



Using 3D Techniques in Video Game Concept Art

Creating Environmental Concept Art For a Video Game

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ABSTRACT

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The objective of this thesis was to research applying 3D work methods in the videogame concept art process. The key question was what 3D techniques could be employed in concept art, how they could be applied, and what sort of a work process would have to be established to use them effectively. The goal was to find out the pros and cons of applying 3D techniques to concept art.

The research was conducted while working at the Finnish interactive media company, Mohavi. The study entailed working on their new game project, Hopped Up, a 3D online multiplayer battle royale game. Environmental concept art was created for the game, and different 3D methods were researched and employed in the process. To understand more of the industry's standard work methods, a professional concept artist was interviewed about using 3D in their day to day work. Additional research was conducted into the work methods of other industry professionals.

The key results and findings include establishing a pipeline for this project and categorizing different 3D work methods into rough categories. Most of these work methods were used while creating concept art for Hopped Up, and assessments were made of their usefulness and appropriateness for use. Different suggestions were given on how to employ them effectively.

The conclusion drawn was that employing 3D to concept art can be beneficial, so long as one knows how to use the programs and methods. Still, beginner 3D concept artists should not feel discouraged, as there are several ways and places to learn 3D, and some 3D techniques, such as using a simple 3D model guideline known as a graybox, are easy to learn. For future research, further exploring different 3D techniques presented in this thesis or researching AI and procedural modelling is suggested.

Key words: concept art, videogame, 3D, game art, environmental concept art

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GLOSSARY

AAA	So-called "triple-A" developers, which are studios with large budgets and teams to create their games
Art lead	Also "art director". The artist who is in charge of the game's artistic vision and decides how things should look.
Asset	Also "game asset". Refers to all the parts that make a game. For example, a single 3D model can be a game asset.
Department	Different departments work together to create the game.
Engine	Game engine, a program where the game is created.
Indie	A small game studio that is independent of any larger companies.
Kitbashing	Combining several ready-made 3D models into one.
Paint over	Painting over, for example, 3D model in a digital art program.
Pipeline	The process, the steps required to take to finish a process. The game creation process can be called a pipeline, but there are also pipelines for different processes in the game production, like for creating concept art.
Photobashing	Combining different elements, such as photographs, in collage technique to create a finished digital painting.

Rendering	2D rendering means the finishing touches added to an art piece. 3D rendering means a process where the 3D program takes the raw information of the variables and calculates what the final image looks like.
Scene	The 3D workspace where the 3D models are and are worked on in any given 3D program.

1 INTRODUCTION

Concept art is a form of visual art created for internal use within entertainment industry projects, and its objective is to help iterate and visualize the different aspects of the product. Be it characters, environments or objects, concept art helps develop the designs and fit them to the general narrative. Concept art is a hectic, demanding field where time is of the essence.

This thesis intended to research modern 3D techniques and how they can be applied to speed up and improve creating concept art for video games. The objective was to explore different 3D methods, employ them and generally offer a look into the world of combining 3D work methods with a normally 2D art form.

These questions were researched while working on a game project for a Finnish interactive media company called Mohavi. The author worked on their game project called Hopped Up as an environmental concept artist. This allowed for testing different concept art and 3D methods in an actual game project. Hopped Up is an online battle royale type game, taking inspiration from Fall Guys: Ultimate Knockout and Overcooked. Current methods of concept art were researched by looking into the work of modern concept artists to develop an effective working pipeline. Additionally, an interview was conducted with Lukas Kuhn, a professional concept artist working for Yager Entertainment.

This thesis first offers a look at concept art as an art form. What are its requirements? Why is concept art made? What can one expect while working in concept art? Then, the process, phases, and different concept art types are given an in-depth look. This is followed by examining how 3D has developed over the years and how it is currently used in concept art. Different 3D methods and when and why to use them are explored. The theory section is followed by delve into the project and what working on Hopped Up was like. The work produced for Hopped Up is displayed in the project section.

The key results and findings include the different 3D techniques that can be employed, the pipeline that was developed for this project's purposes, and how,

when, and why to employ 3D in one's concept art process. Some other discoveries include roughly defining different concept art types and outlining a general concept art pipeline.

1. CONCEPT ART IN VIDEO GAMES

Concept art is a form of art used in commercial production processes such as movies and video games. Though its definition slightly varies from industry to industry, concept art is, in its essence, a form of communication. According to Elliot Lilly, an experienced concept artist, concept artists are the first link in the production chain of video games. Concept artists are needed to convey the project's mood, ideas, designs, and art style between different departments before the final assets are made and put into the game. They do so by presenting a concrete visual medium that allows everyone to discuss the same idea without room for error. (Lilly 2015, 12-15) The final art assets, such as 3D models for characters, are created based on the designs of concept artists.



PICTURE 1. Example of character concept art. (Rhodes 2019)

One core part of a concept artist's work is developing and portraying ideas. As written on the videogame blogging platform Gamasutra by Ben Sim, concept art exists to create something that hasn't existed before (Sim 2017). Typical areas of concept art include character designs, environmental concepts, and creating concept art of objects and their functionality in-game. All of these, be it environment, character or an object, are conceptualised and their appearance invented by the concept artists based on the given task and their research. As such, storytelling also plays a significant part in concept art. For example, all the characters in Picture 1 have their own story to tell. The details come together to form a whole that informs us of the character's personality, purpose and role.

Several other fields of commercial art are similar in purpose to concept art. They are often confused with each other, as their definition varies slightly from field to

field. Terms such as visual development and concept design are sometimes used interchangeably with concept art, but they have subtle differences. Concept artist and illustrator Dylan Choonhachat defines "visual development" as used mainly in animated shows and films. In contrast, the term "concept art" is generally used with video games and live-action productions. (Choonhachat 2019) The same line of thought is collaborated on by Concept Art Empire's article on Visual Development (Concept Art Empire).

Concept design is somewhat trickier as a term. Concept designer veteran Paul Tobin states in an interview that concept art and concept design are interchangeable as terms, but that concept design focuses more on the practical outcome of the design. While concept art might focus on what something looks like, concept design focuses more on the real-life function. (Tobin 2014) If going by Tobin's definition, concept designers are more common in film production than video games, seeing that real-life functionality doesn't limit the designs created for video games. Still, some sources, such as the aforementioned Elliot Lilly, state that concept designers work on video games but have a background in industrial design rather than illustration (Lilly 2015, 15). This shows how the definitions can vary significantly between different industries and people.

Another common misconception is that concept art is all finished and carefully rendered digital paintings, also known as illustrations. In an interview, illustrator and concept artist Tyler James says that concept art's function is a schematic for others to use rather than just art itself. Meanwhile, illustration is a more finished product. "If concept art is the creation of the ingredients of a recipe, illustration is the final plate that arrives for someone to taste", James describes. (Stefyn 2020)

Concept artist Lucas Peinador explains that illustrators and concept artists are separate occupations, both of which work for entertainment industry clients. According to Peinador, concept art is done at the beginning of the project, while illustrations are made towards its end. They can be hard to tell apart visually, but the most significant difference is the purpose - concept art is meant to solve visual problems. In contrast, illustrations are intended to sell the idea to the public. (Peinador 2020) An excellent example of an illustration can be seen in Picture 2.



PICTURE 2. Illustration for Clash Royale. (Saint-Martin 2021)

Even if people within the industry understand what concept art is for, it still often suffers from general misconception from the public. Some veteran concept artists, such as Anjin Anhut and Farzad Varahramyan, admit to their concept art students having misconceptions of what concept art is. Varahramyan states that many of his students believe that concept art is all about big and flashy paintings, often seen in concept art books. Anhut, on the other hand, says that many of his students feel demotivated by unrealistic expectations from the public. (Anhut 2014; Lilly 2015, 132) This is caused by the confusion between promotional art, also known as promo art, that is often displayed in concept art books and to the general public before publishing a game.

It is risky for a game studio to put out concept art before the game is published, as the designs and ideas are liable to change. Consumers might feel let down if the art style or plans change a lot during the development process. According to Anhut (2014), much of the art that is "leaked" is intentionally published. What is often sold to consumers as concept art is not representative of real concept art. (Anhut 2014) Promotional art is the finished, fully rendered and finalised art, while concept art is often more sketchy and unfinished (Sim 2017). Concept art only needs to be as rendered as is necessary to convey the idea. Much of concept art is not meant for the public to view and is simply a byproduct of the game creation process (Lilly 2015, 23).

An excellent example of what concept art might look like can be seen in Picture 3 (Ly 2009). A closer look at the concept art reveals that several shortcuts were used in the image. Some of the elements and textures are directly copied from the photo references. Mirroring was used to draw the character. (Anhut 2014) It is far from the clean illustrations often displayed as concept art, but it gets the point across. That is much more important than a perfectly clean and impressive final product.



PICTURE 3. A concept art piece for Uncharted 2. (Ly 2009)

1.1 Requirements and purpose of concept art

"The job of a concept artist is not to make pretty pictures - it is to solve visual problems", writes concept artist and industrial designer Lukas Kuhn (2021) in an interview conducted for the thesis. Whether it's communicating a story, personality, history, the functionality of a prop or a game mechanic, a concept artist's work is to make sure these get across to the player and the other artists working on the finalised assets of the game. Whatever method is used, the concept artist is required to make sure everyone understands the tone, mood, style, and designs the game aims for. Their work is the blueprint everything else is based on.

There are several additional requirements a concept artist must consider while working on visual problem-solving. The work is demanding, fast-paced, and requires both artistic know-how and telling stories through art. Additionally, it's a very desirable position with much competition. Seeing your ideas and designs represented in a game is a tempting thought for aspiring artists.

This chapter will be going through standard requirements and purposes for concept art. However, it will not be going through art principles requirements. Understanding the basics of art and 2D rendering is a given, and they will not be concerned in this thesis, as they are required for almost any video game art career. Instead, the focus is on outside pressure and work expectations placed upon concept artists.

1.1.1 Reducing costs

According to Marketwatch.com, in 2020, the global video game industry was expected to make more money than the worldwide movie industry and North American sports industry combined. While the movie industry reached \$100 billion in 2019, and the North American sports industry was estimated to bring in \$75 billion in 2020, the video game industry was expected to bring upwards of \$179.7 billion in 2020 (Witkowski 2020). Even with the margin of error and the boost in video game sales caused by the COVID-19 pandemic, the global video game industry has by now easily surpassed at least the global movie industry.

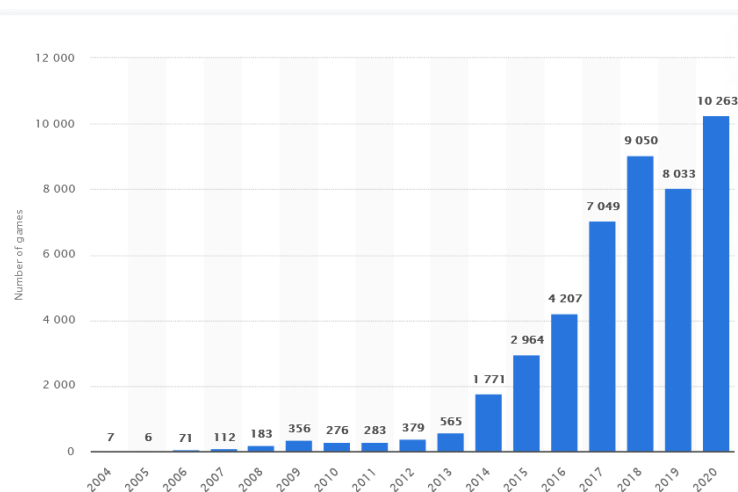


FIGURE 1. The number of games released on Steam since 2004. (Statista 2021)

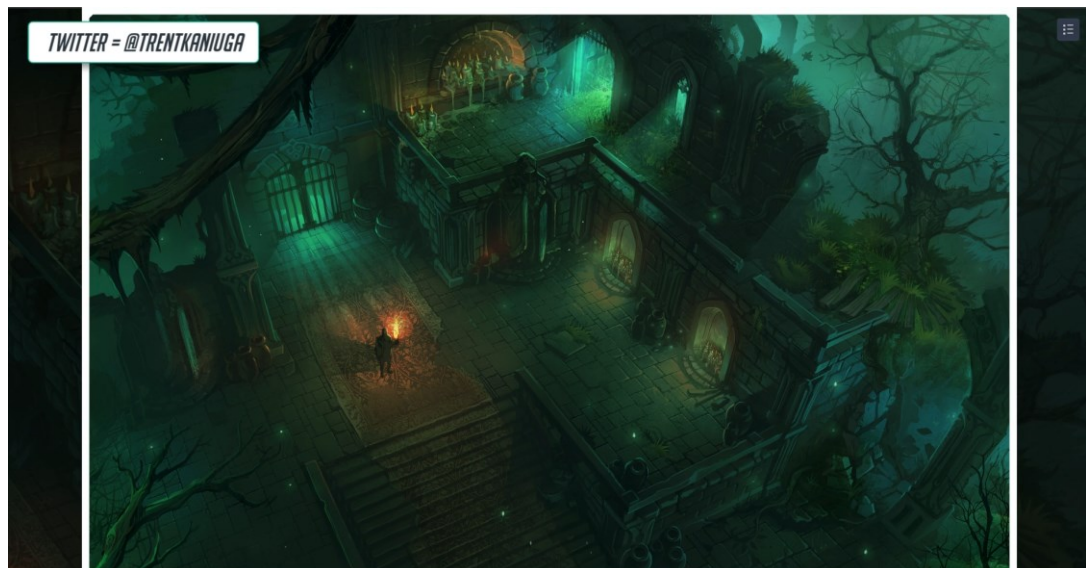
The immense growth of the video game industry also tells of pressure to generate more content for the market. Statista (2021) lists how many games have been released on Steam, a PC online gaming platform, since 2004. Only seven games were released during the platform's inception in 2004, 356 were published in 2009, and 379 were published in 2012 (Figure 1). By 2020, this number has gone all the way up to 10 263 games being released on Steam. All of these games, be they indie games or large studio published AAA games, require people to make them. These games have teams and creators behind them, whether it's a team of one or a team of several hundred. And these teams, the hardware, the software and everything related to creating the game costs money.

According to veteran concept artist Matt Rhodes who works at Bioware, a single rigged and animated character 3D model for any of their games cost approximately between \$40-60 thousand. However, when a concept artist draws several iterations of the character, the costs are, in comparison, low. (Rhodes 2017) Creating several fast iterations while still in the planning process is much cheaper and more sensible for a studio, as it will help cut back costs further down the pipeline. Creating several 3D models or constantly changing the current 3D model is cumbersome, time-consuming, and, more importantly for the studio, money-consuming. Game developer Glyn Williams explains that concept art is a way of reducing risk. Their work ensures that several iterations and versions can be tested early on while making changes is still cheap. The further along the process is, the higher the cost of changes. (Williams, 2016)

Concept artist Jason Pickthall writes that in addition to lowering costs, concept art is also, on occasion, used to convince people to invest in the game. Concept art pieces can work as proof of concept and sell the idea of the game to outside investors, or producers or project managers. Having concept art to show is a cheaper option than creating ready assets and trying to sell the game with those. (Pickthall, 2013) If the concept ends up rejected, any excess money used will be lost. Once again, concept art is more risk-proof because of its cheaper cost in comparison.

1.1.2 Fast iterations

While an illustrator might have a turnaround time of a few weeks for a single illustration, a concept artist will have to generate content daily (Peinador 2020). For instance, Trent Kaniuga, another veteran concept artist who has worked in the field for well over a decade, says that he generally spends around 7-8 hours on one painting. Picture 4 illustrates what a said painting might look like. The following day Kaniuga might generate some other versions and alterations, but generally, one painting takes him one working day. (Kaniuga 2020a) One painting a day is a fast turnover rate, one which concept artists must abide by in most companies.



PICTURE 4. An example of concept art Trent Kaniuga draws daily. (Kaniuga 2020a)

Several iterations are often required, and the faster the artist can produce them, the quicker the final version can be agreed upon and assets built based on it. Most of what a concept artist creates will be discarded during the concepting process. Usually, only a fraction of what the artist creates gets used as the final reference material for the production (Anhut, 2014). Because of this, not getting too attached to one's concepts is recommended, as they might get discarded and never used. A fast-paced approach to art, be it using photo references and textures, 3D-model base, photobashing or whatever is available to the artist at the time, is also recommended. If a concept artist spends much time on a singular

concept only to get it rejected and discarded, they will have wasted their time and energy on something that will never see the light of day. Even if the artist takes pride in their piece, it will get discarded if it's not what the client requires.

Anhut (2014) has outlined that the priority of creating fast iterations changes depending on the phase of the game development process. Figure 2 represents this change of priorities over development. So long as the art is made simply for other team members, speed is of the essence. The more art is presented to outside factors, be it partners or the public, the more weight is placed on the execution of the art itself. As priority changes from exploration to approval and finally generating more excitement, also known as hype, the more polished the art becomes. Anhut goes as far as claiming that some studios release what is considered fake concept art. This art is repolished and repainted but given the appearance of what the public perceives as concept art to fit better with the narrative. (Anhut 2014) This, unfortunately, contributes to the misconception on what concept art is, as discussed earlier in this thesis.

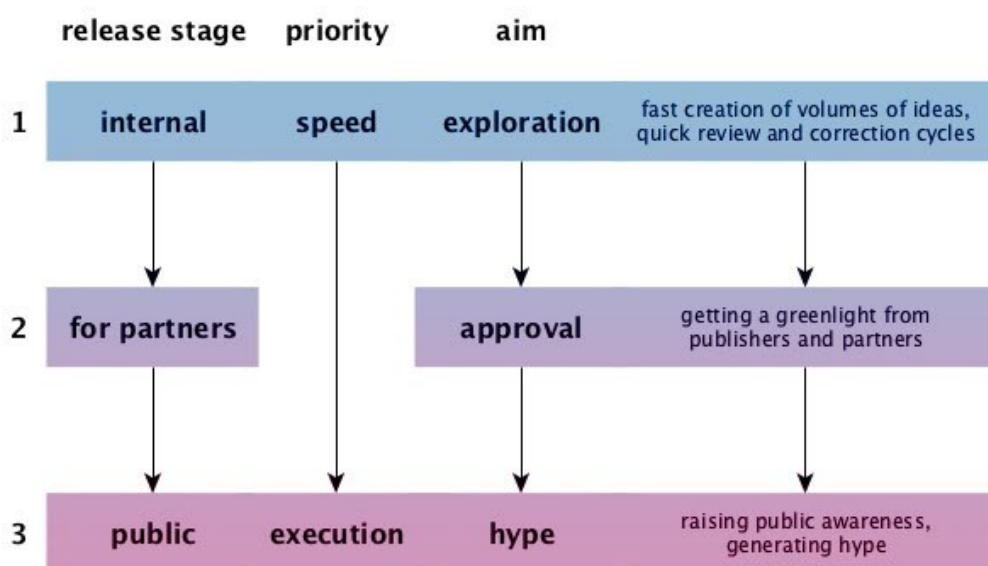


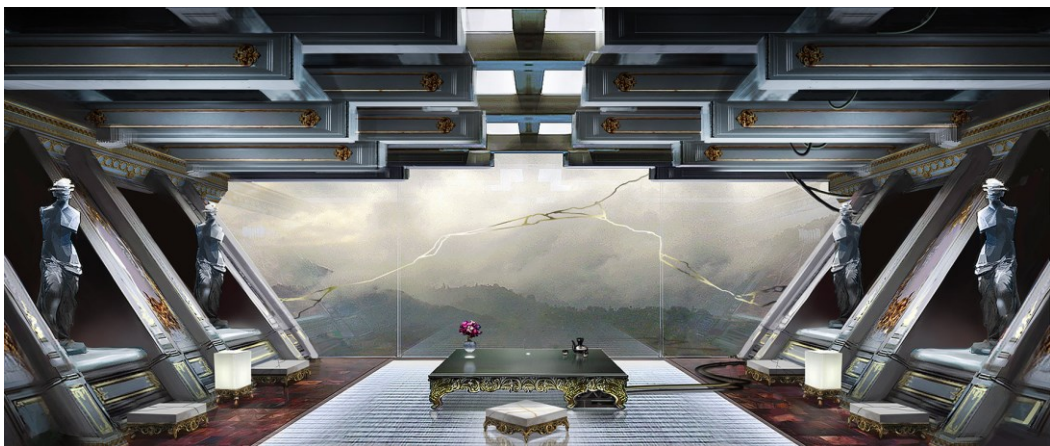
FIGURE 2. A picture depicting different priorities for concept art in the game development process (Anhut 2014)

1.1.3 Telling stories

Although one's first instinct might be to think all a concept artist needs is a good understanding of the fundamentals of art, equally important is a concept artist's ability to tell stories. Imagination and ideas are the foundation on which a concept artist builds their art - everything they draw has to have and convey meaning. As the concept artist is a visual problem solver, usually, these problems are all about solving how to convey the wanted idea. How to make sure the player understands something is dangerous and evil? Or good and safe? How does one describe the idea of a gothic, horror-filled castle? Or a beautiful, secure home base?

As Trent Kaniuga (2020) puts it, "concept art is all about telling a story". Every item in a given place should have a meaning. If there are spike traps, that means someone set them up. Why? Do they want to keep someone away? Again, why? A concept artist cannot simply add what they think is cool to any given picture. Everything they do has a meaning.

In concept piece drawn by concept artist Lukas Kuhn (Picture 5), the details all convey meaning. The statues, elegant golden accent, and baroque structures tell of a high-class, expensive and refined taste. This space likely belongs to someone rich. Despite taking inspiration from history, the shape language is futuristic, with sharp angles and repetitive shapes. The area looks like a waiting room or a lounge. The low tables, paper lantern-like lamps, and kintsugi bring to mind Asian inspirations. All this can be determined from just one image.



PICTURE 5. Environmental concept art for VIP suite. Project NEO – MEIJI.
(Kuhn 2018)

Whatever the concept artist's task is, the first place to start is research. If a concept artist is given the task to design a forge, the first thing they should do is research forges. One must understand what a forge is used for and what items, functionalities or structures can be found there to design it. Knowledge in architecture, history, clothing design, and industrial design is surprisingly valuable and sometimes even a requirement to concept artists.

In addition to research, visual libraries are a great help. Visual libraries are simply collections of pictures on one's computer a concept artist can look through while searching for ideas. They can be photos one has taken or found online. They can range from architectural pictures to pictures of animals, human anatomy, or simply inspirational art created by other artists. More traditional methods of searching, going to the library and finding books on the subject, is also a good way to grow one's visual library.

1.2 The phases and process of concept art

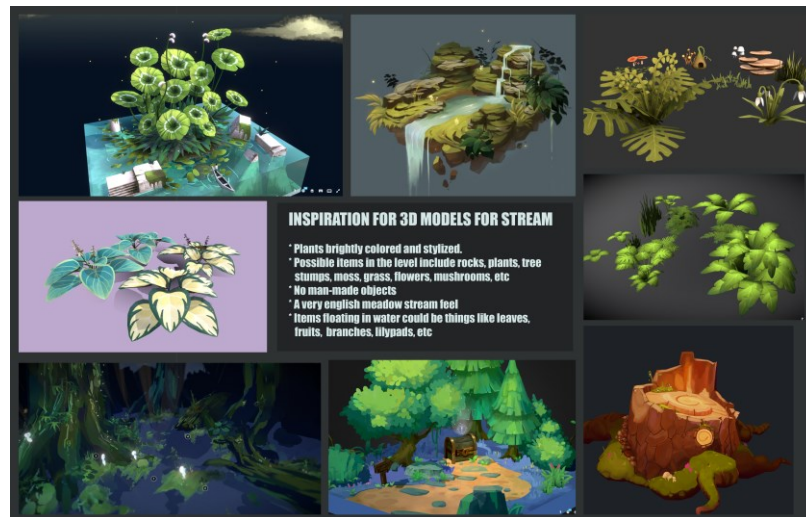
Concept art is an iterative process where each eliminated design is one step closer to the final product. For a 3D modeller to understand the shape of an object or an animator to understand the movement of a character, concept artists help the process by creating iterative art that conveys ideas they can then refine further. The role of concept art during a video game project changes depending on the development phase, and their process with creating concept art pieces is usually a personal choice.

Elliot Lilly outlines the game development pipeline for a concept artist as follows. First, the blue sky phase is where "only the sky's the limit". During this phase, the concept artist is given much freedom to experiment and test things as the game and its ideas are taking their shape. This is followed by pre-production, the phase where the concept artist is very involved with the game. The game is still being planned during pre-production, and the final assets are not being produced yet. This is the phase where the concept artists work actively on visualising the look of the game. (Lilly 2015, 17)

After the blue sky- and pre-production phases, the production phase of the game begins. The final assets that will be used in the game are made. During this time, the concept artist is still involved in the game process. They are often asked to supply things such as designs for props and other objects in the game or quick concepts of levels. After production moves to post-production, where the game is finished and released, a concept artist's role diminishes. Usually, any concept artists who stay to work at the studio after the game is finished are asked to help with miscellaneous art tasks, such as creating promotional art to market the game. (Lilly 2015, 17)

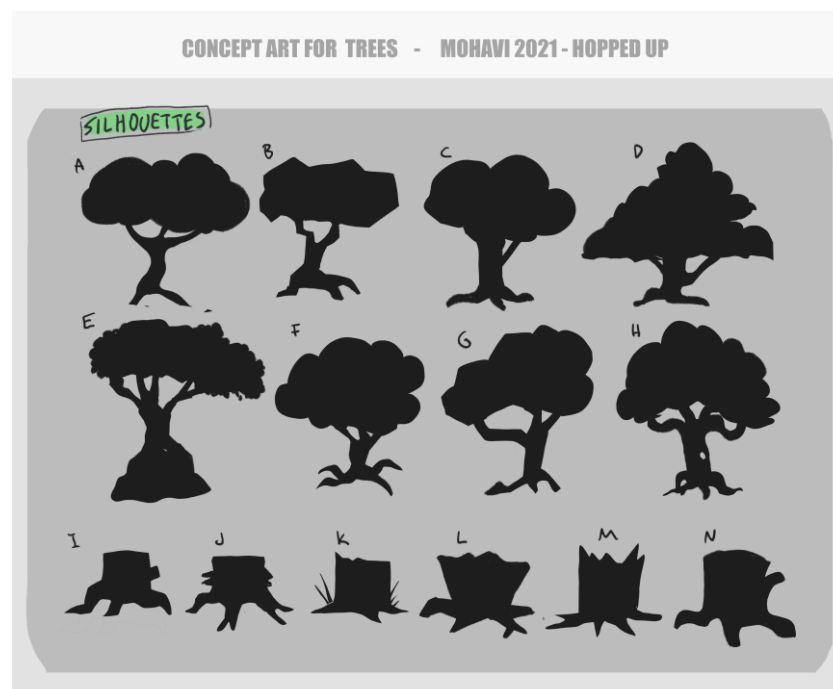
The process of a concept art piece can differ between artists. As Lukas Kuhn (2021) remarked when interviewed, there is no perfect pipeline for any creative process. Usually, all creative processes are dependent on the artists behind them. Seeing that all artists have different backgrounds, education, art style, and art techniques, naturally, they all have their creative thought processes as well. Sometimes the process is also dependent on the given task. While working on a highly realistic piece versus working on a more stylised one, an artist will likely choose different approaches.

The process usually starts with research after being given the assignment by a senior artist. Environmental concept artist Samantha Kung gives brainstorming and looking for references as the first phases of the process, same as a concept artist and designer Dela Neve. (Kung n.d; Neve 2019) If the design calls for a castle, it is essential to research castles. What is the castle used for? What meaning is it meant to convey? What sort of castles are there? When these questions are answered, more in-depth research can be done. References and moodboards can be looked for and created. Moodboards, as seen in Picture 6, are collections of reference images meant to help convey the mood and idea the final design is meant to take inspiration from. It's a fast way of communicating ideas without drawing anything.



PICTURE 6. A moodboard used by the author in the project to research different 3D model styles.

Usually, the following phase is creating different sketches. There are several different types of sketches one might choose to make. As seen in Picture 7, silhouette drawings are meant for exploring shape language and the silhouette of the designed element. Thumbnails are tiny sketches where the focus is on the general ideas rather than the details. They are meant for exploring different compositions and shapes fast. Some artists choose to create sketches using a two-tone approach, where they limit their sketch colours to two to not work in too many details too fast.



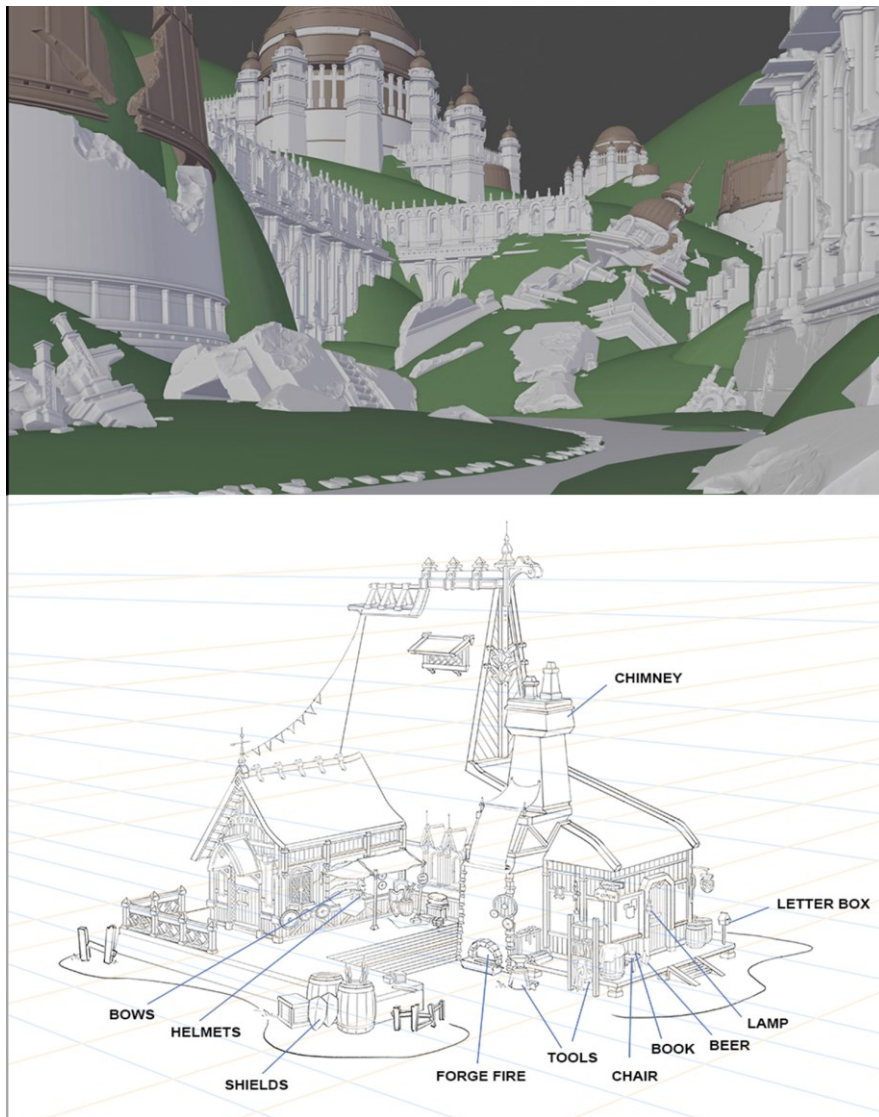
PICTURE 7. Silhouette sketches from the project.

For some artists, the sketching process involves using 3D elements. While they might create some preliminary sketches in 2D, they move over to 3D for more refined sketches. For instance, Neve (2019) creates several quick blockouts of shapes by quickly creating 3D models in Blender. It helps in checking lighting, scale and composition. In Picture 8, one can see some of Neve's exploratory 3D model sketching. (Neve 2019) Kuhn also talks about preferring 2D sketching, but he sometimes helps the process by taking pre-existing 3D models and kitbashing them together (Kuhn 2021).



PICTURE 8. Blocky 3D models used to sketch a quick composition. (Neve 2019)

When moving from sketching to creating the finalised artwork and rendering, the method a concept artist chooses to use begins to diverge further. In Picture 9, one can see comparisons between the work processes of Kung and Neve. Some concept artists, like Neve, prefer to work almost entirely in 3D, sculpting all the assets and only doing a paint over towards the very end, while others like Kung create a rough base with a 3D model but work in the details by hand. (Neve 2019; Kung n.d) Usually, the process is dependent on the preferences of the artist. Some prefer rendering things more by hand, while some use generous amounts of photo textures, 3D sculpting and 3D renderings.



PICTURE 9. Comparison between Neve's style (above) and Kung's style (below). (Neve 2019; Kung n.d) (modified)

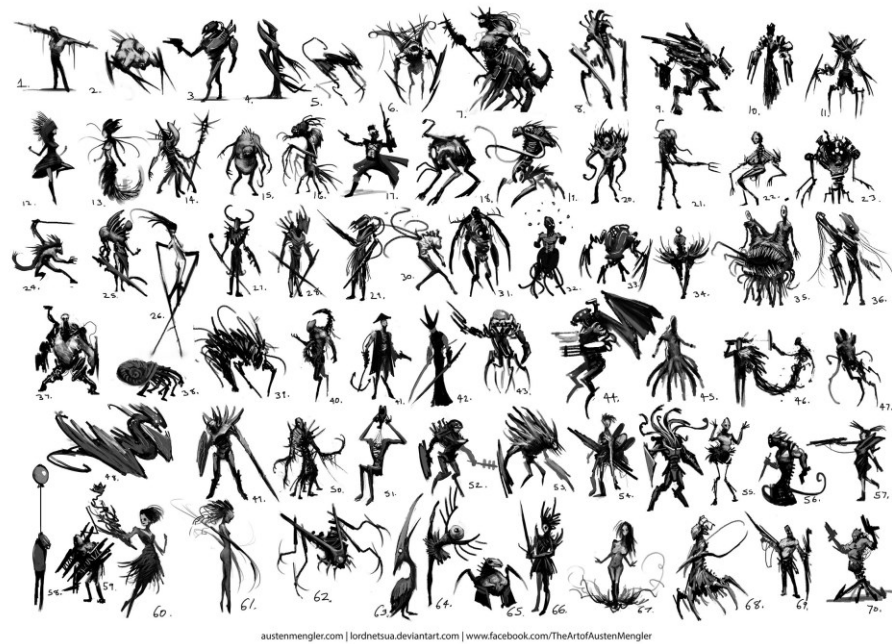
However, something that usually drives this process is the requirement to work fast. All of the artists compared above, Neve, Kung and Kuhn, use some method of speeding up their work process. None of them works from the ground-up as usually defined by fine art, where the artist carefully lays out the perspective and renders every material painstakingly by hand. They all utilise different combinations of using assistive 3D models, 3D renderings, photobashing and perspective tools. It's essential to keep in mind the requirements of concept art - speed, conveying and a story and efficiency are often more important than carefully rendered paintings.

1.3 Different concept art types

There are different types of concept art a concept artist might produce for any given project. Depending on what they need to develop, creating different kinds of art allows for a concept artist to focus on what's essential efficiently. A painting may not be required when a sketch may suffice. A detailed environmental image with many details may not be necessary when one only needs to portray the designed items accurately. There are different subjects a concept artist might focus on, such as environmental concept art, character concept art, prop concept art, or vehicle concept art. However, it is essential to keep in mind that there is no one defined pipeline as all other art fields. Not all artists will call their concept art types with the same names or even name them. The terms and techniques listed here are rough and very generalised definitions.

There are several different types of sketches a concept artist may create. There are **thumbnails**, which usually are a series of several small drawings that display the general shapes of the design and go through several iterations fast. They might also be used to design compositions for the environment. The key is their small size, focusing on the big picture and their large number. Toni Justamante Jacobs, a senior concept artist working at Social Point, states that the usual number for thumbnails is 50 or more. After the thumbnails are created, the concept artist will develop more sketches that focus more on the details, such as a character's face and clothing. (Jacobs 2018a)

A very rough type of sketch is **silhouette sketches**, which only display the silhouette of an object. These are usually created early when trying to find a good shape language for the objects to convey their intended meaning. A good combination of silhouette sketches and thumbnails can be seen in Picture 10.



PICTURE 10. Thumbnail silhouette sketches created by Austen Mengler (Mengler 2015)

Sketches may portray a number of subjects. **Material studies** are usually meant for concept artist themselves. They may use material studies while working on a picture to get a clearer image of how to render a particular material, study it first from photos, and test how to render it. However, a material study can be helpful as a reference for the artist meant to create the final texture. Concept artists may also portray actions as **action sketches**, such as the one in Picture 11, which help explain how different movements or effects might look when animated.



PICTURE 11. Action sketches created by Sam Santala (Santala 2018)

Although fast iterations and sketches are necessary for a concept artist, they still have to generate finished art. After all the sketches and iterations, when the final concept is chosen, a polished version, a **final reference sheet**, has to be created to work as a definitive reference to the other artists creating the finalized asset (Jacobs 2018a). These might include **turnarounds**, which are images of the character or the object drawn from multiple angles (usually the front, $\frac{3}{4}$ angle, back and side). These are used to help the 3D artist understand the intended dimensions and shape of the object.

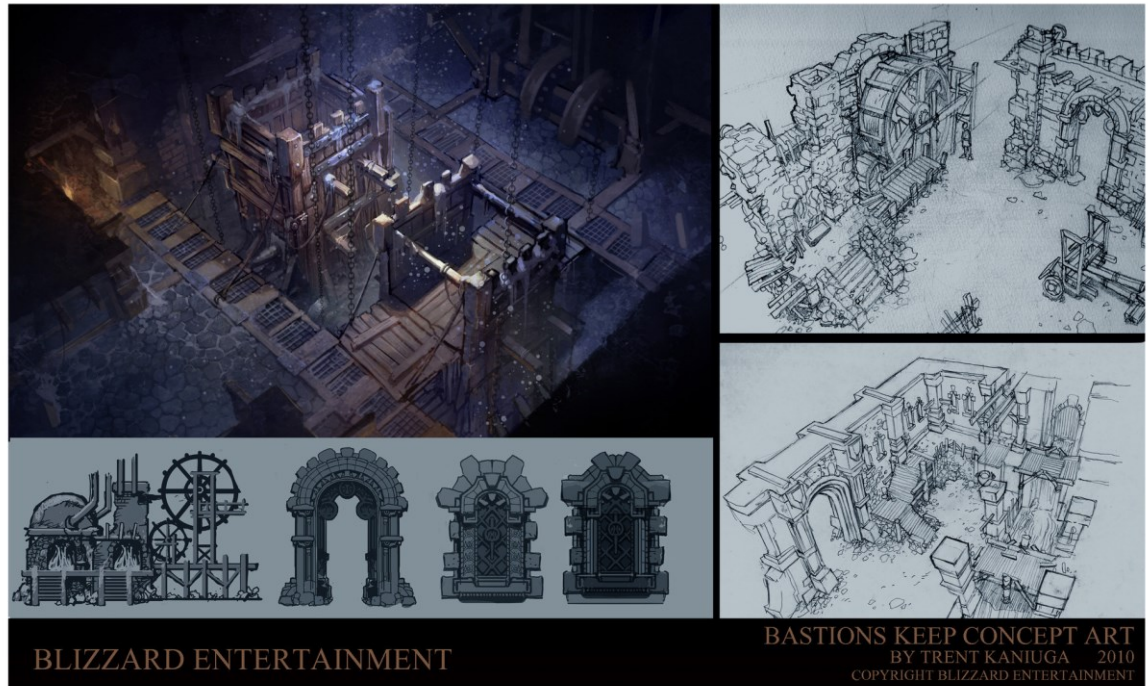
Mood shots are artwork that is used to convey how the game is supposed to feel and establish a tone rather than display how a level might look specifically. Their goal is to show how the game should feel to the player and are especially helpful to any artists in charge of lighting and environmental effects. A concept art piece by Donglu Yu depicting the mood of the game Assassin's Creed: Valhalla can be seen in Picture 12.



PICTURE 12. A moodshot for Assassin's Creed: Valhalla by Donglu Yu (2020)

Cutaways show a relevant part of an environment and are suitable for other artists to see what might be relevant to create for a level, while **callouts** focus on the details found in the environment. When an image is displayed in perspective,

seeing the details on objects can be difficult. Callouts take these objects and elements, for example, pillars and windows, and display them in a detailed manner, so any artists creating further assets have more information to work on (Kaniuga 2020). Both callouts and cutaways are depicted in Picture 14, where the concept art of Diablo 3 by Trent Kaniuga can be seen.

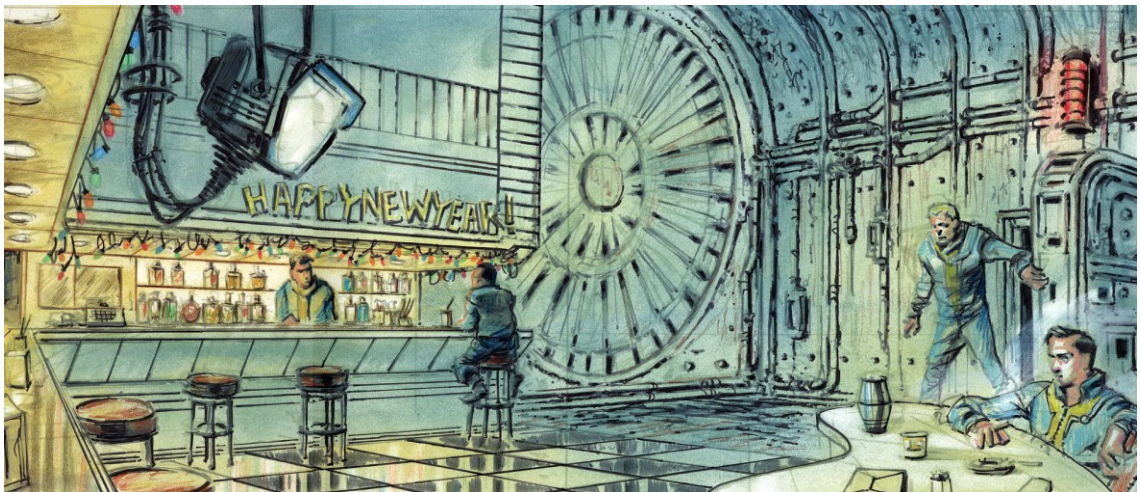


PICTURE 13. Concept art for Diablo 3 by Trent Kaniuga that has a callout (lower left corner) and cutaways (top left and right). (2016)

Additionally, there are different subjects of concept art. Some concept artists focus solely on a certain type of concept art. Environmental concept art often focuses on portraying different landscapes and spaces depicted in the game. It requires a good understanding of perspective and space. Character concept art focuses on creating the characters and creatures seen in the game. Character concept artwork revolves around designing compelling characters, and it requires an understanding of costumery and fashion, as well as the anatomy of humans and creatures alike. Prop concept art focuses on objects seen in the game, like weapons and items used by the character. It's close to vehicle concept art, which focuses solely on designing vehicles and other machines. (Jacobs 2018a)

2 3D AND ITS CURRENT STATE IN CONCEPT ART

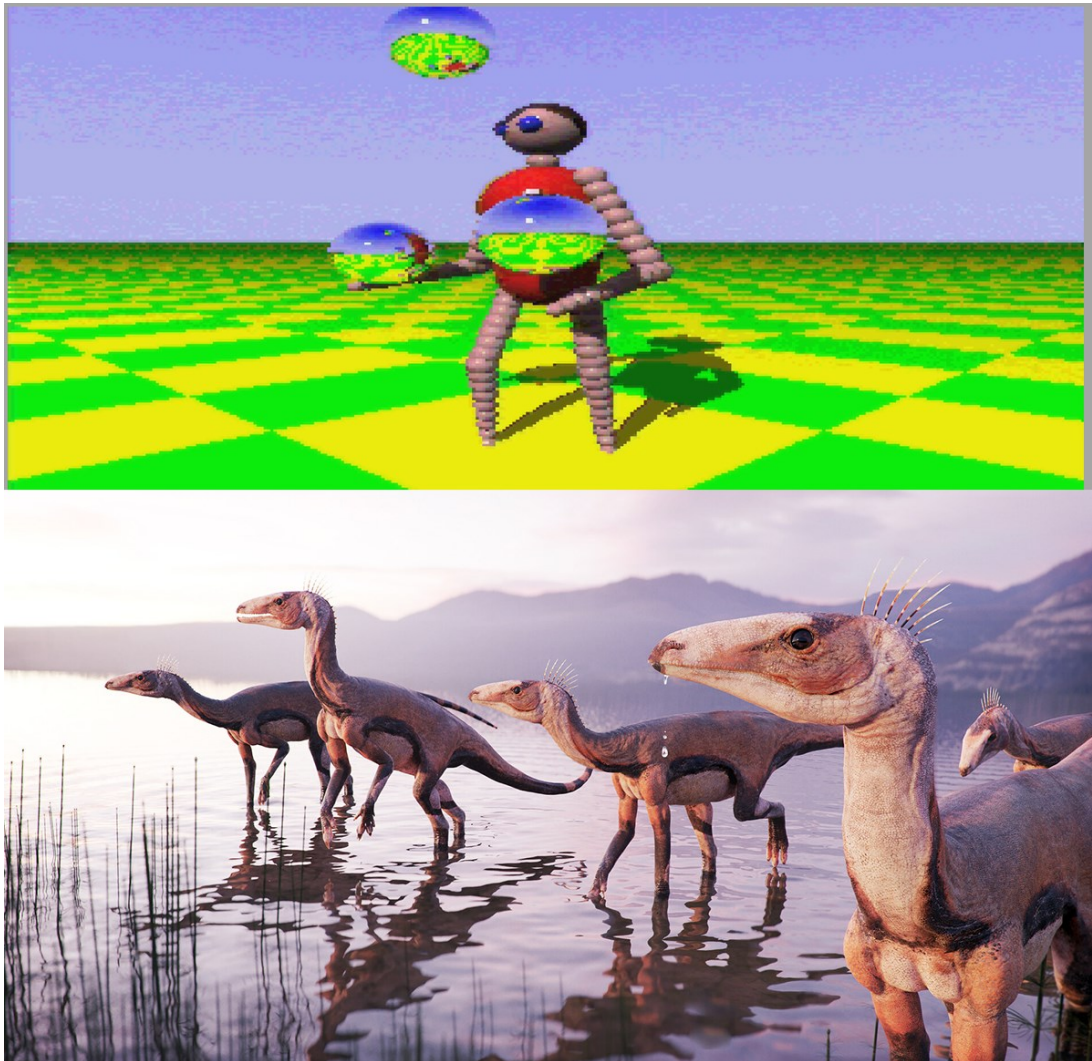
Game art, and by extension, concept art, has also come a long way since its inception. According to Nicolas "Sparth" Bouvier, a veteran concept artist and the art director of Halo 5, back in the 1990s, game concept artist wasn't a profession. Not only that, artists drawing digitally was rare, and the idea of doing professional digital paintings wasn't given much thought. (Lilly 2015, 117) But these days, the opposite is true. Concept art is a profession of its own, and concept artists are generally expected to deliver their art digitally while working on games. In Picture 14, one can see original, hand-drawn concept art from Fallout 3, as illustrated by Adam Adamowicz (2012). Trent Kaniuga maintains in his video on professional concept artist tools that concept artists will have to work digitally in the modern AAA development industry, barring some particular circumstances (Kaniuga 2020b).



PICTURE 14. Hand-drawn concept art for Fallout 3 by Adam Adamowicz (Adamowicz 2012)

As technology develops, the game industry, and by extension, game art follows in its footsteps. Especially with the exponential development of home technology, using 3D modelling software at home and even complex 3D renders are now possible. Compared to 1987, when the raytraced Juggler Amiga animation demo (Picture 15, above) produced on a home computer was thought to be a hoax, computer technology has developed in leaps and bounds. (Zgodziński 2018). To put the change in computing power to scale, when comparing FLOPs, floating operations per second, one Cray 2 supercomputer released in 1985 is equivalent

to one iPhone 4 phone released in 2010 (Routley 2017). But even the visual comparison alone is stark enough when comparing a screenshot from the Juggler demo and a screenshot of render on Blender 2.9 side by side (picture 15).



PICTURE 15. Amiga Juggler demo from 1987 (above) and a Blender rendered scene by Joanna Kobierska (2020) (below)

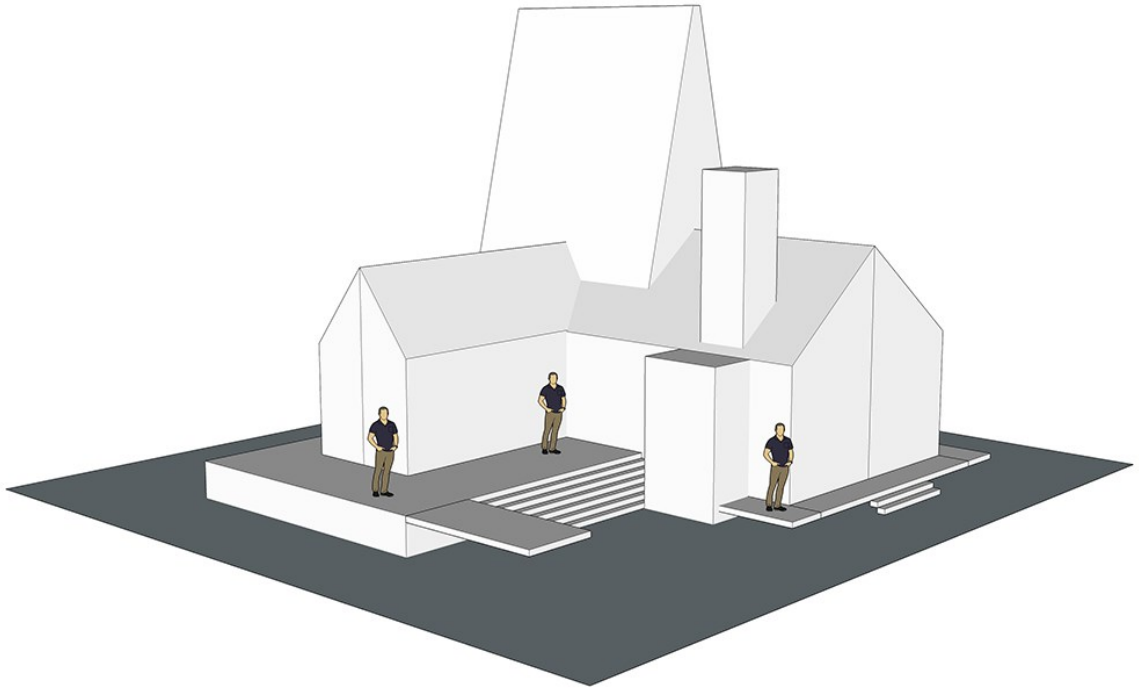
It's no wonder that with the development of game art, digital art, and 3D, these would eventually become intertwined and related to each other. According to several sources, such as concept artists Trent Kaniuga, Philip Scherer and Phoebe Herring, using 3D in concept art is slowly becoming standard and, if not mandatory, a very desirable skill for concept artists to have. As said by Phoebe Herring when referring to using 3D in concept art: "Clients are interested in the designer's vision, not in waiting around for them to lay out all of their vanishing points by hand." (Kaniuga 2020; Carter 2018) Dela Neve also points out that concept art

is about ideas and design and that 3D is an excellent way to quickly iterate and test ideas, making the artist able to respond to revisions fast (Neve 2019). Indeed, after 3D programs and 3D modelling have become more widely available and usable to the general public, its pros have made it a very attractive tool for many artists to utilise alongside 2D techniques.

While several artists seem to lament the difficulty of learning the ins and outs of 3D programs, the programs and tools to learn them are now more readily available than ever before. An excellent example of this is the development of the free 3D modelling software Blender. While programs such as Maya or 3dMax are used by many companies, these programs can be costly for anyone not using them professionally. However, Blender is free to use. With the inception of Blender 2.8 and its new features, such as EEVEE real-time render engine, UX and Grease Pencil overhauls, and other new functionalities, free programs like Blender are becoming a viable option even commercially. For instance, Ubisoft Animation Studios announced in 2019 that they would adopt Blender into their animation production process (Ubisoft 2019).

In addition, with the rise of the internet and social media, artists are now able to share know-how and information in ways inconceivable before. Long past is when a user would have to learn to use a program by looking at a manual or going on expensive courses. Instead, a simple look at a video sharing platform, such as Youtube, offers plenty of free video tutorials and guides for learning different 3D programs. Several courses are available on different teaching websites, such as Udemy, LinkedIn Learning and Skillshare, and tutorial series on webshops such as Gumroad, allowing artists to sell their content.

Even with the development of computers, some 3D programs, especially rendering complex images and animations, can be a challenge if one does not own an up-to-date computer. But even if one's computer may not be able to handle a heavier 3D program, there are still 3D programs available that are not as taxing on the computer, such as SketchUp, that even allows for creating 3D models in a web browser. Though not as versatile as some 3D modelling programs, such as Blender, SketchUp is still used in concept art (Picture 16). This shows just how available using 3D is in the modern era of art.



PICTURE 16. SketchUp base for concept art. (Kung n.d)

Though it might be tempting to call using 3D models cheating, they are the same as using any reference to help with art. Artists have used 3D models in a very nominal sense of the word for hundreds of years. Illustrator and traditional artist James Gurney wrote in his book *Imaginative Realism* (2009) that artists saw a great deal of effort to create as convincing paintings as possible since the renaissance. For example, Federico Barocci (1528-1612) created his paintings in several steps, including creating miniature figures of wax and clay, complete with small costumes to test how the clothes might look in the final painting. Using small real-life figurines or models, known as maquettes (Picture 17), are often used by traditional animators and illustrators. (Gurney 2009, 10-11, 68-69)



PICTURE 17. Maquette scene example by James Gurney in his book, *Imaginative Realism*(2006)

Modern-day 3D software is just following an old tradition of art, and 3D models can be said to be just a form of maquettes. Using them requires a great deal of skill, and rather than a crutch, 3D models are a tool to be employed, same as any other. Understanding perspective, lighting, shape, colour, materials, and basic design principles are still needed.

As for the future of using 3D in concept art, it is hard to say. The change in 3D technology has been rapid. Within the last fifteen years, 3D graphics have developed and changed from the slightly misshapen and rough 3D characters and terrains of the early 2000s to the meticulously rendered, realistic and detailed versions of the 2020s. It is hard to predict just how fast the technology will continue to advance.

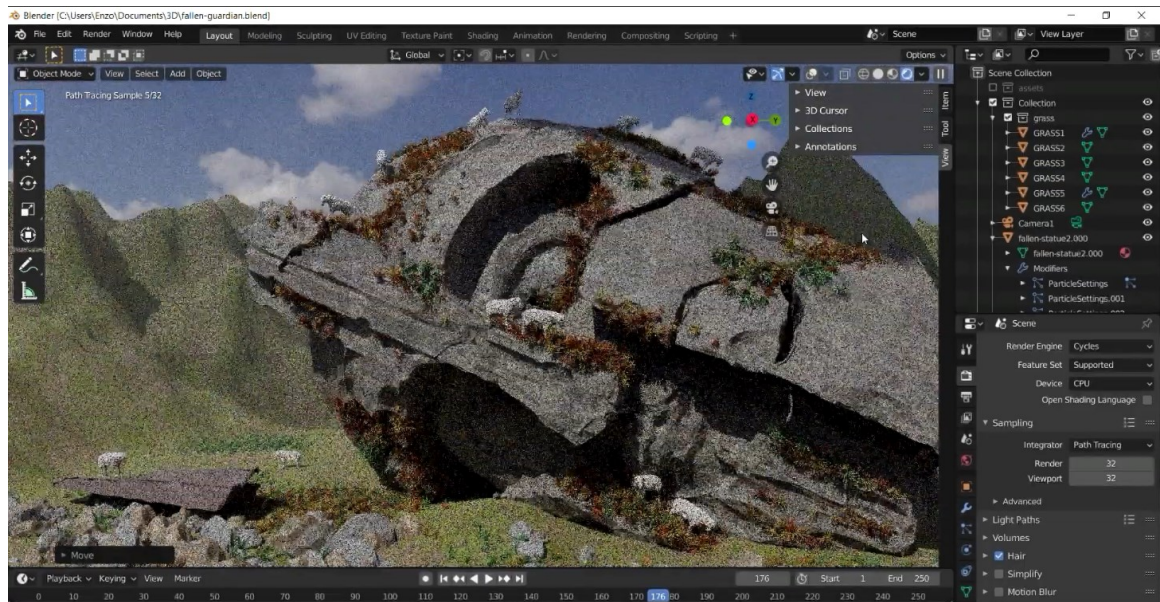
Some future visions presented by Trent Kaniuga in his video "Predicting the Future of Concept Art" include concept artists working even more directly using 3D programs. Kaniuga predicts the rise of photorealism as a videogame art style. Using 3D, creating realistic concept art is easier and faster, as 3D allows for realistic lights, textures, and reusing assets several times. Though not always true, in the time it takes to paint and render by hand, for instance, an armour, a fast 3D

modeller may be able to create it in almost the same time, if not quicker. Using preset lighting setups available in 3D programs allows for even faster work, as the artist will not have to generate the lighting themselves. In five to ten years, Kaniuga thinks there might be concept artists who cannot even draw much but might generate models and sculpts using augmented reality or VR headset. (Kaniuga 2020c) Another interesting possibility is brought by the advent of using ready-made 3D models. Websites such as Quixel Megascans offer larger libraries of ready-made models and textures, which could also be used for concept art. Though if everyone uses the same assets, the question of originality comes to play.

Kaniuga can be considered a relatively reliable source, seeing as he has worked in the games industry for over fifteen years. Even if these visions of concept artists working in 3D and having no talent for drawing might not be true, a relatively reliable takeaway is that using 3D in one form or another will become more prevalent in the video game concept art industry.

2.1 3D techniques

As 3D has developed both as a technology and as an art form, it has become more widely used in concept art. There are several different 3D techniques and ways to use 3D to further one's concept art and save time by creating multiple iterations faster and easier. One of the most common techniques used is drawing on top of an image of a 3D model. The 3D base can be something as simple as rough shapes arranged in 3D space, but it can also be as complex as a fully rendered sculpt, complete with nodes, textures, and particle effects, as seen in Picture 18.



PICTURE 18. Screenshot of the 3D base working process of Enzo Minarro (2020).

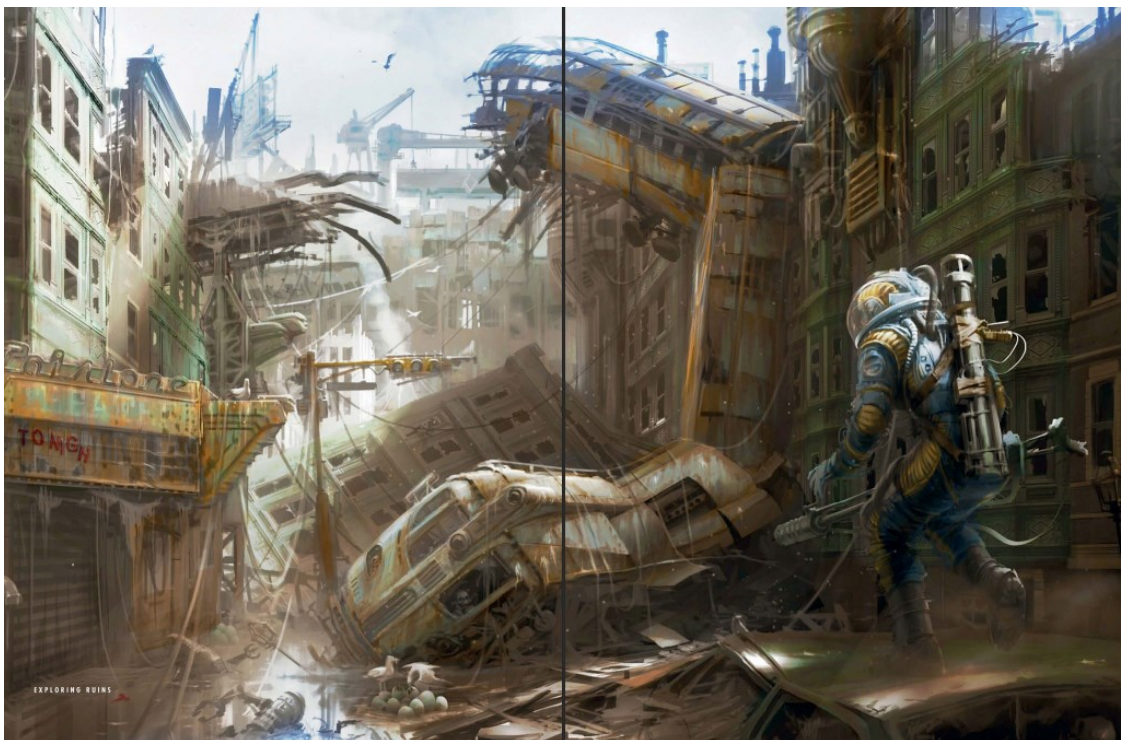
Some concept artists work almost solely using 3D models, 3D rendering and sculpting programs or using Blender's Grease Pencil techniques. Some opt for an entirely different way of working in 3D and instead work in virtual reality. There are as many techniques as there are artists, but some of the more common methods are outlined in this chapter.

2.1.1 Photobashing

One of the more common 2D techniques employed in concept art is photobashing. According to concept artist Toni Jacobs, it's a technique where an artist carefully overlaps and blends existing photos with a digital painting. They paint over, warp the perspective, and use different layer modes and other digital painting techniques to make the images blend and form a cohesive whole. (Jacobs 2018b) In a sense, photobashing is a form of collage, but the goal is to make sure the final image is as seamless as possible. While a 2D technique, photobashing is often used in conjunction with 3D techniques. 3D models and pictures of 3D models can be used for this process, and some photobash on top of a basic structure made using a 3D program.

The most significant benefit of photobashing is creating highly realistic textures and structures with minimal actual effort. Instead of manually drawing every detail, the artist can focus on the mood and idea they want to convey. When a photorealistic finish is desired, sometimes the only way to achieve a realistic enough look is through photobashing.

It might be tempting to claim that photobashing is simply cheating, but doing so would be reductive of the skill required to create a believable and seamless photobash. Photobashing is merely a technique among many, and skill is necessary to employ it properly. Its user still needs to understand the art fundamentals, such as colour, shapes, lighting and perspective, to create a believable and cohesive finish. It is important that the artist understands how to make art without photobashing. A well-executed photobash can be seen in Picture 19. With a keen eye, one can notice that, for example, some of the windows and textures in Picture 19 are photobashed. However, to an untrained eye, the photobashing is nearly invisible.

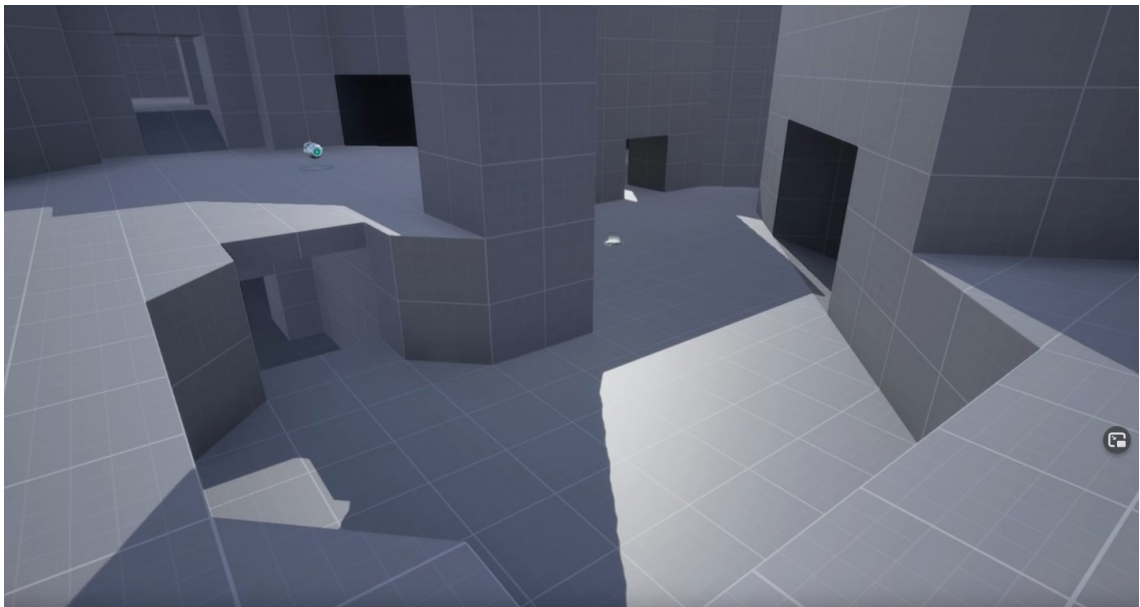


PICTURE 19. Concept art of Fallout 4. The art is photobashed in places (Art of Fallout 2015)

Then again, some criticism of this technique is still entirely valid. If an artist learns how to use photobash too early, they may begin to use it as a crutch of sorts, halting their artistic advancement. It is best to learn the basics first and then use photobashing. Another valid criticism is presented by concept designer Ben Mauro, who remarks that while a powerful tool, the nature of the technique makes for unoriginal designs. While it saves time significantly, it can lead to what Mauro calls "lazy designs". As the method is based on things that already exist, it doesn't allow much room for creating something genuinely new. (Mauro 2015)

2.1.2 Grayboxes and 3D models as preliminary base

One of the most common 3D implementations a concept artist might run into is called a graybox. **A graybox** is a very simple mock-up made for testing out game mechanics, as Trent Kaniuga (2018) explains in his video on the subject. They might be used to test out how a character moves in the level and how different game functionalities and tasks work, a sort of prototype with very rough and preliminary 3D elements, as seen in Picture 20.



PICTURE 20. A graybox in Trent Kaniuga's video. (Kaniuga 2018)

A concept artist is often handed a screenshot of a graybox, on top of which they draw what the level might look like using a program like Photoshop. They might have indications where items and elements cannot be placed, as, for example, if

a character can climb walls or destroy them, these will affect the designs a concept artist can create. (Kaniuga, 2018) Communicating these needs and restrictions together with a ready-made base eases the process. It makes it easier for a concept artist to produce functional and practical concept art for the game. On the other hand, a concept artist using these ready-made bases also makes sure they don't create anything unusable in the game.

Most often, 3D models help with a tricky pose or a perspective and offer guidance on lighting. Picture 21 is a comparison between the 3D model used as a perspective guide and the final illustration. Very fast and basic shapes were used to get the rough scene down, and then a camera was moved around to get the desired angle. Lights were placed after this to better display the shapes and shadows. The final illustration was created on top of the 3D render it using Photoshop CC. Some artists create more detailed models, adding materials, using nodes, particles, or preset lighting setups.



Picture 21. A comparison between a 3D model base and the final painting created by the author.

A guideline such as the one in Picture 21 is handy if several iterations of the same scene are needed from different angles or if reference of the space is needed often. For instance, when drawing the same house multiple times, one might create a 3D model to use for it repeatedly. This also helps keep the space logical and mapped out and makes sure there are no errors between iterations. Another common trick used by artists is using posing software, such as DAZ 3D, to compose scenes with characters from various angles. Especially when creating tricky poses, difficult camera angles, or scenes with multiple characters, posing software can save a lot of time and effort.

The biggest problem in a situation that calls for more complex shapes is how much time it might take to model the required 3D base. After all, a 3D shortcut is only a shortcut if it helps save time. Many artists use a technique called **kitbashing** to help with this problem. Kitbashing means taking ready-made models and "bashing" them together to form either a complete scene or a model. Artists might sell 3D model packages online, which can be used for this very purpose (Picture 22). These are at times utilised by larger companies for purposes other than just concept art, as modelling everything by hand for a big game or a movie might be simply too time-consuming. The question of originality comes into play again - if everyone uses the same 3D models, things may start to look unoriginal.



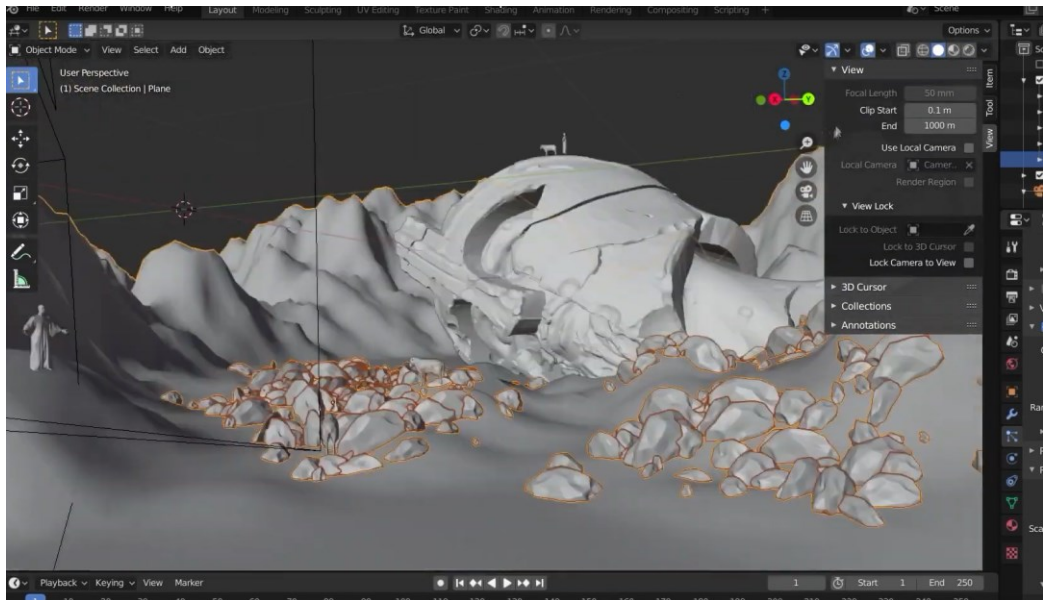
PICTURE 22. A commercial kitbashing pack by Kitbash3d.

Additionally, one has to be careful when claiming kitbashed art as one's own for copyright reasons, unless one has bought a package that allows them to use the models for commercial purposes. It is also good to keep in mind that taking several 3D models made by others and kitbashing them and then simply drawing on top will not make the art your own. Though kitbashing is helpful for concept art purposes, it's good to be careful about copyrights.

2.1.3 Further 3D renderings

One step further from using 3D models as a preliminary base is using lighting, particles, materials and textures in the 3D scene. Using them adds more work, but once applied, they can be easily altered en masse and save time towards the end of the process, where the artist exports the picture to software such as Photoshop to be painted over and retouched. Especially when creating a scene from multiple angles or during different times of the day and with different moods, committing the extra work may well be worth it. It is better for moodshots, and when the artist knows the sculpted assets will not have to be redone and rejected. In his interview, Lukas Kuhn (2020) remarks that just applying materials and lighting the 3D scene can improve one's art quality, especially as objects with high reflectivity will look more believable.

Some artists use several different 3D programs in the process to speed their workflow. An excellent example of this process is in a video by illustrator Enzo Minarro (2020a), where he demonstrates his work process pipeline using Blender, 3D Coat and Photoshop. He creates the base model of the scene using Blender, then adding rocks and grass to the background using particles. He weight paints the ground plane to add a desirable amount of particles in the right places (Picture 23).



PICTURE 23. Screenshot of Enzo Minarro's process. The rocks were placed using a particle system. (2020a)

Meanwhile, he creates the fallen guardian statue using a sculpting program called 3D-Coat, which he then exports to Blender. He puts the final render together in Blender, adding materials, particles and lights. Finally, he retouches the final illustration using Photoshop CC, using a combination of painting, photobashing and image adjustments (Picture 23). In other videos, he is also shown using a clothing design program called Marvelous Designer to generate cloth physics fast (Minarro 2020b). Once the 3D base has been made, Minarro can quickly generate different moods, angles and times of day with just a few adjustments, such as by changing the lighting settings.



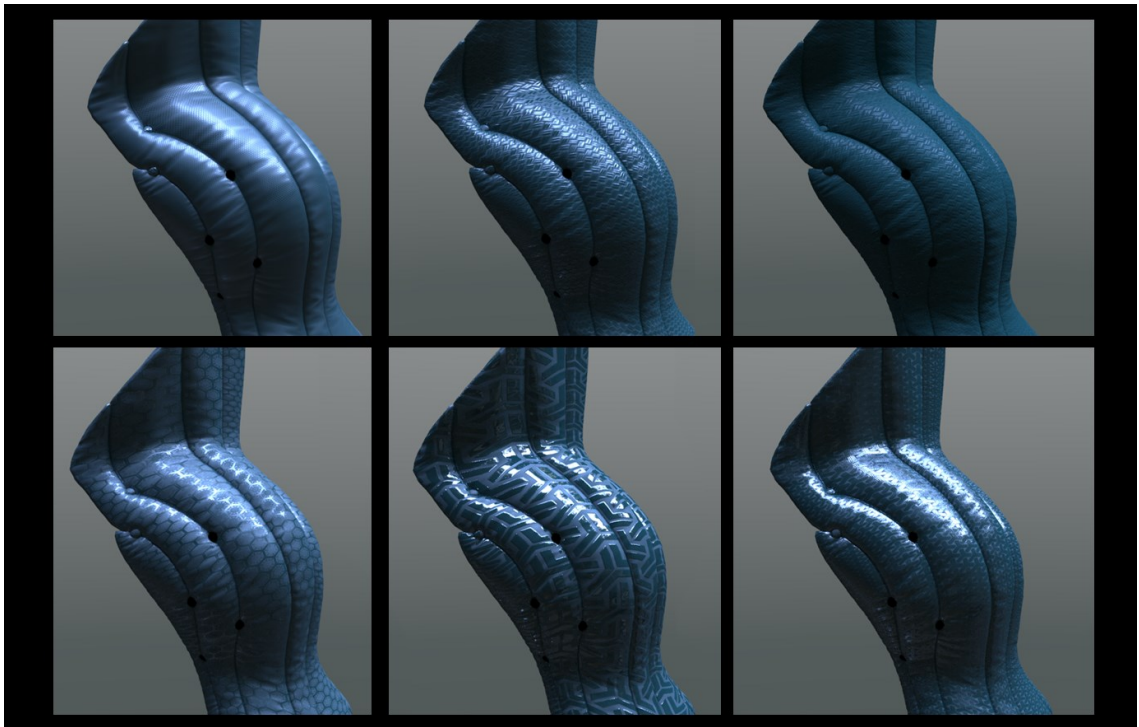
PICTURE 24. One of the final pieces made by Enzo Minarro (2020a) of his 3D scene

Multiple renderings can also be combined. Walid Feghali (2018), a concept artist and mechanical engineer, uses a technique to render several passes of the same design using the rendering program Keyshot and then composites the several different renders in Photoshop CC (Picture 25). The same process could also be used in various programs capable of rendering, such as Blender. Instead of assigning different areas of the 3D sculpture with their own materials when working solely to create a 2D artwork, such as an illustration, compositing different materials in a digital art program such as Photoshop CC will likely be faster.



PICTURE 25. Different renders made in Keyshot (above) and the final composition made in Photoshop (below). (Feghali 2018)

Nodes are another convenient tool that can be utilised in further 3D renderings. As 3D concept artist Artem Kurenkov (2020) explains, the one thing an artist cannot do in 2D is make fast changes to materials. However, with the help of nodes, this is possible. Nodes allow for very complex materials to be created by passing a particular material through a series of nodes (Blender Manual). This process is similar to using different layer modes in 2D art programs, allowing for properties, such as colour, saturation, properties, patterns, and roughness, to be changed. The rapid variations that Kurenkov (2020) allegedly managed to generate in "2 minutes" can be seen in Picture 26.



PICTURE 26. Different iterations created by Kurenkov (2020) by using nodes

2.1.4 Virtual reality

A relatively new 3D technique comes with the inception of virtual reality. Though not necessarily the most common tool, 3D art can still be created using VR, and as such, it can be used for concept art as well. When Julia Sagar interviewed several artists on the prospects of virtual reality, many of them were excited by the possibilities offered by it. Darren Bacon, the lead concept artist at 343 industries, believed that the industry might face a revolution similar to the move from traditional art to digital. However, his colleague, Sparth, aka Nicolas Bouvier, thought VR would not entirely replace art programs such as Photoshop out of lack of precision and how tiring it is to use. (Sagar 2016, 16-19) However, since the interview, Google has shut down its development of the Tilt Brush, and it isn't entirely surprising. Tilt Brush was always more of a novelty tool rather than something to be used professionally. Some programs that concept and game artists use as of 2021 include Quill, Medium and Masterpiece.

The most significant advantage of working in virtual reality is generating 3D concept art intuitively, even without much knowledge of 3D modelling. Handing them over to other artists allows for them to look at the design in a 3D space and understand the ins and outs of the design with less room for error than with a purely

2D picture. On his blog, software engineer Joan Charmant (2020) writes that painting in VR allows for others to truly experience the concept the artist is trying to convey in an immersive manner. He also notes that it allows the artists to focus on content without worrying about framing or perspective. Example of a VR painting done in Quill can be seen in Picture 27.



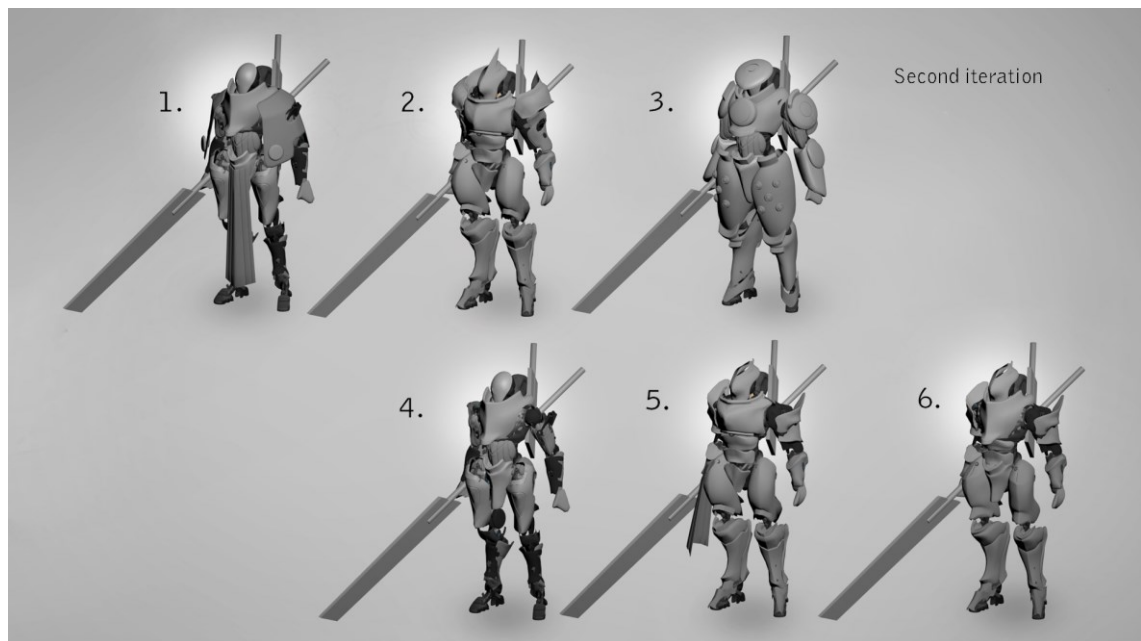
PICTURE 27. An example of a VR painting done using Quill. (Charmant 2020)

The biggest issue with virtual reality is how different it is from both traditional painting and digital painting - it is an entirely new art form of its own that needs to be learned (Charmant 2020). Another issue is how physical the work might be. While moving around in real space, drawing may get exhausting. Motion sickness and getting used to working very differently might also work as a bumper for any artists interested in trying their hand at VR concepting. Additionally, the lack of detail mentioned by Sparth is an issue. (Sagar, 2016)

2.1.5 3D sketching

In a sense, 3D can also be used to sketch out different designs. Although typically 3D is thought to be a rather unyielding medium that only allows for more careful and deliberate work, it can also be used to generate quick sketches of sorts. As concept artists do not have to consider the topology and polygon count of their 3D art, sketching in 3D does not pose as much of an issue, save for possibly causing one's computer to crash if overwhelmed.

An excellent example of sketching in 3D is offered by Artem Kurenkov (2020). By using rapid 3D sculpting and modelling methods, he creates rough blockouts out of basic shapes like spheres. These quickly made rough models (Picture 28) can then be further refined in both 2D and 3D and later rendered in a 3D rendering program such as Keyshot. The positive side of sketching like this is that it allows others to see the concept in 3D constantly, and though the model is rough, it can be later refined by a 3D artist, cutting back on the time that would typically go to creating the base of the model. The negative side is that this technique can take most of all the time if one is not experienced in 3D.

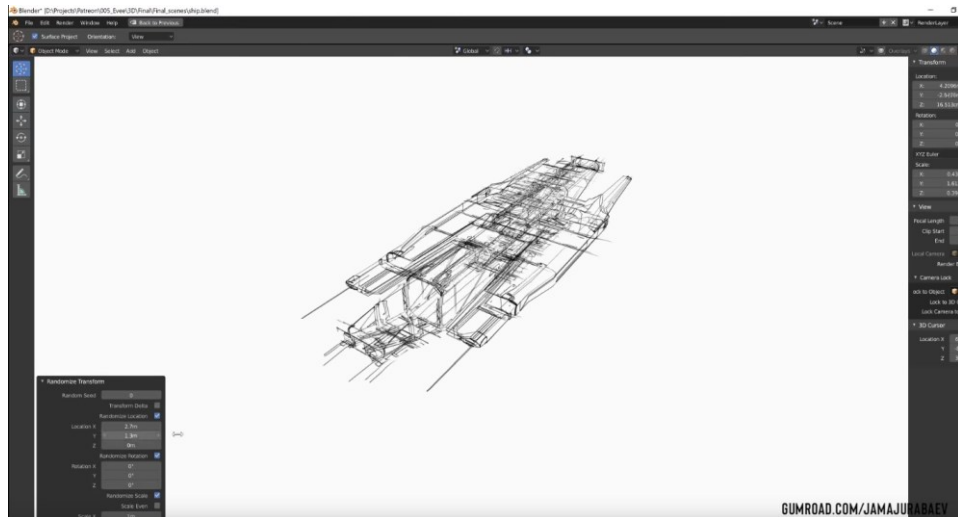


PICTURE 28. 3D sketches created by Kurenkov (2020)

Another form of 3D sketching is using Grease Pencil. Grease Pencil is a tool offered by Blender which allows an artist to create 2D animations using 3D shapes. When used at first, Grease Pencil looks like a traditional 2D animation tool, but in fact, all the brush strokes made with it create a 3D object that can be viewed from multiple angles. This allows for some interesting experimentation.

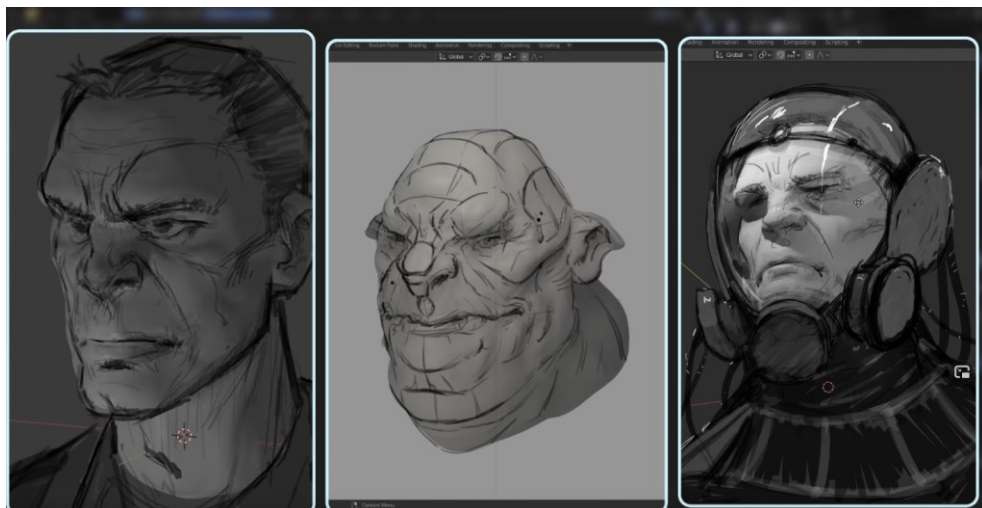
As researched and shown in Jaakko Takalo's (2019) thesis on the subject, Grease Pencil can be used to create 3D object wireframes with the help of modifiers. Modifiers are operations that can affect a 3D object in a nondestructive way, allowing for tedious effects like mirroring and tiling to be done automatically (Blender manual). Grease Pencil drawings in 3D space can then be used to

create a sketch quickly, view it from multiple angles, and be either refined further as a 3D model or be drawn on top of in an art software such as Photoshop CC. Essentially, they work to create wireframe models (Picture 29) that can be used as a guideline for further drawings.



PICTURE 29. Example of a wireframe model made using Blender Grease Pencil (JurabaeV 2018)

Grease Pencil can draw on top of 3D models, either directly on the 3D model (Picture 29, middle) or on a flat canvas in front of the 3D model (Picture 30, right & left). This allows for exciting explorations, as by creating a very rough sculpt that can be lit from different angles, an artist can draw several quick concepts on top of the 3D model with a Grease Pencil. These can be used as rough sketches on themselves or refined further.



PICTURE 30. Grease Pencil drawn on a transparent canvas in front of a 3D model (left and right) and Grease Pencil drawn directly on the model (middle) (Bucci 2020)

2.2 Why and when to use 3D

There are several reasons why to use 3D in the concept art process. One of the biggest is the speed it allows for an artist to iterate different versions and create a finalised concept art piece. Even with very blocky and bare-bones models and with no materials, utilising a 3D render in the process will save time in the long run. The usefulness of 3D comes to play especially if several iterations from different angles are needed. Instead of having to draw everything from the beginning for each angle, the artist can instead turn the camera to get a new perspective.

Another way 3D can save time is through communication. Using 3D models helps with in-team communication. In an Artstation Magazine (2019), a point is brought up about interpretation. While using purely 2D concept art for creating 3D games, something is always left up to the interpretation of the 3D modellers. This "blank space" in the communication of interpreting 2D art for a 3D world can lead to mistakes, or at least much back and forth between different departments. This costs everyone involved time and extra work. (Artstation magazine 2019) This communication gap can be closed using 3D in the early concepting process.

Sometimes, purely 2D concept art will not be viable for 3D or work in the game engine. The restriction of both 3D and the engine can be more easily looked into and realised when using 3D models in the process. Even a basic 3D model can help understand how things will look when viewed in the actual game. At best, this final asset can be used as a starting point by the 3D modellers (Carter 2018). It can even save several days in the overline pipeline process (Kurenkov 2020).

Changes can also be made more easily to 3D models. For instance, a concept artist draws an object entirely by hand from several angles. However, the art director is not pleased with the object and requires changes to be made. The concept artist then has to make changes for each of these pictures manually. Meanwhile, changing a 3D model is faster and less destructive than modifying massive portions of one's 2D artwork. There is less chance for degradation, as changing 2D artwork can severely impact the quality of the image. (Kuhn 2021)

Using 3D models also affords a level of realism that cannot be achieved by drawing. Lights, shadows and materials are calculated precisely by the program in a way the human brain is incapable of. Especially while creating concept art for a very realistic game, sometimes the only way to do it reasonably is through utilising photobashing and 3D techniques. (Kaniuga 2020a)

However, sometimes the matter is that 3D simply takes more time than it is worth. If one wishes to go for a more finished render complete with materials, nodes and particles, it may take more time than creating a passable 2D version. Sculpting several objects, laying down the different materials, working out nodes and particle systems may take much time, even if one is proficient with the 3D tools. Especially when there is a chance that a model might get rejected, spending hours on one scene is a gamble. However, some artists think that 3D will save time towards the end of the phase, as even if creating the sculpts and laying the materials and nodes take time, the finalised look can be changed fast once the groundwork has been applied (Kurenkov 2020).

There are still times when using 3D models in concept art may not be beneficial or more cumbersome than necessary. Usually, for things such as sketching and creating multiple fast and loose iterations at the beginning of the process, several artists prefer using traditional 2D sketching methods (Kurenkov 2020; Kuhn 2021). 3D is typically employed more after the roughest sketches are done, as creating a lot of wildly different 3D models without any idea of vision is very hard.

While there are more ways to learn 3D than ever before, learning to be proficient in a 3D program takes a lot of time and work; even with all the tutorials out there,

knowing where to start may be complicated, especially when learning a 3D program that is not as widely used. Additionally, even with the development of home computers, 3D programs can be so heavy as to not run properly on older computers. Not everyone can afford a well-optimised computer that can handle 3D programs effortlessly.

Same as with any tools, it is essential to not rely too heavily on 3D. In an interview for ImagineFX, several concept artists, such as Houston Sharp and Alix Branwyn, agree that it's good first to understand art and design principles. According to them, there are plenty of 3D concept artists who cannot draw or paint, and this can prove to be an issue when they are asked to generate anything that requires further understanding of art principles, such as convey certain moods or create quick sketches. 3D is a good tool, but it will not save one if they do not understand how and when to use it and apply it to a deeper understanding of art principles. (Carter 2018)

3 OUTLINING THE PROJECT

For this thesis, the author collaborated with Mohavi, a small independent Finnish interactive media company based in Tampere. To properly explore how the concept art pipeline works in conjunction with 3D assets, creating concept art for an actual game project was necessary for gathering relevant data. Having real clients and creating concept art for a concrete and not just a hypothetical project allowed a greater understanding of the big picture and for testing how different techniques worked in practice.

The concept art in this thesis was created for a game called Hopped Up, a 3D online multiplayer game that is currently in development at Mohavi. In Hopped Up, the players play as a small frog character and join each other online to compete in various challenges of speed, skill and luck. The challenges range from reaching a goal first to surviving as long as possible in a level full of environmental hazards.

Hopped Up takes inspiration from games like Fall Guys: Ultimate Knockout (Picture 31, upper left) and Overcooked, emphasising chaotic battle royale-type game mechanics. Other games benchmarked were modern Mario (Picture 31, upper right and below) and other Nintendo games, which inspired the game's fresh and colourful look. While Fall Guys: Ultimate Knockout has a somewhat plastic feel to its 3D models and art style, Hopped Up tries to go for a more organic and natural feel without appearing too rugged and cluttered. The style is stylised and comic-like rather than realistic, with the models being soft and approachable.



PICTURE 31. Examples of inspiration sources for Hopped Up. Fall Guys: Ultimate Knockout (upper left), Super Mario Galaxy (upper right), and Super Mario 3D World (below)

Hopped up uses Unity as its game engine, while 3D models, rigging and animations were created with Blender 2.9, a free 3D modelling software. This is why all the 3D done for this thesis has been made using Blender 2.9. Most 2D art was done in Photoshop CC, while most texturing was done in Substance Painter. For project collaboration, a repository program GitKraken was used and Google Drive and Discord for meetings and communication. A prototype of one of the first playable levels, the racing level, can be seen in Picture 32.



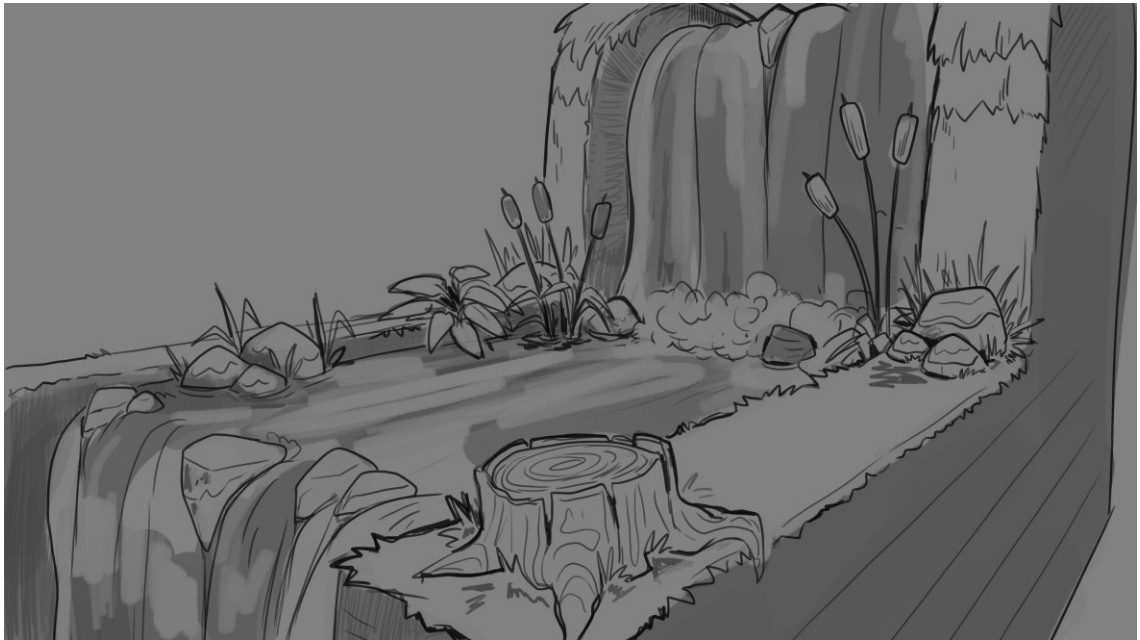
PICTURE 32. Screenshots of Hopped Up prototype. (Mohavi 2021)

3.1 Client expectations and author's role in the project

The team working at Mohavi is small. The company is much looser in its structure than, for example, Rovio Entertainment or Remedy Entertainment, which employ several artists and need to be more structured to work as a team. This made the author one of the four artists currently working on Hopped Up, allowing for more control of the creative process and the freedom to research different methods. People's opinions were equally appreciated within the team, but the art lead had the final say in everything art-related. Generally, the project was more relaxed than most, seeing that it is a side project the studio was working on while doing client projects.

The author's primary role in the project was to create environmental concept art for Hopped Up (Picture 33). The goal was to make the levels feel attractive, alive and natural, and communicate ideas inside the team so other members could make refined 3D models of props and items to use in the levels. As the author's task was to make the levels feel alive, as much content as possible was created

to be further refined. Creating the art required generating as many ideas as possible, presenting them, and refining them after receiving feedback. The refined ideas could be then added to the finalised art and levels. Another artist on the team worked on the character, usable items and different .



PICTURE 33. Example of concept art produced by the author for Hopped Up

Creating the concept art included more than simply the environmental prop designs themselves. The placement, feel and mood were of importance. The author was also tasked with research and helping come up with ideas for the game, such as creating moodboards to communicate feelings and new designs for props. Art-wise, the work involved creating silhouettes and other sketches and more refined 2D art of the levels. The refined 2D art of the levels helped convey ideas and the mood, and some of it could also be used for marketing purposes if required.

Both for the sake of research and for the ease of other members of the team, the author created preliminary 3D models of level props. These were both to help the concept art process by providing a reference for lighting, perspective, size and shape, and a usable model for other team members. This helped minimise work, as the preliminary 3D models could be used and further refined by 3D modellers. With the help of 3D, it was simple to create prop placement inside the levels and see how the models look from the angle used in the game.

3.2 Researching for the thesis

The critical questions that the author wanted to answer with this thesis revolved around using 3D in video game concept art. How can one utilise 3D in the concept art to speed up the process as efficiently as possible, and what different 3D techniques are out there? When should one use 3D, and when might it prove too cumbersome to use? What are its pros and cons? While it is generally known that several concept artists use 3D, its pipelines and the work methods used have not been written about extensively. "Visual Concepting for Video Games Using 3D Software: Study of Grease Pencil Tool for Blender 2.8", a thesis written by Jaakko Takalo (2019), touches well on the subject, but most of all from the perspective of Grease Pencil Tool of Blender 2.8. The purpose of this thesis was a more in-depth look at other 3D work methods in addition to the possibilities of the Grease Pencil tool.

Hopped Up offered a unique chance to research as a part of making it. Mohavi had other projects to work on simultaneously, and Hopped Up was yet to receive funding, so the project was not in a hurry to be finished. This way, the author was allowed more freedom to test various methods for creating concept art using 3D than would normally be possible. In a typical scenario, concept art would be in much more of a hurry to be finished, and there wouldn't be time or place for experimentation.

The primary research method tested different techniques used by professionals working in the field and saw which methods worked the best for this project. Other 3D work methods were utilised, from using Blender's Grease Pencil function to creating paintovers of 3D scene screenshots. Though it was a rudimentary method, learning from professionals in the industry and picking and choosing what worked for Hopped up proved a fruitful way to find the best techniques and develop them further. An interview with concept artist Lukas Kuhn was arranged to gather relevant information about the industry. Kuhn works at Yager Development, a studio previously famous for its game *Spec Ops: The Line*. Interviewing Kuhn provided up-to-date information on the state of 3D in concept art from the perspective of a professional actively working in the field.

Artistically, several different techniques and different types of concept art were created. This thesis's various concept art forms include silhouette sketches and other fast sketches, moodshots, callouts, and environmental cutaways. Different 3D techniques used include basic grayboxes and 3D renders and Blender Grease Pencil to map levels and draw sketches. Most of the concept art was later on drawn, painted and post-processed in Photoshop CC.

4 WORKING ON THE PROJECT

Working on the project was both as enlightening as it was difficult. Especially in the beginning, trying to find a good work pace and pipeline for the concepting process was challenging. Being expected to be professional while still learning the theory and practicalities of concept art was a rather stressful experience. Communication took a while to establish while working on the project, as finding ways to get concise and relevant feedback took trial and error. This was most of all on the author's part, as knowing what sort of feedback to ask for took a while to learn. After the immediate beginning of the project, it was decided that the author would work on creating concept art for a certain level, called the waterfall/stream level.

More concise communication methods were established towards the middle of the project, and after enough research, a concept art pipeline of sorts was established. It was decided that it is best to do research and moodboards for the designs first, then create sketches and have them approved. After the sketches and ideas were approved, fast and very simplistic 3D models were made to work as a guideline of sorts in the scene. Finalised concept art was created based on the final 3D render. The finished artworks included callouts, moodshots, material studies, and environmental cutaways. Though the process seems simple in retrospect, arriving at it took reading concept art theory and research of techniques used by modern concept artists. Most of the 3D experimentation was done during this time.

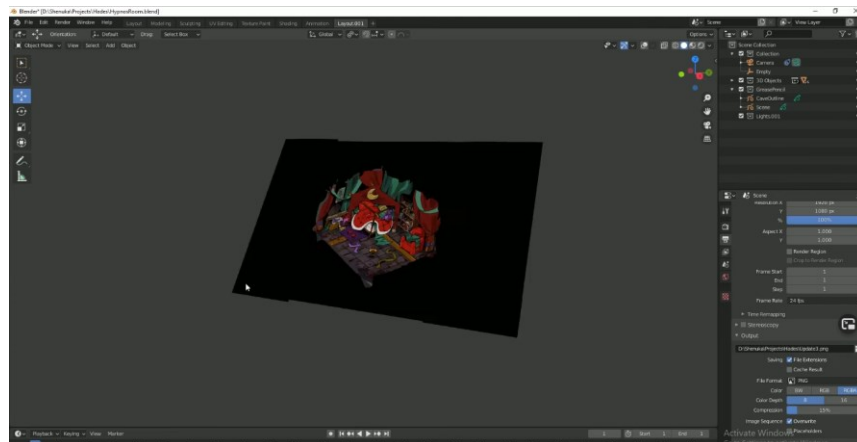
At the end of the thesis project, sufficient amounts of concept art of the stream level were produced to eventually create the finalised level. At this point, a sufficient amount of 3D techniques and concepting techniques had been tested to gather enough relevant data for the thesis. While the author moved onto other projects, Mohavi will continue to develop Hopped Up further, as the game was still far from finished at the time of writing this thesis.

4.1 Starting the project

Starting the project was the most challenging part of it, as most likely everyone who has ever worked on a project can agree. After agreeing to work on concept art for Mohavi, it was a simple question of starting to work on the environmental concepts. This proved slightly challenging, as because of the thesis, the author had to research the subject and work on the project simultaneously.

When just starting to work, finding focus proved difficult. As the author was simply given the task to create environmental concept art of the levels with no specific task in mind, deciding what to work on was hard. Several levels needed concept art, and deciding what to focus on took a while. The same applied to the art techniques used. The main focus of the thesis was 3D techniques, but choosing which to try first while still researching them was confusing.

Eventually, the author decided that they would start work by creating concept art for an almost finished race level and test how to make the level feel more natural and organic. The first 3D concepting technique was found in a video by Shenuka Corea (2020), a concept artist and 2D animator working at TeamMiracles. The method involves drawing on top of a 3D model on a Blender Grease Pencil canvas. The actual 3D model is not drawn on, but creating a drawing space, a canvas, with lowered opacity at the desired camera angle lets the artist use the 3D model underneath as a guideline. Picture 34 shows the canvas viewed at an angle in Blender 2.9's 3D space.



PICTURE 34. An image demonstrating the Grease Pencil canvas painting technique. (Corea 2020)

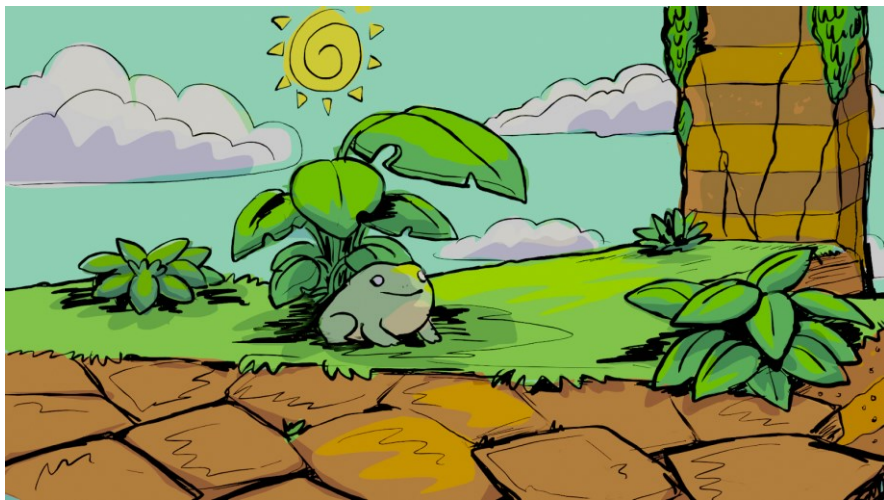
There are two ways of colouring in Blender Grease Pencil. The first one is material, where each colour used has to be created as a different material. This method makes coloured sketches a slow process as every colour used in the picture has to be created separately. However, this method allows each colour to be changed retroactively by changing the material. The colour materials used can also be transferred between different Grease Pencil Objects by linking their materials. The other Blender Grease Pencil colouring method is vertex colour, where only one material for fill colours and one material for lineart is needed. The vertex colour used can be picked easily and freely from a colour wheel and changed at any time. These colours cannot be changed retroactively.

Grease Pencil is a good choice for quick sketches because of the capability to create several iterations by simply making several canvases at different camera angles and seeing the 3D model beneath, as in Picture 35. However, working using a Blender's Grease Pencil to create coloured artwork was cumbersome. As outlined before, the colouring process was somewhat unintuitive, and the tools left a lot to be desired. The different brushes felt slightly laggy and never quite managed to draw the lines where the author wanted them. Additionally, the preset brush selection was small.



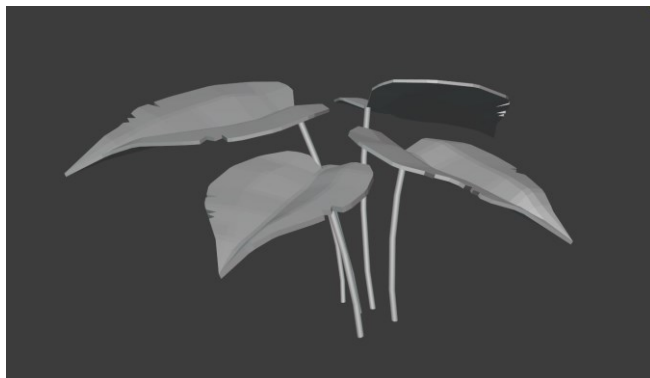
PICTURE 35. Grease Pencil canvas drawing. The 3D model can be seen under the sketch.

Picture 36 is a finished and coloured sketch of the racing level. The colours were created using materials, though it would have much more sense to use vertex colours in retrospect. Although the artwork was simplistic and not in the intended Mario-esque style, it received positive feedback and helped the team develop new ideas for level elements. However, the author decided to change the drawing technique for other images with colour. It's simply faster, easier and more intuitive to take a screenshot and refine it using a drawing program such as Photoshop CC.



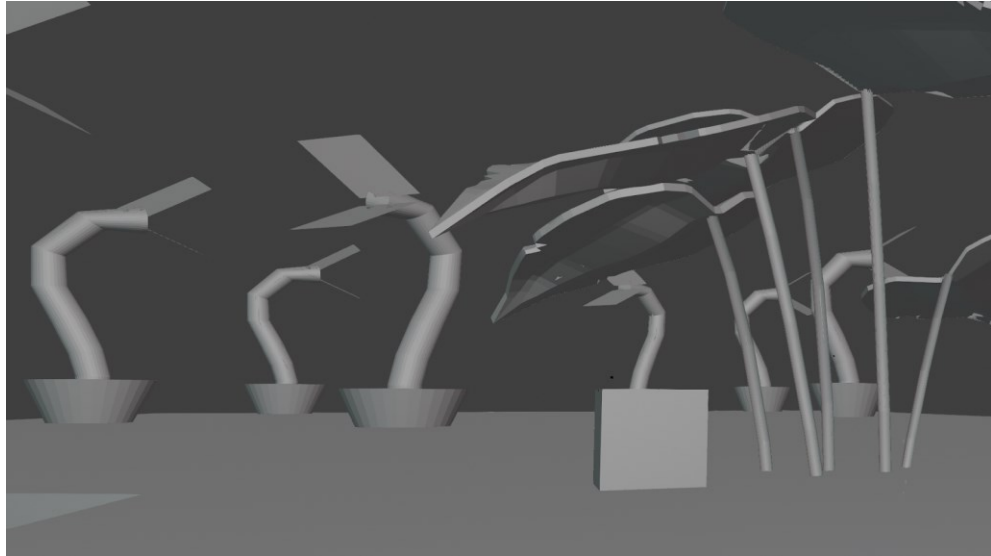
PICTURE 36. A finished colour sketch of the level.

The first 3D models created by the author were made after the experiments using Grease Pencil. The author was asked to see how to make the levels feel natural, and for this task, a fast and straightforward 3D model of a leafy plant was created (Picture 37). The plant was meant to work both as a guideline for the final drawing and as a possible 3D model for other artists working at Mohavi to refine further. It could then be used in the game.



PICTURE 37. 3D model plant meant to be used as a guideline to draw on top of

The final plant model was placed at the race level in a desirable spot. A cube was set to work as a scale model for the player character. Then the view was angled as desired, and a quick viewport render was taken (Picture 38). The viewport render was then drawn on top of using Clip Studio Paint, an art program similar to Photoshop CC, meant for drawing and painting digitally.



PICTURE 38. Placement of 3D models in the level at the desired camera angle

The final moodshot, as seen in Picture 39, was intended to convey the mood of a player about to move forth into a dangerous level. The final piece received positive feedback, and the drawing was much more intuitive than the earlier attempt made using Grease Pencil. The simple 3D guideline underneath was sufficient to convey the perspective and placement of the objects in the level. However, some shapes in the render blended together. Determining the placement of the leaves on the 3D model plant was difficult. Instead of a viewport render, it would have been better to create a proper render with defined lights and shadows to see the details better. Additionally, it became apparent that even while using very rough models, it is best to have something more complex than a simple cube. A blocky, large and rough model might obscure the background and make it harder to perceive what is going on.

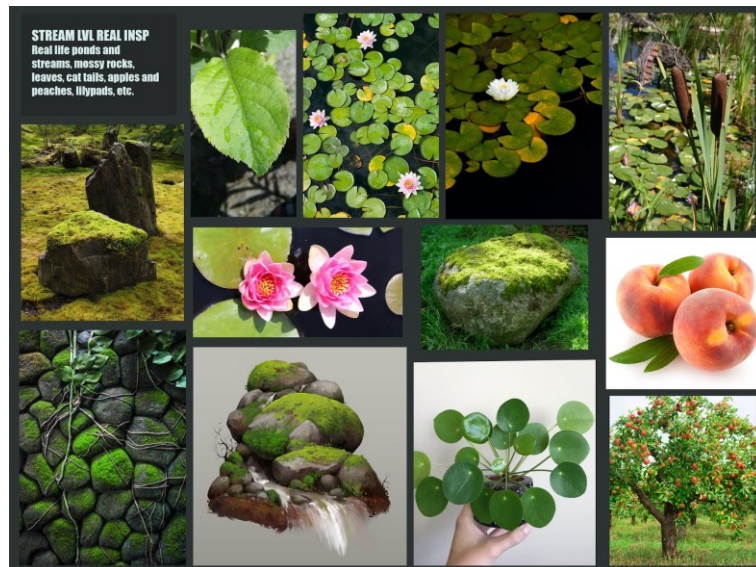


PICTURE 39. A coloured moodshot of the race level.

4.2 Working on the stream level

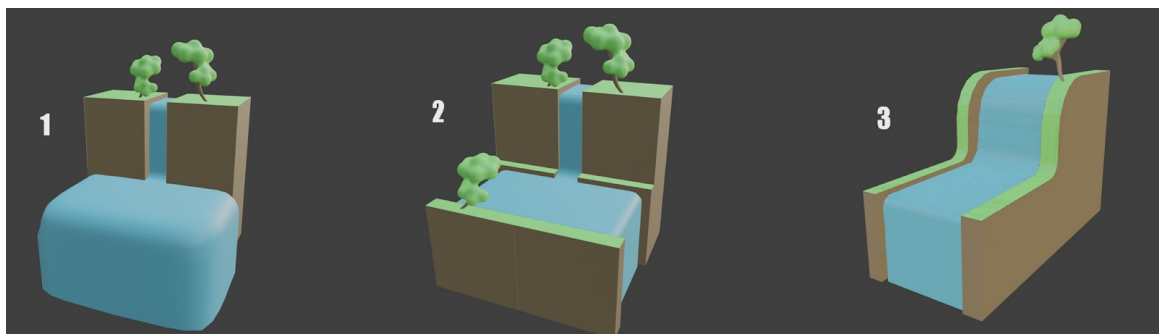
After creating some sketches and drawings for the almost finished race level, it was decided that the author should start working on a whole new level. This level was named waterfall/stream-level. The idea is that players will constantly be floating downstream on a river. The player cannot touch the water and instead has to jump from one floating object to another on the stream. The player who survives the longest without falling into the water wins the round.

The creation of the level started with research and deciding its tone. It was agreed that the style would be more akin to a small river found in the English countryside, rather than, for instance, a lush jungle or a Finnish forest. General moodboards, such as the one seen in Picture 40, were created to convey different objects and general mood ideas. Retrospectively, it was realised that these moodboards should have been more precise and targeted. Instead of conveying a general feeling, each subject should have been given their own moodboards. The ones created were passable for their intended purpose, but the moodboards will have to be more precise in the future.



PICTURE 40. an initial moodboard for the waterfall/stream level.

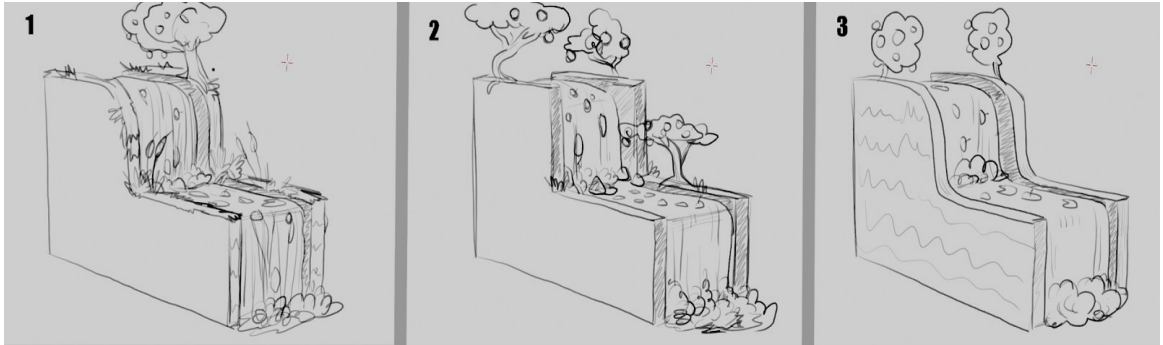
Another artist working on the project created several ideas for the base layout of the level, as seen in Picture 41. Playability posed some design restrictions for the stream level at this phase. The play area, in this case, the river under the waterfall, would have to be large enough to fit several players, and for the sake of the player's visibility, there couldn't be any tall shapes like trees near the banks of the river. Additionally, the player camera movement had to be taken into consideration. Eventually, option number 3 was chosen because the level's design wouldn't interfere with playability.



PICTURE 41. Possible ideas for the level layout. (Anthony Vanoostendorp 2021)

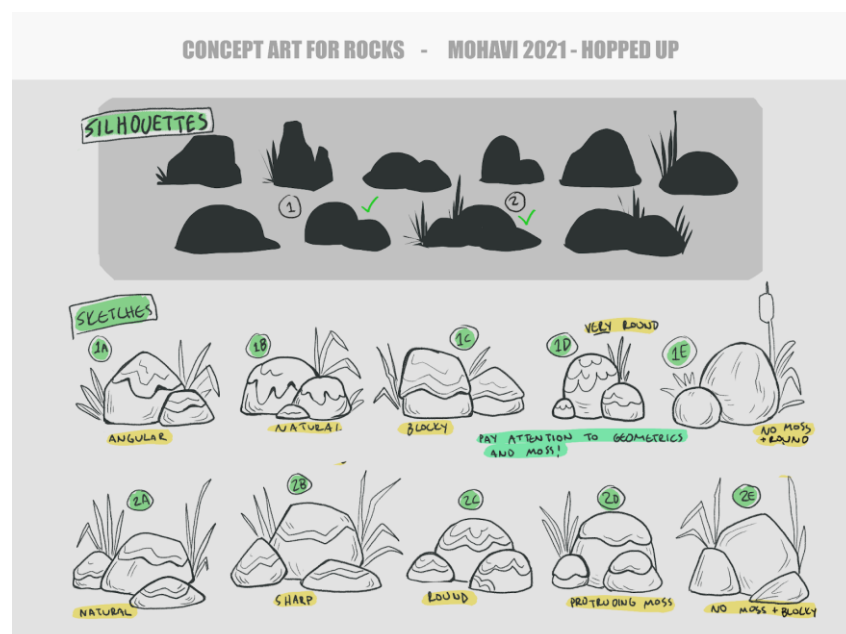
After choosing the general layout of the stream level, it was essential to decide the amount of "lushness" and other details. How organic would the level be? How many plants, trees, and other elements should there be? Should the level feel messy or clean? Eventually, it was decided that a very simplified design, like number 3 in Picture 42, wouldn't be attractive. However, like the one in number

1, a very overgrown level would be too messy and, at worst, cause visibility issues for the players. Eventually, design number 2 was chosen as the rough guideline, but with some edits. First, there could be no trees at the bottom where players are situated. It could obstruct visibility. Second, the waterfall shape would be sloping, like in picture 1, instead of straight up.



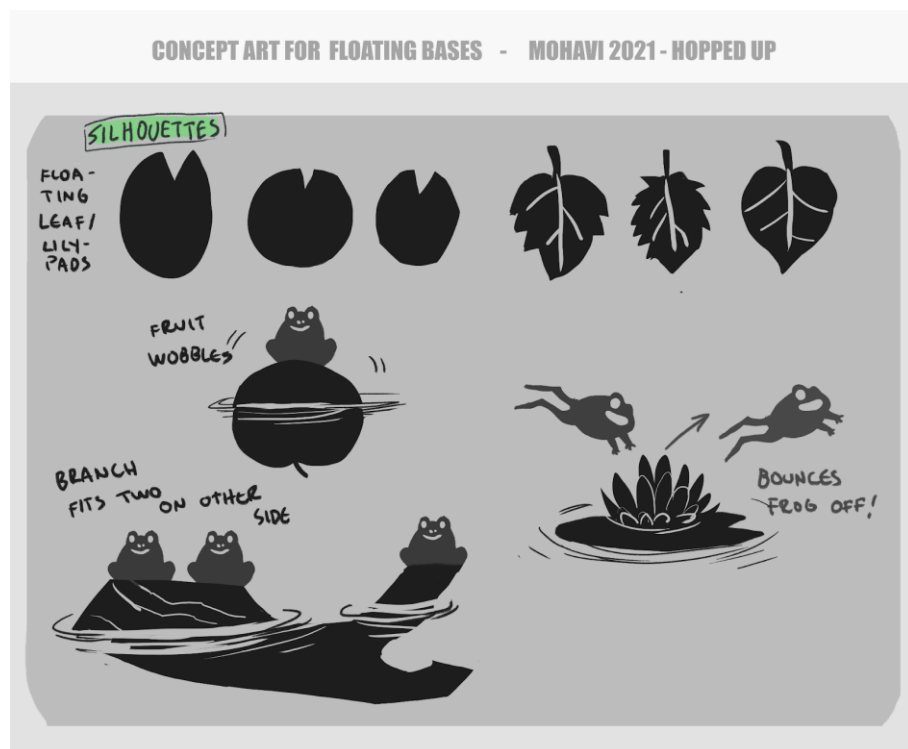
PICTURE 42. Quick possible level designs made by sketching in Blender's Grease Pencil

Following choosing the level layout, several silhouettes and other sketches were created of the elements placed in the level. An example is shown in Picture 43. Rocks, trees and plants all needed a shape language. How cartoony and exaggerated should things look? Should all the shapes be soft angular? For example, with the rock designs, the more angular look with flat textured moss of option 2B was chosen. For plants and trees, softer and round shapes were chosen.



PICTURE 43. Rock silhouettes and sketches

Working on quick thumbnail sketches and silhouettes directly in an art program such as Photoshop CC or Clip Studio Paint turned out to be far easier than using Blender's Grease Pencil or creating 3D models for each option. Using an art program was fast and straightforward, especially when illustrating movement and actions (Picture 44). The author could produce several sketches of good quality in mere ten minutes. This preliminary sketching phase of art felt unnecessary to replace with 3D.



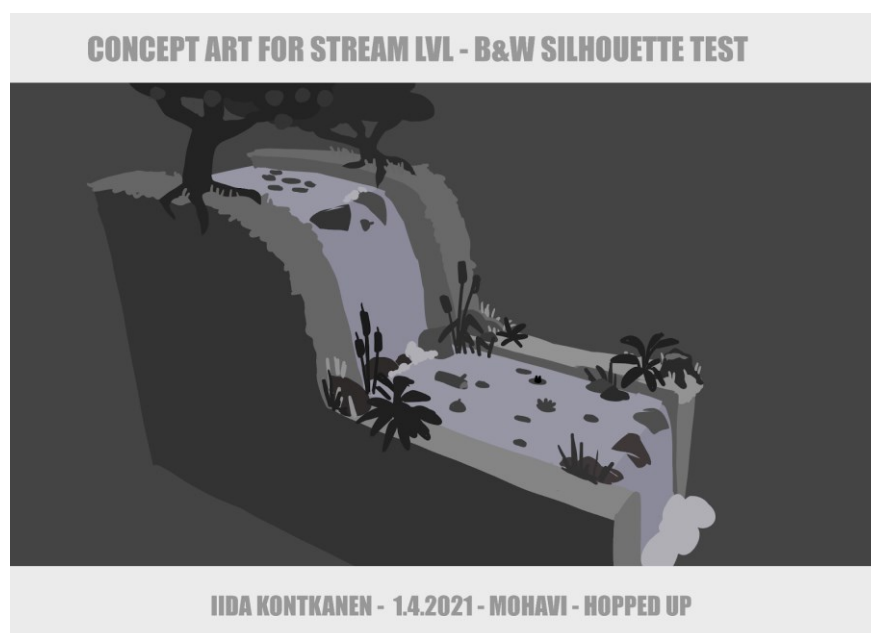
PICTURE 44. Concepts of different floating objects players can stand on and their functions.

At this point, the author began to better grasp the concept art pipeline. It became clear how vital working methodically was. This didn't apply only to techniques but to timetables and planning. Deciding what to do next - be it a mood shot, material study, callout, or a cutaway- and then sticking to it helped keep focus. It was like climbing stairs one step at a time instead of trying to jump five at once. However, one hiccup along the way realised how much time technical difficulties can take. Troubleshooting with issues that came from small mistakes, such as the 3D view in Blender not showing any models because the camera clipping distance was

accidentally too high, or having to deal with someone else's Blender settings, took up a lot of valuable work time. This shows how important it is to know one's program of choice well.

Generally, seemingly small things significantly affected the game art process. Something one might not consider, such as creating a template for all concept art that will tell when it was made, who made it, and what it was made for, can be helpful when organising the project. In larger game projects staying organized is a vital part of the work. The same goes for numbering designs. If there are twenty different thumbnail sketches on one page, team members can say which design is the most fitting concisely makes the process that much easier. It is also important to know how to ask questions while pitching designs. Instead of asking which options someone likes the best, one should ask which option is the most like the desired quality (such as scary, fun, beautiful, lush).

A quick and straightforward placement map (Picture 45) was created after creating a good selection of different designs for stones, plants, and trees. It would be easier to plan what exact designs would be used in the level and where they should be placed after making a rough guideline. For the sake of clarity, a simple grey-scale image was created. It would help understand the differences between negative and filled space better.



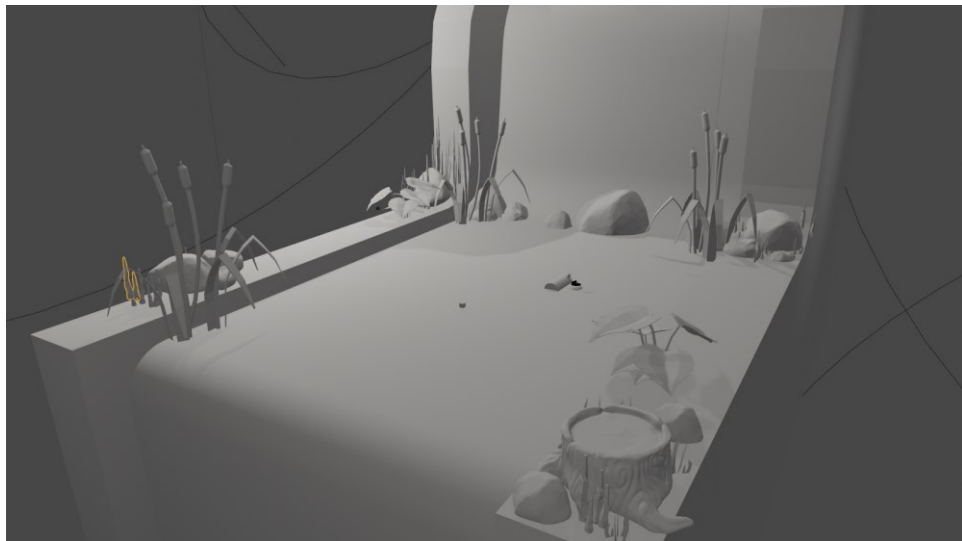
PICTURE 45. A simple grey-scale drawing of the placement of items in the level

Before any 3D models would be created, a simple environmental concept piece (Picture 46) was drawn to display the intended idea behind the level. This was most of all for research purposes. Testing the difference between drawing on top of models versus drawing without any further guidelines would help determine the best possible pipeline for the 3D concepting process. It would also help test the ideas before committing too much work to the 3D models.



PICTURE 46. A simple 3D model of the level with no other models to work as guidelines and the final environmental concept piece

After drawing Picture 46, the base idea was accepted with some added changes. It was decided that there would be no rocks in the water so the players would not think they can hop on them, and it was agreed that the water would be more "Mario-blue" with less green and more sky blue. Red-ish tones of the stones were also decided against, and after agreeing on the changes, the preliminary 3D models were created. Cattails, rocks, grasses, a tree stump, and different plants were added to the level, as seen in Picture 47 below.



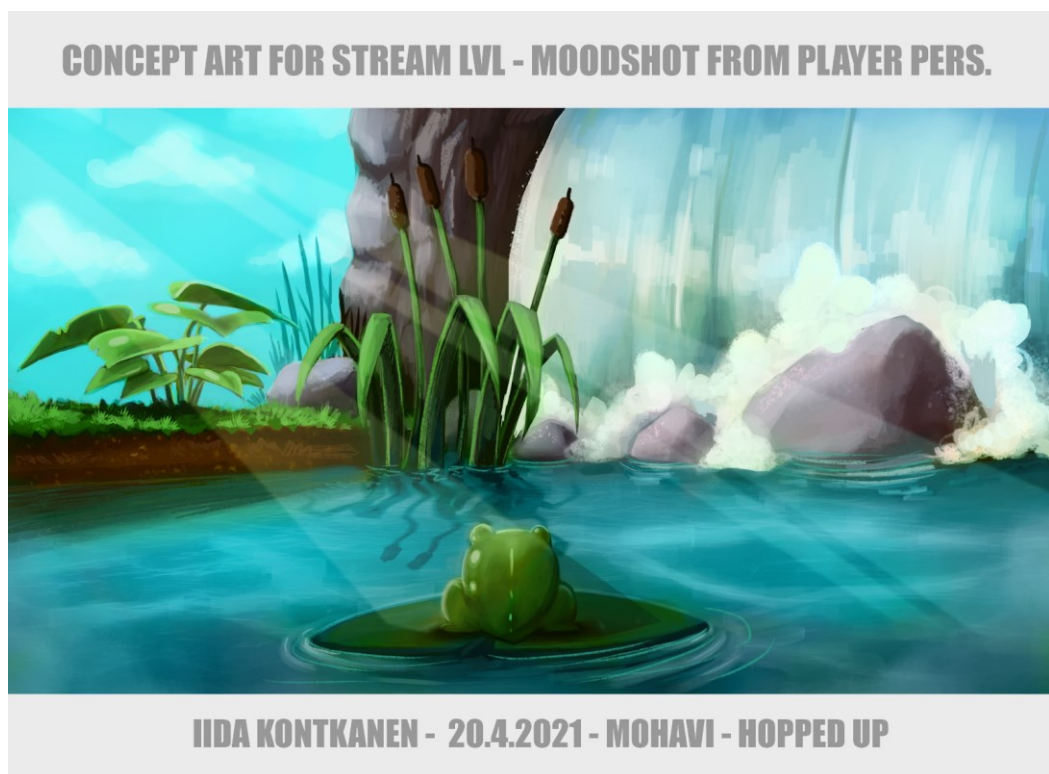
PICTURE 47. Level with most of the 3D models done

In order to speed the process, randomising was used to generate the rock shapes, and several elements, like most of the plants, were duplicated all over the level. Still, the process was slower than the author would've liked. Placing the items into the level was incredibly arduous, more so with the occasional clipping distance problems. It also had to be admitted that the author's 3D skills were a bit rusty, and Blender 2.8 onwards was uncharted territory. Many new things had to be learned, and old memories refreshed while working on the concept art. If the author had been more skilled at 3D at the start of the process, many problems could have been avoided, and the process would have been faster.

The additional 3D models helped the author understand the scale and final placement of the objects in the level. If only a preliminary graybox were used, items would look completely different in the concept than in the final level. The scale and distances work differently in 2D and 3D. Creating preliminary bases for 3D

models that could be used in the final level helped realise what level of detail was helpful for the end product. Creating simplified 3D models was more beneficial than using simple blocks to denote object placement, but sculpting was unnecessarily complicated, especially for a game as stylised as Hopped Up.

After watching Trent Kaniuga's (2020a) tutorials, it became apparent just how many small details there are that have to be taken to account while creating the concept art. For instance, creating concept art from angles that the players will never see is not as helpful as creating concept art from the player's angle. Realising this helped design levels better, as things that may look nice from other angles may not work in the player's perspective view. In Picture 48, the concept art moodshot rose from the want to test what the level might look like from a player's perspective.



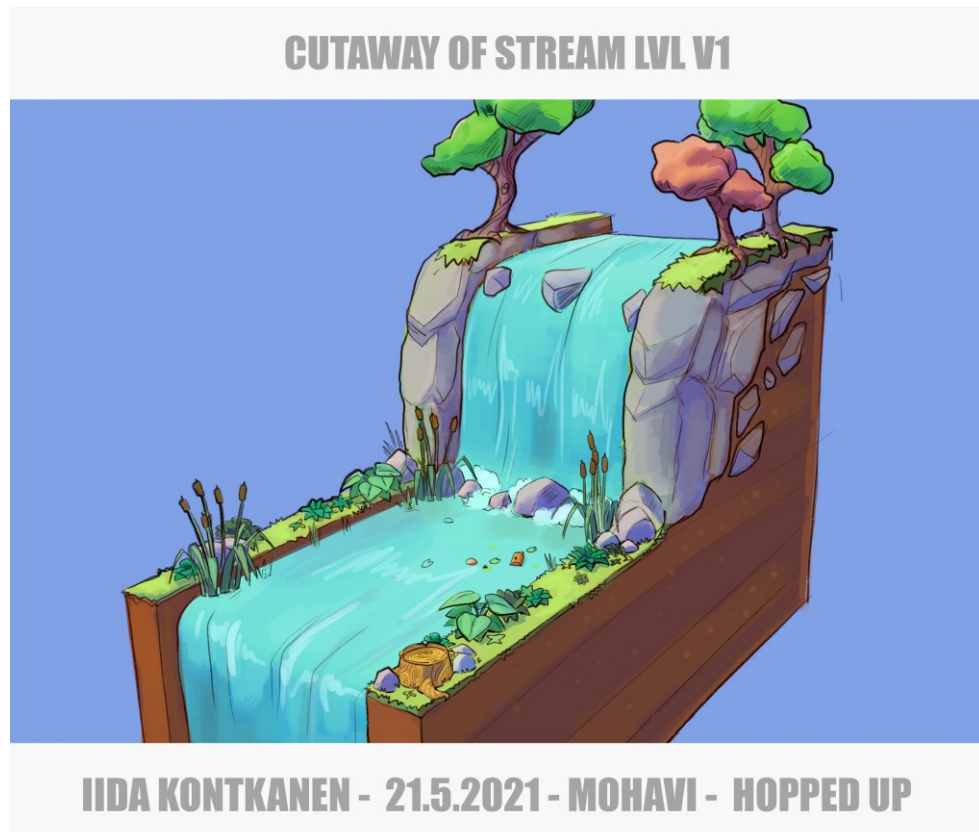
PICTURE 48. The finished moodshot from the player perspective.

The moodshot in picture 48 was rendered as carefully as possible, with several techniques that took inspiration from Trent Kaniuga's (2020a) video series on creating concept art for Diablo 3. First, the whole picture was rendered as carefully as possible in grayscale to get the desired values. For colours, a technique where an image with approximate right mood was used, then blurred and colour

picked from. Additional colours were done with a gradient map, which is an effect that assigns different values of darkness and lightness with a specific colour. Photobashing was used for water textures.

After the moodshot in Picture 48 was done, it was decided that it was time to test using materials for the 3D render and how using them might help with the final concept art piece. Adding the materials to the 3D objects in the scene was easy and fast, allowing for broad changes to be made fast. After the material was applied to the objects, it was easy to change how they looked and felt by changing their glossiness, colour, and other qualities. While the materials were very basic, they still gave a good preview of how the final level might feel.

A final cutaway was made to compare previous iterations in both design and colour (Picture 49). Drawing it felt intuitive and easy, and changes to the final artwork (some colours were changed, and some objects added to the final cutaway) were faster and easier than the author could have imagined. The small added effort paid off, as adding the materials to the 3D scene helped tremendously with all aspects of the finished piece.

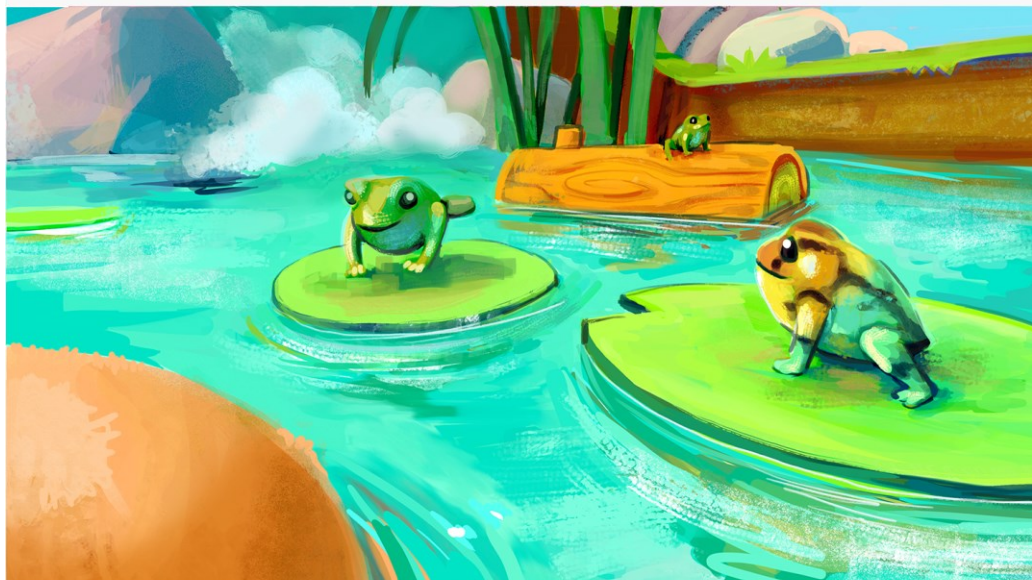


PICTURE 49. Final cutaway of the stream level.

The same technique was then tested on a more painterly artwork. Other members of the Hopped Up team had requested a moodshot with several frogs in it. It was the perfect way to test painting on top of a 3D render where materials and lights were used. It proved to be slightly more challenging than simply drawing and throwing in some quick colours. The colours had to be more vibrant, and making the image look less stiff took more work than anticipated. However, the final moodshot (Picture 50) was well worth the effort. The original 3D rendered image can be seen above in Picture 50.



MOODSHOT OF STREAM LVL V1



IIDA KONTKANEN - 21.5.2021 - MOHAVI - HOPPED UP

PICTURE 50. The 3D render of the scene, and the moodshot painted on top of it.

4.3 Testing the different 3D concept techniques

Here is a collection of all the 3D techniques used in this project and some opinions. The thoughts on practices in this section are all based on the research and personal experiences of the author. The tested methods for this thesis include basic grayboxes, drawing on canvas using Blender Grease Pencil, using materials and lights in Blender, and photobashing and paint overs. Virtual reality sculpting, particle systems or nodes were not used during this project, as there was not enough time or warrant to test them.

4.3.1 Basic graybox

Basic graybox turned out to be one of the most convenient techniques used in the project. In the author's opinion, the results that were achieved with it were the best, as a basic graybox allows for more freedom while drawing. A basic greybox works as a solid perspective and shape guideline without getting too much in the way. The world is one's oyster with a basic graybox - they are easy to make and even easier to draw on top of, as nothing unnecessary is in the way of the drawing. If too many 3D models are added to the image, making changes becomes more complicated, as the 3D models obscure the perspective. Grayboxes are easy to make with any 3D program and an excellent place to start with for beginner 3D artists.

However, drawings made on top of the graybox aren't representative of what the level might look like in the end, as a basic graybox doesn't allow one to test what a 3D model will look like in reality in the level. There is always a small amount of disconnection between 2D and 3D, and the more things are made in 2D, the more work it takes to convert them faithfully to 3D.

4.3.2 Additional 3D objects in Blender

Using basic 3D models in addition to a graybox proved helpful to a certain point. Using just a cube obscured the vision and made light and shadow harder to understand, but using sculpted models proved redundant for a game as stylised as Hopped Up. It simply took too much time, and the sculpt would be harder to refine further by other artists down the pipeline. The same outcome was achieved with more low-poly models. However, if the game were made in a realistic style, or if kitbashing was utilised, sculpts might prove to be worth the time sunk into them.

Using additional 3D models as guidelines helped see how a finalised game asset might look in the level. For instance, the final scale and placement of objects were easier to figure out using 3D models. But at least in Blender moving the models around and placing them in the level was an ordeal. Hand-placing each 3D model in the scene takes much time. There is a reason why most artists create repetitive models, such as stones or plants, as particle systems that automatically place them in the level. If particle systems had been used as part of this project, maybe the author's life would've been made easier, though hand-placing everything allowed for excellent control on the look of the level. Particle systems were not eventually used because of time constraints towards the end of the project.

One of the more valuable aspects of using additional 3D models is that other artists can further refine them if they are deemed fit for the level. However, this is a double-edged sword - if the preliminary models are rejected, all the time spent working on them will be lost.

4.3.3 Blender Grease Pencil

Blender Grease Pencil was used in a somewhat limited way in this project. There are several ways of employing Grease Pencil, such as creating wireframe models, using Grease Pencil objects to generate particles such as grass, and creating sketches in 3D space. However, creating wireframe models wasn't helpful for this project as it's best employed for symmetrical objects like vehicles. Creating sketches in 3D space seemed somewhat redundant as there already was a 3D

base for the levels. If the author would have had to design the levels from scratch, maybe the additional functions demonstrated by artists such as Jama Jurabaev would've proved more beneficial. Using Grease Pencil objects as particles may have been very effective, but there simply wasn't enough time to test this particular technique.

But as it stands, Grease Pencil was used most of all for quick sketching on a Grease Pencil canvas with the graybox visible behind it. Creating coloured paintings with it was hard, as as a primarily 2D animation tool, the brushes aren't made for creating a very painterly look. The vertex and material colour systems were also somewhat confusing and cumbersome to use. Additionally, the brushes caused much frustration, not always functioning as intended.

A surprising usage for Grease Pencil was found creating placement maps on the levels. Setting the Grease Pencil object's origin to a 3D surface made it possible to draw directly on 3D objects. This allowed for mapping quick "blueprints" for item placement and how big they would approximately have to be.

4.3.4 Lighting and materials in Blender

Materials and lighting were tested in a few pieces during this project, and they instantly showcased their usefulness. Adding basic materials to the models was easy and fast, and several 3D models could be given the same material by linking their materials to each other. The materials could then be easily changed and modified across the models, allowing for significant changes to the scene in a matter of minutes. Using materials and lights allowed to plan the colour and look of the entire 3D scene quickly, and even with simple materials, the change in usefulness was noticeable.

Using materials made colouring and rendering the final 2D piece faster and easier. With the base colours decided, it was easy to get them precisely as wanted with minor editing adjustments in Photoshop. It made working on the final piece much more manageable when colours and shadows didn't have to be planned by hand.

One problem with using materials and lights and then painting on top of the 3D render is how stiff the outcome might look. While the 3D combined with lights and materials allows for precision, it also can make the final piece look lifeless and washed out, and the 3D models can look very stiff, mainly if they're meant to portray movement. Additionally, to get the final render to look exactly as wanted takes much tweaking and mastering the 3D rendering process of the used program.

4.4 Conclusions and finishing the project

The expectations at the beginning of the project were somewhat mixed. Even as a thought, working for an official company was rather stressful, since having to conduct research while working on an official project seemed like a lot of work. Having to make concept art for a project that Mohavi would try to get funding for created high expectations. In a way, this was a good thing, as it forced the author to work hard and take the project seriously. At the same time, it was exciting to work for an actual company. Creating concept art for a real client helped with having a more realistic look at the concept art process as a whole, even if the experience was unique, with looser deadlines than most game projects would allow.

As for the reality, the project ended up being less stressful than the author feared. However, working as a professional concept artist while still learning the techniques and theory was much work. It was also surprising how much time it took to learn fundamental things like communicating efficiently and finding a proper working pipeline for the concepting process. More work involved more work than the author could've imagined, both regarding the thesis and the project.

Finalising the project was rather anticlimactic. With a sufficient amount of concept art done for the stream level, the thesis could be completed. With the end of the thesis came the end of the project, and the author moved on from working on Hopped Up after delivering the final concept art pieces. As of May 2021, Hopped Up was still in development by Mohavi and had not yet reached the beta testing

phase. It was unsure if the author would work on the project further after the thesis, but the possibility was left open.

After having finished all the concept art, the author asked the team working on Hopped Up for feedback. The team noted that they usually don't have a concept artist in the team when they work on a project. Instead, they make everything from the start themselves. When someone is working, for example, on a 3D model, they will create their own concept art for it. This can make seeing the big picture hard, as everyone has their own processes. Additional work has to be done to give the game a final, unified look. Seeing the author's concept art helped the team see the big picture and realise their vision easier than usually. It also helped see what needs to be created for each level, such as different particle effects and shaders.

Both the author and the team agreed that it would have been nice to see more concept art of different levels. However, it was also agreed that there was only so much work that could be done within the limited time frame. It was remarked that a full-time concept artist would be helpful in Mohavi's future endeavours, as it would help give their games and products a unified look.

5 DISCUSSION

A quote that stuck with the author throughout the whole work process was one by comic book artist Tom Foster (2016). “People often lament that the ‘magic’ of the entertainment industry, a market in which comics reside fairly perilously, dissipates when you become aware of how it is achieved. Indeed, drawing professionally is a bit like being a magician: it’s an instantly impressive skill; it takes years of solitary, thankless toil to master; and it often requires you to pull something out of your arse at a moment’s notice. And yes, when the mechanics are exposed, it often seems considerably less supernatural – but, just like magic, the end result relies entirely on the deftness of its performer. Management of resources is simply part of the craft, not a way of cheating. “

Indeed, Foster’s comment very aptly resonates with the feeling of many artists who employ techniques such as 3D. While those who have little understanding of art may see it as cheating, it is but a tool to be used, a resource to be managed. Using 3D as part of any process, be it for concept art or something else, requires skill and planning in its own right. It requires a pipeline, understanding how to use the programs, and how to employ them to get the desired results. It requires understanding why you’re using 3D in the first place.

The final pipeline and working process for the environmental concept art created for the thesis was as follows:

- 1) Assignment / deciding what to focus on.
- 2) Research and moodboards
- 3) Silhouettes and other sketches
- 4) Sketches of the environment with the help of a simple graybox
- 5) Creating simple 3D models to work as guidelines and placing them in the level
- 6) More refined concept art such as cutouts, moodshots, callouts and material studies.

However, even after defining a pipeline, following it rigidly for every project will not work. Each project is different and requires the artist to adapt and consider how to change their tools to fit the project and ask themselves - what type of art is needed? What sort of a game am I making? A 2D game might not always benefit from 3D concept art. A game that is flat-coloured doesn't need material studies. And so forth. What matters most, in the end, is internal consistency and the artist's adaptability. Once a work method has been adopted, it should be uniformly used to keep everyone on track and produce consistent concept art that fits the current project.

The research and the project conducted for this thesis are just one experience among many. The pipeline of creative processes is never entirely defined, but this was a good window into the possibilities of 3D methods. Though the project for Mohavi was unique because of the creative freedom and lax timetables, it still gave a view into working on an actual game project. It's just that not all aspects of it can be considered reliable representations of the reality of the game industry.

One challenging aspect of the research was how fast things had to be learned and how the 3D techniques had to be assessed with limited experience on the method. In the future, some of the 3D work methods presented in this thesis could be researched more in-depth to test the opinions presented within this thesis. Another aspect that could be explored further is learning what it is like to create concept art for a more typical game company, where the day-to-day work is more hectic and structured.

Despite the hiccups and difficulties, the project and the research were valuable experiences. The author could genuinely be a valuable member of the team working at Mohavi and contribute to Hopped Up. Though if there had been more time, even more art could have been created, but then again, that seems to apply to every project out there.

When it comes to using 3D for concept art, some general points came up both during the research and the project. First, if one needs only a general guideline, it's best to start somewhere small and go with a basic graybox. A basic graybox can get even a beginner artist going a long way. They're intuitive and easy to

make and can be made using almost any 3D program and for almost any type of project, regardless of its style. However, if one wishes to create additional 3D objects to work as guidelines in the level, it's a good idea to go the extra mile and employ at least materials. The 3D objects can help with proportions, but they can also help with understanding the surfaces and colours much better with added materials. The small extra effort helps a lot.

Understanding why one is using 3D is vital. Usually, this is done to save time. If one does not know how to use a 3D program, using it when creating art for a professional project is not as valuable as employing techniques they already know well. Using more experimental methods, such as 3D sketching, virtual reality or Grease Pencil, should only be employed for projects once one knows how to use them and make them a natural part of their work process.

Another reason concept art is employed is to help in communicating. The biggest issue with creating purely 2D art for a 3D game is the disconnection between what an artist assumes the level might look like versus what it will actually look like. If the disconnection is too big, creating a game that follows the vision presented in the concept art might prove simply impossible with the tools at hand. If concept art is a language, then eliminating miscommunication is one of the most important parts of it. While it might not be the best idea to hammer a nail with a spoon, so long as whatever tool one uses is comfortable and one can use it to produce quality work, it can and should be used.

However, work comfort shouldn't discourage people from trying new techniques. While it can be intimidating to learn challenging new programs, one cannot develop as an artist if one does not spend the time to learn new things. Art is about challenging oneself - nobody starts doing art for a living unless they are comfortable with the idea of learning something new and spending the hours to learn. Something like 3D tools can be a great way to take the extra step to develop oneself as an artist.

3D will likely be a big part of the future of all art, with 3D work methods presenting fascinating possibilities, especially for realistic interactive art. New exciting technologies, such as AI and procedural modelling, are already a reality. For instance,

as of May 2021, Metahuman Creator, an Unreal Engine project, is in early access. Metahuman Creator is a cloud-streamed app that allows for creating real-time, highly realistic human models that can be modified freely. Meanwhile, Substance Designer is developing Substance Alchemist, a parametric 3D modelling tool that would allow for creating 3D objects by simply inputting desired qualities for the object. When tools like this become more common, the chances are that they, too, will be adopted by the concept art industry. When it comes to the future of the concept art industry, no matter what, new methods and techniques will continue to be introduced and adapted into the process.

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PICTURE 49: Author's own image. 2021. A cutaway of the stream level made with the help of lights and materials.

PICTURE 50: Author's own image. 2021. A final rendered moodshot of the level with several frogs and the 3D render it was painted on top of.

5 APPENDICES

Appendix 1. An email interview with concept artist Lukas Kuhn

Lukas Kuhn is a professional concept artist who works at Yager Entertainment.

LIST OF QUESTIONS

1. First, could you tell us a little about yourself? What is your name, where do you work, and how long have you been studying and/or working in the concept art field?
2. What is your typical concept art process like? Do you use 3D modelling as part of it?
 - a. If so, how much 3D do you use, and how far do you take the process (adding materials, particles, nodes, or just a simple, quick render with a few lights, or just a simple graybox)?
 - b. Do you feel like using 3D makes the process faster/easier for you?
 - c. In what cases would you use 3D, and in what cases would you not use 3D
 - d. If you use 3D in your concept art, what programs do you use?
3. Do you use photobashing in your work? Do you combine it with 3D elements?
4. The video game art field is still rather new. How do you feel the field of concept art has changed since you started working in concept art? Has 3D become more prevalent or even a requirement? If so, why do you think this has happened? How do you think this might change in the future?
5. Much of how the general public perceives concept art is through cool images posted online or concept art books. How do you feel people not working in the field see concept art? Is this image truthful?
6. Do you know any concept artists who use VR techniques in their work? In 2016, Google Tilt Brush was exciting news, and everyone talked about it revolutionising the art field, but do you know anyone who actually uses these techniques actively?
7. Have you used maquettes, mannequins or other real-life items as a helpful reference while working on concept art?

ANSWERS

1. Hi! My name is Lukas Kuhn, and I'm currently employed as a Concept Artist full-time at Yager Development GmbH in Berlin working on The Cycle. I've been working in the industry for about three years now, previously also having worked on The Surge by Deck13 Interactive. Before that, I studied Industrial Design for ca four years, as it's technically very similar to Concept Art, and many professionals like Scott Robertson or Mike Hill also started with this background.
2. For the longest time, I didn't want to get into 3D and tried to get by using only 2D techniques like photobashing- when I used 3D, it was the roughest blockouts to establish perspective with complicated geometrical layouts, at most. But lately, I've come to realise the power of utilising 3D more than that. Its been a huge motivator to see myself making big leaps in quality again.

From a design perspective, it's a great tool to avoid falling for optical illusions and forcing the 3D modeller later down the pipeline to have to amend the design to make it possible in 3D space. It also helps immensely with achieving consistency across multiple views, i.e. front-, side- and back view.

Also, utilising even a rough 3D sculpt can help a lot when dealing with art direction feedback or game design requirements changing after your work is done- instead of having to redraw massive portions of your artwork and the quality of the artwork degrading from those fixes/losing huge amounts of time, making amendments to the model is comparatively fast with no loss to the quality of the artwork.

At the moment, I'm merely applying materials to my models and taking care to light them well- even just this can be a huge boost to your art quality, as objects with high reflectivity instantly look far more believable than you could paint them, bounced lights included, and again, you are saving massive amounts of time in the long run. Often, I only spend 1 to

2 hours overpainting the rendered image to give it fine surface details I didn't bother to model- there is, of course, a threshold of what level of detail would actually be more of a bother to model than it is to paint- for me, that includes wear and tear details like chips on bevels or cracks on surfaces etc. I've also found it very helpful to shake up the process and introduce new tricks and techniques to my work to keep it fresh and engaging for me on a day to day basis.

2c) This varies from task to task- it's both exciting and scary that there is no perfect pipeline for any creative process. Typically I would begin my design process purely 2D, as sketching with pen and paper still is the fastest way for me to think visually, with the least friction between me and the medium. However, I have also been in a situation where it was more beneficial for me to use pre-existing 3D models and kitbash them into something new. For final images, I would try and utilise 3D always- be it perfect perspective for an interior, great lighting and materials on a hard surface design or consistent volumes on an organic sculpt.

2d) My first 3D program was Rhinoceros 6.0 when I studied. On my job, I was recommended MODO but ultimately decided to learn Blender. As it is free, it makes you independent from any licenses

3. For the past few years, I've fallen in love with handpainted stylised designs, so I've been using photobashing less and less- however, If I was working on a somewhat realistic looking project, I would definitely recommend using any technique you feel comfortable with. If building clean meshes and texturing your model is not an option, laying photo textures over your render is a sensible option!
4. The job of a concept artist is not to make pretty pictures- it is to solve visual problems. This is not only something you may hear from concept artists but is also a sentiment that was taught in industrial design (and part of why this is such a good field to study to have strong competencies for the job of a CA). Be it communicating a story to the player, the personality of a character, the history of a place, the functionality of a prop, often

unifying all of these aspects simultaneously, that is usually your job. To communicate these solutions to the 3D modeller, you have to use any tool that is best suited to the task. Previous generations used Copic drawings, then digital paint, and with the ease of use of 3D software, now this has become more and more prevalent. We are not fine artists- typically, the consumer will never see our work directly. Anything goes that gets the job done clearly and quickly.

5. Concept Art has many different faces- in the pre-development phase, a lot of visual development for AAA games does indeed include making those pretty artworks; capturing the overall mood areas, for example (how does sundown feel in AC: Valhalla vs AC: Unity etc.). However, that is just the tip of the iceberg- usually, concept art is not as pretty and then simply doesn't get released. A lot of it is also overpainting 3D models to get the right level of muddiness on the boots and stuff like that. And most of the work you're creating /should/ be exploratory sketches, not final, pretty artworks. Often game designers don't yet know what they need, and usually, your first idea won't be the best, either. It pays to explore a wide range of possibilities, unhook oneself from that first idea you already fell in love with, and find the design that's actually best for the project on the 5th iteration.
6. While I see some submissions on Artstation being done in VR every now and then, I can't say that I know any artists using it in their day to day. This kinda goes back to question 4/5; if the program is actually so fast and easy to use that it is better than using the means you currently have available (i.e. painting, 3D modelling conventionally), then by all means, use it.
7. I personally have not. I find the wooden IRL mannequins too stiff to assume the complicated poses I would actually need those references for. Usually, it is still best to find photo references of those poses. There are definitely character artists in my studio that have models of human skulls by their desks

