual clichés.

But even if some of these limitations have become defining factors for the medium, in general limited resources will translate in a well-rounded scene, and if done poorly it can impact really badly the final product. Limited animation help animators to deal with these tight budgets and tight schedules. First there are the tricks that are revolving around reusing content that has been already made, like the concepts of library and layers. A library is a collection of different assets that you can reuse in order to animate different characters. That is normally why in an anime, there are characters with the same face shape or mouth, because animators will use these drawings again and again in order to save time. In the other hand, to animate in layers it is a technique that consists in animate different parts of the body in different frames, and then put them all together, instead of drawing the whole figure in every frame. This gives the creator the possibility of taking layers and use them in order to animate different characters.

Then, there are the tricks that revolve around skipping certain parts of the animation. Some can be evident, such as a very limited palette of lip flaps or close camera shots that keep everything unimportant out of the camera, but some are a bit more complex, such as “smears”. A smear depicts one quick blur of motion in a single frame. Instead of drawing a perfect subject moving through an action in dozens of poses frame by frame, animation smears accomplish the illusion of motion in a single frame, or a short run of frames, placed in between typical key-frames.



F 5.8.- Frame from Dragon Ball Z (1989). Example of a smear. Using this technique, we can imply a very fast movement with a few numbers of frames. In this case, it gives more strength to the kick.

This blur creates the sensation of a sudden burst of speed that gives the animation a sense of frantic pace and action that careful key-frame animation does not quite match.

5.3. Creation of the animations

After analyzing the specifics of every animation, it is time to see if the study translates to what it has been stated, and see if the framework established works. In order to do this, a collection of animations is going to be created following the different procedures explained above. There is going to be a total of three animations for each case, representing the three different styles. These animations will be used later, in the validation stage. For that reason, it is very important the main differences between the animations are produced by the different styles, and not by external factors. To assure that, the animations will be created under the same set of rules and with the same tools. This will also reduce friction between the theory and the practice. For this specific project, the animations are going to be created in 2D, but all the principles can be moved to a computer animation or 3D programming situation without any problem, since it is a matter of technique.

There are going to be two sets of different animations, a running cycle and a dialogue scene. First, in the running cycle, the animation will consist of a character running in place. This type of animation is very useful because it is fairly simple to produce, but at the same time complex enough to be able to introduce the techniques that have been explained previously. It is also a very popular animation found in many animation products, especially in video games, since it is loopable and can be used to represent the movement of the different characters that can be found in the game. And then there is the dialogue scene, which will consist of two characters interacting between them. The main goal for this animation it is to show the differences in facial animation, something impossible in the walking cycle, and how the mouth movement relates with the sound bits. For this reason, it is important to have an audio cue in these scenes. The chosen sentence is “Still not moving ban uh... I guess what I really want to say is, thank you.”, a sentence from the movie “Inside Out” from Pixar and it will be the same sentence among all the three different clips. Apart from this, it is also important to note that the scenes will be composed by different shots. This means that the structure and the type of the different shots chosen will depend on each style, since it has been seen that the camera placement is also crucial when defining the key characteristics of each animation style.

First of all, it is important to define the shape of the character that will be animated. To avoid a style that could favor one of the specific processes, the art of the figure representing the movements will be fairly neutral if it is possible. This will help the tested individuals to focus in the current movement only. The anatomic proportions will be neutral, and the level of detail will be kept to a minimum. This decision derives from the realization this shape could imply a more realistic shape, and could incite viewers to associate the character shape with the European animation, known by their similarities with real world movement.

All the animations are going to be created with the same set of tools, to also avoid any external discrepancies within the different scenes. The software of choice has been “OpenToonz”. OpenToonz is a 2D animation software developed by Dwango, and released in 2016. This software has been used by many studios worldwide since its birth, especially in films and TV shows. OpenToonz gives the animator a powerful software with a vast variety of means to create professional animated products. Some of the biggest names in their filmography are “SpongeBob SquarePants”, “Futurama” and every single movie from Studio Ghibli. Also, “OpenToonz” is an open source software hence it is free. Thus, because his high reliability and power, its position as a standard in the industry and its price, OpenToonz stands as the best option for this project. The resulting animations will be exported in 24 FPS (frames per second), and a resolution of 1920x1080, which is the standard for any piece of visual content in this day and age. The drawing tablet used to create the scenes will be a HUION Kamvas Pro 22.



F 5.9.- Proportions of the character in the animations

Finally, the piece of equipment used for the creation of the required references will be a Canon 750D, in combination with two lenses, depending on the prerequisites of the scene. The set of lenses consist of a 50mm 1.8f and an 18-135mm 3.5f-5.6f. More details about used lens are specified in each animation section. The footage will be taken in RAW format, which represents a video with a resolution of 1920x1080, and 25 fps. Since the frame rate of the references is different from the frame rate desired for the animations, the videos will be converted to make the process easier.

5.3.1. European animation

Next, it is explained the procedure followed to create the European different animations, how they were approached and why.

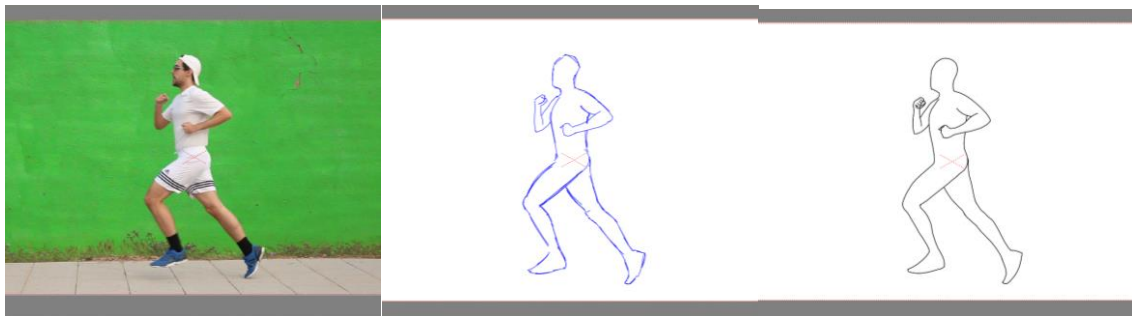
Walking Cycle

Since realism was the principal characteristic the animation had to strive to achieve, the first step was the creation of the references. To guarantee the quality of the final product, it was decided to film specific references for this project instead of obtaining

them from a “Live-action references library” online. This also would provide a more personalized movement; in case it was needed. And since it is a fundamental part of the animating process, it felt necessary to be done.

A problem that appeared during the process of filming the references was the difficulty of getting a clear contrast between the actor performing the movement, and the background. Walls with very complicated textures would result in noise, and invalidate the reference since it was hard to have a clear understanding of the motion, and being able to analyze it. Thus, a proper location was searched and found eventually. It consisted in a wall with a flat green color. The attire of the actor was white clothing, not only to create a difference in hue with the background, but also to match the skin. The reference video can be found in the annex (01_WalkCycle_reference.mov).

With the references, the animation process began. It was decided to start making a rough draft of the final product using rotoscoping to try to reproduce a movement as real as possible, making emphasis in anatomic proportions and movement.



F 5.10.- Rotoscopy process. From the reference, to the traced first draft, to the fair draft with the detail.

But after having a more polished draft, another issue appeared. The scene consisted of only 9 frames. This made the movement too fast to make possible to appreciate any realism. This was due to material limitations. The reference shot had to be done in a steady tripod because the lack of a camera stabilizer. The 18-135mm lens gave the possibility of filming a wide shot, but unfortunately the lens would deform all the anatomy, so this option was rejected. In the end, the shot was filmed with the 18-135mm lens but with a close shot. Because of the speed of the movement, the figure was only inside of the range of the camera for 9 frames. Therefore, the inclusion of in-betweens in the final animation was crucial to get a much clearer result. The in-betweens were drawn by free hand using the previous 9 frames as the reference, especially for anatomic proportions. After having them, the draft was verified and a fair copy was finally created.

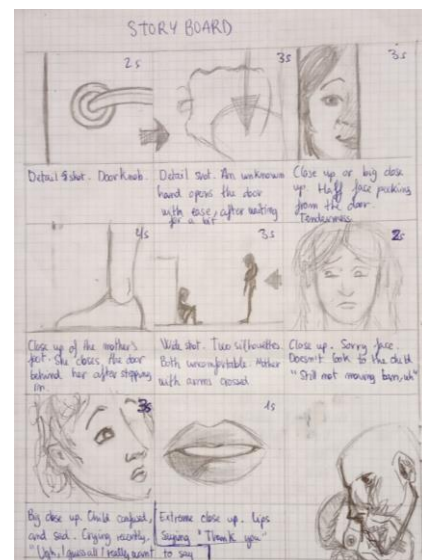


F 5.11.- Spritesheet from the final European style walking cycle

The final animation has 14 frames and it required 11 hours of work. In this 13 hours the filming of the references is included. The animation can be found in the annex (02_WalkingCycle_European.mov).

Dialogue Scene

The process for this scene was very similar to the previous one, the walking cycle, but there was a major difference. This variation was the implementation of a previous step before the animation production, the storyboard. Since the walking cycle scene was fairly simple and it was composed only by one scene there was no need to plan the shots. In this case, because the scene was going to be formed by more than one shot it was needed to have these scenes outlined before starting drawing, or even recording the references. In the end, it was decided that the scene was going to be composed by seven different shots. The election of the shots were specially close-ups and detail shots for two main reasons. The first one was to give enough space to be able to express the required movement in the face without having too much information in a small area, and the second one was to save time in the production process of the animation. This was especially important in the European one, since the motion of the characters had to be traced from real life footage, where it is almost impossible to find motionless poses. The reference filmed for this animation can be found in the annex (05_DialogueScene_Reference.mov).



F 5.12.- Original storyboard

During the creation of this scene there were many difficulties, but the primary ones were caused by a poor choice taking during the recording of the references. The scene was supposed to take place between a mom and her daughter, and the audio cue that was going to be used was said by a female character. Despite this fact, in the reference video there is a male adult acting both of the characters, so when the rotoscoping both characters looked the same, and they did not resemble the characters they were supposed to look like. However, due to the essence of the project this error was not as critical as it could be in other situation.



F 5.13.- Comparison between the reference and the final drawn frame.

Another problem found during the creation of this scene was that the chosen setting to record the videos had too many elements in the screen. This meant that during the rotoscoping process it was difficult to know which details of the image were important enough to keep them in the animation and which ones should not appear. Apart from that, elements would blend between them making the lines of the important elements hard to guess. This resulted in a “wobbly” effect, where some lines, instead of being steady when they were still, they were moving around the screen giving a weird effect.

These issues, added to the fact that the scene was relatively long and the need for extreme detail resulted in an extremely lengthy process. The final animation has 870 frames and it required 40 hours of work. In this 63 hours the filming of the references is included. The animation can be found in the annex 06_DialogueScene_European.mov).

5.3.2. American animation

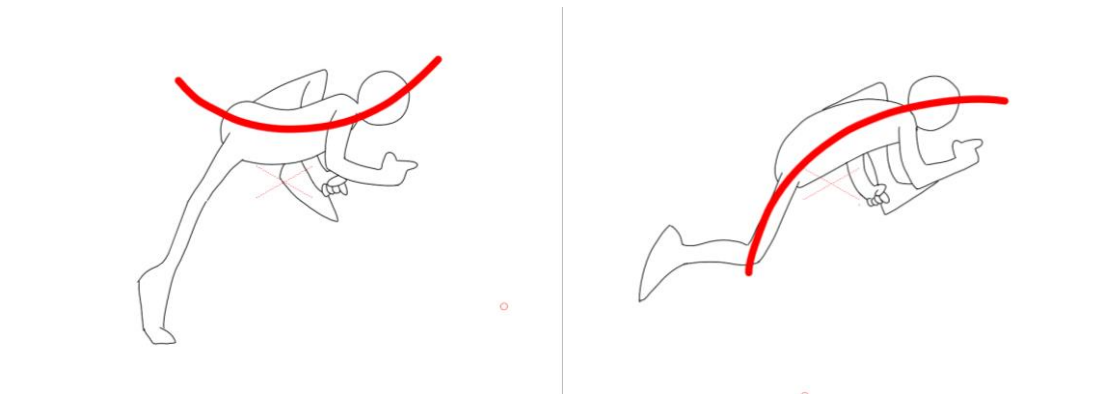
Next, it is explained the procedure followed to create the American different animations, how they were approached and why.

Walking Cycle

For this animation, it was very important to convey in a clear manner the expression of movement as the main factor in the scene, and the one directing the scene. Walking can look like a very mundane task, but it is actually one of the better and most effective ways of showing the personality of a character through movement. But since the action needed to be assimilated clearly in the validation test, it was chosen to exaggerate the movement a lot. This way it is ensured that the results of the test will be more useful, but also it helps to test and show the techniques explained in an easier approach. To

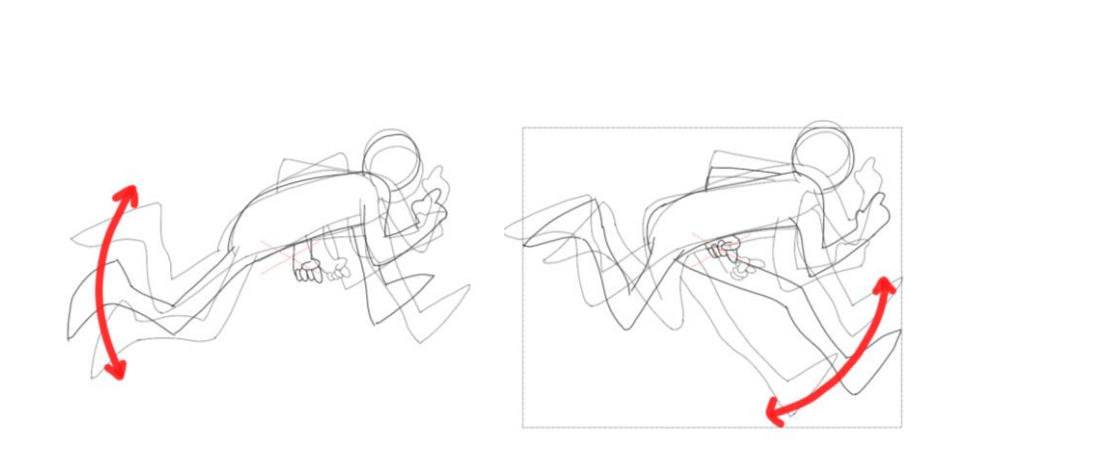
achieve this task, the reference will be, of course, Disney. Specifically, the animation done with characters like Goofy, in the 1960s-1970s.

The animation was drawn following the pose to pose method, since the movement was already planned. The process began drawing the two main poses, and then the breakdown. When the main key-frames of the animation were done, it was time to look at the lines of action. Since the movement needed to be pretty dynamic, the lines of action follow a behavior where they go from a pose to the opposite pose, to express more strength in the movement.



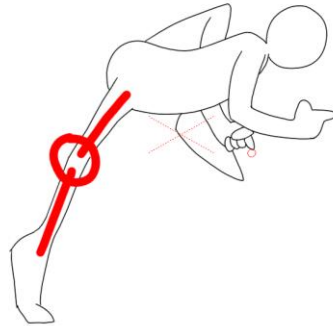
F 5.14.- Changing drastically the direction of the lines of action, it is easier to give a stronger sense of dynamism.

Another thing to keep in mind while developing an animation under this style, was the 12 principles of animation. Some of them were used as much as possible, as arcs for example. They can be found in multiple instances of the animation.



F 5.15.- Some examples of arcs implemented inside the animation

Finally, in order to give an extra sense of elasticity, there are some other techniques implemented in specific frames of the animation, such as “breaking the joints”. This results in not only a more appealing movement, but also a clearer movement.



F 5.16.- A example of breaking joints within the animation itself. In this case, the hip and the knee are broken.

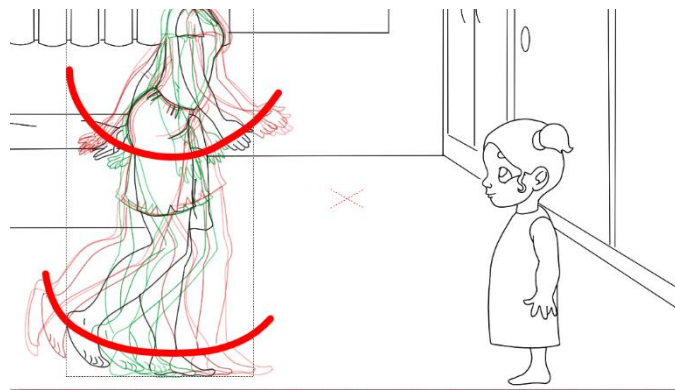


F 5.17.- Spritesheet from the final American style walking cycle

The final animation has 24 frames and it required 16 hours of work. The animation can be found in the annex (03_WalkingCycle_American.mov).

Dialogue Scene

For this scene, the shots used were different from the European one. In order to give a better outlet for American animation, for it to show its particularities, there were some changes. The most notorious one is the inclusion of a moving shot, in order to put one of the characters walking. The total number of different shots went from seven, to six. During the scene, one of the moments where it is easier to see the American animation rules is during the walking cycle of the mom along the room. Despite the fact, that the walking cycle in this scene is much more discrete than the one created for the first video, it is still following the same principles. Specially arcs, squash and stretch, and in some instances, a very slight case of breaking joints in the arms.



F 5.18.- Frame from the American animation where the arcs can be seen clearly in the movement of the character

Another part where it was crucial to demonstrate American animation particularities was in facial animation, and lip-syncing. The anatomy of the face was modified, in order to increase the effect produced by the movement of the elements of the face. It was especially important to, even if it was not with that many details as the European animation, to show a good mouth movement, at least following the basic phonemes that have been used along many American animation productions.



F 5.19.- Lip-Syncing example in of the frames from the animation

For all these reasons, this scene, and as a result American animation, has emerged as the most difficult animation to do, not only because it is required a lot of time to make it look good following these rules, but because added to this, the animator needs to

have a very good understanding of movement, volume and anatomy to make something graceful that really shows the good traits from American animation style. The final animation has 418 frames and it required 50 hours of work. The animation can be found in the annex (07_DialogueScene_American.mov).

5.3.3. Japanese animation

Next, it is explained the procedure followed to create the Japanese different animations, how they were approached and why.

Walking Cycle

In order to represent Japanese animation, it was decided to use one of the most famous visual clichés in anime, which is the “ninja run”.

The “ninja run” is the common word for a very used way of running in anime. The movement consists in running with the arms floating behind the back, and just move the legs. This movement represents the main principle of Japanese animation, which are still frames and drama in animation. It is true that there is movement, and it cannot be considered a completely still image.



F 5.20.- Naruto Shippuden (2017). Example of the “ninja run”

However, the animation is only complementary to the character, and even if the action is stopped and an isolated frame it is taken from the scene, the image has the same strength as the complete motion. The pose of the character is what gives the sense of the speed, not the animation, and because how dramatic the pose is, it is enough to understand the action.

Also, since the arms are not moving, the spectator attention will completely shift towards the lower part of the body of the character. This is an easy way of misdirecting the viewer towards important parts and giving even more strength to the animation, but it is also a way of hiding the flaws of limited animation. Since one of the qualities of Japanese animation also revolves around the use of limited animation, it was established the need of incorporating some of these techniques to the movement too.



F 5.21.- The character was divided in two different layers so the process was easier

First of all, the upper part and the lower part of the body were drawn separately. The legs were drawn first, to see how the pelvis and the waistline would affect the torso, and then the torso was placed in each frame. Because the torso was saved to a library, it was only needed to place it with no need of drawing extra material. Finally, a small movement was implemented in the torso, going up and down each frame to give a more natural look. The quantity of frames was also heavily reduced, and it was animated on twos, which means that every drawing is shown for 2 frames instead of 1. Overall, the process was substantially faster than with the other animating styles.



F 5.22.- Spritesheet from the final Japanese style walking cycle

The final animation has 8 frames and it required 5 hours of work. The animation can be found in the annex (04_WalkingCycle_Japanese.mov).

Dialogue Scene

For this second animation, following the Japanese style, the method was the same as the one followed in the two previous scenes. First, there was the shot planning. In this case, the storyboard was not designed from scratch but instead it was decided to use the storyboard created from the European animation. The reason behind that decision it was that the shots were fitted to also make sense in the Japanese animation style. However, some tweaks were done to specific parts of the scene since the particularities from Japanese animation required them. These differences can be found between camera angles from scenes 2, 5 and 6 from European animation and Japanese animation.

As stated before, still shots are one of the fundamentals behind anime. During this animation there are several of them, but the most important one it is in the fourth shot from the scene. This shot it is not the most relevant because it is the longest, but because there is no other animation apart from a camera panning, making it a pure still image. And despite not providing any motion on the screen during a couple of seconds, it fits perfectly into the scene setting and gives a dramatic break that explains the situation without the need of explaining it with more details.



F 5.23.- Still image used to give more drama to the scene.

Another rule that was important to follow it was exaggeration. This is not only, as mentioned previously, a key factor of Japanese animation but also one of its main tools to convey a strong feeling of drama. Therefore, it was important to change the anatomy to fit the characteristics of anime, which are big eyes and small noses and mouths. This had a great impact in the facial animation, since the mouth was not the main element of the face, in contrast for example to the European animation. Now the eyes were the most important part of the scene. Consequently, the animation shows more effort in the eyes that in the mouth, keeping the lip-sync animation to a bare minimum, as seen in other Japanese animated products, especially in weekly anime, where they need to cut time to be on time.



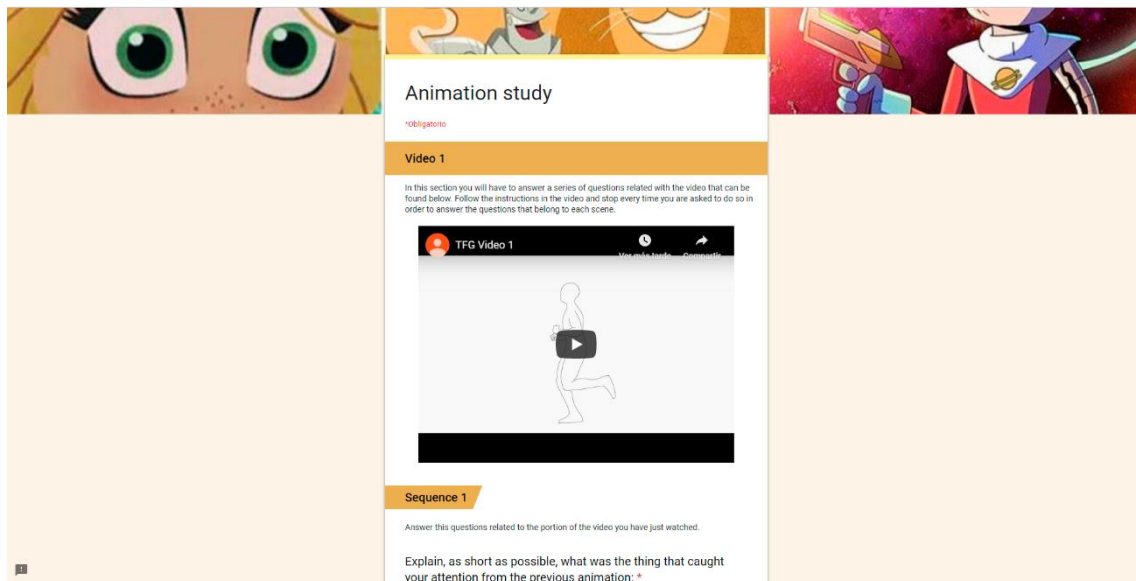
F 5.24.- Face following Japanese anatomy. The most prominent feature are the eyes.

Thanks to these animations tricks, the process was still long, since it took 31 hours, but compared to the two others it was fairly faster. The animation has 402 frames. It can be found in the annex (08_DialogueScene_Japanese.mov).

5.4. Validation test

Before getting any conclusions about the project, it is important to validate if the hypothesis stated in it are true or not. In order to do this task, it is important to run a validation test. This test needs to cover the main ideas that have been explained in the first leg of the document, and show clearly if the framework exposed works or not. Since the animations of the previous stage have been done following said framework, it is important to notice that the opinions, reactions and feelings produced by these animations will represent the results of the rules that belong to this framework. Therefore, the answers got in this test will be crucial to compare the theory and reality.

For this task, the tool chosen has been Google Forms. One of the most important reason behind this decision is the option to embed videos in surveys, making the test quicker and easier for the person taking it. Also, it is a very familiar and very used tool among people, and this will reduce the possibility of misunderstandings or confusions when doing the test. This becomes crucial when thinking that because logistic reasons, the vast majority of tests will be done in remote, without anybody supervising it.



F 5.25.- Google Forms.

The validation test will be divided in three sections:

- In the first part, the subject will find a repertory of personal questions about themselves, such as age or sex, and their familiarity with animation and the different products where we can find it. It also defines how well they know other cultures. The main task of this part is not to define if the person taking the test it is inside the desired target, but to be able to interpret their answers with a better result. It is important to point that the opinion of a person that is used to watch American cartoons, and the opinion of a person that is used to watch anime could differ since their references are very different. In fact, in case these differences would occur, it would be interesting to explain why they happen, and

this will be possible if the person taking the test can be associated with a specific target. It also helps to give clearance on how diverse the validation test was, and in which sectors of the population sector the framework works better.

- The second and third section are the analysis of the animation scenes, first the walking cycles and then the dialogue scenes. These sections are going to be, in turn, divided in two more parts. In the first one, the scenes will be analyzed one by one. The subject will be asked about what the main thing that caught their attention, the perfect story setting for the animation and previous similar references they have seen in the past. With these three questions it is possible to see very fast, how familiarized are the people answering the questions with the animation style, and most important which was the main feeling they got. Also, since the question about the most remarkable thing about the scene is open, this allows to get a better insight behind the person opinion and emotions when watching a similar animation style. Then, the second part of this section consists on a comparison between the three scenes to define which one is more realistic, more entertaining and more dramatic. Considering that these are the three main attributes of the three different animation styles, it is relevant to know how well expressed they are in the different motions.

The questions for both videos, walking cycles and dialogue scenes, will be identical, since the purpose of having two different animation pieces it is to verify that the results are valid and not a result of chance. Therefore, any discrepancies between the results of the two different videos with the same style, would need a further examination to analyze the reasoning behind it. However, the order of the different styles will be different to avoid any pattern caused by it. In the first video the order will be European, American and Japanese, then in the second video, the order will be American, Japanese and European.

The validation test can be found in the annex (09_ValidationTest.pdf). To see the Google Forms survey used for the recollection of the data from the different subjects used in this project, go to this link (<https://forms.gle/rryrLWNPaeuzqW7B6>).

5.4.1. Validation test results analysis

Hereunder can be found a deep analysis of the different parts from the test. The test results can be found in the annex (10_ValidationTestResults.xlsx):

First it is important to define the profile of the people that took this survey. The test was done by 25 individuals. The age range varied between 17 and 26 years of age, having an average age of 23. Nine of these twenty-five were females and sixteen were male. Also, it is remarkable that only a 20% of the people that took the survey work for the entertainment field, so the majority of the subjects were consumers.

Another interesting fact is how the majority of people admitted that they consume a lot of products originated outside their land. In fact, a 32% of the survey respondents believe that everything they consume is produced in other parts of the world that they are not their own. This makes sense when its compared with the next question, where America is the most popular culture amongst the participants. It is not a surprise than 3D animation and hyper realistic animation are the two forms of animation preferred by most of the respondents, with a 32% a 24% respectively. And despite Japan culture being the one with fewer people in touch, accordingly to their own criteria, anime has also a 24% of the participants voting it as their favorite type of animation product. Anime is the most popular 2D animation between the options given, which include cartoons and classical Disney. The average of animation consumption between the individuals polled per week was ten hours, and the majority of these products were videogames.

The results for the walking cycle animations were these:

- In the European walking cycle, the majority of the comments were about the realism in the movement. The respondents made special emphasis in the movement of the head and the legs, and how real it looked. It is logical that people then, when asked about past references similar to the one they just saw, they said real scenes. However, there was more discrepancy between the type of story where this animation would fit, and there were votes in almost every category.
- In the American walking cycle there was again a consensus between opinions since most of them repeated the same words. The thing that caught the attention from the participants was the movement of the character, and they described it as “weird” and “exaggerated”. Since the style was taken directly from the old Disney style of animation, it is understandable that it can look exaggerated or strange under the current animation styles to many of the respondents. However, most of the people that did the test pointed out in the next question that the animation reminded them to old cartoons, so despite recognizing the style, they still labeled it as odd. They also considered that the story type that would fit better this animation would be comedy or farce.
- Finally, in the Japanese walking cycle there was an overwhelming number of answers madding an allusion to the ninja run and “Naruto”. This should not be a surprise since the show it is has amassed a huge popularity along the years, being one of the most famous animes in the western world along with other very familiar ones, such as Dragon Ball. The most remarkable details for the respondents were the sensation of speed, and the running pose, not only because the ninja position, but also because the arms were steady. The most favored story type amongst all the answers was, without any doubt, the farce.

Finally, when people were asked to compare the scenes and give them a score on how realistic, entertaining and dramatic, in a scale from 1 to 5, these were the results (the number showed in the table represents the average from the data gathered in the surveys):

| | Realistic | Entertaining | Dramatic |
|----------|-----------|--------------|----------|
| European | 4.64 | 2.2 | 2.2 |
| American | 1.64 | 4.04 | 3.04 |
| Japanese | 2.5 | 3.32 | 3.88 |

T 5.1.- Average survey scores for walking cycles. The score goes from 1 to 5. The highest ones are marked in red.

The results in this table are very revealing since they show how the opinion of the people match the intended results. Each scene excels in the specific thing they were created for. The European animation was seen as the most realistic of the three, the American as the most entertaining and the Japanese as the most dramatic. It is also remarkable the big difference between the different results, especially with the realism. The smallest gap could be found in the entertainment result, which would be a 0.72 difference between the Japanese animation and the American animation. Since the score goes from 1 to 5, that means a 0.72 would represent a 20% difference, which can be considered a pretty substantial difference.

The results for the dialogue scenes were these:

- In the European dialogue scene there was a very interesting reaction. People coincided in the fact that the animation looked realistic as well as with the previous one. But here, instead of praise for a good-looking animation, the comments were the complete opposite. Many people expressed discomfort, calling the animation strange, and even some people went as far as calling it ugly. The reason behind this reaction could be, in fact, that the animation was poorly executed, but keeping in mind that people also found the movement very realistic, the feeling of discomfort can be associated to the “uncanny valley” concept. This also makes sense considering that during the animation process, one of the main problems was the fact there were specific elements that could not appear in the final image because of time limitations, which could have amplified the “uncanny valley” effect. It is also easily understandable why the participants of the survey chose horror as the perfect story setting for this animation. Nobody had any reference of previous animations with this style.
- In the American dialogue scene, there was the complete opposite reaction. If the survey respondents were saying the European animation was ugly, now they were saying the American was beautiful. It is very likely that this affirmation

occurs because the characters, since in the American animation the characters were more complex in order to show some animation techniques. However, the most abundant comments were about the movement of the characters in specific scenes, like the hand movement in the scene with the little girl or the walking cycle during the fifth scene. Almost everybody related this scene with Disney, and the most participants coincide in the best story setting was tragicomedy, which is the most used plot style by Disney in its movies and shows. There were other people that also pointed out it would fit in a story for children.

- In the Japanese dialogue scene, again, people taking the survey were very quick to indicate the scene was anime. The things that captivated people mind about this scene were, first of all camera angles and long shots. As explained before, this is in fact something very relevant in Japanese animation and one of the main tool to convey the desired emotions. And, something that was also noticed by the participants was in fact the facial expressions and the huge eyes that accompanied this animation. As before, one of the main tools of anime to show emotion. And it is interesting to point it may be succeeded in its task, since people were commenting on how this scene was the one where you could feel better what characters were feeling, in this case, discomfort. The most suitable plot for this scene was tragedy or farce, accordingly to the respondents, the two most dramatic styles from the list.

Finally, when people were asked to compare the scenes and give them a score on how realistic, entertaining and dramatic, in a scale from 1 to 5, these were the results (the number showed in the table represents the average from the data gathered in the surveys):

| | Realistic | Entertaining | Dramatic |
|----------|-----------|--------------|----------|
| European | 3.52 | 2.44 | 3.64 |
| American | 3.44 | 3.64 | 2.56 |
| Japanese | 2.44 | 3.56 | 3.72 |

T 5.2.- Average survey scores for dialogue scenes. The score goes from 1 to 5. The highest ones are marked in red.

For this scene there is an interesting result. As in the other video, the results confirm the framework explained in early stages of the project. However, in this case we can see how the numbers are much more proximate between them. There could be several reasons behind this phenomenon, but considering the other answers in this part of the validation test it can be considered the amateur production of the animation could have affected the results. This could explain why the framework has worked in both sets of animations, but with better results in the one that was simpler.

6. Conclusions and future work

In this final section of the project

6.1. Conclusions

First it is important to emphasize the clear relation between narrative and animation when talking about the three different styles, since it is their different ways of explaining stories what motivates the animation to be expressed in certain way or another. European animation seeks for realism, American animation seeks for entertainment and Japanese animation seeks for drama, and this comes directly for their unique ways of narrating events. In order to reach this goal, all styles have different tools and different paths to follow, sharing some similarities but it is in their differences where the style resides.

Many of these techniques and rules were analyzed in the first leg of the project and a framework was created from them. One of the main goals of the project was to create this framework and test if it worked. After the results obtained with the validation test, it can be said that the framework is a success and the techniques exhibited on it work as intended, especially in simple animations.

Also, it is important to mention that despite being three different styles, only one of them has an identity by itself, which is anime. Among all the tests, this style was clearly recognized as the Japanese animation. However, in the current animation scenario it is very rare to see any production using only one style. The majority of the times, the resultant animation is fruit of the mix from all styles, depending on the feeling and emotions it wants to convey. In fact, this is one of the keys behind the reason why most of the people on the surveys assumed they are used to consuming entertainment from every part of the world. One animation does not have to be exclusive to one style, but mix them to find the result it is required.

Finally, it is important to see how this whole project affects video games. Narrative in video games has become more and more important with the pass of the time. Not only to explain more complex plots, but also to use video games as an outlet to share and to provoke different emotions in the players. This is why it is very important all the parts of a video game work together in order to amplify this effect, instead of fight between the different elements and cause confusion. It is so important that some terms as ludonarrative dissonance have emerged lately in the industry. This is nothing more than a conflict between the narrative of a video game told through the story and the narrative told through the gameplay. It is important to consider animation also as one of the key elements in the narrative of the game to avoid problems like this when creating a game. Specially now, with games that rely on their visual aspect as their main selling point. Taking "GRIS" and "Cuphead" as examples, both are very spectacular visually, but very different at the same time. Both use the styles that fit better their own narratives. "GRIS" opts for a European style, more realistic, for a darker and mature narrative. "Cuphead" chooses an American style, which fits better the action paced nature of the game. What

makes their animations very successful it is not only how well-crafted they are, but how good they work in harmony with their own unique ways of explaining a story.



F 6.1.-GRIS (left) and Cuphead (right). One of the main reasons both games have become so successful is by their unique and beautiful animation.

6.2. Future improvements

One of the main improvements that could be done in the future in order to give more validity to the results it is to use longer animations, and with more quality. Since it has been proven that the framework works specially well with simple animations, like the walking cycles, it would be interesting to redo the test with a longer scene where different characters intercede between them. More experienced people running the animation production would be also able to implement more gracefully some techniques exposed in this project. Also, the inclusion of other elements to the animation such as voice acting, sound, music and color could also be interesting. It is important to keep these elements always away of the focus and use it only as a support, since the goal of this project is to explain how anatomical animation varies in each style, their particularities and the different techniques to achieve one or the other.

Another interesting tweak would be the implementation of these techniques on a 3D animation and test if the framework still works fine. Since some of these techniques cannot be translated from 2D to 3D and vice versa this could potentially result in another set of rules, or a small change in the design of the actual one. The most interesting part of this project would be to know how Japanese animation would convert to 3D animation, since it has been specially arranged to fulfill the needs of anime, which is in its totality in two dimensions.

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8. Annexes

- Video. *01_WalkingCycle_Reference.mov*
- Video. *02_WalkingCycle_European.mov*
- Video. *03_WalkingCycle_American.mov*
- Video. *04_WalkingCycle_Japanese.mov*
- Video. *05_DialogueScene_Reference.mov*
- Video. *06_DialogueScene_European.mov*
- Video. *07_DialogueScene_American.mov*
- Video. *08_DialogueScene_Japanese.mov*
- Text document. *09_ValidationTest.pdf*
- Excel document. *10_ValidationTestResults.xlsx*