GEAR SHIFT

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Master Thesis

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ABSTRACT

This thesis project outlines the development of our stylized 3D computer-generated animated short *Gearshift*. We challenged ourselves to achieve a 2D-3D hybrid aesthetic inspired by current state-of-the-art animation. We have also sought to develop and produce this project according to production pipelines utilized in the animation & game industry. Alongside our production we investigated the potential of alternate modelling software - in particular Blender versus Gravity Sketch on the Meta Quest 3S Virtual Reality (VR) headset - to assist in the modelling pipeline. Considering that we are a team of two students, with a certain amount of experience and time, our challenge is to identify methods for optimising our development phases to accommodate our limited resources.

The results of the user experience evaluation indicate that both Blender and Gravity Sketch can be implemented in the modelling process of an animation production. Blender is best suited for precision modeling, especially hard-surface assets. Gravity Sketch is excellent for modelling organic forms, ideation, and early prototyping. However, we noted that the learning curve for each system differs - Blender's steep learning curve can cause potential difficulty for beginners. In contrast, Gravity Sketch offers learning rooms and quick tutorials which are easily accessible, facilitating a shorter learning curve. This demonstrates the potential of Gravity Sketch and other VR-based sculpting tools as alternate methods of asset creation for animation pipelines, ideally used in tandem with the current industry standard software.

INTRODUCTION

The impetus behind this project stems from a shared love of animation. There are projects currently being developed in the field of animation that are utilising nascent techniques and art styles to create large-scale, high-budget works of art, which have become notable for employing large teams of artists and being released to financial and critical success. Many of these features have taken strides towards impressionism and stylisation, which - blended with new 3D animation software - have initiated a spike of new corporate and consumer interest in the medium as an art form. This project is the outcome of an ambition to learn the basic skills of 3D animation, with the end goal of writing, directing, building and animating a brief homage to some of these inspirational works.

We will first introduce our animated short, entitled *'Gearshift'*, and delineate the process of its development over the course of several months. To clearly portray our intention with the conception and production of this work, it is necessary to provide a brief contextual look at the current milieu in the field of 3D animation. This will include a recent history of the medium as a whole and a look at some contemporary landmark works that have altered what we might expect from the industry. Then we will describe the planning, visual style, process, successes and failures of our undertaking, evaluating the experience of two novice animators with a view towards the aspects of the workload that were expressed through 3D software.

Next, we will dive into the comparison between Gravity Sketch and Blenders modelling tools. We have analysed the user experience, through usability, focusing on workflow efficiency, learnability, and satisfaction, as per the SUXES evaluation model. Adjusting for variation in skill level and man-made versus organic forms, we aim to discuss our findings and the light they shed on the respective strengths of each format. An important factor is whether the assets made in one program (*Blender*) or the other (*Gravity Sketch*) would form an appropriate outcome for use in the animated short.

Our workload was bifurcated between the members of our two-person team. The distribution was as follows:
Elin worked as a producer, writer, designer, modeller, animator and lead UX tester and performed tasks such as sculpting the models, rigging, lighting and scene set-up, arranging the testing surveys and associated apparatus, UV unwrapping and projection mapping.
Beth worked as a concept artist, background artist, texture painter, writer and designer and performed tasks such as painting the scenes, foliage and models, assisting in asset generation, working on the visual development and prop design and creating thumbnails and storyboards.
This allowed us both to further hone our abilities in subjects with which we were previously familiar, alongside grasping new competencies.

PROBLEM STATEMENT

Gearshift is a stylised animated short blending 2D & 3D elements, developed in Blender with the aid of additional software. We are a team of two students with a certain amount of experience and time so our challenge is to identify methods for optimising our development phases, to accommodate our limited resources.

ANIMATION - STATE OF THE ART

The recent history of the medium has been dominated by 3D animation, which has been primarily associated with CGI special effects and animated family films. This method of bringing stories to life was brought to the fore in 1993 with *VeggieTales*, America's first fully computer-generated 3D series, and in 1995 with Pixar's *Toy Story*, the first feature-length fully computer-generated film. The use of computer software to create animated film increased in popularity, heralding the transition from 2D hand-drawn animation - with the occasional use of CGI assets - to characters and environments fully realised in 3D. These often used stylisation to avoid the 'uncanny valley' effect that was a common issue in early attempts at realism. (*Bouwer, et. al 2017.*)

There have been notable technological and artistic advancements since *Toy Story,* such as the use of ray tracing *(A Bug's Life, 1998)*, the implementation of motion-capture suits to record movements (*The Polar Express, 2004*), and, most relevant to our sphere of focus, the groundbreaking blend of 2D comic-book-inspired visual elements with 3D backgrounds and models (*Into the Spiderverse, 2018*). The idiosyncratic style of concept artist and animator Alberto Mielgo lent the film a unique look, utilising comic book motifs such as speech bubbles and half-tones to create eclectic, vibrant designs for characters, objects and environments. Subsequent computer-animated properties displayed the fingerprints of *Spiderverse*'s influence, among them *Klaus* (2019), *League of Legends: Arcane (2021), Entergalactic (2022)* and *Teenage Mutant Ninja Turtles: Mutant Mayhem (2023).*
A prominent feature common to these is the seamless and attractive blend of hand-drawn painterly elements with sculpted 3D models. This 2D-3D trend has proven lucrative, with *Spiderverse* and *Mutant Mayhem* numbering among the highest-grossing animated films of the 2020s thus far. *Arcane* yielded similar attention, its second season reportedly becoming the most-watched series across 60 countries on its first day of release. *(Netflix, 2024.)*

While the art of the moving drawing has long featured scratchy, flickering marks and characteristic roughness, it is a new development that polished, high-budget entries into pre-established franchises encourage their artists to be liberal with their texture and intentionally 'messy' with their designs. *(O'Keefe, 2018*). This indicates an ongoing shift in the current zeitgeist, away from 'safe' aesthetics that have defined computer animation and towards striking, expressionistic art styles. It can be assumed that there are unannounced works now in development that have taken their cue from this era of stylisation, and future entries into the canon of animation will further push the limits of technology to generate memorable visuals.

The release of the Latvian feature-length film *Flow* in 2024 also impacted the genesis of this project. Developed by Gints Zalbalodis, *Flow* follows the story of a cat as he travels through a rich, fantastical landscape. The film was created with a small group of three people, which broadened to about 20 as the development stage progressed. *(Zalbalodis, 2024.*) They utilised the software Blender, which is a free and open-source tool for generating and manipulating 3D assets. The film was acclaimed upon release, receiving recognition at the Annecy animation festival, the Golden Globe Awards and the Academy Awards. Proving that notable works of animation could be created by a small team with limited resources, using only Blender, *Flow* formed a large part of our inspiration to attempt an animation along similar lines. Zalbalodis endorsed NPR (non-photorealistic rendering) workflows as a technique that aided in *Flow*'s production, prompting us to investigate it as a potential methodology.

These works have influenced our art direction during this undertaking, so much so that we challenged ourselves to achieve this 2D-3D hybrid aesthetic as much as possible. This represented a significant hurdle, as while we had ascertained the characters, vehicles and environments would be 3D, there was the question of how best to flatten the textures to create a painterly effect. As we will detail below, there was a procedure of trial and error during the course of this endeavour.

APPROACH

The short is a 3D non-photorealistic rendered (NPR) animation made in Blender, utilising a range of free or easily accessible features to showcase a mixture of realistic and stylised elements. We planned to use our compatible skill sets to generate a range of preparatory materials and inform this process – painted concept art, modelled and painted assets, visual design, and animation. It has been instructive to experiment with the different technical capabilities of Blender, especially as Blender is slowly becoming more common as an animation tool.

To achieve our goal, we have used a common workflow used by the animation and game industry. This is a template made and provided by Richard Lemarchand, a game designer interested in innovation and creativity in the game industry. His template consists of four phases: concept development, pre-production, production, post-production. Throughout these phases we have explored and utilised different methods to develop the narrative, facilitate the production process, and achieve the non-photorealistic style we envisioned.

As the production would take up most of our time, it was important to schedule our time efficiently and innovate our methodologies where possible. Because a lot of our time has been spent focused on the stylisation, we needed a streamlined approach to modelling. During our production we evaluated and compared two asset generation modes; the first being the more traditional process using Blender, while the second was utilising Gravity Sketch on the VR set Meta Quest 3S. We have researched these techniques, documenting this process, our impressions, and whether we found it possible to streamline our modelling pipeline. These findings are presented in our extended research report.

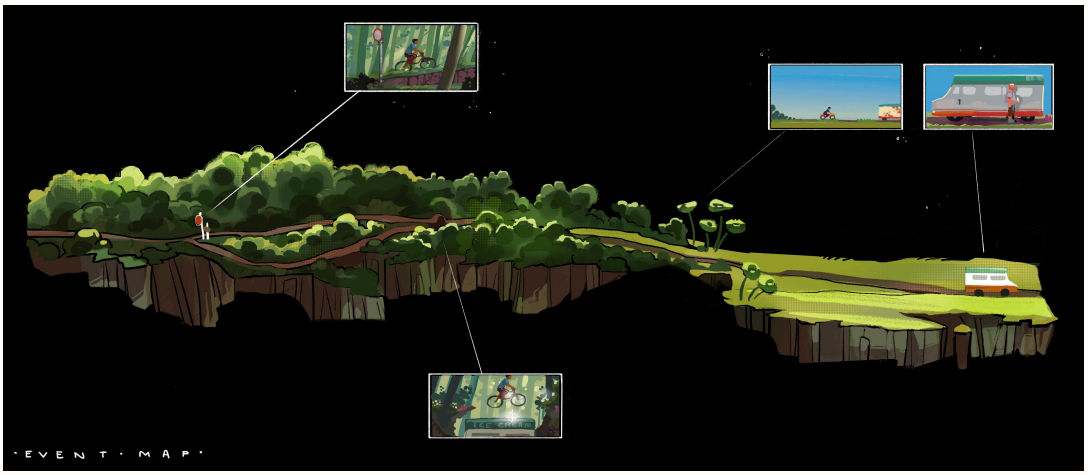
NARRATIVE

The idea generation phase of *Gearshift*'s production took place in November. Knowing, as we did, the style and general atmosphere of what we wanted to create, our task at this stage was to conceive a story that would showcase our strengths without extending the scope of the project beyond what we could realistically achieve. To this end, we decided to focus on a natural setting and keep our cast limited to two or three characters. After an iteration process of suggesting and ruling out several simple concepts, we settled on an upbeat and lighthearted narrative with a selection of fast-paced scenes.

The story of *Gearshift* follows a pre-teen boy in his attempt to pursue a mysterious van through a forest. Traversing the forest trails at speed on a bicycle, he struggles to get closer to the vehicle, even ascending a broken old-stone bridge and leaping over its roof as it drives. The chase continues, with his hopes of success diminishing, until the van stops without warning due to a family of ducks crossing the road in its path. The boy, unable to brake in time, collides with the back of the van and falls to the road. It is revealed that the van he has been chasing with such persistence for the duration of the film is, in fact, an ice-cream van. The driver, having been unaware of the boy's efforts, exits the van and they meet, whereupon the short film ends.

This core story was abridged over several weeks of whittling down unnecessary elements. We began the project with a broad range of ideas for the setting and environments of the film, collecting large swathes of collage boards and prospective details for inclusion. This showed an overestimation of the scope of the film, as we hoped to incorporate as many of these early concepts as possible. For example, we were initially inclined to worldbuild, including a post-apocalyptic element to the world portrayed in the film. This was intended to serve as an interesting contrast to the whimsical nature of an ice cream van, as generally the harsh and unyielding landscape of a post-apocalyptic setting is incongruous with childish or non-essential things. Due to the design and narrative challenges this aspect of our concept posed, we were obliged to omit it in favour of a simpler and more streamlined arc.

Similarly, the route the boy would take through the forested environment was long and winding at first. He was originally written to begin the journey scavenging for supplies in an abandoned grocery store before hearing the van outside and deciding to give chase. This was then changed to a scene featuring him looking out for the van from atop a building and embarking on his pursuit through the forest from there. The setting for the film's beginning was to be an abandoned town, designed in the style of a colourful Spanish settlement, where the marks of a long-gone population were still extant. Like with the previous opening sequence, this was elided due to time constraints. As it stands now, we are launched into the events of the short film *in media res*, with the ice cream van and its pursuer travelling through the forest in the first shot.

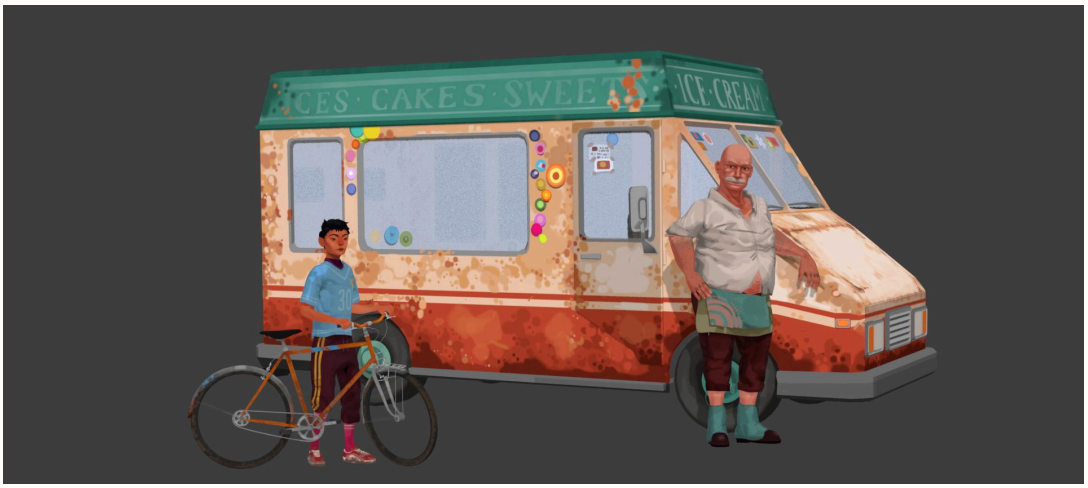


Throughout this iteration process for refining the narrative, we cleaved to the framework of a three-act structure. We were additionally mindful of the fundamental requirements for a short story - a protagonist with a clear goal, a difficulty to overcome, a climax where the action rises to a peak, and the denouément, where he has achieved his aims and the story ends. This storytelling formula is an effective way of ensuring the audience is engaged throughout the course of the film's short runtime, curious about the protagonist's fate and satisfied by the ending (*L. Blazer, 2019*).

VISUAL DEVELOPMENT

Characters

The designs of the boy (Ben) and the ice cream man (Boris) were intended to be in stark contrast with each other, highlighting their respective ages and roles within the story. Ben was initially visualised as a tough, jaded survivor of about fifteen who had scraped through the harsh post-apocalyptic landscape by scavenging. Boris was conceived as an archetypal ice cream man - gentle, enthusiastic and lighthearted. Their designs evolved as the story outline morphed, trading roles and taking on the others' characteristics. By the final iteration of concept art, Ben had become bright-eyed and vital in contrast to his previous shabby incarnation, and Boris had transformed into a tough, cigarette-smoking, tattooed ex-prisoner. These changes reflected the simpler story, while retaining an element of humour. It was also important that their clothing design was consistent with their roles; for example, we took pains to ensure that one leg of Ben's tracksuit bottoms is tucked into his sock, in a habit common to cyclists (this prevents it catching in the chain as they cycle).

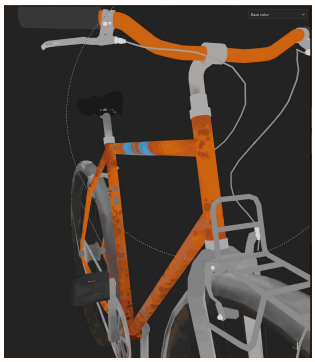


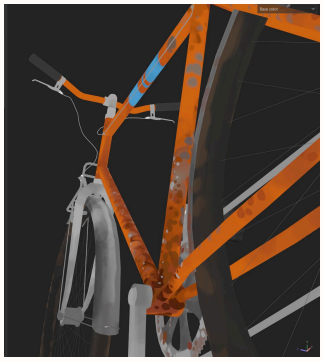
Props & Vehicles

The bike and the van were, similarly to the other assets, built in Blender, then UV-unwrapped and transferred to Substance Painter for texture painting and finally back to Blender to be rigged. Their design featured rust, weathering and splashes of paint, creating a 'lived-in' look that contrasted their bright colours. Attention was paid to applying the appropriate amount of weathering to the paint on the van, obscuring its nature as an ice-cream van until the reveal at the climax of the film. A generally warm colour palette was chosen for both objects, in order to contrast the greens and blues of the forest.

A detail of the film is the headphones worn by Ben as he cycles in pursuit of the van. They are knocked from his head in the impact when he strikes the van and fall to the ground. As a man-made object with a manageable size, they were chosen as a test subject for the course of usability testing completed with both Gravity Sketch in VR and Blender. The final asset created for use in Gearshift was the duck, which is the reason the van stops suddenly and causes Ben to collide with its rear. As detailed below, they were also sculpted in both Gravity Sketch and Blender, owing to its status as an organic form. It provided a helpful contrast to the headphones, and the different approaches taken by both testers allowed for strong contrast in the results of the modelling trial.


TWO DIFFERENT BENS!
LITTLE MORE TIRED
MORE ALERT
30






Ben 1

Asset Creation – Workflow

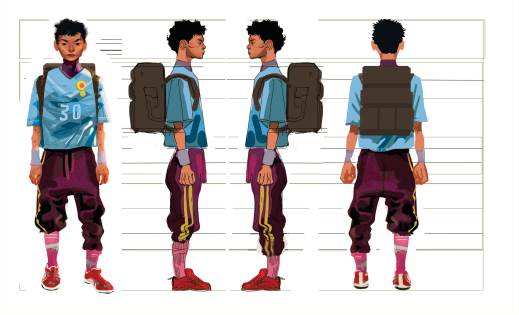
Once the concept art was finalised, Elin worked on building and sculpting the models in Blender. Initially guided by an online tutorial course posted by 'Dikko' (https://www.youtube.com/@Dikko) she started by planning and blocking out the body based on concept art drawn by Beth. As the figures came together volume was added before modeling the hands, sculpting the face and hair, retopologizing the face and hair, modelling the clothes, and finally UV unwrapping the model to be texture painted in Substance Painter by Beth.

Adobe Substance Painter became an indispensable tool for the application of colour and tone to each model. Initially a texture-painting add-on to Blender, Ucupaint, was considered as a method of finishing the assets, but it lacked an intuitive display and only offered the ability to implement layers when applying colour. As an alternative, Substance Painter was excellent as it provided a wide range of brushes, layers and textures, and the UX was such that an artist with no prior texture-painting experience could easily draw on cloth, skin, metal and any other necessary materials without a significant learning curve.

After Beth finished painting the model, Elin would import the textures into the model in Blender. To create the flat look we aimed for, we applied toon shading in the shader editor. This gave us control over the interaction with light and color of the model.

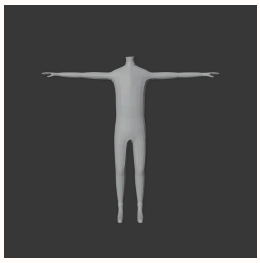
Once happy with the textured look, Elin rigged the characters using Accurig and Rigify, while the van and bike were rigged manually using multiple tutorials provided by YouTube creators to get them ready for animation.

Concept Art

Iterative visual process for the character Ben. (Beth)

Modelling




Modelling process of Ben in Blender, with the help of a modelling course provided online. (Elin)

Texturing



Character is texture painted in Substance painter by Beth. Shaders are then applied by Elin in Blender.

Rigging


Character is rigged with AccuRig and Rigify and linked to the rigged vehicle. (Elin). Shader notes are visualised in the appendix.

Scene Creation – Workflow

The changes to story were instrumental in turning the focus of our project away from the narrative structure and centring our efforts on style. Once the simpler series of events had been established, we were free to concentrate on the primary goal of attaining a painterly 2D-3D synthesis.

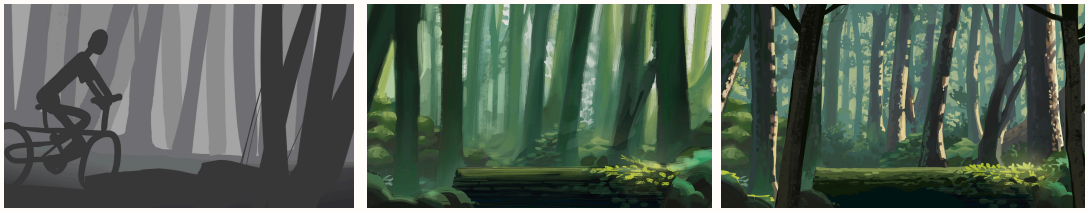
One aspect of our attempts toward this synthesis was the problem of the forest. With our stated goal being a hand-painted landscape, the visual complexity of a scene filled with plant life posed an intimidating obstacle. The plan, before meticulous research, had been to create these 3D assets ourselves and texture-paint them to achieve a 'flat' effect. Before long we switched tactics to favour a downloadable 3D asset pack, FloraPaint, which contained ready-made foliage in line with our artistic requirements for a cohesive look. FloraPaint was capable of 'brushing' 3D assets - such as plants, mosses, shrubs and full-size conifers, rendered in a hand-painted style - onto a plane in Blender with the Scatter tool. Benefits of FloraPaint included subtle wind animation and a decorative air, along with the ease of simply loading in assets ready for each scene. However, the strain this exerted on the program was too great and it was not deemed fit for use.
This left us with a considerable quandary - if our backgrounds were all 2D painted planes, it would leave the environments looking flat and artificial. This did not align with our vision for the forest scenes, and it was difficult to implement FloraPaint assets without system failure. The alternative - modelling the trees and foliage ourselves - was not practicable at this later stage of the project.

Fortunately, a solution presented itself as a result of Elin's extensive research. Having investigated the possibility of implementing projection mapping at an earlier stage of production, she revisited the prospect in a new light: applying it to the problem of the forest environments. The new procedure for building scenes was as follows: each background would be drawn as a concept art piece, then separated into layers - each holding one of the artwork's constituent elements. The layers were imported from Krita into Blender and projected onto individual planes that were either flat or slightly curved, in order to catch and reflect generated light. These were placed at intervals between the camera and a flat background, forming a framework somewhat similar to the painted wooden trompe l'oeil scenery of a stage play. Our sculpted, painted and rigged model of the boy on his bike could move through the scene, complete with soft golden shaded lighting, and appear to be in the depths of the woods. While this new approach required a heavier emphasis on painted scenes and concept art, as well as carefully divided layer groups, the strain of these new scenes was negligible when compared with FloraPaint. In addition, while FloraPaint was a fully 3D asset pack, the novel method we were testing was far more true to the spirit of our project: the successful merging of 2D with 3D.

This new pipeline utilised the skills of both members of our team to great advantage. The concept art for most of these scenes was already drawn and it was a simple task to elevate them visually to be adequate for use as environments. Elin's proficiency at Blender credited her with the ability to set up planes and scenes that - if observed through the viewport - looked like a full landscape with the necessary depth of field. With careful arrangement and setup of planes, light and atmosphere, the sculpted 3D characters can move through each scene as though it is an entire terrain.

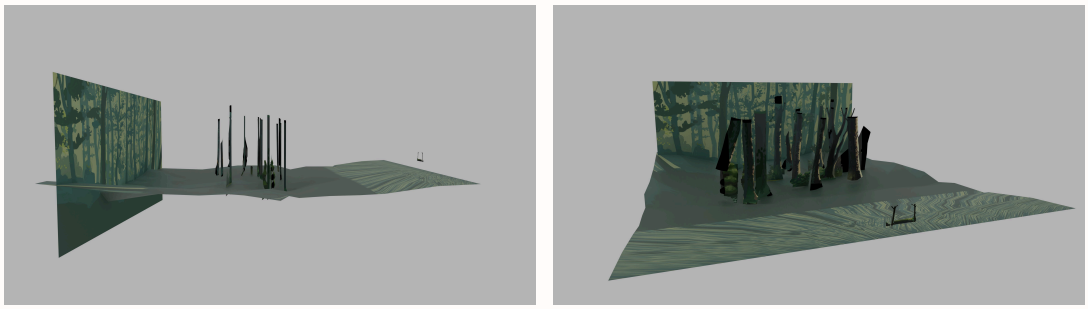
With this breakthrough and the positive outcome of the numerous different attempts at backgrounds, we became more confident that *Gearshift* would come together as envisioned.

Environment Painting



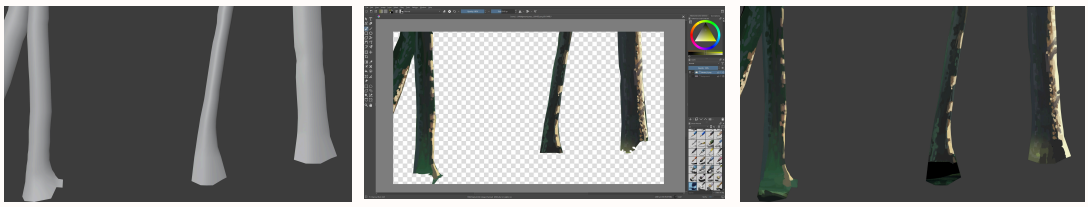
Iterative visual process for the environments painted and divided into layers. (Beth)

Blender integration



Layers are imported as 2D plains in Blender and arranged to fit the camera. (Elin)

Painting Touch ups



Workflow using the image editor option in Blender. This uses Krita to edit the painted layers for projection mapping on simple 3D planes.

Compositing

Final render after adding lights, fake light rays, fog, and applying filters through the compositor in Blender.

RESEARCH QUESTION

As we began to think about 3D models for this project we were prompted by the input of our tutor Alessandro Canossa to consider alternate methods of asset generation. Thus our research question evolved into the following:

Can we utilise the Meta Quest 3S - in particular Gravity Sketch - to improve our modelling pipeline compared to the more commonly-used modelling pipeline in Blender? Additionally, how does the different level of modelling expertise between both members of the project group influence our user experience with these tools?

Motivation

Our plans and schedules for the semester were split by numerous factors: Lemarchand's four phases, our individual skills and limitations, and the division of the work into collaborative and individual tasks. We planned that pre-production and production were going to take up most of our time within the four months available to develop Gearshift. This consisted of researching structure, creating concept art, storyboarding and turning it into an animatic, but mainly our time was going to be spent modelling characters, props and environments. Asset creation is where we had to optimize our workflow and create a pipeline that is efficient, making it possible to achieve the stylization we wanted and easy to learn; Beth was primarily responsible for visual development, while Elin focused on the technical aspects such as modelling and rigging, leveraging her intermediate experience with Blender.

Once we started researching and discussing how we could optimize this process to quickly develop assets for the animation, our supervisor Alessandro Canossa suggested utilizing Gravity Sketch - an innovative 3D modelling software for VR sets – to accelerate our workflow.

Following this discussion and suggestion, our project was developed with the above research question forming the basis of our inquiry.

Method

To evaluate and potentially optimize our 3D modelling pipeline, we designed a comparative user experience study focused on two systems: Blender (desktop-based) and Gravity Sketch (VR-based via Meta Quest 3S). Our goal was to assess how each system supports our three core production needs:

1. Quick production
2. Ease of learning
3. Stylization matching our desired aesthetic

We approached this through the lens of user experience (UX) and usability, evaluating both systems using a combination of quantitative and qualitative methods.

User Experience

According to Jakob Nielsen's definition, *"User experience encompasses all aspects of the end-user's interaction with the company, its services, and its products."* A common definition used in human-technology interaction. Here user experience is described broadly and tailored to a customer's journey with a company. As we are not developing any services or products, but evaluating two existing applications with a specific goal, Nielson's broad definition does not directly apply to our context. Instead, we adopt Tuuli Keskinen's definition of user experience (2015), used in her dissertation Evaluating the User Experience of Interactive Systems in Challenging Circumstances:

A user's subjective opinion about (or answer to) a certain statement (or question) about the system (or modality, interaction, or any other specified target) in a certain context at that time.

This user-centered and situational definition aligns with our project-based use case, where we are both creators and evaluators working under real-world constraints.

To figure out the usability of these systems within our modelling pipeline, the study follows the method SUXES *(Turunen, Hakulinen, Melto, et al., 2009)*, used by Keskinen (2015) in many of the case studies. SUXES is based on the framework SERVQUAL, created for service quality *(Zeithaml, Parasuraman, & Berry, 1990).* The method focuses on the evaluation of multimodal interaction, and measures both user expectations and user experiences on certain statements. The statements are rated on a seven-step scale ranging from low (1) to high (7). The statements are the same before and after the usage of each application. Which enables us to compare pre-usage expectations and post-usage expectations by calculating the median values for each variable and then compare them. This quantitative data will be supported by qualitative data, such as responses to open questions, observations or interview data.

The original SUXES statements, listed by Keskinen, are rephrased according to our objective and tailored to focus on the usability of the two applications in question. Usability is defined by Jakob Nielson *"as a quality attribute that assesses how easy user interfaces are to use."* (1993). Additionally stating the importance of realizing that usability is not a single, one-dimensional property but consists of five key components.

- Learnability – How easy is it for users to accomplish basic tasks when they first encounter the system?
- Efficiency – How quickly can users perform tasks once they've learned the system?
- Memorability – How easily can users re-establish proficiency after a period of not using the system?
- Errors – How many errors do users make, how severe are they, and how easily can they recover?
- Satisfaction – How pleasant is the experience of using the system?

Our three pipeline conditions (*quick production, ease of learning, and stylization*) were aligned with Nielsen's five usability components as follows: quick production and efficiency, achieving the desired stylization and satisfaction, and easy to learn with learnability. This mapping helped us frame our expectations and guide the phrasing of our SUXES evaluation statements.

SUXES Evaluation

Objective

The purpose of this study is to first evaluate the user experience of two modelling systems, Blender (Computer based) versus Gravity Sketch (Virtual reality), used to create 3D models during our modelling pipeline. Second, to examine which one meets our goal of creating an efficient workflow, can achieve our desired stylization and is easy to learn. And thirdly, we will compare the two modelling pipelines and conclude how each system can be implemented best into production processes within animation.

Systems

Blender

Blender (https://www.blender.org/) is a powerful, open-source 3D creation suite used for a wide range of digital content creation, including animated films, visual effects, digital art, 3D printing, motion graphics, and interactive experiences. It offers a comprehensive toolset for the full CG production pipeline—modelling, sculpting, rigging, animation, simulation, rendering, compositing, video editing, and more.

For years Cinema 4D (https://www.maxon.net/) and Maya (https://www.autodesk.com/) have been the industry standard for creating 3D animations. However, over the past decade, Blender has grown from a community-driven project into an industry-recognized platform and can now compete with Cinema 4D and Maya. Leading to Oscar nominated animations such as Flow, made by Dream Well Studios (https://www.dreamwell.lv/). Blender's versatility and open accessibility make it especially suitable for independent creators and small teams—such as ours.

In the context of Gearshift, Blender is our primary software for most of the production pipeline. However, for the purpose of this evaluation, we focus specifically on Blender's modelling functionality. Blender's modelling system includes multiple approaches: polygonal mesh editing, sculpting with dynamic topology, and non-destructive editing through modifiers. Users can work with primitives (e.g., cubes, spheres, text), adjust geometry through vertices, edges, and faces in Edit Mode, and apply procedural changes using the Modifier Stack. Like Edit mode, Sculpt mode can be used to alter the shape of a model. But instead of dealing with individual elements (vertices, edges, and faces), areas of the model are primarily changed using brushes.

While Blender is highly capable, it comes with a steep learning curve, due to its complex interface and the diverse availability of tools. Its traditional, screen-based interaction may slow down the modelling process for beginners and can sometimes hinder rapid creation when compared to immersive, interaction tools like Gravity Sketch.

In this study, Blender represents the traditional desktop-based modelling pipeline. It will serve as the baseline method in our evaluation which we compare with the potential benefits of using a VR-based workflow using Gravity Sketch.

Gravity Sketch

Gravity Sketch (https://gravitysketch.com/) is a 3D design platform built specifically for Virtual Reality (VR), allowing users to ideate, prototype, and model directly in 3D space using hand gestures and spatial input. It is compatible with Meta Quest headsets and offers an immersive, intuitive alternative to screen-based 3D modelling software.

Unlike traditional tools such as Blender, Gravity Sketch leverages embodied interaction by letting users design at a 1:1 scale, manipulate shapes in real-time 3D space, and iterate with creative freedom. It offers tools for curve-based modelling, surfacing, symmetry, subdivision, and rapid sketch-to-form transformations. Gravity Sketch supports importing reference images, exporting models in standard formats (FBX, OBJ), and integrating into traditional pipelines like Blender or Unity (https://unity.com/).

The software is used professionally in automotive, industrial design, and concept art industries, particularly for early-stage prototyping. Gravity Sketch provides a high degree of spatial awareness and immediacy in form creation, which can potentially improve ideation speed and stylistic control—key factors for our project Gearshift.

While immersive and intuitive, Gravity Sketch is limited in its purpose. It is solely for 3D modelling affecting its suitability for full production workflows. The ability to UV map, sculpt, rig, and animate are lacking. Additionally, VR headsets like the Meta Quest 3S introduce their own constraints, including accessibility, limited battery life, physical discomfort during extended use and in some cases disorientation. These factors can impact both workflow efficiency and user comfort during long modelling sessions. In our study, Gravity Sketch is explored as a potential method to speed up and simplify the modelling pipeline during pre-production and production especially for beginners.

Challenges

The challenges during the user experience evaluation that may have impacted the evaluation process itself as well as the results, is that both participants were also the researchers, which provided a personal perspective reflective of the user group. But posed a risk of bias expectation and experience ratings. Additionally, the participants represented different 3D modelling experience levels: one novice and one experienced user.

This required us to carefully design the task and questionnaire to ensure the evaluation was meaningful and useful for both participants, while still being able to use and compare the intended data. The small sample size also limited the generalizability, though it allowed for in-depth, context-specific results.
In addition, during the tasks the modelling process was recorded in both Blender and Gravity Sketch. While using the VR headset the limited battery life interrupted modelling sessions and affected the recorded time of the task.

Evaluation

The evaluation of our modelling pipeline takes place in a real-world production context: the development of our stylised 3D animated short Gearshift. The tests are carried out during the pre-production and production phases, with us - Beth and Elin - as the evaluators as well as the participants. This means the evaluation occurs in a semi-private, project-based working environment rather than a public setting, allowing for focused and reflective testing while still resembling authentic usage scenarios. While this eliminates distractions and social pressure mentioned by Keskinen (2015), it introduces new physical factors, such as the comfort and spatial requirements of VR.

The social context is limited to the two of us, allowing for open discussions and reflection on our experience. However, this may present bias, especially if our expectations unconsciously influence our experiences. To moderate this, we collect both subjective reflections and objective ratings using the SUXES method, supporting our impressions with qualitative feedback. While this is not a large-scale user study with external participants, the project-based, real-use context gives us valuable insight into how these tools perform under realistic conditions of time constraint, collaborative production, and creative ambition.

Participants

This study focuses on improving the modelling pipeline for a specific creative context —independent 3D animation production—so the user group is intentionally limited to the two individuals actively engaged in the project. As both designers and end users, we represent the exact target audience for the system: creators working on stylized animation, with different levels of experience in 3D modelling. While this small user group limits the generalizability of results, it enables focused and highly contextualized evaluation that reflects real use.

However, we can classify ourselves into two distinct user types, novice and expert, as recommended by Nielsen (1993). Our levels of experience with 3D modelling are different. Elin, having more experience with Blender and stylized asset creation, will approach the evaluation as an expert user. She will assess both the traditional desktop-based Blender pipeline and the VR-based Gravity Sketch pipeline, with particular attention to modelling precision, creative freedom, and efficiency. Beth, by contrast, is relatively new to 3D modelling and will evaluate both tools from a beginner's perspective, providing insights into learnability, onboarding, and overall ease of use. Her experience reflects that of potential future users who may approach such tools without extensive technical training but with strong creative intent.
This combination of perspectives allows us to simulate multiple user paths through the pipeline—one rooted in expertise, the other in exploration—providing a richer view of usability across different stages of experience. It also ensures that usability findings are directly actionable for the development of our own pipeline, which is both the object and context of study.

Procedure

To evaluate the usability and user experience of two different 3D modelling workflows —Gravity Sketch (VR-based) and Blender (PC-based)—we conducted a task-based study using the SUXES evaluation method.

Before the usage

As both observer and user the participants understood what the evaluation and tasks involved, so an introduction was unnecessary in our case. However, background information was gathered through a digital questionnaire. Which included the following information to be filled in: name, application type, experience level, specification of task. Participants also filled out the SUXES questionnaire by setting their minimum acceptable and desired levels of user experience for each statement. This establishes a personalized baseline for comparison. When participants were informed and ready the screen recording would be activated to signal the start of the usage phase.

Usage

Each participant completed the following modelling tasks:

- Hard-Surface Modelling Task:
  Create a 3D model of a pair of headphones based on a provided reference image.
- Focus: Accuracy, use of primitives, symmetry, and clean topology.
- Objective: Recreate the object to a reasonable level of fidelity using the given tool.
- Organic Modelling Task:
  Create a 3D model of a duck based on a provided reference image.
- Focus: Sculptural and freeform modelling, handling of curves and organic shapes.
- Objective: Capture the shape and stylized features of the object using the given tool.
- Each participant completed both tasks in both tools, resulting in a total of four modelling sessions per person.

After the usage

Once finished with the task, participants stopped the recording, took screenshots of the model, and exported it as an FBX file. And participants rated their actual experience with the tool based on the same SUXES statements in the digital questionnaire.

Once all tasks were completed by both participants, they filled out a short interview form asking general questions about both systems.

The questions of the interview conducted:

- What was the best thing about using Gravity Sketch?
- What was the most frustrating part about Gravity Sketch?
- What was the best thing about using Blender?
- What was the most frustrating part about Blender?
- Which tool would you prefer for similar future tasks and why?

These ratings and interviews were used to evaluate how each tool met or deviated from the participants' expectations in terms of usability, satisfaction, and effectiveness. This approach allows for direct, task-specific reflections and comparison of user experience across both tools and modelling contexts. It also supports individualized analysis by accounting for each participant's expectations and background experience.

Outcome And Conclusions

Results were gathered, calculated and visualised to compare the data and draw conclusions. The designed evaluation and data collection is gathered in the appendix. Below we have summarized our results.

1. User Experience Comparison: Gravity Sketch vs Blender

Hard-Surface Modeling (Headphones)

User	*Tool*	*Summary*
Elin (Intermediate)	Blender	Strong performance; confident, fast, neat result. Tools familiar and effective for precision modeling.
Elin (Beginner)	Gravity Sketch	Smooth experience, but initial confusion with mirroring and spatial orientation. Good final result.
Beth (Beginner)	Blender	Achieved a clean and symmetrical model using mirror and subdivision modifiers. Some tool discovery challenges.
Beth (Beginner)	Gravity Sketch	Intuitive use of drawing and ribbon tools. Less precise model, some size inaccuracies.

Organic Modelling (Duck)

User	*Tool*	*Summary*
Elin (Intermediate)	Blender	Confident execution with editing and shaping tools. The final model was polished and comparable to the VR result.
Elin (Beginner)	Gravity Sketch	Joyful experience, more expressive and intuitive shaping. Struggled with spatial grounding and scale.
Beth (Beginner)	Blender	Frustrated, she resorted to basic assembly. Difficulties with modifiers and creative freedom.
Beth (Beginner)	Gravity Sketch	Enjoyed the process, and used ribbon tools to convey style. Outcome more satisfying.

Analysis

Blender

- Blender excelled in precision, especially for hard-surface models.
- Gravity Sketch felt more intuitive to beginners but lacked tools for exact proportions and mirroring.
- Both users would prefer Blender for structured, man-made objects.

Gravity Sketch

- Gravity Sketch was clearly preferred for organic modeling, particularly by the beginner user.
- Creative freedom, flow, and satisfaction were higher in Gravity Sketch, despite some practical limitations.
- Blender still enabled precise modeling but was perceived as rigid and less enjoyable for expressive forms.

2. SUXES Themes: Usability Insights

While exact numeric values aren't visible in the document, both interview and observation notes reveal clear patterns across the SUXES statements:

Key Positive UX Findings:

- Learnability *(Statement 3)*: Gravity Sketch felt intuitive and required little setup; Blender was familiar to Elin but harder for Beth.
- Tool Accessibility *(Statement 5)*: Gravity Sketch menus and tools were easy to access (Elin); Blender tools were powerful but less discoverable for Beth.
- Creative Satisfaction *(Statement 7):* Both users emphasized feeling freer and more expressive in Gravity Sketch, particularly for organic tasks.
- Pipeline Suitability *(Statement 8)*: Blender models were more readily usable for production; Gravity Sketch required export and refinement.

Key Frustrations:

- Precision and Scale (Gravity Sketch): Lacked grounding (fixed axis), making accurate positioning and scaling hard.
- Overcomplexity (Blender): Hotkey overload, hidden tools, and modifier confusion led to friction for Beth.

Overall Conclusions And Recommendations

Blender was best suited for precision modeling, especially hard-surface assets. It was found to be effective for experienced users; however we noted the steep learning curve for beginners to be a potential cause of difficulty. Alongside this, it offers direct integration into the production pipeline, with no conversion between software needed. On the other hand, Gravity Sketch was excellent for modelling organic forms, ideation, and early prototyping. Its high capacity for intuitiveness and creative satisfaction, especially in VR's immersive space, allowed for liberal and slapdash asset generation with a focus on impressionistic 3D mark-making. This results in a tool less suitable for tasks requiring exact symmetry or scale, which can be limiting for final production assets.

Based on both quantitative SUXES ratings and qualitative feedback, we recommend the following modeling pipeline strategy for a prospective animation: the use of Gravity Sketch during pre-production and prototyping, especially for organic or stylized forms, like for example characters, landscapes or plants. Blender, in our view based on the results above, is preferable for final modeling, hard-surface objects, and any assets requiring precise control, modifiers, and integration into the final production workflow. We also recommend that Gravity Sketch be viewed as a complement, not a replacement, for Blender.

The benefits of making use of Gravity Sketch (and other VR-based modelling software) as a supplementary tool for creating assets in the course of production are clear. Both Elin and Beth enjoyed the novel sense of being fully immersed in the digital world, sculpting assets with the illusion of tactility. The perception that the artist or modeller is within the same world as the object they are creating helps to engender focus, creative freedom, and the impulse to 'play around' and experiment. This may be due to the fact that simply manipulating the VR apparatus and creating a free-floating structure feels pleasant and incites curiosity in the user. In the pre-development stage of an animation, when concepts, plans and ideas are still liable to change, the relaxed and playful creative freedom of Gravity Sketch could help animators enter a state of 'flow' ideation. Rather than being separated from the objects of our imagination, planning and labour by a screen, Gravity Sketch permits the user to move around and among them. While our subject of evaluation was confined to the comparison of Gravity Sketch and Blender, we find this question compelling. We would like to see a study on the effect of this difference in immersion on focus and creativity, particularly on animators just beginning to come up with ideas for a project.

In summary: we conclude that Blender and Gravity Sketch have different strengths in their capacity as tools for modelling. Blender, allowing for heightened precision, is preferable for man-made objects. Gravity Sketch, being looser and more intuitive, we found to be preferable for organic forms. This indicates that maximum benefit for animators can be gained from the adjunct or intertwined usage of both.

POST-REPORT WORK

In terms of Gravity Sketch and our associated investigations into user experience, we have an interest in exploring the utility of Gravity Sketch for generating landscapes. Until this point we have largely restricted our forays into VR-based 3D modelling to smaller assets. As concept artists and 3D sculptors, the prospect of turning our attention to environments and modelling the contours of terrain is a compelling one. Gravity Sketch proved to be a useful and intuitive tool, and it would be a stimulating exercise to broaden our repertoire in a virtual space.

A significant amount remains to be done after the submission of this report. With every scene painted, set up and prepared for animation, the focus now is on completing the bulk of the animation in the weeks before the examination period. This animation largely consists of facial movements, such as the furrowing of brows, and the correct jostling and impact necessitated by high-speed movement on a bike. There are additional details to consider - while we have made plans for the sound design and music of *Gearshift,* it will require some time and effort to appropriately mix the sounds.
VFX is another consideration, especially if we are planning to conserve the 2D sensibilities we have put so much time into thus far.

However, we have come a long way and learned a substantial array of skills associated with 3D animation over the course of recent months. Turnarounds, storyboards, animatics, planning and scheduling for animation, texture painting, UV unwrapping, projection mapping, modelling, sculpting, rigging, asset creation in VR, 3D animation and compositing - these were all novel concepts to us at the beginning of this semester, and we are confident the remaining tasks will be another engaging and enjoyable challenge.

Link to Animatics:

https://www.youtube.com/playlist?list=PLKsdVnh1-G-BmeTpMxkyBTdbzV_ohUrZB

REFLECTION

As a two-person team on this project, we found the co-operation and expansion of both of our skill sets to be the defining theme of our course of inquiry. Between both strands of our thesis, the investigation into VR and Blender-based 3D modelling workflows and the development of the animated short *Gearshift*, this thread formed the basis of the motivation to continue refining our work. We co-operated on every aspect of story refinement, design, asset generation and scene arrangement, allowing our separate competencies to complement and interact at every level of this process. Beth's artistic leaning helped inform Elin's technical prowess and talent for organisation and production, and Elin's thorough knowledge of the requirements and demands of the tasks ahead of us in turn directed Beth's contributions. Through dozens, if not hundreds of discussions about our next steps we navigated the constantly-shifting workload and adapted to overcome the natural obstacles that presented themselves in the construction of this project. We would, as a result, be inclined to work together in future after the completion of our thesis as we found significant mutual benefit in our collaboration.

Furthermore, there is potential to make further use of the pipeline employed as part of our work on *Gearshift*. As it allows scenes within Blender to closely mimic concept art and detailed 2D paintings, with no need to fully model many of the environmental assets, it streamlines many aspects of an otherwise time-consuming process. Despite the limitations of this technique, it may be an interesting next step to push it further and apply it to other landscapes, with the possibility of utilising it in future animation exploits.

The results of the user experience evaluation indicate that both Blender and Gravity Sketch can be implemented in the modelling process of an animation production. The characteristic traits of both tools should be used in concert to adapt to the user's needs. Blender is best suited for precision modeling, especially hard-surface assets. Gravity Sketch is excellent for modelling organic forms, ideation, and early prototyping. However, we noted that the learning curve for each system differs - Blender's steep learning curve can cause potential difficulty for beginners. In contrast, Gravity Sketch offers learning rooms and quick tutorials which are easily accessible, facilitating a shorter learning curve.
It is important to note that the need for 3D asset creation became less demanding as the project evolved. From the start we planned to model most background assets along with the characters, props and vehicles. However, our introduction of the projection mapping method in Blender made it possible to work with mainly 2D planes. Our reliance on Gravity Sketch decreased somewhat as a result, in contradiction to initial plans.

Overall, we consider this project to be an elucidation of the strengths and weaknesses of both modelling workflows. The production of our short was an appropriate backdrop against which to test our modelling outcomes, as the stated goal was to generate assets across VR and Blender and evaluate their eligibility for use in the animation. *Gearshift* itself changed and adapted several times from its inception to its completion, but the end product reflects the skills and proficiencies retained from this development period. We were, as a result, left with a new understanding of current techniques in 3D animation and our own capabilities going forward.

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Our families, our dear friend Matias Bonanata for his creative and sonically inspired work with the film's soundtrack, which it is a pleasure to play overlaid with our short animation, along with our fellow students and toilet wine drinkers Thora Magnusdottir, Samuel Mathiesen, Kaspar Dahl Tosti and Mati Kalter.

And, of course, our beloved friend and long-suffering flatmate Zoe Scully, for putting up with our deranged planning and periods of exhaustion in the course of this thesis.

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We would like to note that during the process of writing this report ChatGPT was used to assist in structuring and summarising the results of the user experience evaluation.

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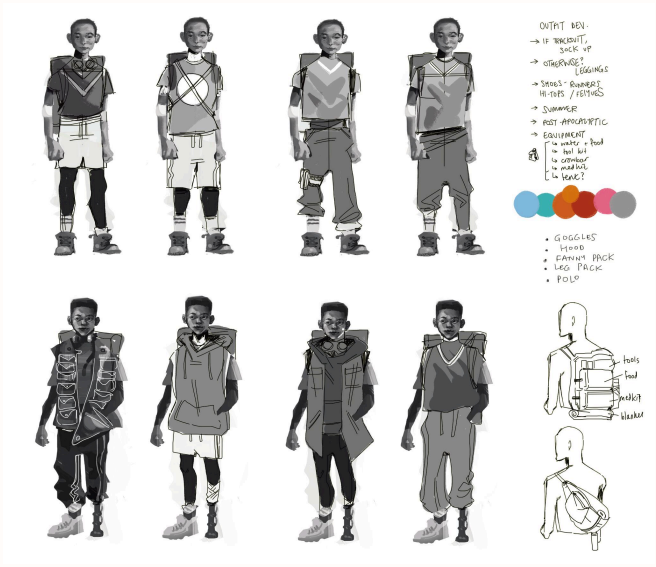
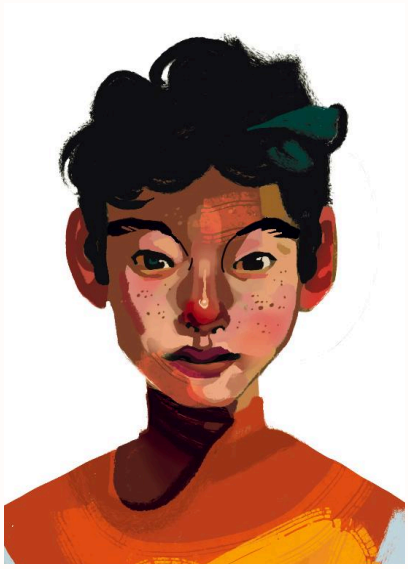
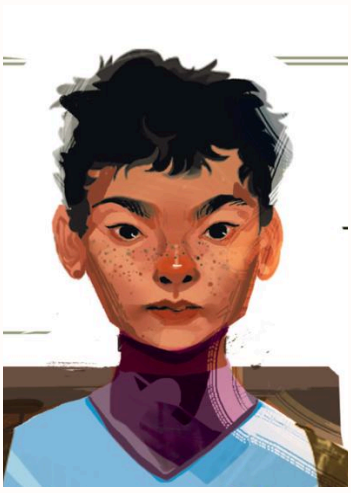
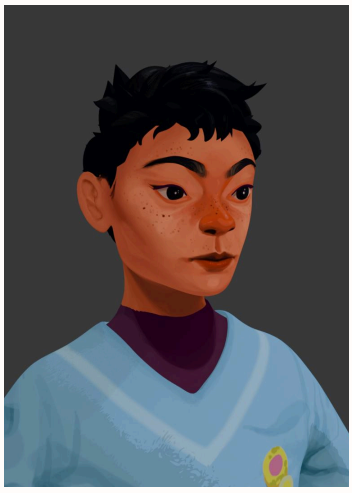
APPENDIX - VISUAL DESIGN

Character – Ben

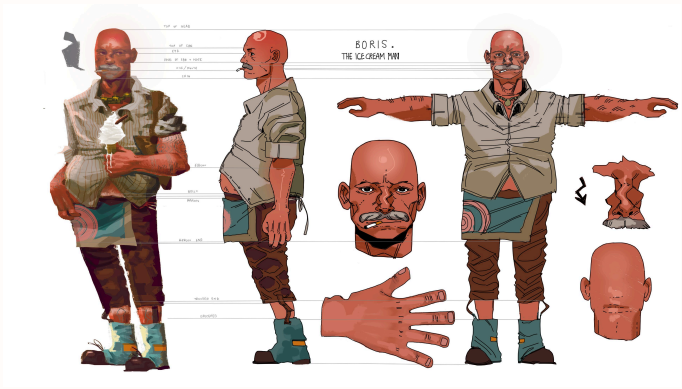


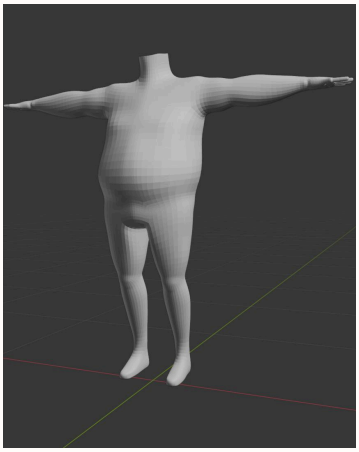


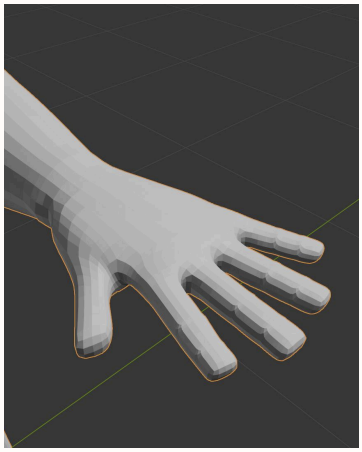


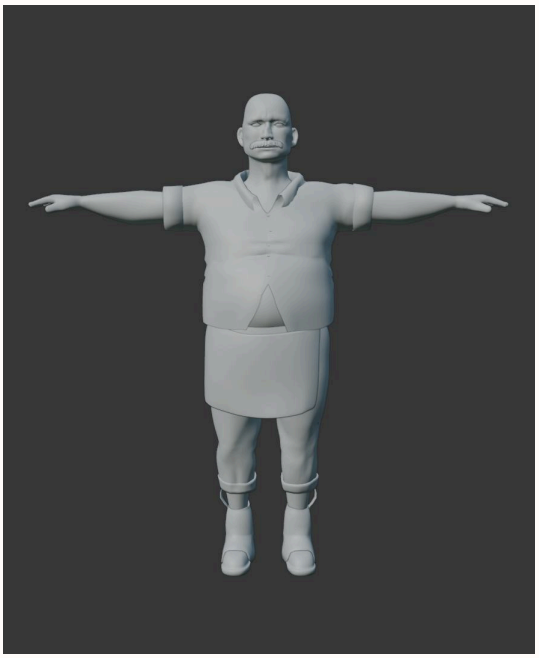


Character – Boris



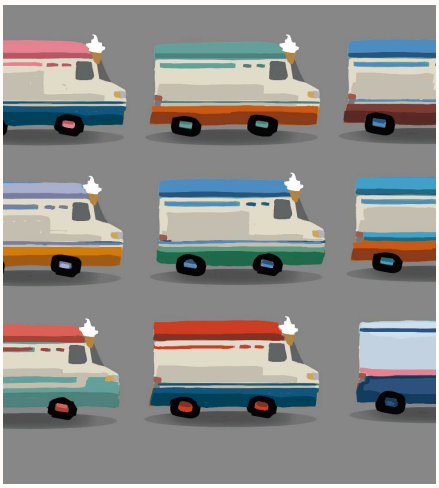


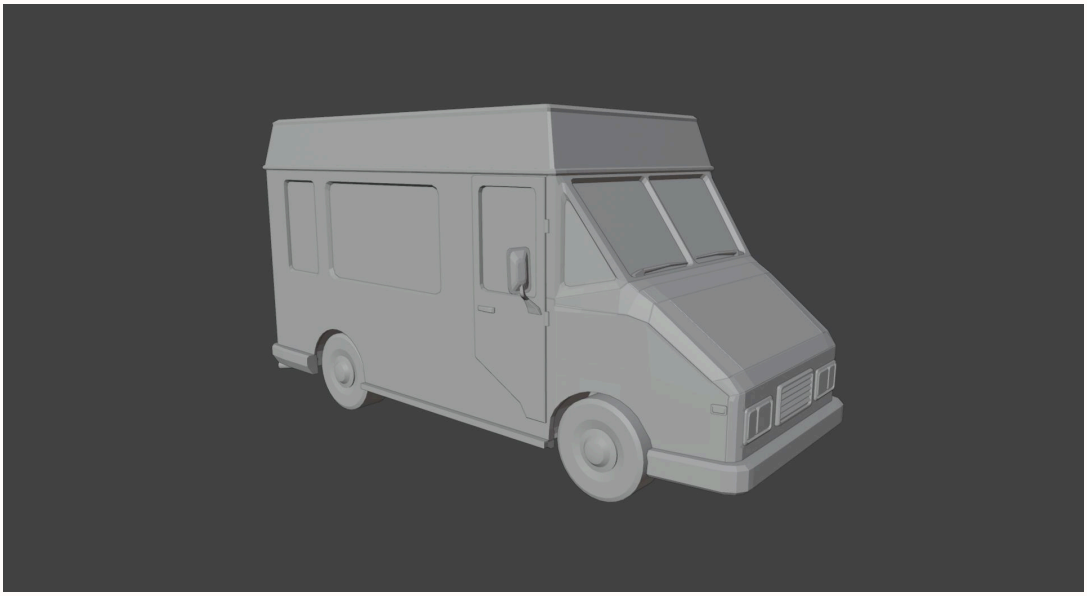




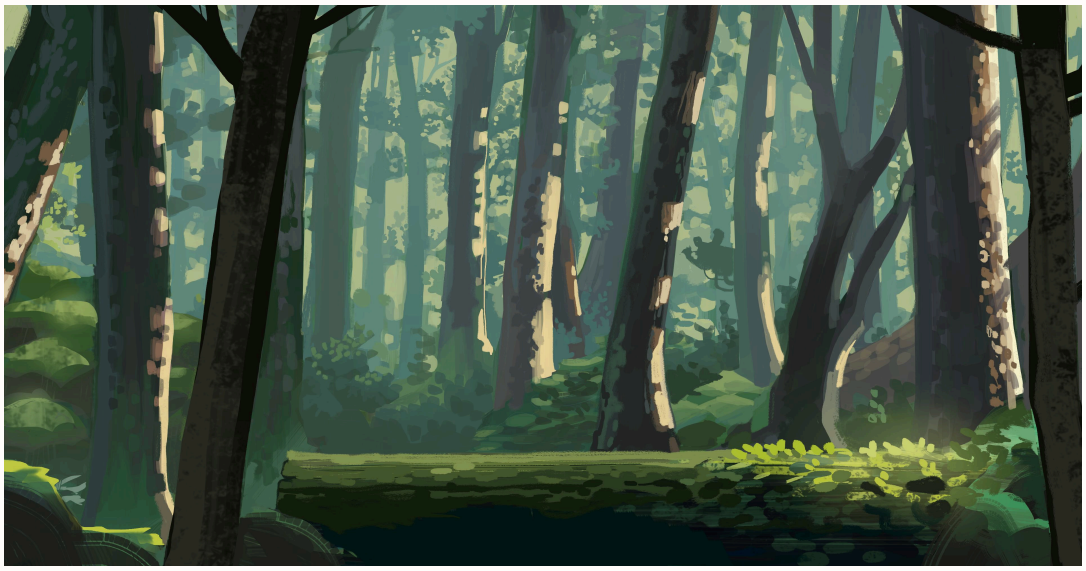
Vehicle – Bike

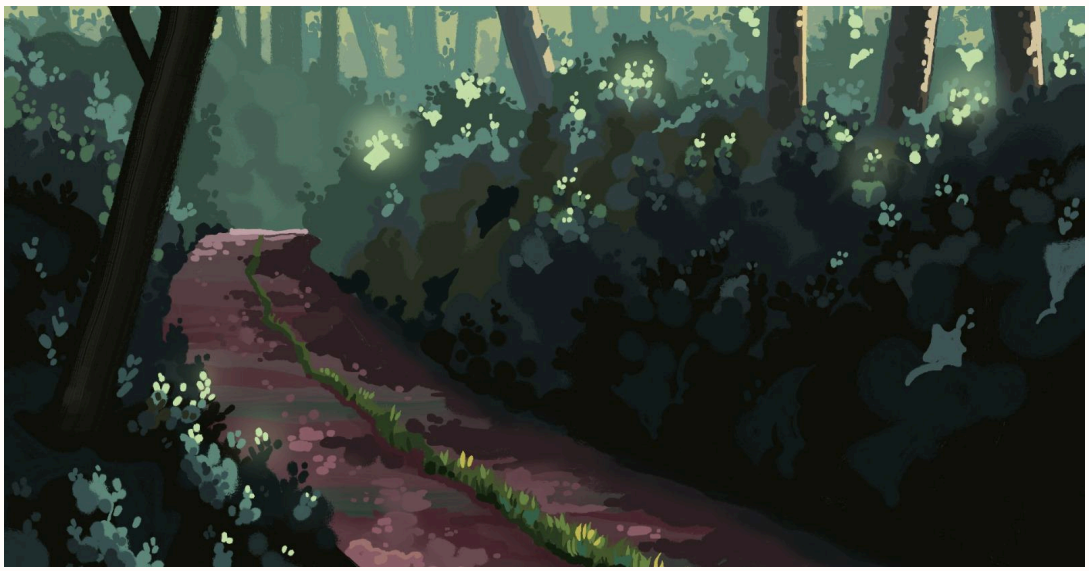
Vehicle – Van





Environment – concept Art





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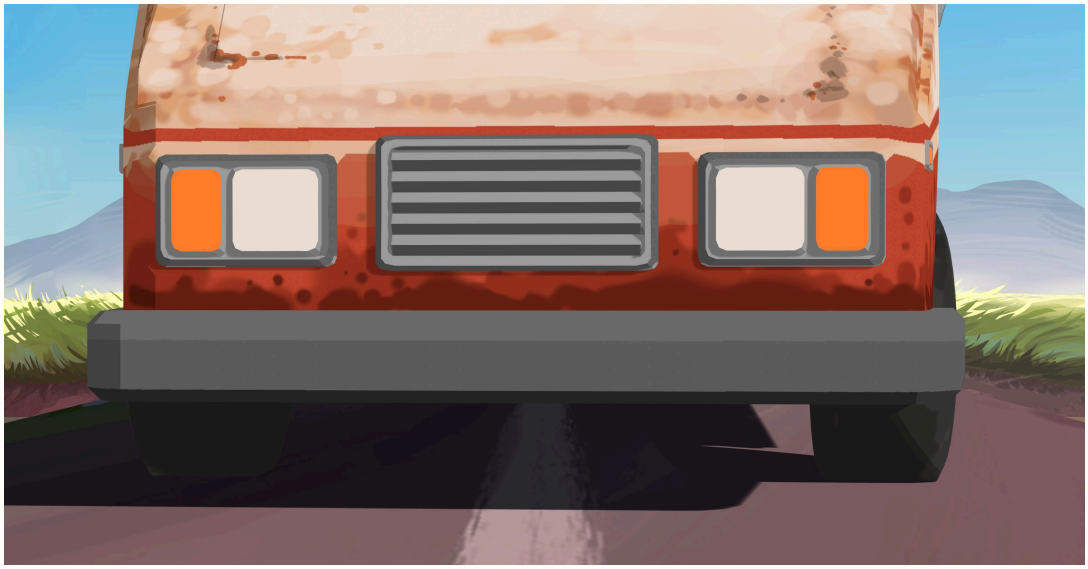
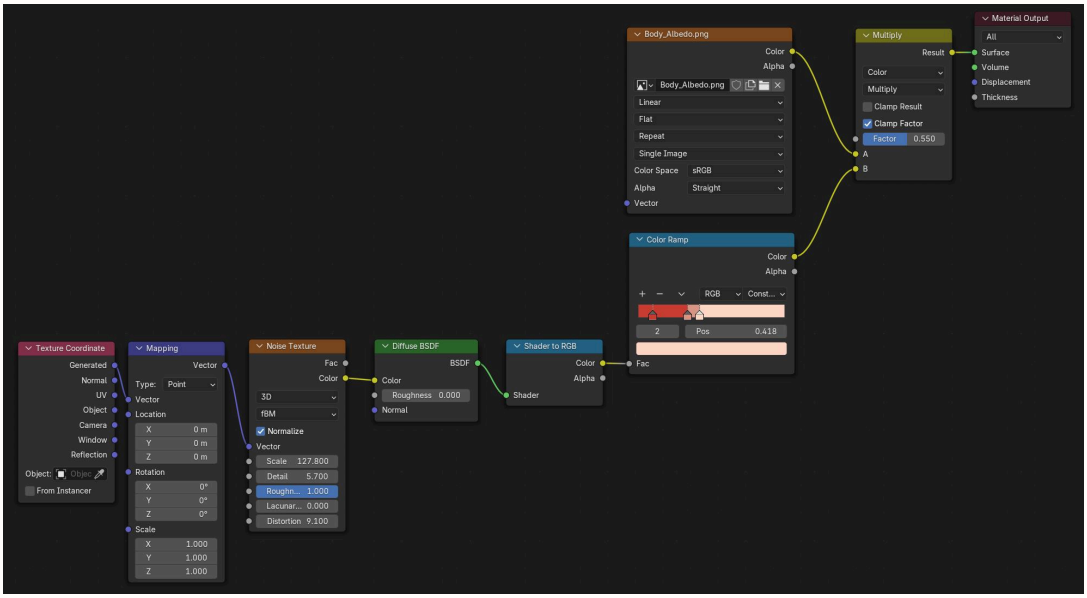
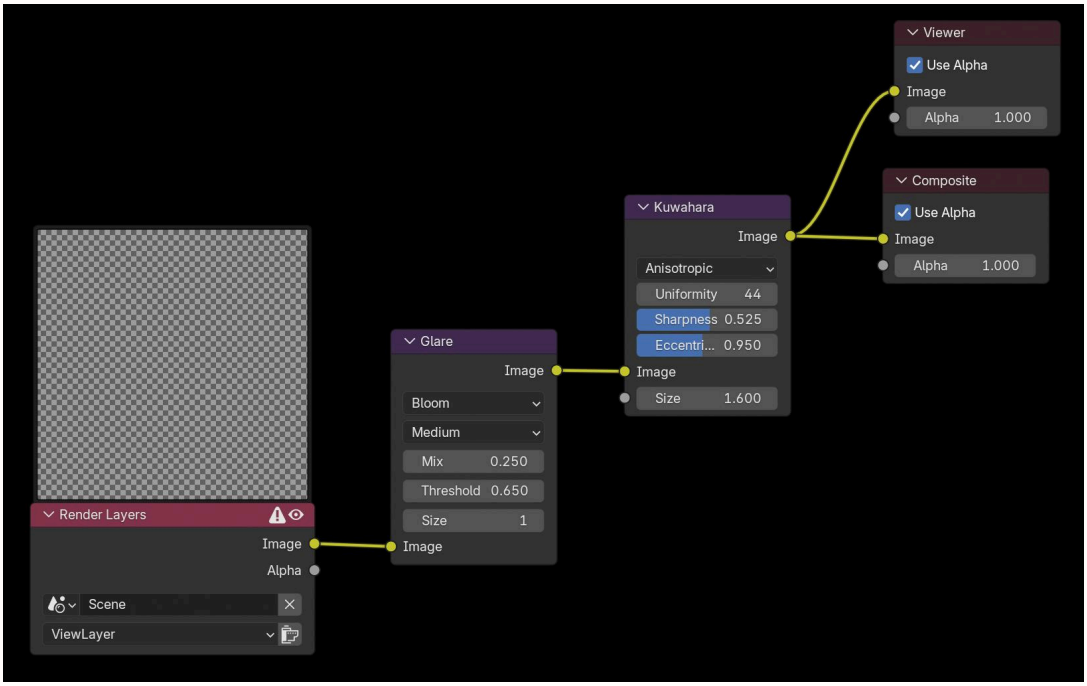


Blender shaders



Toon shader for characters, vehicles and props.



Compositor nodes that we use so far. Might change during further production.

SUXES TASKS DESCRIPTION.

Task Description

To evaluate the usability and user experience of two different 3D modeling workflows—Gravity Sketch (VR-based) and Blender (PC-based)—we conducted a task-based study using the SUXES evaluation method.
Each participant completed the following tasks:
Modeling Tasks

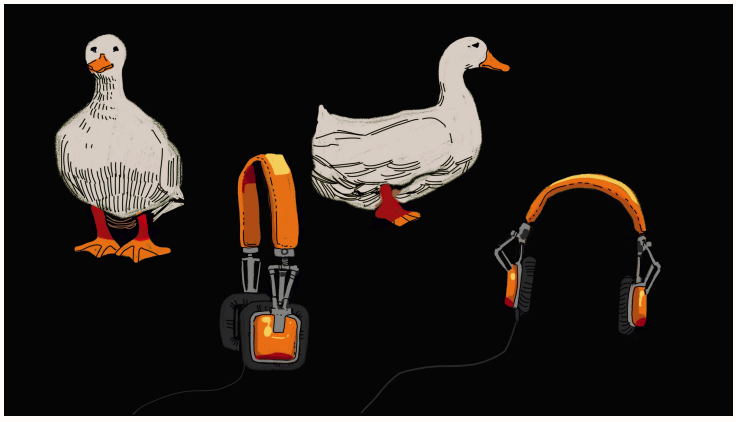
1. Hard-Surface Modeling Task:
   Create a 3D model of a pair of headphones based on a provided reference image.
   - Focus: Accuracy, use of primitives, symmetry, and clean topology.
   - Objective: Recreate the object to a reasonable level of fidelity using the given tool.
2. Organic Modeling Task:
   Create a 3D model of a rubber duck based on a provided reference image.
   - Focus: Sculptural and freeform modeling, handling of curves and organic shapes.
   - Objective: Capture the shape and stylized features of the object using the given tool.

Each participant completed both tasks in both tools, resulting in a total of four modeling sessions per person.
Evaluation Procedure Using SUXES

- Before the tasks:
  Participants filled out the SUXES questionnaire by setting their minimum acceptable and desired levels of user experience for each statement. This establishes a personalized baseline for comparison.
- After each task:
  Participants rated their actual experience with the tool based on the same SUXES statements.
  - These ratings were used to evaluate how each tool met or deviated from the participants' expectations in terms of usability, satisfaction, and effectiveness.

This approach allows for direct, task-specific reflections and comparison of user experience across both tools and modeling contexts. It also supports individualized analysis by accounting for each participant's expectations and background experience.

Reference image.



SUXES STATEMENTS.

Statement 1.
I expect I will be able to complete the modeling task in a reasonable amount of time.

Statement 2.
I expect the tool will allow me to adjust or revise parts of the model easily as I go.

Statement 3.
I believe I will be able to start modeling the object without needing extensive setup or tutorials.

Statement 4.
I expect I will not get stuck or confused while performing basic modeling actions during the task.

Statement 5.
I expect the core modeling tools (move, scale, extrude, sculpt) will be easy to find and use.

Statement 6.
I believe the modeling process will feel focused and uninterrupted by technical distractions or workarounds.

Statement 7.
I expect I will be able to shape the model in a way that matches the stylized aesthetic we are aiming for.

Statement 8.
I expect the final model will be usable in our production pipeline without major fixes or rework.

Statement 9.
I expect the level of detail I can achieve will be sufficient for use in our animated short.

ELIN - SUXES RESULTS.

System

Gravity Sketch

Experience level

Beginner

Task

Model Headphones

Time to complete task

01:56:31

Observation notes:

Elin repeatedly rotated the object and briefly struggled to find and utilise the mirror tool. She located it after a short time and proceeded to model without any major setbacks. Overall the process was generally smooth despite the unfamiliar digital space, and the outcome was excellent.

Final result

Rating Scale

Low High

Statement 1.

Statement 2.

Statement 3.

Statement 4.

Statement 5.

Statement 6.

Statement 7.

Statement 8.

Statement 9.

ELIN - SUXES RESULTS.

System

Blender

Experience level

Intermediate

Task

Model Headphones

Time to complete task

01:17:21

Observation notes:

Elin, being more proficient at Blender, had no major problems completing this task. With ease and confidence she modelled as per the design, checked and edited her forms, and finished the headphones fairly fast and with an extremely neat outcome.

Final result

Rating Scale

Low High

Statement 1.

Statement 2.

Statement 3.

Statement 4.

Statement 5.

Statement 6.

Statement 7.

Statement 8.

Statement 9.

ELIN - SUXES RESULTS.

System

Gravity Sketch

Experience level

Beginner

Task

Model Duck

Time to complete task

01:33:56

Observation notes:

Elin created the duck with an air of initial uncertainty, owing to her lack of prior experience at modelling organic forms in Gravity Sketch. However she continued to edit the shape until she got one she liked, and created the beak and feet to a high level of detail and specification.

Rating Scale

Low High

Statement 1.

Statement 2.

Statement 3.

Statement 4.

Statement 5.

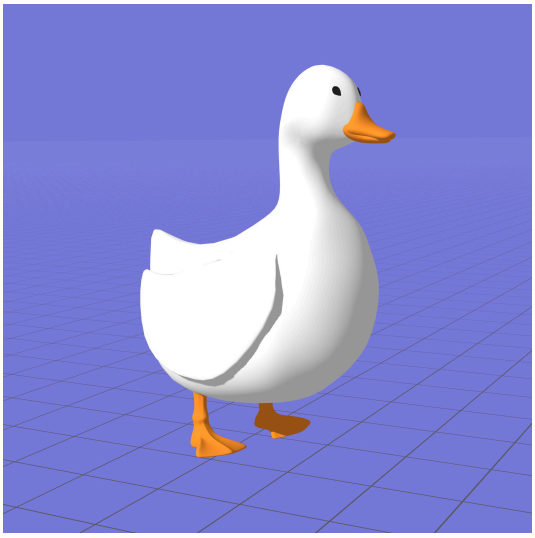
Statement 6.

Statement 7.

Statement 8.

Statement 9.

Final result



ELIN - SUXES RESULTS.

System

Blender

Experience level

Intermediate

Task

Model Duck

Time to complete task

01:20:56

Observation notes:

Elin was dubious at the initial prospect of creating a feathered form in Blender, but generated and moulded the necessary shapes with confidence. The duck came together quickly after a series of edits and tweaks and the final result is symmetrical, similar to the design, and closely resembles its Gravity Sketch counterpart.

Rating Scale

Low High

Statement 1.

Statement 2.

Statement 3.

Statement 4.

Statement 5.

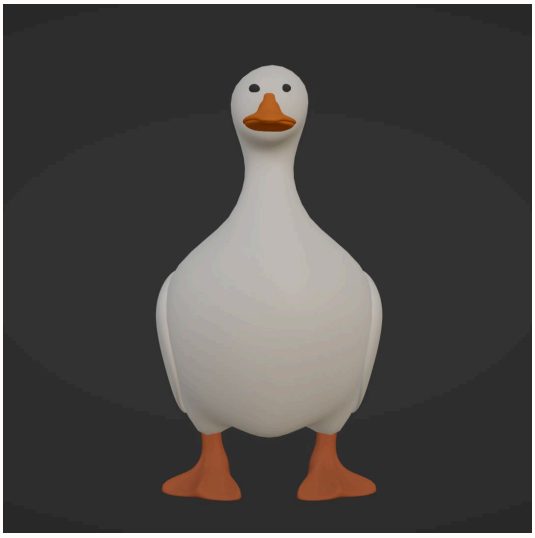
Statement 6.

Statement 7.

Statement 8.

Statement 9.

Final result



BETH - SUXES RESULTS.

System

Gravity Sketch

Experience level

Beginner

Task

Model Headphones

Time to complete task

01:11:32

Observation notes:

Beth used the drawing and ribbon tool a lot which seemed to work well with some difficulties here and there. Overall the model is similar to the reference but is not as accurately in size.

Rating Scale

Low High

Statement 1.

Statement 2.

Statement 3.

Statement 4.

Statement 5.

Statement 6.

Statement 7.

Statement 8.

Statement 9.

Final result

BETH - SUXES RESULTS.

System

Blender

Experience level

Beginner

Task

Model Headphones

Time to complete task

01:27:28

Observation notes:

Using the mirror tool she got an very symmetrical set of headphones. It took a little bit of time to figure out the subdivision surface but got it to work for the ear piecers. Which contrasts well with the more metallic details and the headband. At the end she struggled with connecting the headband once applying the mirror modifier but resolved the issue.

Rating Scale

Low High

Statement 1.

Statement 2.

Statement 3.

Statement 4.

Statement 5.

Statement 6.

Statement 7.

Statement 8.

Statement 9.

Final result

BETH - SUXES RESULTS.

System

Gravity Sketch

Experience level

Beginner

Task

Model Duck

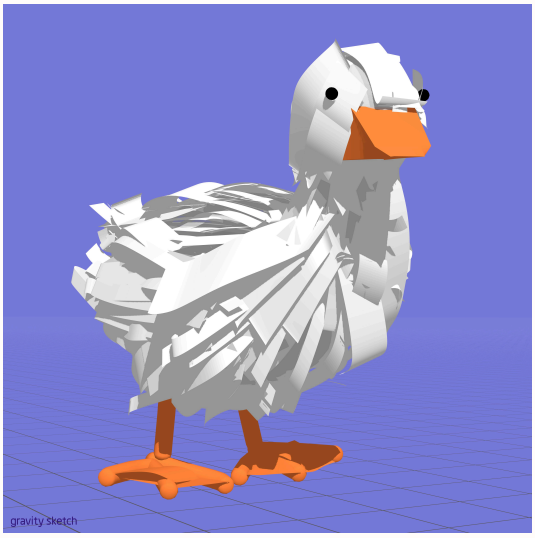
Time to complete task

00:55:17

Observation notes:

Starting out with big shapes to get the silhouette of the duck. she was pleased with the sizes but not with the look of it. And decided to use the ribbon tool to give the duck the feathery look seen in the final result. Again she used the draw and ribbon tool for most things similar to when she made the headphones.

Final result



Rating Scale

Low High

Statement 1.

Statement 2.

Statement 3.

Statement 4.

Statement 5.

Statement 6.

Statement 7.

Statement 8.

Statement 9.

BETH - SUXES RESULTS.

System

Blender

Experience level

Beginner

Task

Model Duck

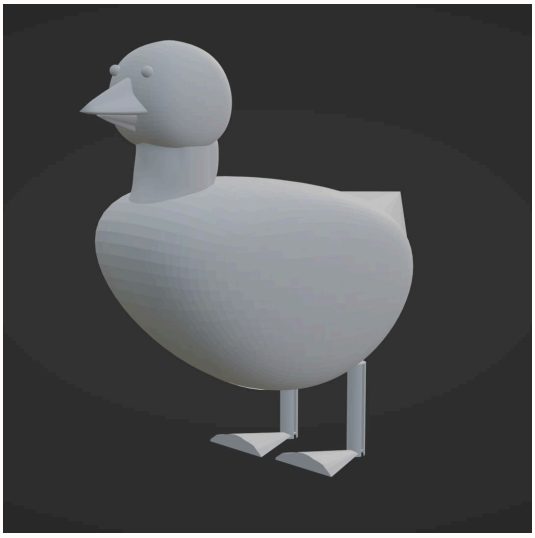
Time to complete task

01:23:48

Observation notes:

Starting out with big shapes in blender, Beth wanted to use the mirror and subdivision modifiers together. It wasn't working as she wanted so decided to start over and edit both sides manually. The main body of the duck is made out of several objects giving it a blocky style. Although the beak has a lot of nice detail. during the task Beth struggled with finding tools and editing shapes how she wanted.

Final result



Rating Scale

Low High

Statement 1.

○ ○ ○ ● ○ ○ ○

Statement 2.

○ ○ ● ○ ○ ○ ○

Statement 3.

○ ○ ○ ○ ○ ● ○

Statement 4.

○ ● ○ ○ ○ ○ ○

Statement 5.

○ ○ ○ ○ ● ○ ○

Statement 6.

○ ● ○ ○ ○ ○ ○

Statement 7.

● ○ ○ ○ ○ ○ ○

Statement 8.

● ○ ○ ○ ○ ○ ○

Statement 9.

● ○ ○ ○ ○ ○ ○

ELIN - INTERVIEW.

What was the best thing about using Gravity Sketch?

Gravity Sketch offers a very immersive experience to create 3D models. With the help of the controllers it feels like you are modelling the object with your own hands, similar to modelling with clay. Which makes adjusting and editing the model very intuitive and free. Especially while modelling the duck I felt I could add little details more freely to make it more organic. Another aspect I like is that the UI is very limited. Through gestures or buttons you can bring up menu and tools which are easy accessible just like the material menu which is very easy to use and helps with quick prototyping. I would also like to mention that the learning rooms or video tutorials were easily accessible during the modeling process and helped out a lot when I got stuck or confused.

What was the most frustrating part about Gravity Sketch?

Because Gravity Sketch is so immersive and puts you literally in the digital world of your 3D model, I had a hard time figuring out where I was in the digital space. I added the XYZ axis to help me, but that element was moveable so not stationary in one place. And applying the podium element, placed it right underneath me, but because I was sitting down that did not help as I was modelling the object in front of me. This goes hand in hand with the fact that I had a hard time knowing what scale my object was. I also would have liked there to be an easier shortcut to see front or side views of my model, I only found this when I was exporting my last model. Lastly I want to remark on the fact that even though the VR headset helps with focusing on the task, I found it not very comfotable. It is quite heavy and presses on your face, leaving a red mark after your done. As well as the fact that the battery died during both my tasks, which meant I had to charge it and wait to continue my task.

What was the best thing about using Blender?

I have been using Blender over the last 3 years and mainly for modelling. I would say I have become quite experienced which means I know where to access all the tools and what they can do to help me model. In Blender I like that I can check the scales of my objects and see very clearly where in the digital space my model is. As well as be very precise with my models, which with the headphones is very helpful as this is a man made object.

ELIN - INTERVIEW.

What was the most frustrating part about Blender?

The only thing I can think of is the fact that Blender works with keyboard shortcuts, so much so that you are sometimes lost in which ones to use, or in my case that you press a keys which impacts my models without realizing it. And can cause issues later on when you are editing vertices, edges, or planes.

Which tool would you prefer for similar future tasks and why?

After trying Gravity Sketch I would still use Blender as my main system to create 3D models. I have spent a lot of time learning Blender and have become confident enough to create models without using too many tutorials or technical difficulties. However, while creating, in particular the duck, in Gravity Sketch, I experienced a lot of joy modelling it. It felt very freeing and using the sketch tool to basically draw out the object was really fun and helpful. In the future I would love to use Gravity Sketch again for quickly prototyping organic assets in future projects.

BETH - INTERVIEW.

What was the best thing about using Gravity Sketch?

It was very intuitive to scale and rotate objects in the 3D space, so I could get a good idea of how they looked. I found I could dial in and inspect the details of the object without thinking twice about needing to search for buttons or re-adjust. With a manmade object it was necessary to fine-tune to a higher degree, so I appreciated the ease of movement, and with an organic object I enjoyed freely adding impressionistic strokes.

What was the most frustrating part about Gravity Sketch?

On the flip side, I found I missed Blender's sense of proportion and relativity. With Gravity Sketch's more free and floating set-up, I frequently found it difficult to scale, mirror and merge different objects with precision. This led to extensive rotation and inspection as I checked and re-checked that everything was correct rather than feeling the more inherent sense of symmetry characteristic to Blender.

What was the best thing about using Blender?

With Blender, as outlined previously, the sense of grounding and order was stronger. I found that the precision of tools such as loop cuts and extruding was conducive to a more structured workflow, rather than moving components around and hoping for a good result. Simply put, when I had a well-structured object in Blender and could manipulate it well, I felt more confident than in Gravity Sketch.

What was the most frustrating part about Blender?

Blender frustrated me quite a lot as I resorted to very simplistic and crude methods to roughly position the objects. I could not mould and sculpt shapes freely as with Gravity Sketch, so when my patience began to expire I constructed the form as quickly as I could. The enjoyment of creating an object was lost, particularly as regards the organic form, and I completed the task feeling discontented. The headphones were easier, but I struggled with the duck.

Which tool would you prefer for similar future tasks and why?

I would probably use Blender for a manmade object owing to the precision tools and sense of structure. Armed with a tutorial, some patience and time, I am more confident the outcome would be acceptable. With the organic form I would go with Gravity Sketch, as the impressionistic sculpting and free movement of the forms that Gravity Sketch permits was vastly preferable to me.

GEAR SHIFT