

**A comprehensive study of the processes  
involved in developing and optimizing  
character designs for top-down games,  
from concept to completion.**

**Master's thesis**

to obtain the academic degree M.A. in the study  
program Time-dependent media: Sound – Vision –  
Games.

**Leila Karamitalab** 

First examiner: Prof. Anke Günther

Second examiner: Mr. Kolja Bopp

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**Hamburg University of Applied Sciences**  
Faculty of Design, Media and Information  
Department of Media Technology

# Abstract

This thesis investigates the integration of generative artificial intelligence into the production pipeline of a stylized character for a top-down game. The study addresses the following research question:

How generative AI tools can be incorporated into character production workflows, and how this integration affects production efficiency, controllability, and visual quality.

The research follows a practice-based approach and is structured as a case study involving the development of a stylized character asset for a top-down game context. The production pipeline combines generative AI tools with traditional game development software and includes concept generation, visual refinement, three-dimensional modelling, optimization, and animation preparation. The process is systematically documented and evaluated based on defined criteria. In addition, a questionnaire with 16 artists was conducted to assess the perceived quality of the final character.

The results indicate that AI-assisted workflows can significantly accelerate early stages of production, particularly during concept development and initial asset creation. At the same time, limitations in controllability and stylistic consistency were observed, requiring iterative refinement and human intervention. The findings suggest that generative AI is most effective as a supporting tool in hybrid workflows, accelerating early stages while requiring human control over artistic direction and final quality.

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# 1 Introduction

## 1.1 Topic and Context

The development of digital games has become increasingly complex over the past decades. Modern games require a wide range of visual assets, including environments, props, and animated characters. The production of these assets typically involves several stages, such as concept design, modelling, texturing, rigging, and animation. Each of these stages requires both technical knowledge and artistic expertise, and the overall process can be time-consuming (Gregory, 2018, Ch. 12).

Recent developments in artificial intelligence have begun to influence creative production workflows. Generative models are capable of producing images by learning statistical representations of data (Goodfellow et al., 2016, Ch. 20). More recent diffusion-based models enable image generation conditioned on textual input through mechanisms such as cross-attention (Rombach et al., 2022, Sec. 3). These capabilities make such systems particularly suitable for early-stage visual exploration, where designers can rapidly generate and evaluate multiple variations during concept development and ideation.

Generative AI systems expand the range of possible visual ideas by producing multiple variations that designers can evaluate and refine. This interaction between human creativity and machine-generated output is often described as computational creativity. In this context, Rather than replacing designers, generative AI shifts their role toward directing, evaluating, and refining generated outputs. (Boden, 2016, Ch. 3; Colton & Wiggins, 2012).

In game development, however, visual assets must also satisfy technical constraints. Characters must be optimized for real-time rendering and remain compatible with animation systems used in game engines. These requirements mean that any automated generation process must integrate with existing production pipelines and technical standards (Gregory, 2018).

Character design plays a central role in this process. Characters act as key visual elements that communicate narrative identity and gameplay roles. Effective character design relies on a clear visual language that allows players to quickly recognise and interpret characters during gameplay situations (Tillman, 2011, pp. 10–15).

Stylized character design is widely used in many games, particularly in strategy and mobile titles. Stylization emphasizes simplified shapes and reduced visual detail rather than photorealistic representation. By removing non-essential details while preserving key visual features, simplified forms can remain recognizable and expressive (McCloud, 1993, pp. 28–32). In game design contexts, this principle becomes especially important, as characters must remain readable under gameplay conditions such as small on-screen size or distant camera perspectives.

Because of these properties, stylized production pipelines provide a suitable context for exploring the integration of generative AI tools into character creation workflows.

## 1.2 Interest in Knowledge

The increasing availability of generative AI tools has raised important questions for creative production fields. In many cases, these tools are capable of producing visually impressive outputs within a short amount of time. However, their role in professional production pipelines is still not fully understood.

Within game development, the integration of generative AI may influence several stages of the character production process. Image generation systems can accelerate concept development, while emerging AI-based modelling tools can produce three-dimensional geometry based on visual input or textual prompts. These technologies may therefore reduce some of the time required for early design stages.

At the same time, game assets must meet strict requirements related to performance, optimization, and animation compatibility. As a result, the outputs generated by AI systems often require further refinement before they can be integrated into real production pipelines. This raises questions about how generative tools should be used in combination with traditional artistic workflows.

The main interest of this research lies in understanding how generative AI tools can support the creation of stylized game characters while still allowing designers to maintain artistic control and production quality.

## 1.3 Research Question

Based on the context described above, this thesis investigates the following research question:

How can generative AI tools be integrated into the production pipeline of a stylised game character, and what effects does this integration have on production efficiency, controllability, and visual quality?

This question is explored through the practical development of a stylised character asset. The character is produced using a workflow that combines generative AI systems with traditional game development software. The process includes concept generation, visual refinement, three-dimensional modelling, optimisation, and animation preparation.

Through this process, the thesis examines how generative systems influence the efficiency, controllability, visual quality, and practicality of character production workflows.

## 1.4 Structure of the Thesis

This thesis is organised into six chapters.

Chapter 2 presents the theoretical foundations of the research. It discusses generative artificial intelligence in creative production, stylised character design in games, and game art production pipelines.

Chapter 3 introduces the methodological framework of the study and explains the research-through-design approach used in the project.

Chapter 4 documents the practical implementation of the character production pipeline. This chapter describes the design process step by step, including concept generation, modelling, optimisation, and animation.

Chapter 5 presents the results of the project and evaluates the effectiveness of the AI-assisted workflow.

Finally, Chapter 6 discusses the findings in relation to the research question and outlines possible directions for future research.

# 2 Theoretical Foundations

## 2.1 Generative Artificial Intelligence in Creative Production

Recent advances in machine learning have introduced new possibilities for digital content creation. Generative artificial intelligence systems are now capable of producing images, textures, and even three-dimensional forms based on textual descriptions or reference data. These systems rely on neural networks that learn statistical patterns from large datasets and use these learned representations to generate new outputs (Goodfellow et al., 2016, Ch. 20).

One important development in this field is the emergence of diffusion-based generative models. These models generate images through an iterative denoising process, in which random noise is progressively transformed into structured visual representations (Ho et al., 2020, Sec. 2). Diffusion models have become widely adopted in contemporary image generation systems due to their ability to produce high-quality and semantically consistent results. Because these systems can generate images conditioned on textual prompts, they allow designers to explore visual ideas rapidly without manually sketching each variation.

Within creative disciplines, generative artificial intelligence is often understood as a tool that expands the design process rather than replacing it. Computational creativity research describes this interaction as a relationship in which generative systems explore possible outputs while human designers remain responsible for interpretation and evaluation. In this framework, artificial intelligence supports the exploration of new design possibilities, while human designers retain control over selection and artistic direction (Boden, 2016, Ch. 3; Colton & Wiggins, 2012, Sec. 2).

As a result, generative systems are increasingly used during the early stages of visual development. Designers can generate multiple variations of a concept and then select and refine promising directions. This process supports

ideation and enables broader exploration of design alternatives, as generative tools have been shown to support early-stage design exploration in creative disciplines (Paananen et al., 2023).

However, the outputs produced by generative systems do not automatically meet the requirements of production environments. In many cases, generated results must be refined, edited, or optimized before they can be used in professional workflows. This limitation is particularly relevant in game development, where assets must function within real-time interactive systems and satisfy both technical and aesthetic constraints (Gregory, 2018, Ch. 12).

## 2.2 Character Design and Stylization in Games

Character design plays a central role in the visual identity of video games. Characters communicate personality and narrative context through their visual appearance. Because of this, character design must balance artistic expression with clear and effective visual communication (Tillman, 2011).

A key element of effective character design is visual readability. Characters must remain recognizable even during fast-paced gameplay situations. Designers therefore rely on visual elements such as silhouette, proportion, and colour contrast to ensure that characters can be quickly distinguished. Strong silhouettes, in particular, allow players to identify characters at a glance, even when viewed at small screen sizes or from distant camera perspectives.

Stylized character design represents an approach that emphasizes these qualities. Stylization focuses on simplified forms, exaggerated proportions, and reduced detail rather than realistic representation. This approach enhances visual clarity while also supporting a distinct artistic identity. Stylized design is widely used across different game genres because it supports both readability and expressive visual storytelling.

In addition to aesthetic considerations, stylization also influences production workflows. Simplified geometry and reduced surface detail make assets easier to optimize for real-time rendering. Stylized characters typically require fewer polygons and less complex textures compared to photorealistic models, which helps maintain performance in interactive environments.

Furthermore, stylized assets are generally more tolerant of minor visual inconsistencies. Small geometric imperfections or texture irregularities are less noticeable compared to photorealistic assets, where visual accuracy is more critical. This characteristic makes stylized production pipelines particularly suitable for exploring the integration of generative tools in game development workflows.

## 2.3 Game Character Production Pipelines

The creation of a game character typically follows a structured production pipeline. This pipeline consists of several stages that transform an initial concept into a fully functional game asset. The process usually begins with concept art, where designers explore the visual appearance of a character through sketches and illustrations. Once a design direction is established, the character is translated into a three-dimensional model.

After modelling, additional steps are required to prepare the asset for animation and integration into a game engine. These stages include texturing, rigging, and animation. Texturing defines the surface appearance of the model, while rigging establishes a digital skeleton that enables movement. Animation then brings the character to life by defining motion and behavioural states.

Traditionally, these stages rely heavily on manual artistic work. Artists sculpt three-dimensional forms, create texture maps, and manually adjust rigs to ensure stable deformation during animation. These processes are time-intensive and require a high level of technical and artistic expertise.

Recent developments in generative artificial intelligence have introduced new tools that can influence several stages of this pipeline. Image generation systems can assist during the concept phase by producing visual variations of character designs from textual prompts (Rombach et al., 2022). In addition, emerging AI-based modelling systems are capable of generating three-dimensional meshes from visual input, which may support early-stage asset creation (Poole et al., 2022).

Despite recent advancements, earlier approaches to AI-based 3D generation often produced meshes that required additional processing and refinement, motivating the development of improved methods (Chen et al., 2024).

Because of this hybrid workflow, the integration of generative AI into game production pipelines is best understood as a collaborative process between automated systems and human designers. Rather than replacing traditional methods entirely, generative tools support specific stages of the workflow while designers retain control over artistic direction, technical validation, and final asset quality.

## 3 Methodological Framework

### 3.1 Practice-Based Research Approach

This thesis follows a practice-based research approach. In design-related disciplines, knowledge is often generated through the process of creating artefacts and reflecting on how they are produced. Rather than focusing only on the analysis of existing objects, practice-based research enables researchers to investigate questions through the development of artefacts and design outcomes (Candy & Edmonds, 2018).

Within game design and digital media research, this approach is particularly relevant when new technologies or production methods are explored. In this context, the design process itself becomes part of the investigation. By producing an artefact and systematically documenting the steps involved, it becomes possible to analyse how tools, workflows, and design decisions influence the final result.

In this thesis, the artefact developed during the study is a stylized game character created through a pipeline that combines generative artificial intelligence with traditional game development tools. The process of designing and producing this character provides a basis for evaluating how generative systems interact with established production workflows.

The aim of this project is therefore not only to produce a character asset, but also to examine how the design process is affected when AI-based tools are introduced into the pipeline. Through this approach, the research focuses on both the final outcome and the process that leads to it, allowing for a more comprehensive understanding of AI-assisted production.

It should be noted that the level of manual refinement applied to the generated assets was intentionally kept minimal. The primary focus of this study was to investigate the integration of generative AI tools within the character production pipeline, rather than to produce a fully polished, production-ready asset. As a result, manual adjustments were limited to essential corrections required for usability, while stylistic refinement and final artistic detailing were not extensively pursued. This approach allows the study to more clearly evaluate the capabilities and limitations of AI-assisted workflows without the results being significantly influenced by advanced manual intervention.

### 3.2 Research Through Design

The methodological foundation of this thesis is closely related to the concept of research through design. This approach describes a framework in which design activities are used as a method for generating knowledge. Rather than treating design solely as a practical outcome, the design process itself becomes a way of investigating research questions (Zimmerman et al., 2007).

In research through design projects, prototypes function as experimental artefacts. They enable researchers to test ideas, explore emerging technologies, and observe how design decisions influence the final outcome. The knowledge produced in such studies often emerges through reflection on the design process and the evaluation of the resulting artefact.

In this thesis, the research-through-design approach is applied to explore how generative AI tools can be integrated into a character production workflow. The character developed during the project serves as a case study that demonstrates how different tools affect each stage of the pipeline.

The design process includes concept generation, visual refinement, three-dimensional asset creation, optimization, and animation preparation. Each stage is systematically documented and evaluated in relation to the research question, allowing the process itself to function as a form of structured investigation.

### 3.3 Case Study Design

The research is structured as a single case study focusing on the development of a stylized game character. A case study approach enables the detailed investigation of a phenomenon within its real-world context, particularly when the aim is to understand complex processes rather than to produce statistical generalizations (Yin, 2018, Ch. 1).

The selected case study examines the creation of a character intended for a stylized strategy game environment similar to the visual style used in titles such as *Heroes of History* (InnoGames, 2024). The project focuses on a single character in order to analyse the complete production pipeline, from concept development to animation.

Focusing on a single asset allows the research to examine each stage of the workflow in depth. Rather than analysing multiple assets at a superficial level, the study concentrates on documenting design decisions, tool interactions, and technical challenges encountered throughout the process.

This approach makes it possible to observe how generative AI systems influence different stages of production and how designers interact with these systems within a practical workflow.

### 3.4 Evaluation Criteria

To evaluate the effectiveness of the AI-assisted workflow, a set of criteria was defined based on the practical goals of the project and the aspects that could be observed and assessed during the production process. These criteria are directly related to the research question and reflect both the production workflow and the outcomes of the final character.

The first criterion is production efficiency. This refers to the time required to complete different stages of the pipeline and how generative tools influence the workflow. The aim is to identify which stages are accelerated or simplified through the use of AI tools.

The second criterion is visual quality and readability. The final character is evaluated in terms of its clarity, recognizability, and overall visual coherence within a stylized game context. This includes how easily the character can be interpreted at a glance and whether the design remains consistent across different views and scales.

The third criterion is controllability of the generation process. This examines how predictable and adjustable the outputs of generative tools are, and to what extent the designer can guide the results toward a desired outcome. It also considers how much iteration is required to achieve acceptable results.

These criteria provide a structured framework for analysing the results presented in the following chapters, focusing on observable outcomes rather than theoretical assumptions.

### 3.5 Evaluation through Expert Questionnaire

In addition to the practice-based evaluation, a questionnaire was conducted to gather external feedback on the produced character asset. The purpose of this questionnaire was to complement the reflective analysis of the production process with perspectives from artists who are familiar with game art and visual design. The questionnaire primarily focuses on the visual quality of the final asset, while other criteria such as production efficiency and controllability are evaluated through the production process and reflective analysis.

A total of 16 participants took part in the evaluation. The participants were artists with experience in digital art, character design, or game-related visual production. The questionnaire focused on key aspects of character quality that are relevant for stylized game production.

The evaluation criteria included:

- A- Stylistic similarity to the target game style,
- B- readability and silhouette clarity,
- C- colour and material consistency,
- D- overall visual quality and
- E- perceived production quality.

Participants were asked to rate these aspects using scaled questions and, in some cases, provide qualitative feedback. The questionnaire was designed to evaluate the final character without explicitly emphasizing the role of AI in the production process. This approach was chosen to reduce bias and ensure that responses focused on visual and production quality rather than preconceptions about generative tools.

The results of the questionnaire are used in Chapter 5 to support the evaluation of the AI-assisted workflow and to compare external perception with observations made during the production process.

### 3.6 Research Limitations

Like all practice-based studies, this research operates within certain limitations. The project focuses on a single character asset and therefore cannot represent all possible production scenarios in game development.

In addition, the evaluation is primarily based on the production process and the resulting artefact rather than on player testing or large-scale user studies. The findings therefore focus on workflow observations and production feasibility rather than player perception.

Despite these limitations, the study provides valuable insight into how generative artificial intelligence can be integrated into stylized character production pipelines and how designers interact with these technologies during practical development processes.

## 4 Practical Implementation: AI-Assisted Character Production Pipeline

### 4.1 Overview of the Production Process

This chapter describes the practical implementation of the AI-assisted character production pipeline used in this study. The production process follows the methodological framework presented in Chapter 3. The goal of the practical work is to develop a stylized game character while evaluating how generative AI tools can support different stages of the design pipeline.

The workflow combines generative systems with conventional game development tools. Generative tools are primarily used during the early design stages and for the creation of visual assets. Traditional software is used for refinement, optimization, and preparation of the asset for animation; however, manual refinement is intentionally kept minimal and limited to essential corrections required for usability.

The production process is divided into several main stages as illustrated in Figure 1, which also shows the tools used at each stage of the workflow. These stages represent a typical character production pipeline adapted to include AI-assisted generation methods.

The main stages of the pipeline are:

- A- Character ideation and concept exploration,
- B- AI-assisted concept art generation,
- C- prompt refinement and style alignment,
- D- 3D model and texture generation and optimization,
- E- 2D idle animation generation and
- F- rigging and animation integration.

Although these stages are presented sequentially, the workflow was iterative. Several steps required repeated adjustments, especially during concept generation and prompt development.

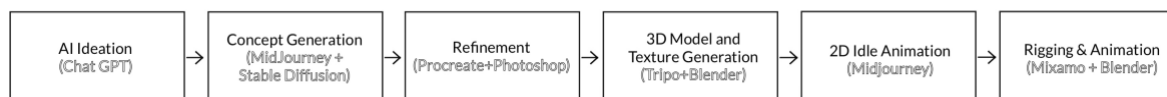


Figure 1: Overview of the character production pipeline, showing the tools used at each stage from ideation to animation.

## 4.2 Concept Ideation and Character Selection

The production process began with the exploration of possible character ideas. This stage focused on identifying a character concept that would fit the visual style of the reference game environment. ChatGPT was used during this stage to generate narrative descriptions and design ideas for historical or mythological Persian characters.

The system produced several candidate characters together with short narrative descriptions, suggested visual attributes, and potential gameplay roles. These suggestions helped structure the ideation process and provided starting points for visual exploration. An overview of the generated character concepts and their associated attributes is presented in Table 1.

| Character                     | Role                              | Weapon                         | Core Theme                                             | Ultimate Ability                                    | Key Visual Identity                                  |
|-------------------------------|-----------------------------------|--------------------------------|--------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|
| Ardashir - Lion of Persia     | Frontline Bruiser / Morale Leader | Spear + Lion-Emblazoned Shield | Imperial Authority, Lion Symbolism, Divine Kingship    | King of Kings: summons Spectral Persian Immortals   | Gold-Trimmed Armor, Royal Cloak, Faravahar Symbol    |
| Atarvan Mehrdad - Fire Priest | Mage / Support / Damage over Time | Fire Brazier Staff             | Sacred Fire Purity vs Corruption Zoroastrian Mysticism | Judgment of Truth: Fire Erupts Under Impure Enemies | White Robes Fire Halo Avestan Runic Glow             |
| Roxana - Steppe Falcon        | Mobile Ranged DPS                 | Recurve Bow (Mounted)          | Speed Precision Battlefield Control                    | Wind of the Zagros: Arrow Storm Slowing Enemies     | Leather Armor Falcon Feather Helm Armored Horse      |
| Rostam - Son of Zal           | Mythic Tank / Destroyer           | Giant Mace or Sword            | Heroic Destiny Legendary Trials Monstrous Strength     | Hero of Iran: Unstoppable & Immune to Control       | Leopard-Skin Armor Massive Frame Glowing Heroic Aura |

Table 1: Initial character ideas generated during the ideation phase.

During the first iteration, the character Rostam from Persian mythology was selected. The full production pipeline was tested using this concept in order to understand how the AI tools behaved during the workflow. However, this initial attempt mainly functioned as a calibration phase. During this stage, several adjustments were made to prompt structures and tool settings.

Because of this learning phase, the production time of the first iteration could not be used for evaluation. For the final case study, the character Gordafarid was selected. Gordafarid is a historical Persian warrior figure who fits the thematic direction of the project and the stylized visual style of the reference game.

The final concept designs of both characters, Rostam (used during the calibration phase) and Gordafarid (used for the final case study), are shown in Figures 2 and 3.



Figure 2: Final concept design of Rostam, used during the initial calibration phase of the workflow.



Figure 3: Final concept design of Gordafarid, used as the primary case study for evaluation.

### 4.3 AI-Assisted Concept Art Generation

After defining the character concept, visual concept generation was carried out using generative image systems. Two main tools were used during this stage.

Midjourney was primarily used to generate initial visual variations of the character. The system produced multiple stylized character illustrations based on textual prompts describing the character's appearance, clothing, and weapons.

Stable Diffusion was then used for more controlled refinement of selected images. This tool allowed for more precise adjustments of specific visual features while maintaining the overall structure and composition of the generated concept.

The combination of these tools enabled a workflow that balanced rapid visual exploration with controlled refinement. Generative image systems can produce a large number of visual variations in a short time, enabling rapid image synthesis and exploration of different outputs (Rombach et al., 2022, Sec. 1).

### 4.4 Prompt Refinement and Style Alignment

One important observation during concept generation was the difference in how generative systems interpret and respond to prompts.

Midjourney demonstrated a strong capacity for generating visually diverse and creative results. The system often produced a wide range of stylistic variations and imaginative interpretations, which were particularly useful during early ideation stages where exploring multiple visual directions is beneficial. An example of these variations can be seen in Figure 4, which shows different generated concepts of the character Gordafarid.

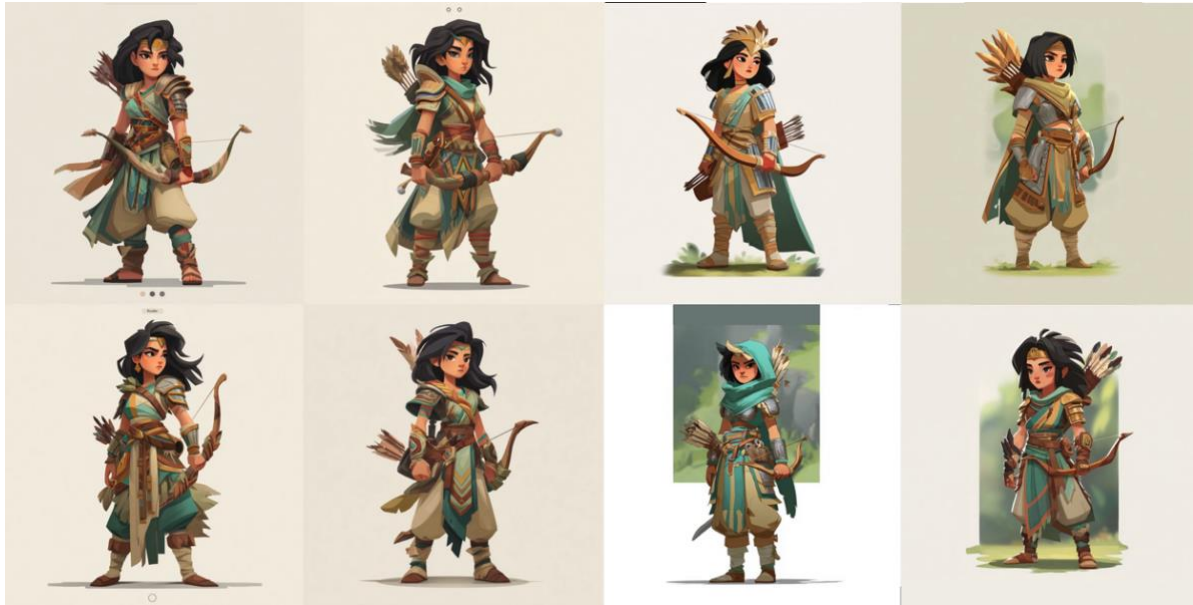


Figure 4: Midjourney concept variation grid.

However, this strength also introduced limitations in terms of control. Midjourney frequently reinterpreted prompts in ways that did not align with the intended design direction. In some cases, the generated characters deviated significantly from the expected human anatomy or visual concept, producing unexpected non-human or hybrid forms, as shown in Figure 5.



Figure 5: Example of incorrect character generation.

In contrast, Stable Diffusion provided a higher level of controllability. When applying targeted changes to an existing design, the system was more capable of preserving the overall structure and identity of the character. A further example of this behaviour can be observed when comparing the outputs of Midjourney and Stable Diffusion using the same base character concept shown in Figure 6.

In this case, a previously generated character design of Rostam was used as a reference image, together with a prompt intended to introduce only minor visual adjustments.

Prompt: Stylized game character illustration in the *Heroes of History* art style: Rostam, legendary Persian hero, strong bulky warrior with simplified anatomy and slightly larger head proportions, wearing leopard-skin armour with clean Persian gold ornaments, holding a large stone mace, flat shapes, limited colour palette, clear silhouette, readable at small scale.

Despite the use of a clear prompt and a reference image, the results produced by the two systems differed significantly.

In the case of Midjourney, even small changes to the prompt resulted in substantial alterations to the overall character design. As shown in Figure 8, the generated outputs deviated from the original concept, introducing new visual elements, modifying proportions, and in some cases changing the overall identity of the character.

In contrast, Stable Diffusion produced more controlled results. As illustrated in Figure 7, the generated variation maintained the core structure and visual identity of the character, while applying only localized changes, such as adjustments to footwear and minor stylistic details.

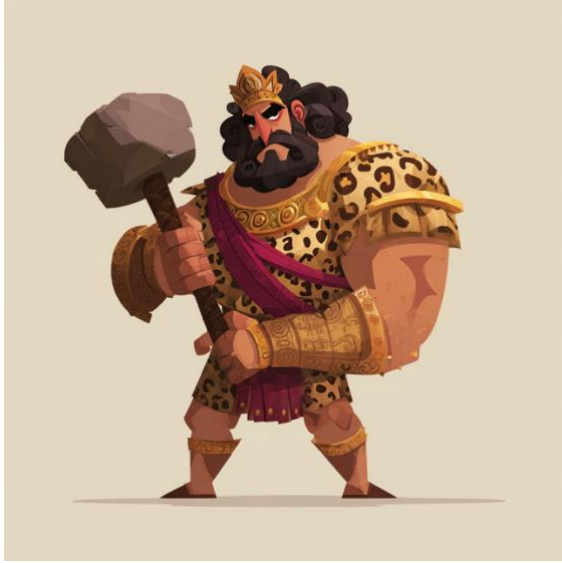


Figure 6: The reference photo given to both Midjourney and Stable Diffusion.



Figure 7: Stable Diffusion-generated variation of the same character, demonstrating controlled and localized modifications while preserving the overall design.

This comparison demonstrates a clear difference in controllability between the two systems. While Midjourney tends to reinterpret prompts more freely, Stable Diffusion allows for more precise and incremental modifications, which is particularly important in production workflows where consistency across iterations is required.



Figure 8: Midjourney-generated variations of the character Rostam, showing significant deviations from the original design despite minor prompt adjustments.

The limitations observed in the controllability of generative systems required the use of more structured prompt strategies. As a result, achieving consistent outputs required active intervention through prompt refinement. To address these issues, prompts were refined through iterative adjustments. Several strategies were used during this process:

- A- structuring prompts into clear visual categories,
- B- gradually increasing detail in later prompts,
- C- using reference images to guide the style and
- D- isolating specific changes in separate prompt iterations.

The use of visual reference images improved the consistency of the generated results in this study. Generative systems can produce more aligned outputs when textual prompts are combined with visual guidance, as multimodal inputs help guide the generation process and improve correspondence between input conditions and outputs (Ramesh et al., 2022).

This effect is illustrated in Figures 9–11. Figure 10 shows the reference image used to guide the generation process, Figure 11 presents the generated output without using a reference image, and Figure 9 shows the corresponding result when the same prompt is combined with a visual reference. The comparison demonstrates that the use of reference images leads to more consistent and controlled outputs.

Matching the visual style of the reference game also required careful adjustments. The reference style uses soft shading transitions, limited colour palettes, and minimal outlines between colour regions. Achieving this aesthetic required several prompt iterations and manual selection of suitable results.



Figure 9: AI Generated photo using the Reference photo.

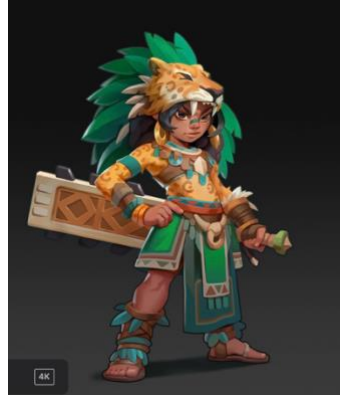


Figure 10: The Reference photo from the *Heroes of History* Game.

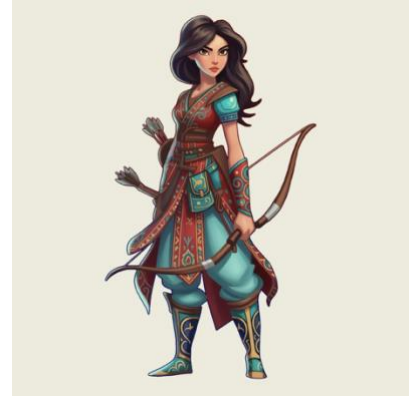


Figure 11: AI Generated photo without using any visual References.

## 4.5 3D Model Generation, Texturing, and Optimization

Once the final concept image was selected, the workflow moved to the generation of a three-dimensional character model. Several AI-based 3D generation tools were evaluated during this stage, including Tripo, 3D AI Studio, and Hitem 3D.

Each tool was tested using the same concept image in order to evaluate how effectively they generated usable geometry and how easily the resulting models could be integrated into the production workflow.

Hitem 3D produced models with detailed surface features and relatively high visual fidelity. However, the generated meshes typically contained a high polygon count and were less suitable for stylized game production, where simplified geometry and optimization are required. In addition, the tool offered limited control over mesh parameters, making it difficult to adjust the output to meet specific production constraints.

Tripo, in contrast, provided a significantly higher level of control over the generation process. The tool allowed adjustment of parameters such as polygon count, topology type, and texture resolution. It also offered optimization options that balanced detail and performance. This level of control made Tripo more suitable for stylized game production, where unnecessary detail can be reduced and the mesh can be adapted to fit real-time rendering requirements.

The results generated by 3D AI Studio showed several limitations during the initial tests. In some cases, the system failed to correctly interpret material boundaries, resulting in texture inconsistencies where clothing textures were incorrectly applied to other parts of the model. In addition, the generated meshes contained structural issues that reduced their usability without further correction. The system also demonstrated limited capability in generating plausible details in areas where the input was ambiguous, resulting in less convincing outputs compared to the other tools. These differences are illustrated in Figures 12–14.



Figure 12: AI Generated 3D Model by "Hitem"



Figure 13: AI Generated 3D Model by "Tripo"



Figure 14: AI Generated 3D Model by "3D AI Studio"

Based on these observations, Tripo was selected as the primary modelling tool for the project. Its controllability and adaptability made it the most suitable option for integrating AI-generated assets into the stylized production pipeline.

The tool also allowed the generation of multiple mesh variations with different levels of detail, supporting iterative refinement of the model.

Seven different mesh configurations were generated during the experiment in order to identify the solution that best fits the stylized game requirements and production constraints. These configurations varied in terms of topology (triangles vs. quads), number of input views, mesh quality settings, polygon count, and texture resolution. An overview of the tested configurations is presented in Figure 15.

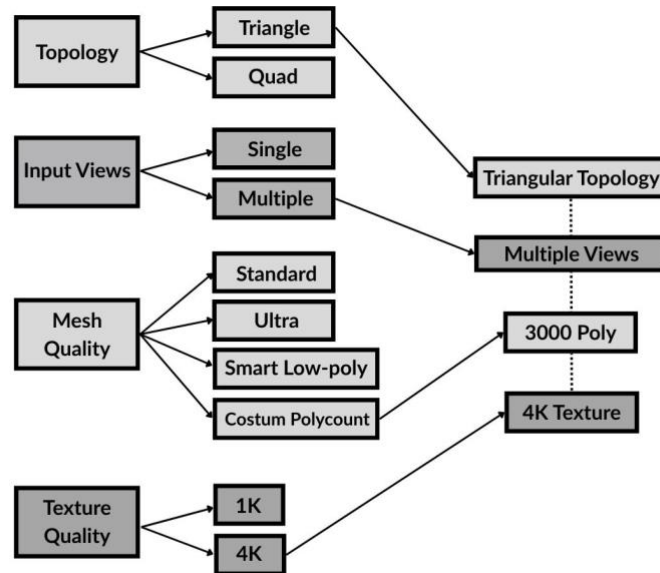


Figure 15: Iterative evaluation process of different 3D model generation settings in Tripo, illustrating the selection of topology, input views, mesh quality, polygon count, and texture resolution for the final asset

During the 3D model generation stage, multiple configurations were systematically tested in order to identify the most suitable setup for stylized game production. The process began with an evaluation of mesh topology. Both triangle-based and quad-based meshes were generated and compared. Although quad topology is generally preferred for further editing and animation, triangle topology was ultimately selected. This decision was based on the fact that real-time game engines internally convert all geometry into triangles during rendering. Therefore, working directly with triangle-based meshes ensured consistency with the final implementation stage.

Following this, different input conditions were tested. Initial experiments were conducted using a single front-view image, while additional variations incorporated multiple generated views, including side and back perspectives. The results showed that models generated from multiple views produced significantly more coherent and structurally stable geometry. Consequently, multi-view input was adopted for the final workflow.

Further experimentation focused on mesh quality and optimization settings. Both standard and ultra quality modes were evaluated. While ultra quality produced higher visual fidelity, it also resulted in significantly increased polygon counts. Additionally, configurations using the “smart low-poly” option were tested. Although this setting provided automatic optimization, its effectiveness varied depending on the model and did not consistently meet the desired level of detail preservation.

Given the production constraint of maintaining a polygon budget between 2,000 and 5,000 triangles, manual control over polygon count proved to be the most reliable approach. Instead of relying solely on predefined optimization settings, custom polygon limits were applied to balance visual quality and performance requirements. For the final character, a mesh with approximately 3,000 triangles was selected, as it preserved essential details while remaining within the target range.

Finally, texture resolution was evaluated by comparing 1K and 4K outputs. The 1K textures resulted in visible pixelation and loss of surface detail, whereas 4K textures provided significantly higher visual clarity. As a result, 4K texture resolution was chosen for the final asset.

Overall, the final configuration combined triangle-based topology, multi-view input, manually controlled polygon count, and high-resolution textures. This setup provided the most effective balance between visual quality, controllability, and suitability for integration into a stylized game production pipeline.

In addition to AI-generated configurations, a high-polygon version of the model generated by the AI system was manually reduced using Blender's decimation tools. This enabled a comparison between AI-generated low-polygon models and manually optimized meshes. The results of this comparison are illustrated in Figures 16 and 17, where Figure 16 shows the directly generated low-polygon model, and Figure 17 presents the manually decimated version derived from an AI-generated high-polygon mesh.



Figure 16: AI-generated low-polygon model produced directly from the concept image.



Figure 17: Manually optimized low-polygon model created by decimating a high-polygon mesh in Blender..

Both approaches produced similar polygon counts. However, the AI-generated low-polygon model preserved texture clarity more effectively. Achieving the same visual quality through manual decimation would require additional clean-up work.

For stylized strategy games, extremely detailed geometry is not necessary. Instead, performance stability is more important. Based on production recommendations, the target polygon range was approximately 2,000 to 5,000 triangles. The final model was therefore optimized to remain within this range while maintaining visual clarity.

A final optimized version of the character Gordafarid is shown in Figure 18, including both the textured model and the underlying geometry. High-resolution textures were used to preserve surface detail, while the mesh remained within the required polygon limits.



Figure 18: Final optimized mesh with topology view.

All models were generated in a neutral T-pose. This standard bind pose simplifies the rigging process and supports more consistent deformation during animation.

Texture maps were automatically generated during the modelling process. In some cases, minor texture issues appeared, such as overlapping UV areas or irregular surface patterns as shown in Figure 19. These problems required either regeneration of the model or minor manual corrections.

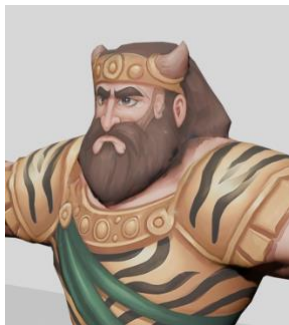


Figure 19: A sample of texture overlapping issue happened in the Tripo

## 4.6 2D Idle Animation Generation

In addition to the three-dimensional character, a two-dimensional idle animation was created for use in the user interface. In many strategy games, animated portraits are displayed when players select characters from menus.

Midjourney was used to generate a short animated visual sequence representing the idle state of the character. Generating animation with image-based systems proved more difficult than producing static concept art. The system sometimes introduced additional elements or unexpected movements that did not match the intended idle behaviour.

Several prompt adjustments were required before obtaining a suitable result. After multiple iterations, a final animation sequence was generated that matched the stylized visual design of the character as illustrated in Figure 20.



Figure 20: Selected frames from the final 2D idle animation sequence generated with Midjourney.

## 4.7 Rigging and Animation Workflow

The final stage of the production pipeline involved preparing the character model for animation. Two automatic rigging systems were tested during this stage. These systems were Tripo's internal rigging tool and the Mixamo auto-rigging platform.

Mixamo was selected because it provided more stable deformation results and offered a larger library of pre-existing animations.

The auto-rigging process generated a skeleton structure that allowed the model to be animated immediately. However, minor deformation issues appeared during certain movements, particularly in the shoulder and arm areas (Figure 21).



Figure 21: selected frames of walking animation showing minor deformation artefacts in the shoulder and arm areas during dynamic movements.

These artefacts were mainly caused by the bulky proportions of the character model. In close inspection they were visible, but within a top-down gameplay perspective they were not highly noticeable.

The final animation set included several common gameplay states:

- A- Walking animation,
- B- attack animation,
- C- death animation and
- D- victory animation.

Most animations were selected from the Mixamo animation library and are demonstrated in Figures 22 to 25. The weapon used by the character was generated separately and attached manually in Blender.

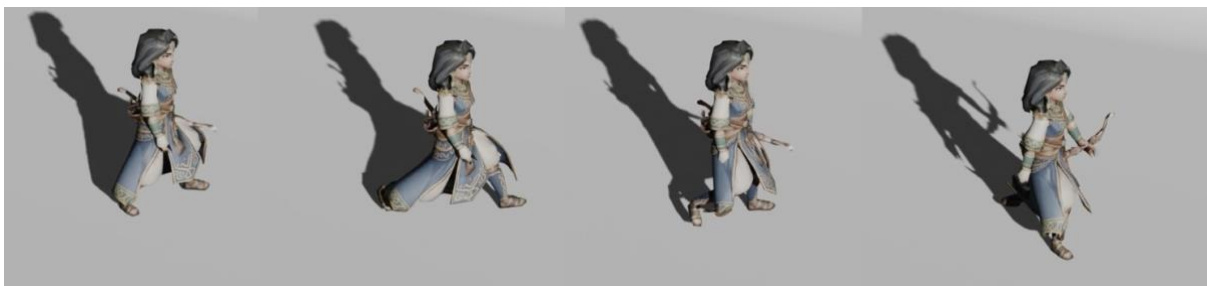


Figure 22: Selected frames from the walking animation cycle.



Figure 23: Selected frames from the attack animation cycle.



Figure 24: Selected frames from the death animation cycle.



Figure 25: Selected frames from the victory animation cycle.

## 4.8 Reflection on the Practical Process

The AI-assisted workflow significantly accelerated several stages of character production. Concept generation and modelling required considerably less time compared to traditional pipelines.

However, the process also revealed limitations. Some generated models contained structural irregularities that required manual correction. Animation deformation was also less predictable compared to manually sculpted character models.

The stylized visual style helped mitigate these issues. Because stylized characters rely less on precise anatomical detail, minor geometric imperfections were less noticeable.

Overall, the experiment demonstrates that generative AI tools can support several stages of character production. At the same time, human supervision remains necessary to ensure visual consistency and technical usability.

## 5 Results

### 5.1 Overview of the Evaluation

The evaluation focuses on controllability of AI outputs and pipeline integration feasibility. These criteria are used to examine how the integration of generative AI tools affects key aspects of the production process, in line with the research question.

The results are based on observations made during the production process, as well as on the characteristics of the final character asset. As the project follows a practice-based research approach, the findings are derived from both the design process and the artifacts produced throughout the workflow. In addition, a questionnaire was conducted to support these findings from an external perspective. Game artists from the HAW Game Master's Discord channel were invited to

participate, and a total of 16 game artists completed it. Due to the limited number of participants, the questionnaire results are interpreted as indicative rather than generalizable.

## 5.2 Production Efficiency

One of the most noticeable results of the experiment is the speed of the AI-assisted production workflow. Several stages of the pipeline required significantly less time compared to traditional manual methods.

The concept generation stage benefited strongly from the use of generative systems. Image generation tools enabled the rapid creation of multiple visual variations within a short period of time. In traditional concept development, artists typically need to sketch several design options before selecting a final direction. Generative tools reduced this effort by automatically producing a wide range of variations, thereby accelerating the ideation process.

In addition to concept development, significant efficiency gains were observed in the 3D modelling stage. AI-based modelling tools were able to generate complete base meshes within seconds, a process that would typically require several hours using traditional modelling techniques. These systems also automatically generated textures from input images, further reducing the time required for asset creation. While additional refinement was sometimes necessary, the initial generation provided a usable foundation that significantly accelerated the overall workflow.

The approximate time required for the main production stages was as follows:

- Concept ideation and prompt refinement: ~60 minutes
- 3D model generation and optimization: ~60 minutes
- 2D idle animation generation: ~20 minutes
- Rigging and animation preparation: ~70 minutes

Although these values represent approximate production times rather than controlled measurements, they indicate a clear reduction in production time across multiple stages of the pipeline. In particular, the concept phase and initial modelling stage showed the most significant improvements in efficiency.

However, the results also show that efficiency gains are not evenly distributed across the workflow. While generation stages are significantly accelerated, refinement stages still require manual intervention. Designers must evaluate outputs, correct visual inconsistencies, and ensure that the asset remains suitable for integration into a game environment. Despite this, the overall production time remains considerably lower compared to traditional workflows.

## 5.3 Questionnaire Results and Analysis

To complement the practice-based evaluation, the questionnaire responses were analysed to identify patterns in how the character was perceived by external artists.

A total of 16 participants completed the questionnaire. The professional background and experience levels of the participants are illustrated in Figures 26 and 27. Overall, the responses indicate a generally positive evaluation of the character across all measured criteria. Most ratings were concentrated in the upper range of the scale, suggesting that the character was perceived as visually successful within a stylized game context within this sample.

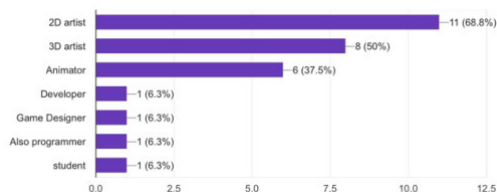


Figure 26: Participants' professional backgrounds.

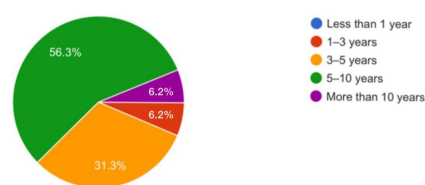


Figure 27: Participants' Years of experience.

## Visual Quality

The evaluation of visual quality was conducted in relation to a reference image from the target game. The distribution of responses is shown in Figures 28 and 29. The results indicate a moderate level of agreement among participants rather than a strongly positive consensus. Most responses were concentrated in the middle range of the scale, suggesting that while the generated character was generally acceptable, it did not fully match the visual standard of the reference.

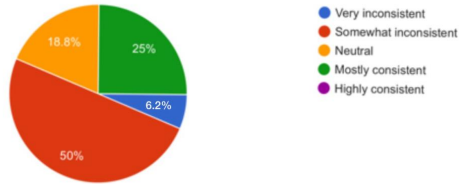


Figure 28: Distribution of participant responses evaluating the consistency of colour and shading in the generated character compared to the reference image.

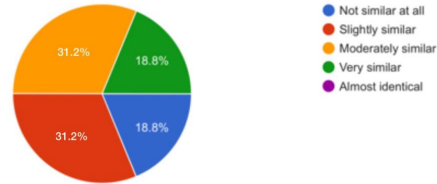


Figure 29: Distribution of participant responses evaluating the visual similarity between the generated character and the reference game style.

This pattern is further reflected in the assessment of colour and shading consistency (Figure 28). A significant portion of participants (50%) rated the result as somewhat inconsistent, indicating that the generated textures and shading did not consistently align with the reference style. While some participants identified areas of visual coherence, the overall distribution of responses suggests that the character requires further refinement to achieve a higher level of stylistic accuracy.

These findings highlight a key limitation of the AI-assisted workflow: while generative systems can produce visually convincing results at a general level, achieving precise stylistic consistency with a target reference remains challenging (Rombach et al., 2022, Sec. 1). This observation is consistent with the challenges identified during the production process, particularly in controlling fine-grained visual details and maintaining a stable stylistic direction across iterations.

During the production process, defining and maintaining a specific visual style through prompts proved to be difficult. Small changes in prompt structure often resulted in unintended stylistic deviations, making it challenging to consistently align the generated outputs with the target aesthetic.

As a result, the generated designs are better understood as intermediate outputs rather than final assets. In a production context, these outputs would require further refinement by an experienced artist familiar with the target visual style. The AI-generated concept can therefore function as a starting point, while manual artistic intervention remains necessary to achieve full stylistic coherence before proceeding to later stages such as 3D modelling.

Overall, the questionnaire results support the findings from the production process: AI tools can significantly assist in generating visually plausible assets, but they do not replace the need for artistic judgement and controlled refinement.

## Readability and Action Clarity

The readability of the character and the clarity of its actions were evaluated based on a video showing the character performing key animations, including walk, attack, victory and death, from a top-down gameplay perspective.

As shown in Figure 30, the majority of participants (53.4%) rated the character model as clear, indicating that its overall form and structure were generally understandable when observed in motion. However, when participants were asked to evaluate how easily the character could be recognized during gameplay (Figure 31), responses shifted towards the middle of the scale, with most participants (56.2%) selecting neutral and fewer indicating that the character was easy to recognize.

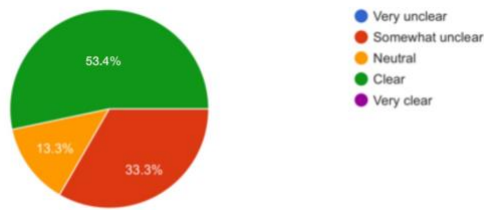


Figure 30: Distribution of participant responses evaluating the visual clarity of the character's 3D model based on the presented animation video.

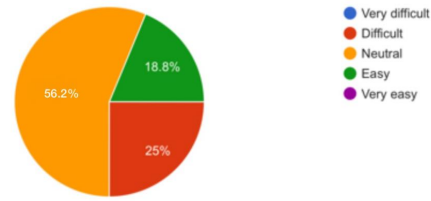


Figure 31: Distribution of participant responses evaluating how easily the character can be recognized during gameplay from a top-down perspective based on the animation video.

In addition, the readability of the animations themselves (Figure 32) was generally rated as acceptable to good. This suggests that while participants were able to interpret the character's actions, the animations did not consistently achieve a high level of clarity or expressiveness.

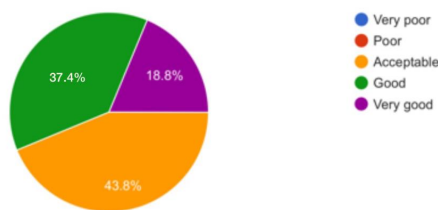


Figure 32: Distribution of participant responses evaluating the readability of the character's actions in the animation video.

Taken together, these results indicate that although the character is generally readable, both its recognition in a gameplay context and the clarity of its actions could be improved. This may be due to limitations in silhouette distinction, motion exaggeration, or animation refinement, which are particularly important in top-down game environments.

### 3D Model Quality and Issues

The evaluation of the 3D model revealed a mixed response regarding technical quality. As shown in Figure 33, participants were divided between those who observed no visible issues and those who reported minor issues. A smaller number of participants identified moderate or major issues.

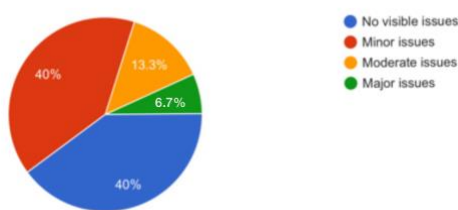


Figure 33: Distribution of participant responses reporting perceived visual artefacts or issues in the 3D model.

These responses suggest that while the model is generally acceptable for use, it is not entirely free from visual artefacts. This aligns with observations from the production process, where minor issues were present and occasionally required manual correction.

Overall, the results indicate that AI-generated models can achieve a usable level of quality, but additional refinement is often necessary to meet professional production standards.

### Suitability for Game Integration

The suitability of the character for use in a stylized top-down game environment was evaluated based on participant responses shown in Figure 34. The results indicate a generally positive but moderate evaluation. While a portion of participants considered the character suitable or highly suitable, a comparable number rated it as moderately or slightly suitable.

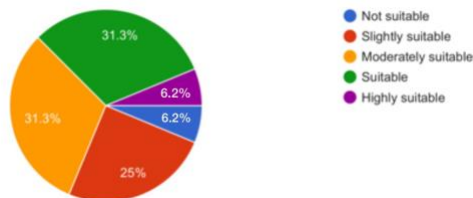


Figure 34: Distribution of participant responses evaluating the suitability of the character for use in a stylized top-down game environment.

This distribution suggests that the character meets the basic requirements for integration into a stylised game environment but does not fully achieve the level of polish expected in production-ready assets.

These findings reinforce the need for further artistic refinement, particularly in achieving stylistic consistency and improving visual clarity in gameplay conditions.

### Perception of AI Usage

Participants were also asked to evaluate whether they believed AI tools were used in the production process (Figure 35). The results show a high level of uncertainty, with half of the participants selecting unsure, while others indicated that AI use was likely or very likely.

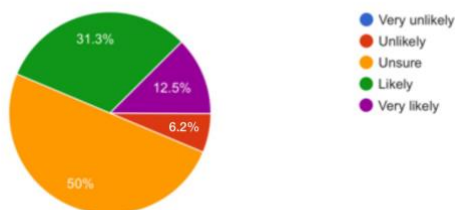


Figure 35: Distribution of participant responses evaluating how likely AI tools were perceived to have been used in the production process.

This suggests that while certain aspects of the asset may reveal characteristics associated with AI-generated content, these features are not consistently identifiable. The results indicate that AI-assisted outputs can achieve a level of visual quality that does not immediately reveal their origin, particularly when combined with manual refinement.

### Perceived Usefulness of AI Workflows

The perceived usefulness of AI-assisted workflows for character production was also evaluated (Figure 36). The majority of participants responded positively or indicated that such workflows are possibly useful, while a smaller proportion expressed negative views.

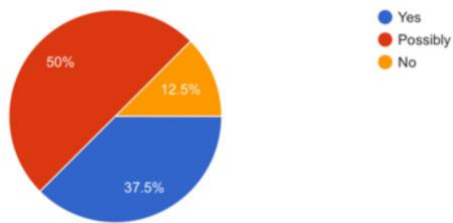


Figure 36: Distribution of participant responses evaluating the perceived usefulness of AI-assisted workflows for character production pipelines.

This suggests a generally open attitude towards the integration of AI tools in production pipelines. However, the presence of uncertain responses indicates that participants may still have reservations regarding reliability, control, or final output quality.

Overall, the results suggest that AI-assisted workflows are perceived as valuable tools for supporting production, but not as complete replacements for traditional methods.

### Overall Evaluation

Overall, the questionnaire results are broadly consistent with the observations made during the production process. The AI-assisted workflow produced a character that demonstrates an acceptable level of visual quality and readability within the context of this study. However, the results also indicate that manual refinement remains necessary to achieve higher levels of stylistic consistency and production quality.

It should be noted that these findings are based on a limited number of participants and should therefore be interpreted as indicative rather than generalizable.

Overall, the results suggest that AI tools can effectively support character production workflows, but do not replace the need for artistic judgement and manual quality control.

## 5.4 Visual Quality and Stylistic Coherence

The combined analysis of the production process and questionnaire results provides a more comprehensive understanding of the visual quality of the generated character.

From a production perspective, the character maintained a clear silhouette and a recognizable visual identity, which are essential for readability in stylized strategy games (McCloud, 1993, p. 30). However, the questionnaire results indicate a more moderate evaluation, suggesting that while the character is visually acceptable, it does not fully match the stylistic refinement of the reference.

This discrepancy highlights a key limitation of the AI-assisted workflow: although generative systems can produce convincing results at a general level, achieving precise stylistic coherence remains challenging. Both the production process and participant feedback indicate that maintaining a consistent visual style requires iterative refinement and manual intervention.

Overall, these findings suggest that AI tools are effective in supporting early-stage visual development, but additional artistic input is necessary to achieve production-level quality.

## 5.5 Controllability of AI Outputs

Controllability was not consistent across the different stages of the workflow and varied depending on the type of tool and task.

During concept generation, controllability was limited. Small changes in prompts often led to significant and sometimes unintended variations in the generated outputs. As a result, achieving a specific visual direction required multiple

iterations, and precise control over stylistic details was difficult to maintain. This limitation directly affected the consistency of the generated concept art.

In contrast, the 3D modelling stage provided a higher level of control. Tools such as Tripo allowed adjustment of parameters. This made it possible to guide the output toward the technical requirements of stylised game production and adapt the generated models more effectively.

Controllability in animation was more constrained. While pre-generated animations could be applied to the character, modifying them beyond minor adjustments proved difficult. Achieving more precise control would require significant changes to the rig structure, which would in turn affect weight painting and require extensive manual rework. As a result, the workflow relied primarily on selecting suitable predefined animations rather than directly controlling animation generation.

These findings indicate that controllability in AI-assisted workflows is highly dependent on the stage of production. While some tools allow relatively precise adjustments, others function more as exploratory systems, requiring iterative selection rather than direct control.

## 5.6 Pipeline Integration

The final criterion concerns the compatibility of the generated assets with existing game development pipelines.

In this project, the generated models were successfully integrated into conventional 3D software and animation tools. The character mesh could be imported into Blender for further adjustments and prepared for rigging using automatic skeleton generation. The final animated character could also be exported in standard formats compatible with common game engines.

However, the integration process revealed several limitations. Certain generated meshes required minor corrections before rigging, particularly in areas where topology was not optimized for deformation. In addition, some deformation artefacts appeared during animation, as the automatically generated topology did not always support clean skeletal movement.

Despite these issues, the overall pipeline remained functional. The AI-generated assets could be adapted to standard game development workflows without major structural changes. This indicates that AI-assisted pipelines are technically feasible, although additional manual adjustments are still required to meet production standards.

# 6 Discussion and Conclusion

## 6.1 Interpretation of the Findings

The results of this study indicate that generative AI can support multiple stages of a stylized character production pipeline. The strongest impact is observed in early design phases, where concept generation and visual exploration are significantly accelerated.

The questionnaire results provide additional insight into how the final outcome was perceived within the scope of this study. Participants generally considered the character to be visually acceptable and readable; however, the responses were often concentrated in the middle range of the evaluation scale. This suggests that while the generated asset meets basic expectations, it does not fully achieve the level of refinement observed in the reference style.

At the same time, both the production process and the questionnaire highlight limitations in controllability and stylistic consistency. While the overall result was functional and usable, variations in visual details and style were observed. These issues reflect the current limitations of generative systems and confirm that human supervision and iterative refinement remain necessary.

The findings of this study therefore support the view that AI extends human creative workflows by accelerating exploration and supporting production processes, while still relying on artistic judgement to achieve final quality (Boden, 2016, Ch. 3).

## 6.2 Limitations of the Study

Several limitations should be considered when interpreting the findings of this study.

First, the project focuses on a single character asset, which limits the extent to which the results can be generalized to larger production scenarios. While the findings provide insight into individual asset creation, more complex projects involving multiple characters may introduce additional challenges related to consistency and pipeline management.

Second, the evaluation is primarily based on the production process and expert feedback rather than player testing. As a result, the findings reflect design and technical perspectives, but do not fully account for player experience or gameplay perception.

In addition, the relatively small number of questionnaire participants ( $n = 16$ ) limits the statistical significance of the results. The findings should therefore be interpreted as indicative rather than representative of a broader population.

Finally, the rapid development of generative AI technologies means that the results of this study are closely tied to the current state of available tools. Future advancements may improve controllability, consistency, and overall asset quality, potentially altering the conclusions presented here.

## 6.3 Implications for Game Production

Despite these limitations, the findings of this study highlight several important implications for game development workflows. Generative AI can significantly accelerate early design stages and support rapid visual exploration, which may be particularly beneficial for small teams or independent developers with limited resources.

The results also indicate that stylized art styles are especially well suited to AI-assisted production. Due to their reliance on simplified forms and strong silhouettes, stylized assets are more tolerant of minor visual inconsistencies than photorealistic models.

At the same time, human oversight remains essential. Designers must evaluate generated outputs, refine visual elements, and ensure that assets meet both aesthetic and technical requirements for integration into game engines.

## 6.4 Conclusion

This thesis investigated how generative AI tools can be integrated into a stylized character production pipeline for a top-down game and how this integration affects production efficiency, controllability, and visual quality.

The findings demonstrate that AI-assisted workflows can significantly improve production efficiency, particularly in early design stages such as concept generation and initial asset creation. These tools enable rapid visual exploration and reduce the time required to establish a design direction.

However, the study also reveals important limitations. Controllability varies across different stages of the pipeline, and achieving consistent stylistic results remains challenging. Both the production process and the evaluation results indicate that manual refinement and artistic judgement are still required to achieve production-level quality.

Overall, the results suggest that generative AI does not replace traditional workflows but reshapes them. Designers shift from manual creation toward a more iterative and curatorial role, focusing on guiding, selecting, and refining generated outputs.

Within stylized game production, where visual clarity and abstraction are prioritized over realism, AI-assisted workflows show strong potential within the scope of this study. However, their effectiveness in more complex or large-scale production contexts requires further investigation.

## 6.5 Future Work

Several directions for future research can be identified based on the findings and limitations of this study.

First, future studies could extend this work by applying AI-assisted workflows to larger-scale production scenarios involving multiple characters. This would allow investigation of challenges related to stylistic consistency, art direction, and asset management across a broader pipeline.

Second, further research could include player-based evaluation in addition to expert feedback. This would provide insight into how AI-generated characters are perceived in actual gameplay contexts, particularly in terms of readability, usability, and player experience.

Another potential direction concerns the improvement of controllability in generative systems. Future work could explore more advanced techniques for guiding AI outputs, including improved prompt design strategies, multimodal input methods, or hybrid workflows combining procedural and manual approaches.

In addition, future research could investigate the integration of AI tools in animation workflows, particularly in improving control over motion generation and deformation quality.

Finally, as generative AI technologies continue to evolve rapidly, future studies may reassess the effectiveness of these workflows using more advanced tools, which may address some of the limitations identified in this study.

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# Appendix

## Questionnaire

### Using AI in Stylised character design

This questionnaire is part of a master's thesis investigating stylised 3D character production for top-down strategy games. Participants are asked to evaluate a character asset created for a stylised game environment.

The purpose of this evaluation is to understand how professional artists perceive the visual quality, stylistic consistency, and readability of the character design.

The evaluation will focus on visual style, readability, and overall production quality.

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Not shared

1.What is your professional background? (Multiple choices possible)

- ☐ 2D artist
- ☐ 3D artist
- ☐ Animator
- ☐ Other: \_\_\_\_\_

2.How many years of experience do you have in digital art or game development?

- ☐ Less than 1 year
- ☐ 1–3 years
- ☐ 3–5 years
- ☐ 5–10 years
- ☐ More than 10 years

3.Are you familiar with stylised character design in 3D games?

- ☐ Very familiar
- ☐ Somewhat familiar
- ☐ Slightly familiar
- ☐ Not familiar

4.Are you familiar with stylised top-down 3D strategy-world building games like "Heroes of History"?



Screenshot of the "Heroes of History" game's in game environment to give a better understanding of the camera angle and distance

- ☐ Very familiar
- ☐ Somewhat familiar
- ☐ Slightly familiar
- ☐ Not familiar

5. How similar is the generated character's visual style to the reference game's visual style?



The Generated Photo

The Reference Photo

- ☐ Not similar at all
- ☐ Slightly similar
- ☐ Moderately similar
- ☐ Very similar
- ☐ Almost identical

6. How consistent are the colours and shading in the generated photo compared to the reference photo style?



The Generated Photo

The Reference Photo

- ☐ Very inconsistent
- ☐ Somewhat inconsistent
- ☐ Neutral
- ☐ Mostly consistent
- ☐ Highly consistent

7. In what aspects is the generated character not similar to the reference photo, please explain.

Your answer

8. How readable is the character's 3D model shown in the video below?



- ☐ Very unclear
- ☐ Somewhat unclear
- ☐ Neutral
- ☐ Clear
- ☐ Very clear

9. How easily do you think this character can be recognised during gameplay in a top-down perspective like the 'Heroes of History' game?



- ☐ Very difficult
- ☐ Difficult
- ☐ Neutral
- ☐ Easy
- ☐ Very easy

10. How readable do you think the animations are? (How surely can you guess what she's doing in the video)



- ☐ Very poor
- ☐ Poor
- ☐ Acceptable
- ☐ Good
- ☐ Very good

11. How suitable does the model appear for use in a stylised top-down game environment like "Heroes of History"?



- ☐ Not suitable
- ☐ Slightly suitable
- ☐ Moderately suitable
- ☐ Suitable
- ☐ Highly suitable

12. Do you notice any visual artefacts or issues in the model?



- ☐ No visible issues
- ☐ Minor issues
- ☐ Moderate issues
- ☐ Major issues

13. If your answer to the last question is yes, please describe.

Your answer

---

14. Based on the visual result, how likely do you think AI tools were used during the production?

- ☐ Very unlikely
- ☐ Unlikely
- ☐ Unsure
- ☐ Likely
- ☐ Very likely

15. According to what you saw, do you think AI-assisted workflows could be useful for character production pipelines?

- ☐ Yes
- ☐ Possibly
- ☐ No

16. What aspects of the character design do you think worked particularly well?

Your answer

17. What aspects could be improved in your opinion?

Your answer

18. If you have any other thing to say regarding the subject, I'll be happy to read it.

Your answer

Submit

Clear form

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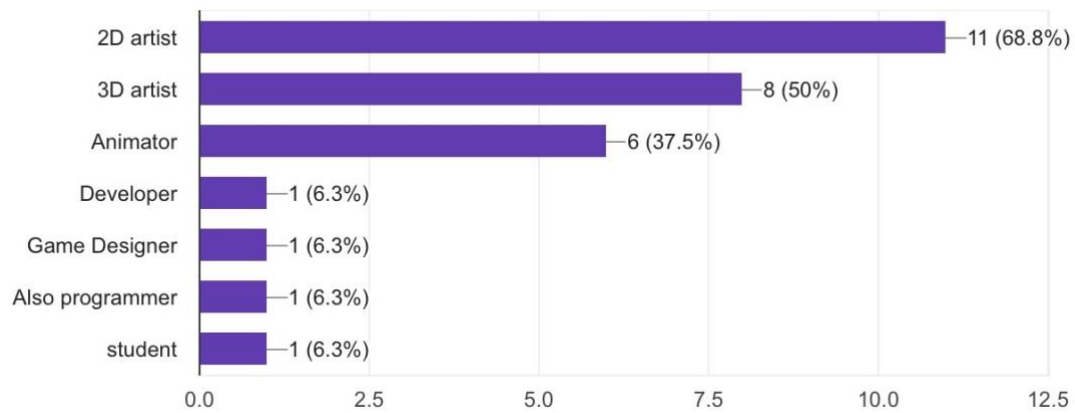
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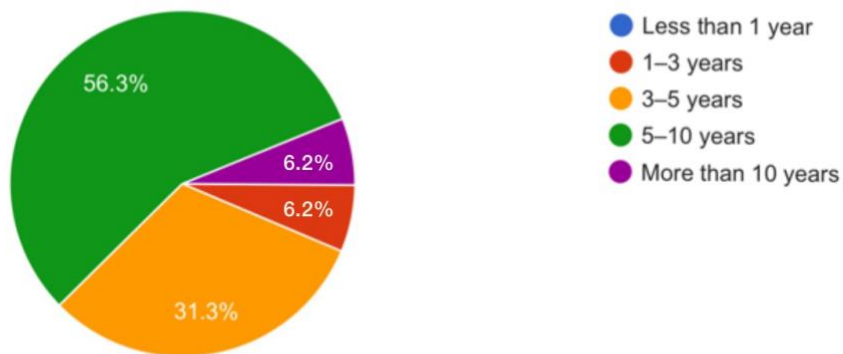
Google Forms

## Questionnaire results

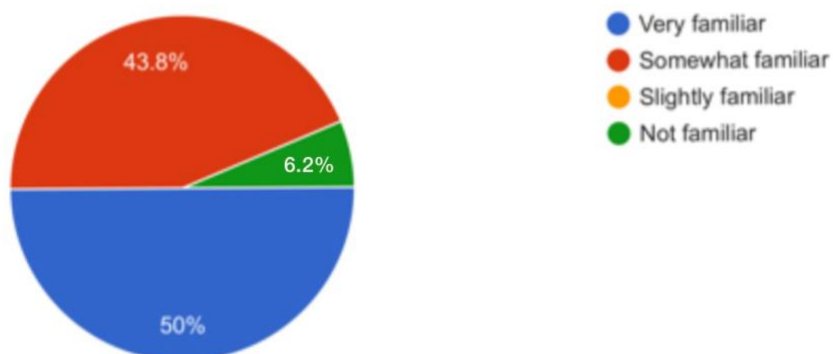
1. What is your professional background? (Multiple choices possible)



2. How many years of experience do you have in digital art or game development?



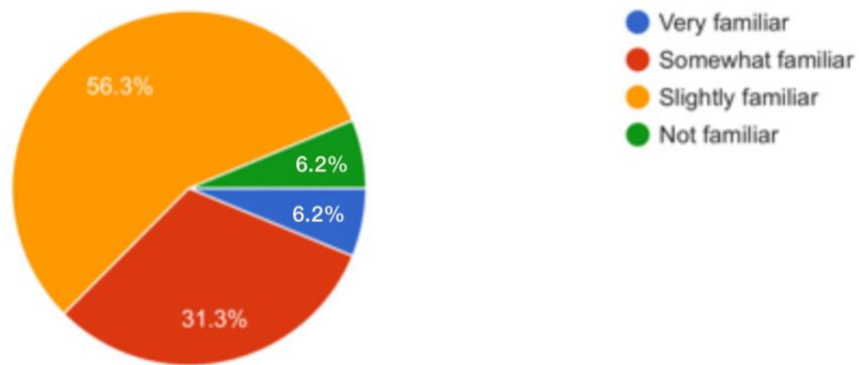
3. Are you familiar with stylized character design in 3D games?



4. Are you familiar with stylized top-down 3D strategy-world building games like *Heroes of History*?



Screenshot of the *Heroes of History* game's in game environment to give a better understanding of the camera angle and distance.

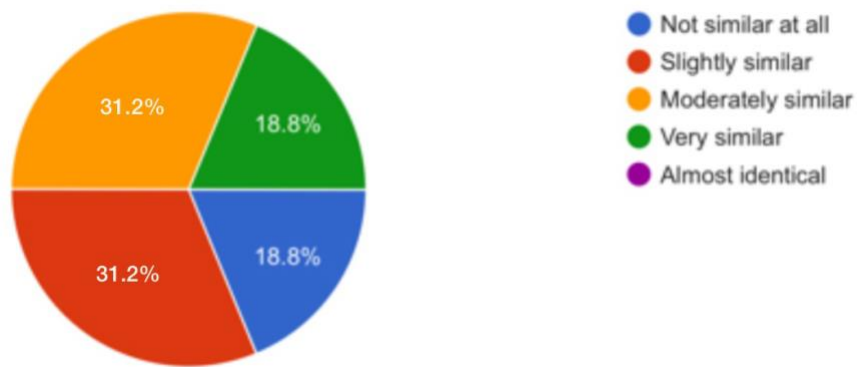


5. How similar is the generated character's visual style to the reference game's visual style?

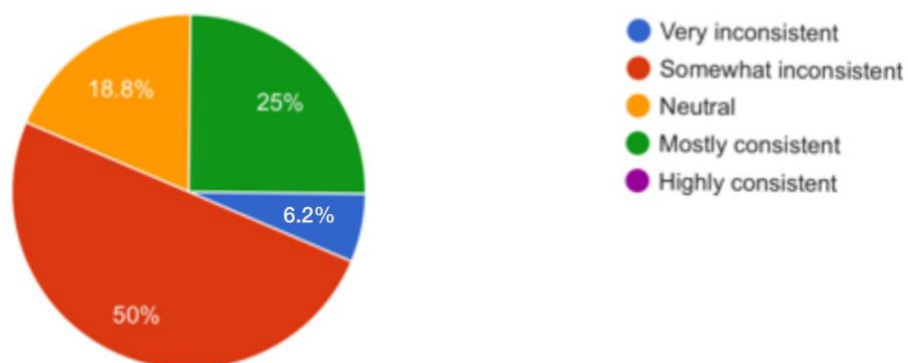
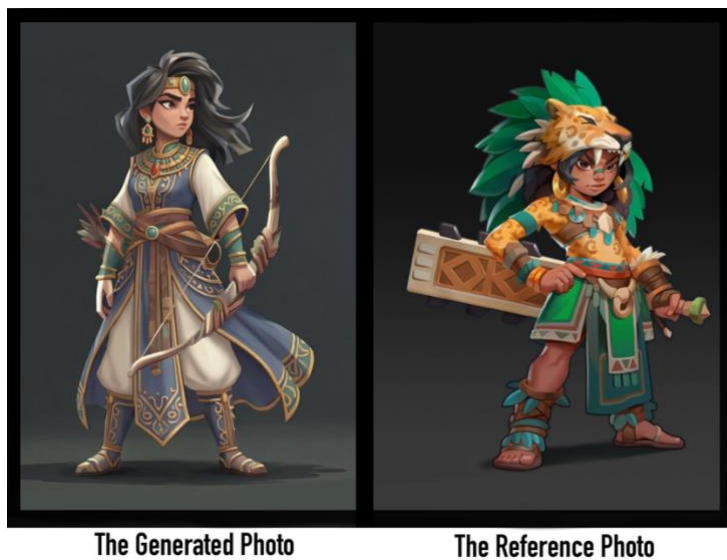


The Generated Photo

The Reference Photo



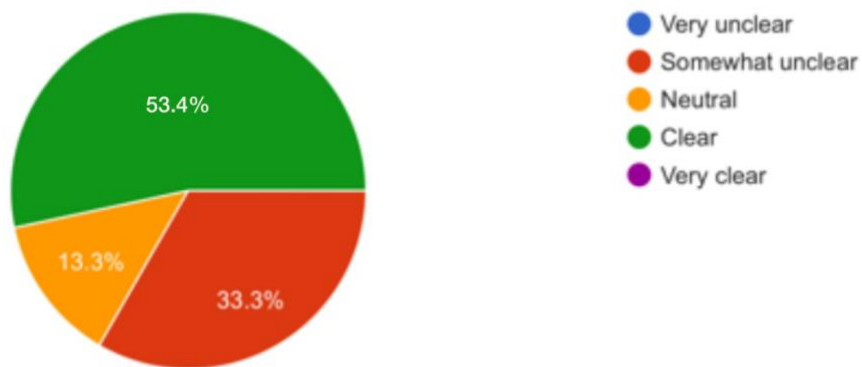
6. How consistent are the colors and shading in the generated photo compared to the reference photo style?



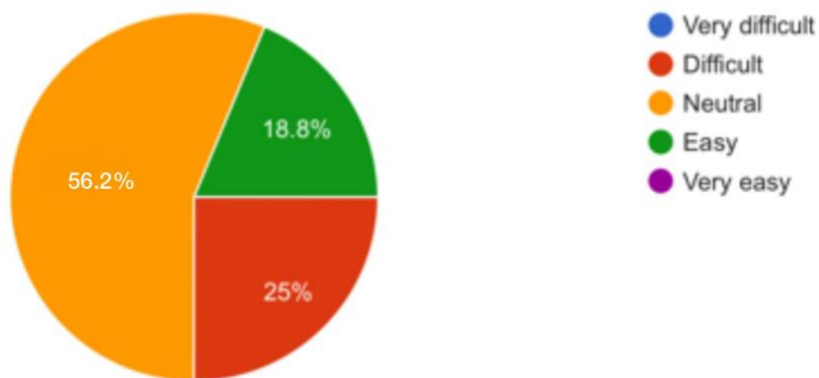
7. In what aspects is the generated character not similar to the reference photo, please explain.

| Participant's Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                    | The colours are way less saturated and muddy, the proportions are much more realistic than the reference photo and the shading is somewhat more detailed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2                    | Lights and shadows are sharper in the reference picture The Level of Detail is way Higher in the generated image Charakter proportions seem to be more stylized in the reference picture                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3                    | Anatomy is totally different, contrast too, and stylization of body parts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4                    | The colours are more washed and a little bit more bright and not that much saturated. It is also a little bit more detailed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 5                    | The lineart and level of detail aren't consistent with the reference photo. The colour scheme of the generated photo seems washed out while the reference photo uses more vibrant colours. The head to body ratio is off: The head of the reference character is larger in comparison.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 6                    | The generated character's light source is inconsistent and unclear, the reference photo instead has a clear light source ( top left corner). The generated image's colours are washed out and it way less readable since the shapes that were used lack a clear vision, the weight of the forms seems overall the same/neutral compared to the reference photo, where there are different types of shape weights used. There is no clear focus overall on the generated character, it uses way too much detail compared to the reference, you can see on the reference photo that every detail has a reason behind it. The shading is also very different, as the generated photo does not play with contrast and saturation at all. |
| 7                    | Overall style, body portions, the render                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 8                    | The colours feel a bit more muted, and the head proportions are smaller than the reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 9                    | The generated character has more details than the other (ornaments on clothes, jewelry)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 10                   | There's way more Detail in the Clothes. The face and hands are smaller and the proportions are less exaggerated. The shading seems desaturated and grey while in the reference it seems more vibrant and with more contrast.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 11                   | I think totally the reference is more stylised than the generated character. For example the body proportion in the reference character is more exaggerated and it has less details on the clothes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 12                   | The proportions are different, the contrast is lower and there are more detailed patterns on the clothes, it has less focus in colour and values. The lines appear more blurry and washed out.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 13                   | The Reference has a stronger black outline, more Contrast (generated one seems grey and washed out), occlusion shadows are significantly darker, the style of the generated one Looks more Like Disney Style than reference (Face, proportions)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 14                   | Body type, expression, color (palette), highlights, tools/weapons, cultural reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 15                   | Shading of stylized characters often uses (top-to-bottom) gradients for color variation, to fake lighting and to highlight important areas. I don't see this on the generated character.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 16                   | Body proportions, stilization of shapes (e.g facial structure), amount of surface detail (especially in clothing), colors (generated image is less saturated and has less contrast), materiality (e.g. rendering of metal)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

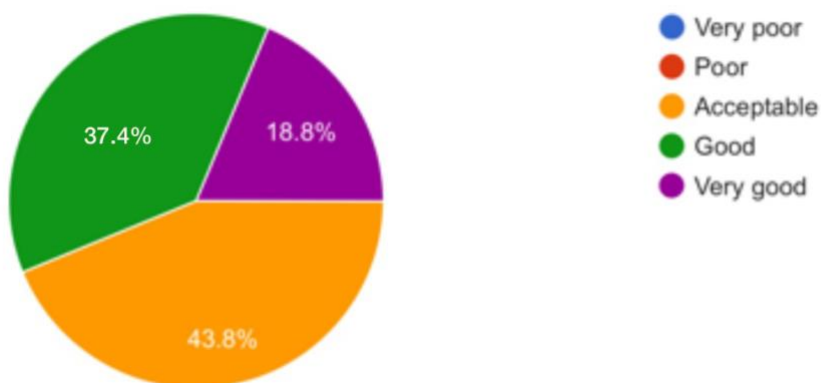
8. How readable is the character's 3D model shown in the video below?



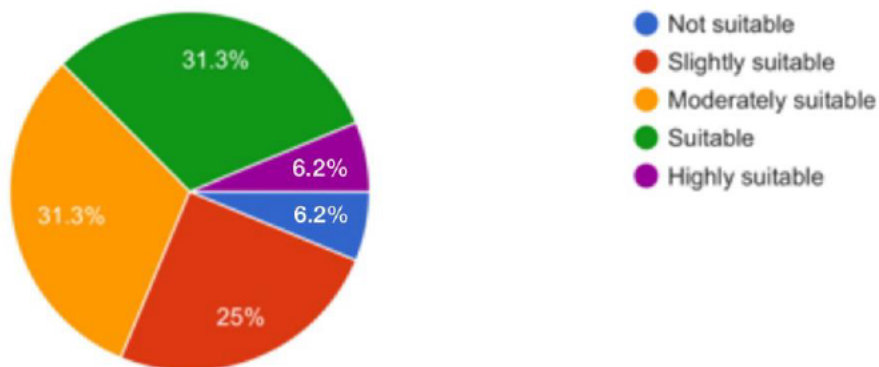
9. How easily do you think this character can be recognized during gameplay in a top-down perspective like the *Heroes of History* game?



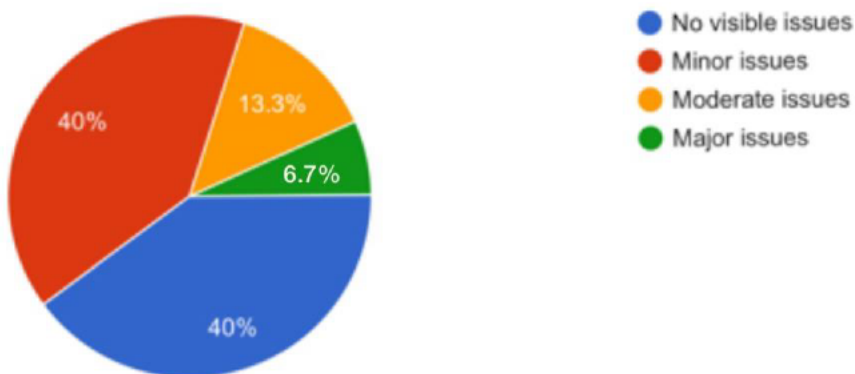
10. How readable do you think the animations are? (How surely can you guess what she's doing in the video)



11. How suitable does the model appear for use in a stylized top-down game environment like *Heroes of History*?



12. Do you notice any visual artefacts or issues in the model?

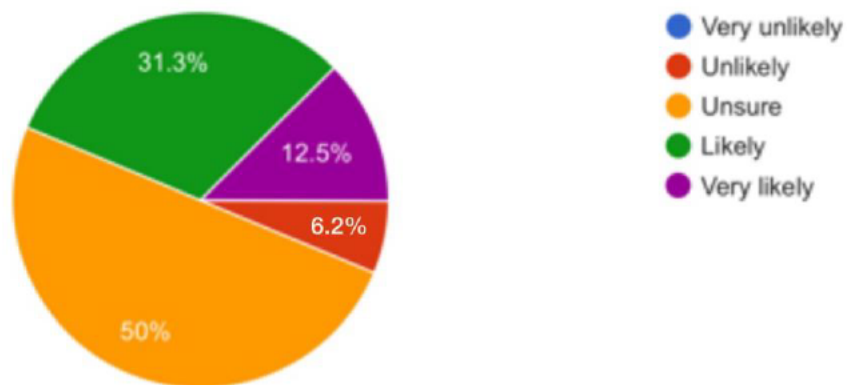


13. If your answer to the last question is yes please describe.

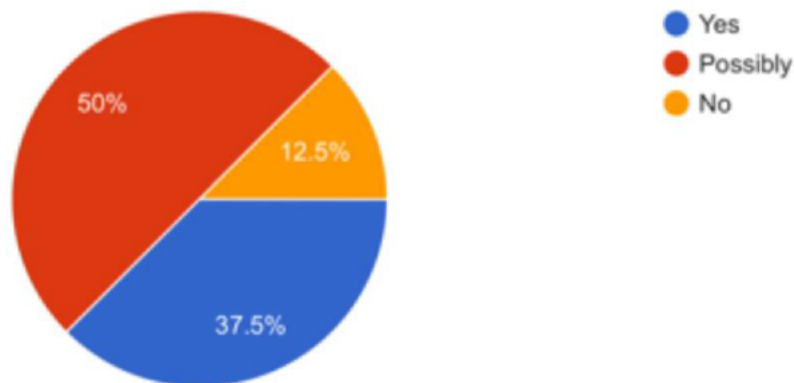
| Participant's Number | Answer                                                                                                                                                                                                                                      |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                    | Feet are too far apart in Most of the Animations which Looks weird Some poses are leaned too far Forward for the Character to stay in balance Can't really tell what the First Animation with their hands over their head is supposed to be |
| 2                    | Hair seems to be static, clothes on lower half don't work well with the rig and stretch too much with certain movements                                                                                                                     |
| 3                    | the hair sticks out weirdly to the side, the walk seems wrong, clipping through the ground in the falling animation                                                                                                                         |
| 4                    | When she dies her legs seem so unnatural.                                                                                                                                                                                                   |
| 5                    | Stretching in Clothes. Clipping into the ground. Hair or Clothes should follow movement somewhat, i.e. secondary Animation.                                                                                                                 |
| 6                    | Clothes and hair are a bit stiff and sticky to the body, clipping into the ground                                                                                                                                                           |

|   |                                                                                                                                                                                                                                                                             |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7 | The feet of the character are angled outwards and because of that she appears rather like a young man. When she falls down you can see her feet in a super unnatural position. The animation seems rather stiff overall, there is not alot of personality in her movements. |
| 8 | The model clips through the ground layer. The character seems to reload their bow, but there is no arrow visible.                                                                                                                                                           |
| 9 | Polygons glitch into one another during animation, also when the "arrow" is flown off, there is no reaction on the body. Like there is no weight to the draft of the bow at all.                                                                                            |

14. Based on the visual result, how likely do you think AI tools were used during the production?



15. According to what you saw, do you think AI-assisted workflows could be useful for character production pipelines?



16. What aspects of the character design do you think worked particularly well?

| Participant's Number | Answer                                                                 |
|----------------------|------------------------------------------------------------------------|
| 1                    | I think they are great for creating a general concept for a character. |
| 2                    | Very little clipping                                                   |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3  | It somewhat conveys the unit's cultural background and function.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4  | Looks like a character, human-ish proportions, elegant (could be used for specific styles and genres)                                                                                                                                                                                                                                                                                                                                                                                           |
| 5  | the wide silhouette downwards and the color combination                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 6  | 3D aspect and also the animation part.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 7  | Its readable as an Archer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 8  | I like the 2D photo and the character's clothing, but unfortunately, all the beautiful details in the 3D model are not visible when there is a lot of distance from the camera. I think the character's colors are a good choice because there is a great contrast to the background, as seen in the screenshots, mainly green grass. I can imagine that AI is useful for gathering ideas, brainstorming, creating conceptual art and making technical preparations for modeling and animation. |
| 9  | It recreated an archetype of an archer pretty well                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 10 | While it differs from the reference, The consistency in the design is quite acceptable!                                                                                                                                                                                                                                                                                                                                                                                                         |
| 11 | I like the idea of a female archer, I like the tomboyish look.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 12 | General costume idea.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 13 | If you base off the character on top of AI and with a lot of prompting work it can actually work very well. The animations look clear and even in a top down game with many soldiers, a lot of parts of the characters are not necessary needed to be well. (Lower body, parts you don't see with the camera angle)                                                                                                                                                                             |
| 14 | The bow and Arrow Animation Looks quite good The model Looks pretty good as well                                                                                                                                                                                                                                                                                                                                                                                                                |
| 15 | Looks actually more appealing than the reference gnom-like proportions. But due to more muted colours, it won't fit into the candy-like colors of the game.                                                                                                                                                                                                                                                                                                                                     |

17. What aspects could be improved in your opinion?

| Participant's Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                    | The coloring of the Character might be a bit pale and flat Some of the Animations could use some small tweaks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2                    | Uniqueness, readability, animation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3                    | The shading looks very flat ("gray") - right now, the knees are the brightest parts of the character, which doesn't make sense. I would highlight the skin on the face and the hands (because of archery) and perhaps some clothing features that best communicate the character's cultural background. The rest of the body should be darker, particularly the parts closest to the ground or on the back. The head could be slightly larger because the facial features are still not very clear. I would also slightly enlarge the bow and quiver, and perhaps brighten them or push the colours, to make the function of the unit clearer. |
| 4                    | While the AI does a good job creating a character that is useable as an asset, it lacks a certain charm that the reference image had, or any specific element that makes it stick out. For this humans are at the very least required to guide the AI, if not do the task completely from character design to modelling                                                                                                                                                                                                                                                                                                                        |
| 5                    | I think the proportions were realistic but boring, more exaggerated face and hands could have improved readability and probably worked better with the stylized brief. Colors were desaturated, not that vibrant.                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 6                    | Readability from a distance/ in a more busy ingame context                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 7                    | color and value contrast, proportions, snappiness in animation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 8                    | The concept of the clothes could be more closer to the references.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

|    |                                                                                                                                                                                                                                 |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9  | Proportion of Character to be like reference, Animation feels weightless. Not too much unique look to it. Colours don't fit the reference.                                                                                      |
| 10 | Replication of the art style, especially the colour and proportions of the character.                                                                                                                                           |
| 11 | A clear vision regarding colors and shapes. It is not stylized enough to be easy to read, it lacks intention.                                                                                                                   |
| 12 | It would be hard to find this character in brighter environments.                                                                                                                                                               |
| 13 | I miss a bit of the charm of the 2D photo in the 3D model. This doesn't necessarily have to do something with AI. I can imagine that it's difficult to design the workflow with AI so that the pose and shading are just right. |
| 14 | I think the visualization for strategy top down games could be better. It's not saturated enough to be seen well, the colours don't match and they don't stand out if you just throw them into the game.                        |
| 15 | Contrasts in colors could be higher, less cliché feminine, more connection to the original regarding the very specific body type, cultural reference and weapon                                                                 |

18. If you have any other thing to say regarding the subject, I'll be happy to read it.

| Participant's Number | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                    | As these games are aimed at casual players that are supposedly sucked into spending money by dark patterns, unique design often comes second. The overall flashyness of the reference design is not met in the AI-Character. Mobile Games have become so overly "stylized" into a certain direction overall anyways, that any distinct style or direction has been lost even before AI was a thing. So in my opinion it won't help saving even more cost doing it with AI, as the overall product will be so much averaged out in visual clarity and vision, that nobody really would see the USP of the product. I for sure don't see the appeal in playing that. But the older generation that played Facebook-Games back in the day might not care, as they are also happy with candy crush etc. I personally think AI should not be used in productions, as the human element is missing, and creating unauthenticity and soulless products. Advertising with AI undermines the honesty and determination of the workers at the company, and undervalues it, gives bad reputation. I wouldn't use AI in any of my productions or Artworks, as it is unethical and a waste of resources. It also will give a worse result, and the Products being created will age like spoiled milk, and won't hold value over the years. |
| 2                    | I think AI could be used as a way to create many character concepts, but these concepts should be adjusted by a 2D artist to fit a consistent art style.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3                    | I oppose the use of generative AI for many reasons. Not only is it the biggest theft of intellectual property in human history, it also has several environmental issues, such as its water and power usage and air pollution, and it is mostly trained by modern-day slaves, for example in Kenya. Furthermore, I see a direct contradiction between the creation of art and the use of AI, which can only repurpose existing content. Ultimately, the most important aspect of art is that the artist can express themselves through their work, leaving their creative mark – something that is not possible if one merely reassembles the work of others.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4                    | I found it hard to answer some these questions because I was unsure if I was evaluation the character design, 3D model, rig, or animation (or everything).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 5                    | If it was generated with AI, then I would say that the result is okay but kind of not that interesting. I would say that the part that makes a Character interesting and cool to Look at are the decisions the Designers Made and If that is left to the AI to decide it either needs all the decisions spelled Out to them or it needs to get better. Right now it gives a result that probably works and is acceptable but really it's quite boring and safe.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | As an Artist I think Ai is only helpful in certain stages of production, it is very important that alot of thought is going into the model, the concept stage is the most important part. As it is now I will be hard to read from afar.                                                                                                                                                                                                                                                                                                                                                                                                |
| 7 | I'm not sure if Question 2 refers to work experience; I interpreted it as not. The readability of the animations in question 10 was very good, except for one animation where the character is holding up the bow. I was unsure, I thought it was an animation for giving up or victory.                                                                                                                                                                                                                                                                                                                                                |
| 8 | Im very negatively polarized against AI, but recognize that in this case the AI did a good job in creating a useable asset. I think games that use AI in their design phase are dooming the game in a way that is difficult to grasp. Games with iconic character designs have relevance even when they arent as popular anymore (See Team Fortress 2 and its 9 iconic classes) and games with unique character designs can motivate new players to pickup the game even if they are skeptical of the gameplay itself (See Valve's Deadlock as a great example). I can definitely see AI being used prominently in mobile games howeve. |

## Declaration of independence

I hereby certify that I have completed the present master's thesis with the Title:

A comprehensive study of the processes involved in developing and optimizing character designs for top-down games, from concept to completion.

I wrote it independently and using only the specified resources.

All passages that I have taken verbatim from literature or other sources such as websites have been clearly marked as quotations with a reference to the source.

Leila Karamitalab,

Hamburg, 13.04.2026

