

Concept Art Best Practices for the Video Game Industry and Classic Illustration Techniques (November 2014)

Victoria Rehfeld Smith and Joel Farrell

Abstract— Creating concept art for video games is about refining ideas into a coherent vision. Concept artists use their knowledge of art principles and their technical understanding of their artistic media to create efficient and effective concepts for an industry that often works on a tight schedule. Every artist is different, and so is any given concept that an artist strives to make. The techniques that are part of an efficient workflow for one artist, may not work for another. There is much to learn from professional artists, who are willing to share their processes. Researching these techniques and applying them through practice and experimentation, I created two concept pieces each of a weapon, a character, and an environment to determine which techniques fit my workflow, finishing with a final, complete concept including all three subjects.

Index Terms—Concept Art, Digital Painting, Illustration, Video Games.

I. INTRODUCTION

Creating concept art is about refining ideas and developing a coherent vision [1]. As part of the game development process, concept art is an indispensable first step in visualizing a unique style that may make the difference between a successful or failed game pitch [2]. From the more complex character and weapon design, to the more mundane prop design, such as light fixtures and the ubiquitous crate, video game art directors call upon a concept artist to develop the look of these game assets for a 3D modeler to “bring to life.”

Although video game concept art has the very specific goal of visualizing the design of a game [1] [2], it is, at its essence, art. Whatever media an artist uses, pencil on paper, pen and ink, or Photoshop, a solid understanding of the fundamentals of art and design remain the ultimate tools in the concept artist’s toolkit [3]. Understanding the elements and principles of design and using them to express their imaginations, artists have the basis by which they can create beautiful artwork that clearly communicates ideas [4]. However, what may be missing is the technical knowledge and efficient workflows that time and practice bring [3].

Thankfully, many artists, both concept artists in the video

game industry and “traditional” artists, are willing to share the results of the time and practice they have put in to developing their techniques. The object of this thesis was to study and apply those techniques, finding the best practices of video game concept artists, as well as classic art and illustration techniques to develop my own optimal workflow, and combining all that I have learnt, produce concept art, which includes a character, weapon, and environment.

II. RESEARCH REVIEW

A. What is Concept Art for Games?

Concept artists take a vague idea and narrow it down to something “aesthetically in the ballpark”[1]. The concept artist engages in an open-ended, visual brainstorming process. However, when it comes to game development, the artist must consider some special limitations when creating art. First, an art director will guide the concept artist as to the initial goal of the design and make sure that the artist fulfills the requirements necessary to meet that goal in the concepts. There is also the deadline. A piece of concept art is finished when the deadline says it is finished. Finally, since this is concept art for games, there is the game itself to consider. The concept must fit the genre and style of game play. It also helps the concept artist to know the limitations of the game engine and technology, so that they create designs that the game engine can handle.

What comes later in the process is Production art [1]. Production art is all about creating the blueprints for the artists who come after the concept artist. It is a continuation and further refinement of the concept, which helps in the building of the art asset needed for the game. The concept artist must make sure the forms in their design read clearly enough for proper interpretation and translation to the final game asset. It is possible for the concept art to have enough information, but that is not necessarily its purpose.

Now that we have a better understanding of what concept art is, the question becomes how does the concept artist go from a vague idea to a final concept?

B. A Five Step Process

In his blog, concept artist Paul Richards outlines what he has learnt through 12 years of experience making concept art and gives advice and insight into his process [1]. Richards includes basic information, such as his favorite drawing tools,

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V. R. Smith is a graduate student at the Guildhall at Southern Methodist University, Plano, TX 75024 USA (phone: 206-898-4844; e-mail: victoriarehfeldsmith@gmail.com).

discusses how to deal with criticism, recommends art books, and breaks down the steps of the concept art making process in multiple ways. In one version, he divides the process into five steps:

- (1) Think
- (2) Thumbnail
- (3) Contour
- (4) Render
- (5) Manipulate

Think means gathering references and inspiration. Looking at real world examples helps concept artists understand their task. This applies to a contemporary object that the concept artist wants to get “right” and to an imagined object that needs some basis in reality in order to be convincing.

Thumbnail refers to the process of creating quick sketches to work out design possibilities. This is the time for the concept artist to explore and determine silhouette, or the basic readability of the concept [5].

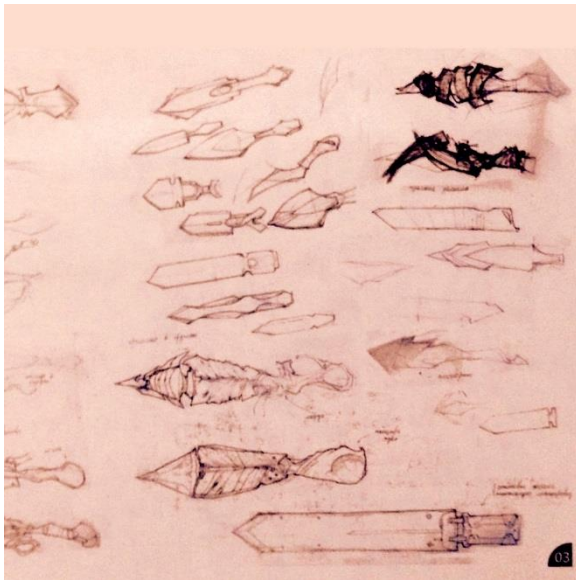


Figure 1: Vadim Sverdlov, Thumbnail Example [3].

Contour comprises the refinement of the design developed in the thumbnail process. The concept artist finds the shapes that define the initial silhouette [1].

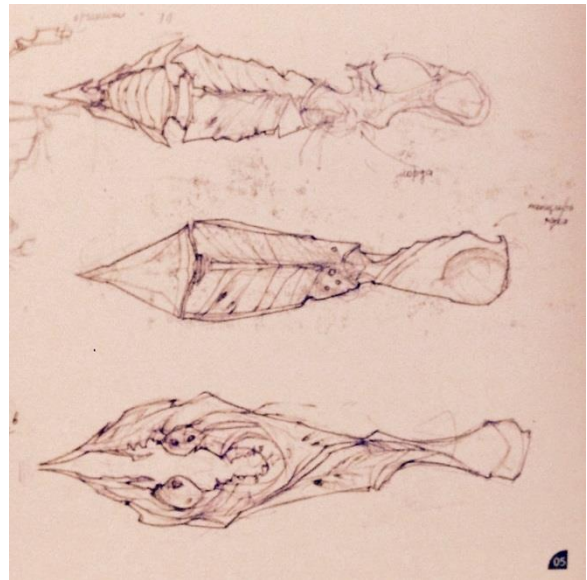


Figure 2: Vadim Sverdlov, Contour Example [3].

Render is the step in which the concept artist takes the progress made in the contour stage and fleshes out the details, textures, and colors of the design.



Figure 3: Vadim Sverdlov, Render Example [3].

Finally, **Manipulate** is not a required step, but using the digital art tools available, a concept artist can “play” with the rendered piece, potentially discovering something more interesting than originally intended.

Concept artists generally follow a process similar to the one Paul Richards discusses, as outlined above. There is a research step, a brainstorming step, and a refinement step before starting what will become the final concept [3]. Then, as the final concept comes together, the artist takes a last look and refines further until the concept is finished.

For one example, illustrator and concept artist Vadim Sverdlov begins his practical weapon concepts by researching his subject [3]. He looks for anything that can help to create his concept: what the subject looked like in the past, what it looks like now, what materials comprise it, and how it works.

Then, he creates guidelines for the subject, based on client request if it is not personal work. With these guidelines in mind, Sverdlov sketches out versions of the subject to study functionality and compares them to his research.

Once he decides what to draw, he sketches his thoughts, using pencil and paper. If on his computer, he sketches thumbnails in silhouettes.

When Sverdlov has sketched many variants, he picks two he prefers to flesh out in a concept. He begins by drawing in greyscale, looking first for the right shapes.

Finally, he takes the two drawings to a point at which he could imagine the results. Then, he picks one to develop the idea further. Sverdlov defines the materials, adds color, and adds details, using photo manipulations, until the concept is complete. (See Figures 1-3.)

For another example, when tackling a fantastical, alien environment, concept artist Simon Kopp first looks for existing examples of his subject as made by other artists [3]. He checks to see what other artists have already done to try to be more innovative. He looks to his reference collection, or if that is lacking, he searches the internet for more inspiration. He also looks at photo books of wildlife and forests from around the world to know what already exists in nature. When research is complete, he writes notes on everything he observed.

Kopp continues to brainstorm, sharpening his idea of what he should draw. He begins by writing down the word that best describes the topic of his concept, "alien," and then whatever words pop into his mind next. If a word stands out, he then brainstorms further about that word and looks up more inspirational research images.

He goes through his references and starts sketching ideas. He sketches ideas for the whole composition, as well as for individual parts. Kopp sketches every idea, or at least writes them down, as they can become useful later.

After finding the best ideas, he plans his final composition and begins drawing and blocking in colors.

Finally, Kopp evaluates the concept as a whole. He makes changes as needed, until the concept is complete.

As the examples above illustrate, regardless of subject matter or style, concept artists use a methodical approach to generate ideas and produce art [3].

C. Paint-Over and the Relationship between Traditional and Digital Art Technique

The five-step process, discussed above, also has a basis in traditional illustration [4]. One of Paul Richards' recommendations is the collection of art books written by the illustrator Andrew Loomis [1]. In *Creative Illustration*, Loomis guides his readers through the process of creating a commercial illustration [4], which is similar to the processes of concept artists [1][3]. The process Loomis describes includes gathering reference photos, sketching and planning through thumbnails, embellishing on the design, setting up live models based upon the design plans, and taking photos or drawing from life where possible. Interestingly, modern, digital paint-over techniques compare to this illustration process used in the 1940s.

Paint-over is the process of blocking in forms using a 3D modeling program, such as Google SketchUp or 3ds Max, or a

3D sculpting program, such as ZBrush or Mudbox, as a tool for the concept artist to explore a design and create a basis, in perspective, for the concept art [3] [7]. The artist creates 3D models of their subject, typically in basic shapes, places them in a composition they want, and takes a screenshot. The artist uses that screenshot as the base for their painting, painting on top of it (or "over" it) to the desired effect. Often the artist is integrating a mix of the 3D screenshots and photo images, using the "paint" as the glue that holds the final concept together. This is a fast, efficient, and flexible method of creating digital art. It allows the concept artist to make small changes in a 3D model that, in a straight painting, would mean more rework and effort dealing with perspective adjustments and volume definition.

As Andrew Loomis describes recreating a design with live models [4], the digital concept artist, who uses paint-over, is similarly taking advantage of the properties of a "real" example of what they are trying to illustrate. Only the artist using paint-over creates their references from scratch. With this technique, perspective and proportion are more likely to be accurate, or at the very least, easier to tackle [1] [3][4].

For example, concept artist Shaddy Safadi uses the 3D modeling program Maya to "cheat," as he calls it, when he paints [3]. He uses simple cylinders and cubes, stretching and rotating them into the shape of a sci-fi robot. He does not care about proper modeling technique. Instead, he cobbles the 3D model together as quickly as possible for easy adjustments. Then, playing with the camera in Maya and taking advantage of the program's lighting tools, he takes a screenshot of his robot model. The result is that the model has realistic lighting and is in the correct pose for the final concept. Safadi then takes this image into Photoshop and combines it with other images. Once he is satisfied that he has created the best composition out of those combined images, then he begins the paint-over. Since Maya has already created the lighting on the robot, all he has to do is add texture details and integrate it into the rest of the image.

Though many concept artists use paint-over as a block-in tool, many others block-in their paintings with simple sketches on a layer in Photoshop [3]. Concept artists may use paint-over for both hard-surface modeling, such as weapons or vehicles, and organic modeling, such as characters, but they may just as easily choose to work solely in Photoshop [3]. It is all about what works best in a particular concept artist's workflow.

Creating art with traditional or digital media, the concept artist uses the media that is most efficient for them [5]. One is not better than the other, but they do have different advantages and disadvantages of which to be aware [1]. For example, Photoshop has the advantage of photo manipulation tools [1] and the ability to build brushes [3], but it also may give too much freedom with the "infinite canvas" and the ability to undo mistakes [5]. Traditional media can create effects and "happy accidents" that a digital painting program cannot replicate, but an effect done in a few seconds with digital media might take hours in traditional media [1]. Once again, it is all about using the tools that facilitate efficiency [5].

D. Other Specific Digital Art Techniques

Since concept artists in the video game industry often create concept art on a tight production schedule [2], efficiency means speed. It is no wonder that concept artists use digital painting programs, like Photoshop, to create their artwork.

Within digital painting programs, there are techniques concept artists use to create art efficiently and effectively. Concept artists employ photo textures directly in their paintings, using it on a layer set to Overlay, or as a source for creating a realistic texture brush [3]. It is much more efficient to use a brush that recreates the scales of a creature's skin than to draw each scale individually.

When using photo textures or other photo references in a painting, it is important to integrate in a way that will not cause it to distract from the painting. A photo can stick out when it does not have the same quality as the painting, or when it is so common as to be recognizable by others [1]. It is also important to make sure to use the photo legally.

Creating brushes in Photoshop is not just limited to creating texture brushes using photo references. Concept artists also create brushes of entire figures, such as a group of soldiers or trees, which can really speed up the painting process [3].

Similar to using photo reference images as overlays, concept artists also reuse previous work, merging it into a newer piece to create different effects, thereby adding more depth and substance.

Further techniques include starting a painting using value only. Then, after the lights and shades establish the volume of a subject, the artist applies the color [3][6]. This is also a classical painting technique known as *grisaille*, which artists used to create the illusion of three-dimensionality in a two-dimensional image [8]. This is another illustration of the close relationship between digital and traditional art techniques.

When using a sculpting program, such as Mudbox, an artist can directly paint colors onto the model they are sculpting, or apply materials to objects with useful properties like reflectivity or transparency to help create the artist's intended look [9].

An additionally helpful trick to create a quick perspective grid involves using the Polygon tool in Photoshop and setting it to Star shape in its settings to produce a vanishing point with the spokes of the star acting as the grid lines [11]. Placing two of these shapes can create two-point perspective, and so on.

E. A Return to Fundamentals

1) Elements and Principles of Design

Beyond these and other useful tips and tricks using digital painting programs [3], the concept artist must always return to their basis in art fundamentals. Whether designing a new upgrade to an armor-set or painting a fresco, an artist uses and considers the elements and principles of design [4][5][6]. The elements are the basic visual tools artists use to communicate their ideas [8].

Composition is the arrangement of multiple parts into a unified whole. The principles and elements work together to create the composition.

Line is a simple and versatile element that activates space, defines shape, creates movement, and makes connections. Lines can define, imply, and organize.

Shape is a flat, enclosed area, while **Volume** is a three-dimensional enclosed area. Shapes can appear volumetric through shading. Simple shapes help to communicate ideas in a direct manner. They can also create different psychological impressions (for example, round is soft and passive, and angular is hard and aggressive) [5]. Artists use these shapes to create forms, and, using basic volumetric shapes, a concept artist is much like a 3D modeler using primitives (basic geometric volumes).

Texture is the surface quality of a shape or volume [8]. It appeals to our sense of sight and touch. Artists use texture to define the materials that make up an object [5].

Value refers to relative lights and darks [8]. The contrast between values effects communication, clarity, and readability. When there is high contrast, clarity typically increases. Artists also use value for emotional impact, creating different moods and "feels." Thinking of value as lighting, an artist can create the illusion of space, depth, and volume.

Color, the last element, is one of the most complex. Artists use color and its psychological effects to strongly effect communication. By employing various color schemes, artists can create harmony in a design. Conversely, an artist can cleverly use their knowledge of color to create disharmony to disturb or disorient as a design might require. Color can define space, emphasize a particular area of a composition, and has so many symbolic and cultural meanings with which an artist can play.

If the elements of design are the basic tools, then the principles are the combination and application of those tools by the artist to the composition.

Unity refers to the similarity of an artwork, while **Variety** refers to the differences. Unity provides the cohesion and variety keeps things interesting. Using various strategies, such as grouping, repetition, and grids, artists take advantage of the way people see, looking at the whole composition first, and then the individual pieces. This helps the artist better communicate to a viewer the overall concept of a design.

Balance is the distribution of weight in a composition. Weight can be visual, as some shapes appear heavy or light. Weight can also be about importance. Knowing how to orient objects in a composition, an artist can create more stability or dynamism. Artists use symmetry, asymmetry, and radial symmetry to achieve this.

Scale and **Proportion** create size relationships that affect the balance and the emotional impact of a composition. Proportion deals with the relative size of objects in a composition, and scale with size compared to human size. Placing scaling objects in a composition is very important when creating concept art to ensure clear communication of size [1].

Rhythm has to do with the sense of movement created by repetition of in a pattern [8]. With rhythm, an artist controls the way the eye moves over a composition, guiding them to the most important points [5].

Emphasis gives prominence to a part of a composition [8]. Often artists use a focal point to attract attention to an area of a composition and create visual impact. Anomaly, placement, and contrast create emphasis.

The concept artist, whose job it is to refine and communicate ideas, is well equipped to do so with their knowledge of the elements and principles of design [5]. However, there is one more thing to take into consideration, especially since the concept artist for videogames develops ideas for three-dimensional objects in space.

2) *The Illusion of Space*

There is one last fundamental that all artists must firmly grasp, and that is how to create the illusion of space when working on a two-dimensional surface [1]. Digital techniques, like paint-over and the Vanishing Point tool in Photoshop help artists achieve the illusion of space, but by understanding the different types of perspective and other tricks, artists can once again manipulate their compositions to better communicate their ideas [8].

Artists commonly achieve the illusion of space by using the technique of **Linear Perspective**. Objects seem to shrink as they get farther away, until finally they reach a vanishing point. Three different types of linear perspective simulate this effect on a two-dimensional surface. **One-Point Perspective** draws the viewer to a single focal point. **Two-Point Perspective** is useful for diagrams and architectural drawings. **Three-Point Perspective** creates a dramatic upward or downward pull, great for communicating the power of a space.

There are other, more simple ways to show space, which all can work in combination and complement each other. **Overlapping** objects show which objects come before others. Objects on top are closer, and the ones on bottom are further away. Knowing that objects appear smaller the further away they are, even without linear perspective, an artist can use **Size Variation** to show which objects are closer and further away. Lastly, **Atmospheric Perspective** works on the principle that the further away something is, the less defined it is.

Games represent space in two or three dimensions, and the player interacts with that space from their perspective or viewpoint [10]. Players experience games from overhead views, side views, isometric views (three-dimensional space without linear perspective), first person views, and third person views.

Just as different types of perspective have different uses in art, each player viewpoint can create a different experience [10]. Game developers, including the concept artist, use that information when designing that experience. For one example, a first person game works to create an immediate experience, where the player sees and feels everything from the perspective of the main character. For another example, the isometric view gives the player a “god’s eye” perspective, where the concern is giving the player large amounts of information.

Now with all of the fundamentals well in hand, the artist is able to use all of their knowledge of the elements and principles of design to communicate visually in a coherent and beautiful way. Of course, one must always practice to master any set of skills.

F. *Practice, Practice, Practice*

The final key to creating great concept art for video games, or any other industry, is to practice the aforementioned techniques [1][3][4]. Amongst all the insights and tips in Paul

Richard’s blog, he also offers a list of “things to just go ahead and draw a million, give or take” [1]. The following are some of the items that he has found always need concepts in games, albeit in a tongue-and-cheek manner for some.

- (1) doors
- (2) crates
- (3) wall panels
- (4) floor panels
- (5) ceiling panels
- (6) light fixtures
- (8) pistol
- (9) shotgun/nailgun
- (10) grenade launcher
- (11) machine gun
- (12) energy gun
- (13) uber gun
- (14) sniper gun
- (15) alien gun
- (16) upgrade station for guns
- (17) blunt melee weapon
- (18) bladed melee weapon, etc.

G. *Conclusion*

Based upon Richards’ list of recommended “things to draw,” I followed his five steps for creating concept art (Think, Thumbnail, Contour, Render, and Manipulate). Applying the fundamental elements and principles of design, and exploring the digital painting techniques that video game concept artists use, I created concept art for a weapon, a character, and an environment.

III. METHODOLOGY

In order to understand the best practices of concept artists in the videogame industry, I practiced their techniques by “testing” them on three concept art subjects. Based upon the list of recommended “things to draw,” I made concept art of a weapon, a character, and an environment, combining them all into one final concept.

A. *Supplies*

I used the following supplies and equipment:

- Computer
 - Alienware M18XR2
 - Intel® Core™ i7-3630QM CPU @ 2.40GHz
 - 32.0 GB RAM
 - 64-bit Operating System
 - Windows 7 Ultimate Service Pack 1
- Wacom Intuos 5 Touch Tablet
- Adobe Photoshop CS6
- Autodesk 3ds Max 2014
- Autodesk Mudbox 2014

B. *Five Step Process*

Before I could begin, I had to first come up with my design goals. Not only was I the concept artist, I was also acting the part of the art director, with the advice and assistance of my

co-author, Professor Joel Farrell. I also had to consider my deadline, which was determined by my thesis schedule. However, I did not consider a game engine or gameplay perspective.

After some thought, I decided to explore the retro science fiction genre. My goal: to create an adventurer of time and space, someone who was once a soldier as well as scientist, travelling to alien worlds, saving people in distress, meddling with the machinations of galactic dictators, and using cool, but ridiculous ray guns and other machines. This theme would allow me to experiment with both organic and mechanical design. Also, it is a subject in which I have interest that could sustain me throughout the entire project.

Since Paul Richards succinctly lays out the process for creating concept art, it was easy to continue by following his five steps: Think, Thumbnail, Contour, Render, and Manipulate [1].

1) Think

The first step was to gather references for the weapon, character, and environment, which would all come from the same retro-sci-fi universe. I searched Google for “1950s sci-fi,” “sci-fi pulp art,” and “ray guns” for a start.

a. Character

Through the process of “thinking,” I discovered some iconic science fiction artists. One of the most inspirational, especially for character design and color choice for this project, was illustrator Ed Emshwiller. Figures 4 and 5 represent two important reference images he made.



Figure 4: Ed Emshwiller, "Have Spacesuit, Will Travel" Reference Art. <http://www.sci-fi-o-rama.com/2009/06/08/ed-emshwiller-have-space-suit-will-travel/>

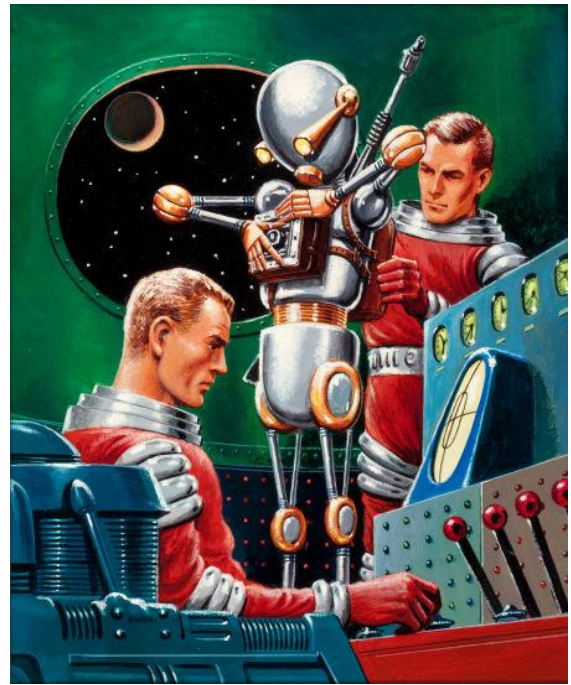


Figure 5: Ed Emshwiller "Science Fiction Digest" Reference Art. <http://cheapsfci.files.wordpress.com/2011/02/emshrobo.jpg>

Another image I latched on to for inspiration is in Figure 6. Simply the title of this book captures the imagination. “Captain Future, Wizard of Science” is everything that I wanted to create in my concepts. The title is so over the top, but the artist appears to have created this cover with genuine seriousness. This is particularly apparent in the soft expression of the face of the white alien man shooting a laser on the left of the image.



Figure 6: “Captain Future, Wizard of Science” Reference Art. <http://www.webomator.com/grafx2/blog/captain-future-golden-age-pulp.jpg>

a. Environment

When it came to the environment, Figures 4 and 5 stand out for their compositions and use of negative space. The artist used an asymmetrical composition. The eye is lead to the focal point of the image through a window or screen, which is off to the right of the image rather than centered.

Also of note is the way the artist chose to represent the technical aspects of the spaceship interiors. They used simple shapes, mostly circles and squares. Yet if the artist uses enough of these simple shapes, as in Figure 8, the controls of a spaceship can seem dauntingly complicated, technical, and “scientific.”

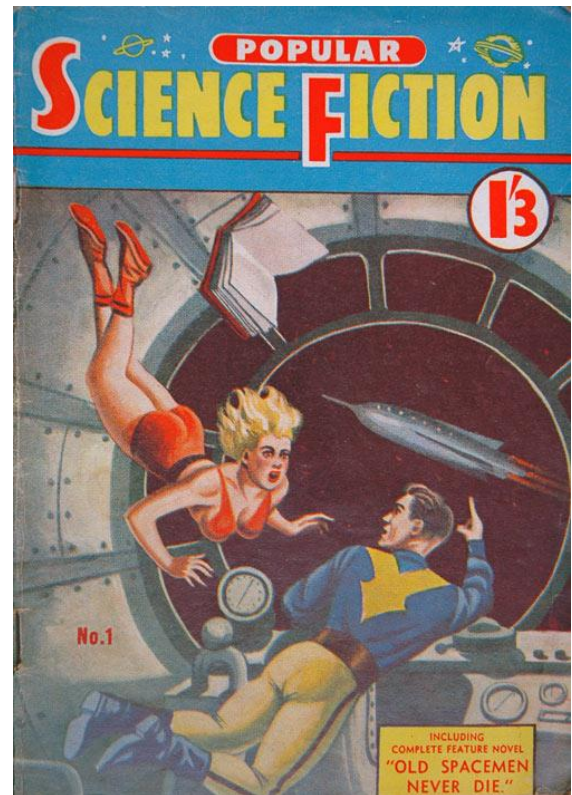


Figure 7: “Popular Science Fiction” Reference Art. <http://www.otago.ac.nz/library/exhibitions/pulp-fiction/gfx/images/14-8-popular-science-fiction-no1-big.jpg>

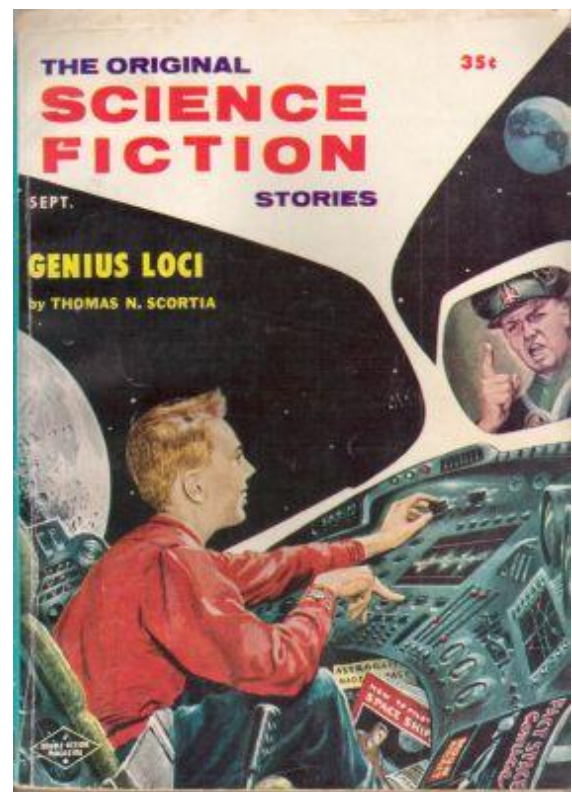


Figure 8: Ed Emshwiller, “The Original Science Fiction Stories” Reference Art. http://1.bp.blogspot.com/_2v-Vwo5ul9Y/RICgUk7kdnI/AAAAAAAAAEE/JwT_SayAPac/s400/OriginalScienceFictionSept1957.jpg

b. Weapon

For the weapon, I chose the classic ray gun that every self-respecting 1940s - 1960s science fiction hero wields. Not only are there many great examples of weapons in science fiction illustrations, there are also toys and replicas from which I drew inspiration. In particular, Figure 9 has a classic design, a “blow dryer” shape, and an emphasis on roundness, circular forms, and repetition of rings.

Figure 9 was also useful to the “thinking” process for how to deal with the background template for presenting the concept art. The idea of a box or advertisement that highlights the important aspects of the gun would help me convey the “attitude” of the concepts I was making. Just like “Captain Future, Wizard of Science,” “Friction Powered Space Pilot X Ray Gun” has that combination of serious and over the top that I wanted to express.



Figure 9: “X Ray Gun” Box Reference Art 1.
<http://punditfromanotherplanet.files.wordpress.com/2014/03/space-gun-japan1.jpg?w=590>



Figure 10 Gun Reference Art 2. <http://media-cache-ec0.pinimg.com/236x/19/12/09/191209a0669fd7e3de7cbe1ead1473d5.jpg>



Figure 11: Gun Reference Art 3.
http://41.media.tumblr.com/84c32ae640cfc4b61c4300735cb4d6e0/tumblr_ms48t4k2Cs1rstmyio9_500.jpg



Figure 12: “Planet Stories” Cover Gun Reference Art 4.
<http://4.bp.blogspot.com/-ZAQRTj3wqb4/UYk-woaY9aI/AAAAAAAAAiU/V58Ioyru9iI/s1600/Planet+Stories+July+1952.jpg>

With references gathered, inspiration building, and imagination running, I could then proceed to the second step, working through my ideas via thumbnail sketches.

2) Thumbnail

a. Character

I began with the character in order to first establish what sort of person he or she was. Once I knew the person well enough, I could better judge what sort of weapons they would use and in which environment they would live.

Though I had my initial goal, the character could be anyone: female, male, bulky, svelte, robot, alien, mercenary, space pirate, hero, or villain, to name a few options. I had to investigate a wide variety of areas in my thumbnails.



Figure 13: Original Character Thumbnails 1



Figure 16: Original Character Thumbnails 4



Figure 14: Original Character Thumbnails 2



Figure 17: Original Character Thumbnails 5



Figure 15: Original Character Thumbnails 3

Since I was interested in establishing personality for the character, I veered towards more fleshed out sketches with some pose element to them, seen in Figures 13-17. As I kept going, I realized that there was a need to narrow things down to one person-type. The greatest decision I had to make at this stage would determine everything else about this project: Male or Female?

After returning to the inspirational images, I chose to go with the common male character. Once that was established, I went back to a more basic technique for approaching thumbnails by creating silhouettes [3][5]. It is important to see the design as a whole first [5], which is something I initially forgot. A strong silhouette contributes to readability. Game assets must be easily readable at glance [10]. As an example, the well-defined silhouette of a gauge helps the player to determine their health status quickly and without much thought.

Using Photoshop, I quickly blocked out shapes using a square, soft brush that builds up color, which keeps some translucency and adds minor details. I also used white or the eraser to rough in details on top of the black. While sketching, I cut and pasted aspects of the silhouettes that stood out in an interesting way and created copies of them to edit for variations.

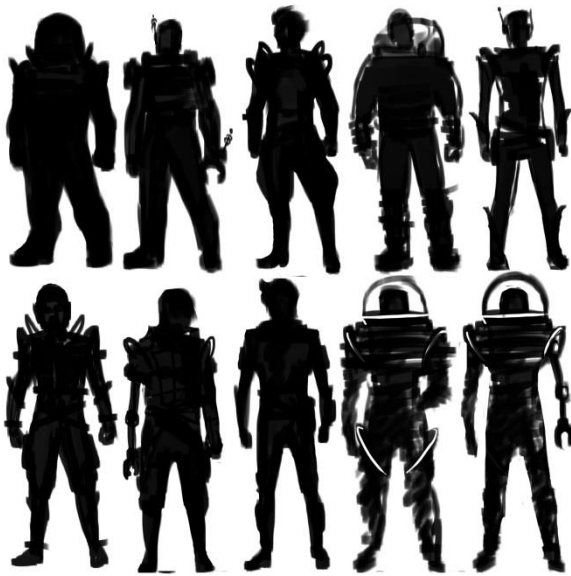


Figure 18: Character Thumbnails

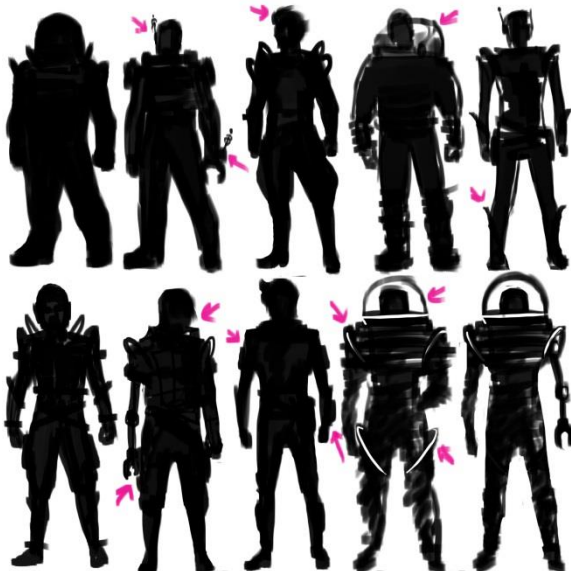


Figure 19: Character Thumbnails with notations

Figure 18 shows the thumbnail silhouettes of the male space hero. I reviewed these thumbnails and labeled the parts that stood out to me as “things I liked,” in Figure 19, that I would want to develop further into the next step, Contour. Aspects that created an interesting silhouette had potential to create an interesting character. For example, a character with a robot arm begs the question, how did he get that arm? Perhaps in his life as a former soldier he lost a limb in battle and now has a prosthetic. Perhaps he is a robot that is piece-by-piece upgrading to a more sophisticated android. This is all part of the creative thumbnail process.

It took four hours and thirty minutes to complete the thumbnail step for the character.

b. Weapon

Now that I had established the character, the nature of his weapon would not be as difficult to determine. After my experience with the character thumbnails, I began the weapon thumbnail step by drawing silhouettes. Inspired by the classic

ray guns, I started with more rounded shapes but worked away from that to more modern shaped guns, with the addition of rings and antennae.

Just as with the character silhouettes, I used the same brush technique of building up black with the square brush and using the eraser or a white brush to create detail if needed. I liberally used cut and paste to explore more variations.

In this way, I found that I preferred the more modern style gun in the thumbnails. I chose the design of the very last thumbnail silhouette as the basis for refining the design of the weapon, seen in Figure 21. At the time, this seemed like the best idea, but of course, in the Contour step I would explore this silhouette more.

The thumbnail process for the weapon took one hour.



Figure 20: Weapon Thumbnails 1



Figure 21: Weapon Thumbnails 2

c. Environment

Addressing the environment thumbnails proved to be just as complicated as the character, as once again, I had to make a major decision. This time the question was: Interior or Exterior?

Initially, the thumbnails were more freeform, see Figure 22, sketching out a scene or part of a scene without any boundaries. Just as with the character, this only perpetuated the dilemma. I had to create a more conducive format for the environment thumbnails.

Of course, using the silhouette technique for the environment did not seem the best way to convey any useable information. Instead, I opted for a quick sketch method, using the square brush, black and white “ink”, and the eraser in Photoshop. I also gave myself literal boundaries by create a canvas with delineated boxes in which to draw the thumbnails. This helped to focus attention on a specific aspect of an environment scene.

Figures 22-24 illustrate the initial explorations into the environment.

There were many environment thumbnails on multiple pages, so it made sense to use a best practice and number the images for easier reference [1]. This is something I should have done on the other thumbnails for easier communication, even if the communication was mostly with myself alone.

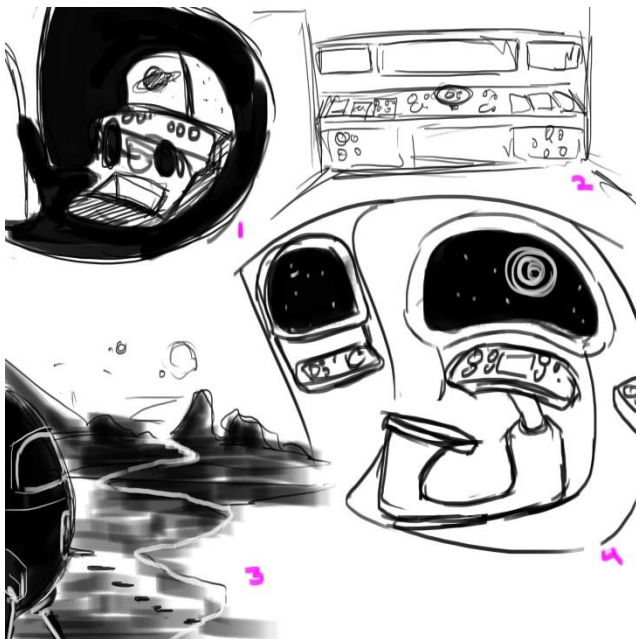


Figure 22: Original Environment Thumbnails 1

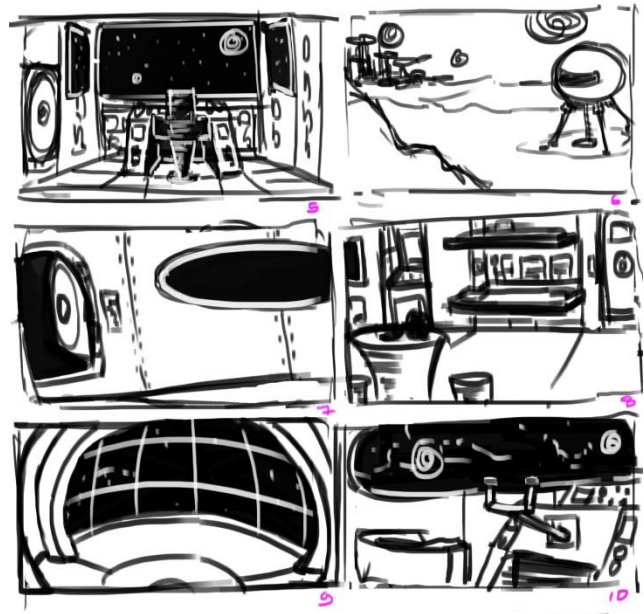


Figure 23: Original Environment Thumbnails 2

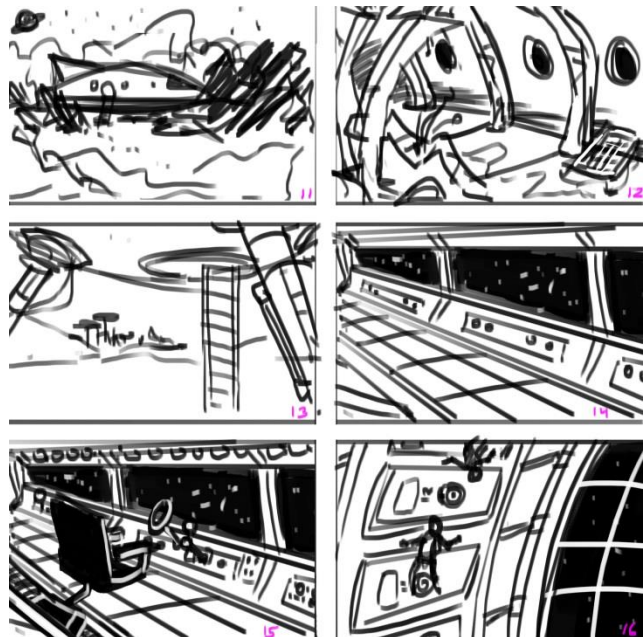


Figure 24: Original Environment Thumbnails 3

When I decided to concentrate on an interior, my acting art director, Professor Farrell, suggested a return to an original thumbnail, in Figure 22, and chose thumbnail 4 as a jumping off point for further explorations. The results of this are in Figures 25-27.

The chair and console design needed more investigation, and so towards the end of the thumbnail step, I worked on understanding how the environment would work for the character, placing him in the pilot seat and getting a sense of scale. Showing the scale of a concept is another best practice that helps keeps things in proportion [1].

By the last thumbnail, I was trying to work out some practicalities of space travel, for example, the need of a seatbelt. I opted for a more humorous solution that would fit the contrasting, kitsch tone I wanted to establish. In Figure

27, thumbnail 34, I converted the chair into a robot that would transform to create back support.

The thumbnail step for the environment took eight hours and thirty minutes.

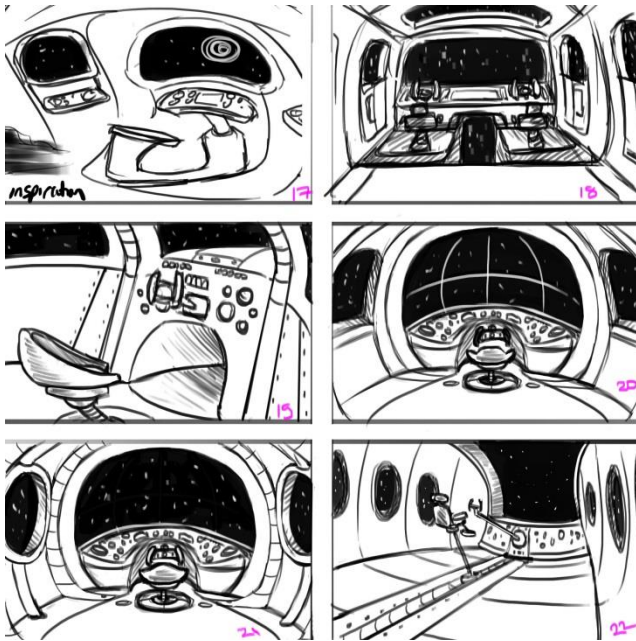


Figure 25: Revisiting Original Thumbnail 1

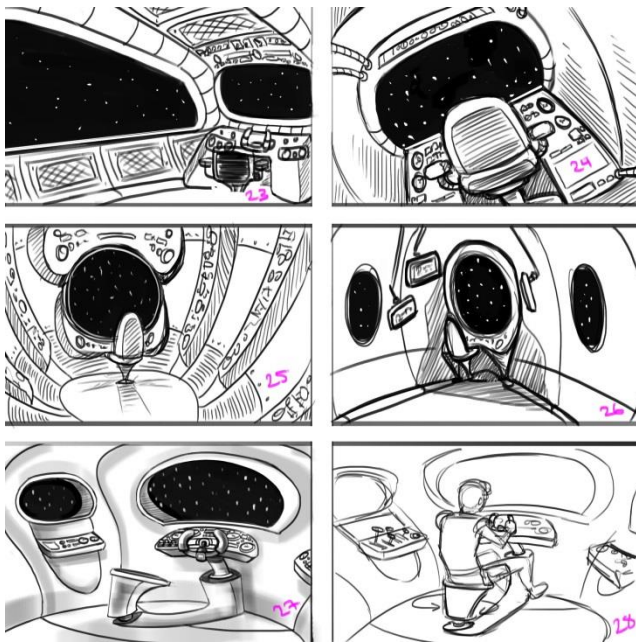


Figure 26: Revisiting Original Thumbnail 2

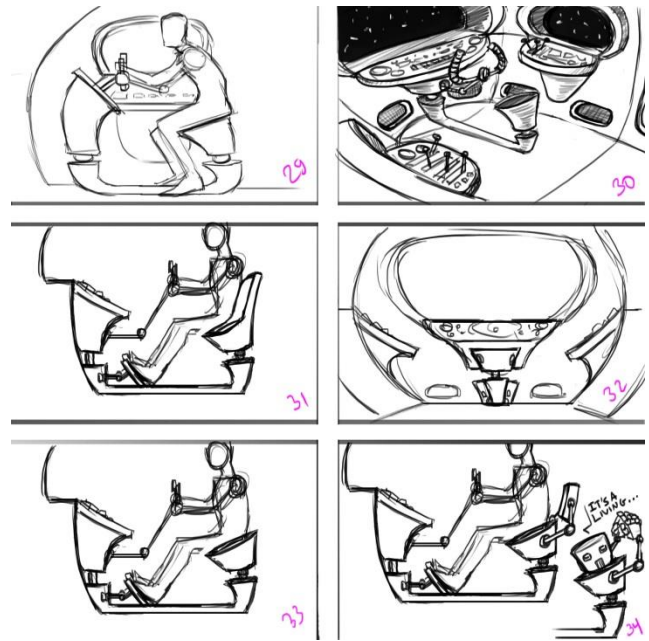


Figure 27: Revisiting Original Thumbnail 3

With the character, weapon, and environment thumbnails complete, I could move on to the third step, Contour.

3) Contour

After exploring the ideas in thumbnails, it was time to Contour and start refining the ideas down, defining the shapes further. With these sketches, I used the same square brush as before, but this time, I was not blocking out large areas of color, rather using line to define the shapes.

a. Character

For the character, I still had a lot to narrow down. In order to keep with the retro spaceman feel, I needed to stick with a simple design. Based on my research images, the space suit should be slightly form fitting, simple fabrics, metals, but not a lot of complicated technology. The first attempt at this outfit is in Figure 28.

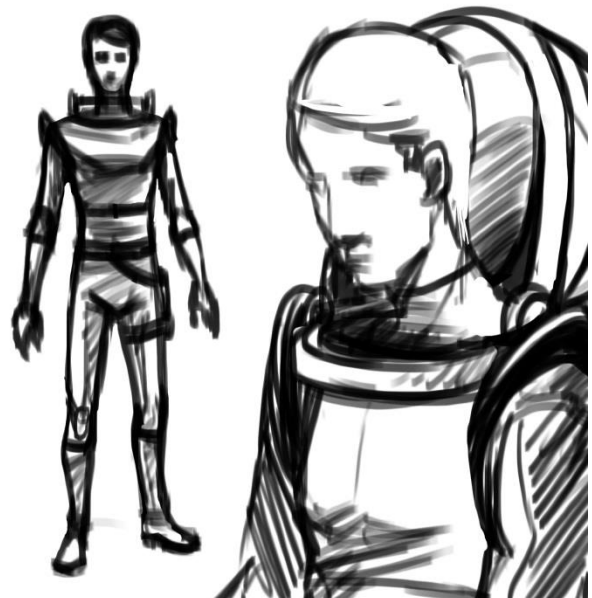


Figure 28: Refined Character Thumbnail 1

Another important characteristic of these space heroes is their hair. The hair needed to fit in with the retro design of the project as well as suit the character's personality. In order to pick the right hairstyle, I produced several thumbnail studies, seen in Figure 29. I chose hairstyle 3, which best exemplified the retro look, and it was a hairstyle often used for the heroes on the covers of the science fiction books I used as reference.

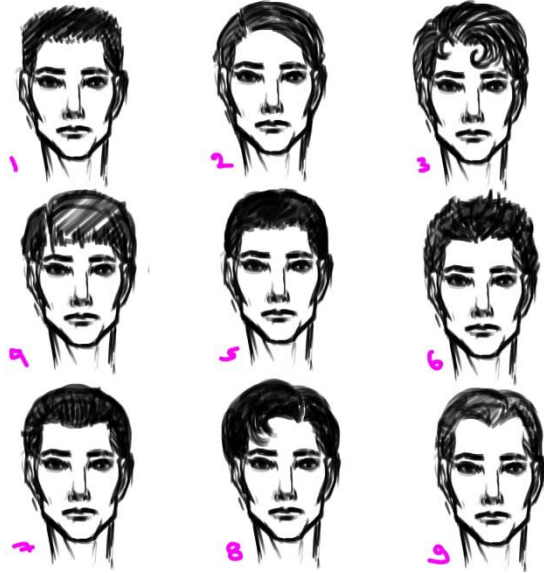


Figure 29: Hairstyle Studies

The silhouette in Figure 28 needed more interest, and so I added a robot arm, but one comprised of primitive shapes, like cylinders and spheres. The robot in the reference image in Figure 2 was the perfect inspiration for the design. However, in several of the references I found, robots and even spacesuit designs had more hook-style hands, rather than articulated fingers, as seen in Figure 30.



Figure 30: Hook Hand Space Suit Example.
http://www.projectrho.com/public_html/rocket/images/spacesuits/handHook03.jpg

After trying out both types of hands in Figure 31, I chose an articulated hand, rather than a simple hook hand, because I preferred the way it looked overall. It also fit with the story I was fleshing out for the character, that this robot arm was his gun arm and was vastly superior to any human arm. The hand would need to have at minimum a trigger finger.

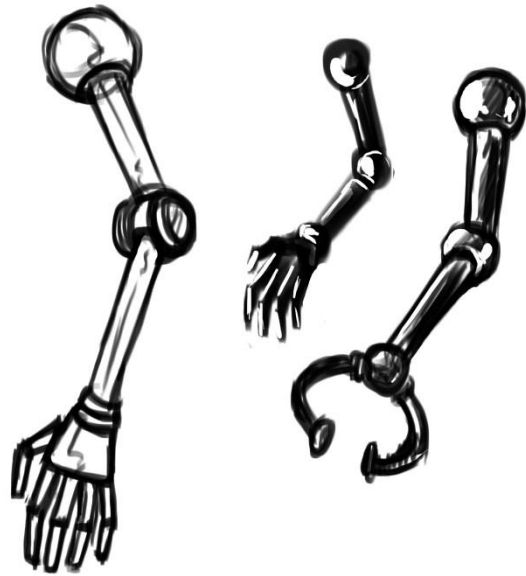


Figure 31: Robot Arm Studies

Returning to the thumbnail in Figure 28, I edited it with the new robot arm and hair design, shown in Figure 32. I also began to work on some options for the types and positions of details like rings on the shoulders and legs.



Figure 32: Refined Character Thumbnail 3

The character was starting to come together, but needed more refinement still. I took the full figure sketch from the thumbnail in Figure 32, and scaled it up to use as a base layer in Photoshop, with the transparency of the layer set to twenty-five percent. I then traced over the base layer in a layer on top of it, using the square brush at a very small size (10 pixels and under) to create a more fine line.

Using line, I defined the shapes and details of the character. Figure 33 presents the two options I tried for the rings around the shoulders, because I was not sure which appealed to me more. In addition, I decided to add a simple fish-bowl style helmet, which contributed to a more interesting and suitable silhouette.

At this point, I felt confident about the overall design, and realized I had yet to address color. I added a third layer to my Photoshop file, and painted in areas that I thought could use color. Then, I copied the layer and using the Hue/Saturation option under the Image drop down menu, in the Adjustments tab, I could quickly change the color slider to try out which ones I might prefer. I also looked to the inspirational reference images to find which colors to use.

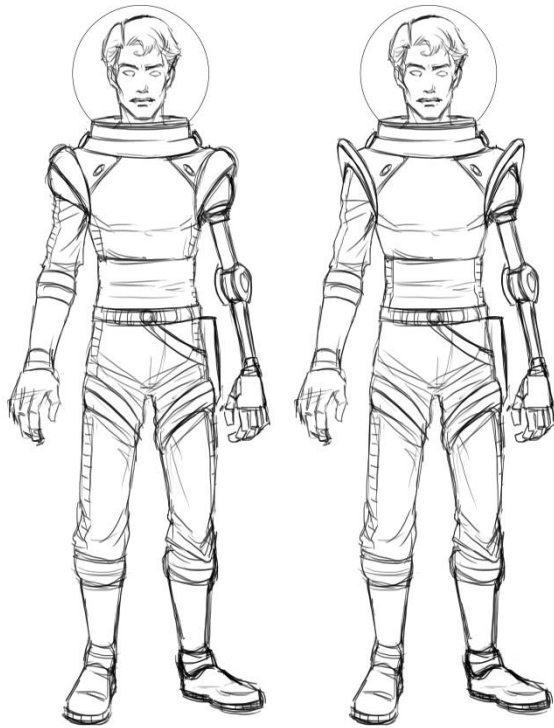


Figure 33: Refined Character Thumbnail 4

Red, yellow, white, and silver-metallic regularly featured as the dominant color choices. Once again, I needed to keep things simple to fit the retro style design, so I thought it would be best to feature only one major color in the outfit. Figures 34-36 are the results of the color investigation.

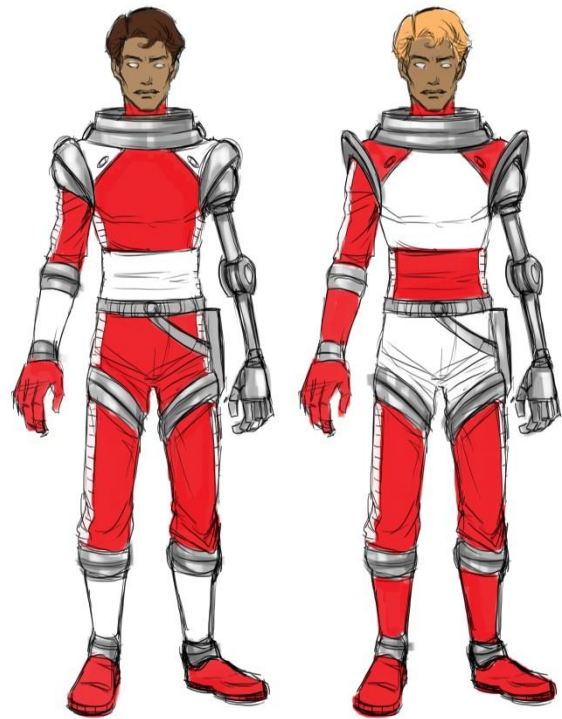


Figure 34: Refined Character Thumbnail Color Choice 1

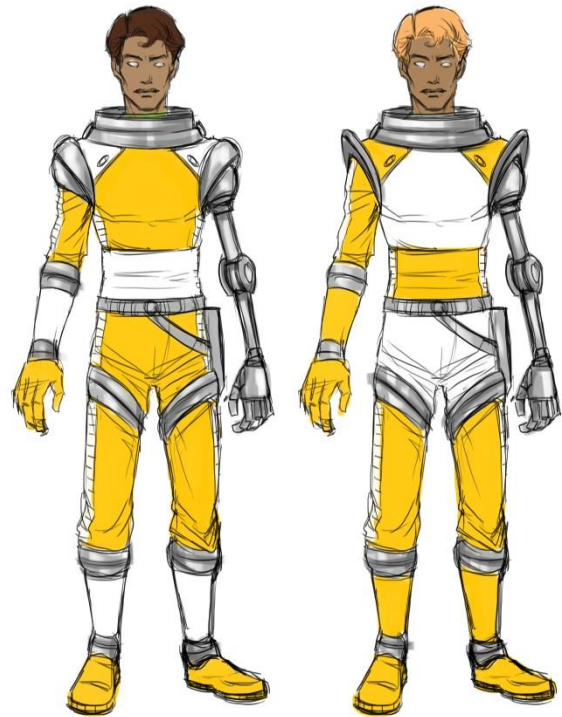


Figure 35: Refined Character Thumbnail Color Choice 2

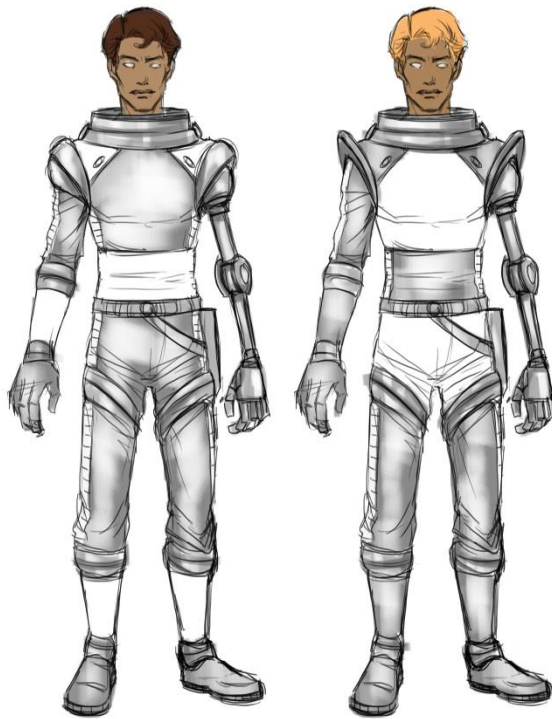


Figure 36: Refined Character Thumbnail Color Choice 3

Color, being one of the Elements of Design, can have a huge symbolic and psychological impact [8]. Reference images such as the one featured in Figure 1, led me to conclude that red was the most heroic color choice. Its bold, bright color reads “action” and “leadership” more than yellow. The silver color as the primary color felt too light and passive. However, it is suitable as an accent color.

The predominance of the color red could also refer to the character’s backstory, as red is associated with the planet Mars, and thus the Greek God of War, Ares. Since the character was a former soldier, it made sense to continue this theme and look up aspects of Ares mythology to choose the character’s name, Captain Altair Antares. Altair can mean “the flying eagle” [13], and Antares means “equal to Mars,” which is in reference to the red color of the star [14].

It was at this stage that I finalized the basic color palette for all the concepts, based upon my think step research. Figure 37 shows the color palette. Primary colors of red, yellow, and blue comprised the core of the palette, with black and white. The palette grew with various tints and shades of the main colors as the project progressed.

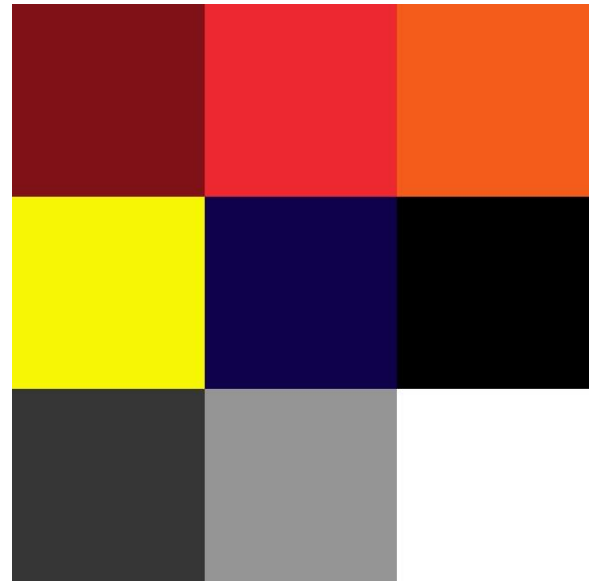


Figure 37: Initial Color Palette

With the final colors chosen, I did an additional refinement to the character thumbnail, by sketching the side and back views. With more practice, I became more familiar with the character. You might also note that I placed the weapon in the sketch to get a better understanding of how it fit with the character, both in scale and in design.

Completing the Contour step for the character took five hours and forty-five minutes.

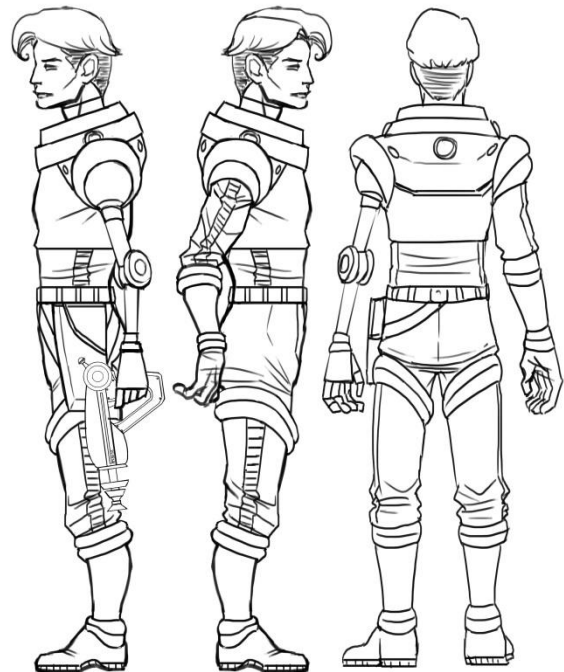


Figure 38: Refined Character Thumbnail Side and Back Views

b. Weapon

For the weapon, refining the thumbnail meant considering how the gun was constructed, and what materials comprised it. I used the same technique for refining the character thumbnail

further, by taking the silhouette, scaling it to an appropriate size, and turning the transparency down to about twenty-five percent, in order to trace over it with a small brush and add in the details.

To create rivet details, I used some shaped brushes, such as a set of concentric circle brushes, which worked like a stamp. The Ellipse tool in Photoshop also made it possible to create exact circles of various sizes, which I used to create the circle design at the back of the gun. Using the Transform tool, I could manipulate a circle to add a ring around the ball of the antenna and rotate it into position.

For more detail, I chose to add a serial number to the gun. As a little pun, I created the number “RN-86-3.8.” “RN” is the symbol for Radon on the Periodic Table [12]. “86” is its atomic number, and “3.8” is the half-life of radon. The pun stems from the pronunciation of Radon, which is “RAY-don” like “ray gun.” So, I dubbed the gun the “Raydon Gun.”

Looking at the reference images, see Figures 9-12, I noted that most guns were made up of a single metal color. A few included an accent color or a slightly different type of metal. Some had paint detailing or a leather handle. Since red had become the main color for the character, it seemed important to carry over that color to the weapon for the purpose of design Unity [8]. On the weapon, red made more sense as an accent color with silver metal as the dominant color.

To add the color, I created another Photoshop layer, and using the square brush at a lower transparency, at twenty-five or fifty percent opacity, I roughly painted the shadows to define the volumes of the gun using a grey color. Then creating a Clipping Mask layer, I applied color on top of the grey, colorizing it. Essentially, I was using the grisaille technique mentioned previously [3][6][8]. This way, if I did not like where I put the color, I could quickly hide the Clipping Mask layer, create a new one, and reapply color to different places.

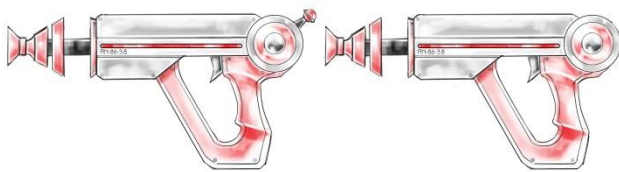


Figure 39: Refined Weapon Thumbnail 1

Figure 39 is the first version of the refined weapon. I copied and pasted the gun to see a version with and without an antenna on the back. Upon reviewing it with my acting art director, the gun appeared too modern, with too many straight lines. While exploring the front and back views of the gun, in Figure 40, I thought about how unimpressive the silhouette looked.

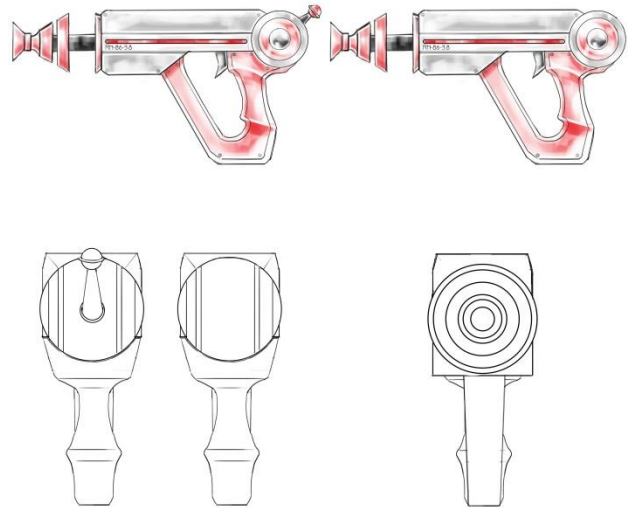


Figure 40: Refined Weapon Thumbnail 2

In Figure 41, I applied the more traditional, rounded ray gun shape. The curved form was more true to the retro style, as well as echoed more of the forms in the character design, such as the rounded shoulder rings, leg bands, and circular shapes in the robot arm. Finally pleased with the gun design, I could move on to the environment.

It took two hours and thirty minutes to complete the Contour step for the weapon.

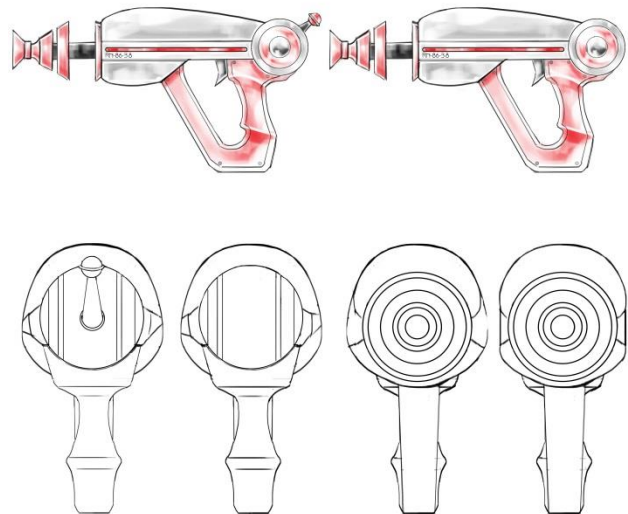


Figure 41: Refined Weapon Thumbnail 3

c. Environment

Refining the environment thumbnail took a slightly different approach. Because I had not created a thumbnail at an angle that I particularly preferred, or thought conveyed enough information, I composed a new, larger thumbnail sketch.

Taking inspiration from my references, I went for an asymmetric composition, using the negative space of windows to create a focal point. Using Repetition of the circular shapes, I created a frame for the image in the foreground causing an Overlap to help with the illusion of space, as well as to create Emphasis and guide the viewer to the most important part of the image, the consoles and chair [8]. Figures 42 and 43 illustrate the development of the rough sketch to something more defined.

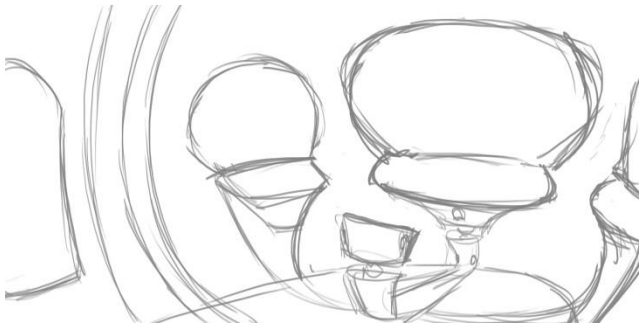


Figure 42: Refined Environment Thumbnail Sketch 1



Figure 43: Refined Environment Thumbnail Sketch 2

I made the sketches in Figures 42 and 43 using the square brush, and by copying and pasting repeated elements, such as the dials and buttons. In order to make a more refined image, I liberally used the Ellipse tool in Photoshop, which creates a smooth curved line, manipulating it with the Transform and Perspective tools to fit them in their place.

Using Variety in the thickness of line, I was able to apply Size Variation to create the illusion of perspective [8]. The frame in the foreground would have a thicker line, since it is closer to the viewer, and details on the consoles would use a thinner line, because they are further away and smaller. Contrast between the light and dark areas of the image also emphasized the focal point of the image.

Figures 44 and 45 show two variations of the final refined environment. In Figure 45, I wanted to experiment with a retractable steering wheel element, but I decided against it, as it obscured the details on the console.

On a separate layer, I added some color to the console elements, to better define them and add a pop of interest,

mostly as a reminder to me for the final concept. In the rest of the image, I lightly shaded with grey and used the eraser to create highlights and imply a metallic look. I also wanted to show that the interior should be better lit than the foreground. Finally, I used a few star-shaped brushes as stamps at different opacities to quickly represent the outer-space background, using the idea of Atmospheric Perspective [8], where the more faded stars should be considered further away than the brighter stars.

The refining step for the environment took five hours and thirty minutes.

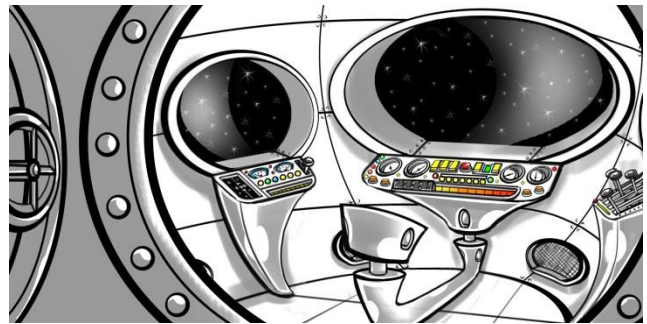


Figure 44: Refined Environment Thumbnail 1

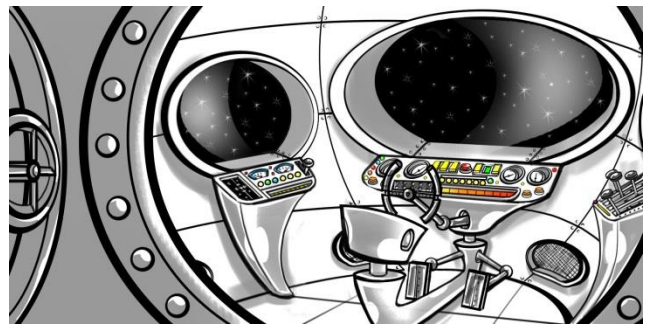


Figure 45: Refined Environment Thumbnail 2

The Contour step complete, the concept of the character, weapon, and environment better fleshed out, I then proceeded to the Render step.

4) Render

In this step, I tested the two major digital art techniques I researched. For each concept, I created two renders, one using paint-over and one hand-painted.

In order to keep things equal, I switched which technique I used first with each concept. I first rendered the weapon using a hand-painted method, then in paint-over. After that, I rendered the character with paint-over first and then hand-painted. Finally, I rendered the environment hand-painted first and then in paint-over.

a. Weapon

I began with the weapon, because it appeared to be the least complicated of the three. To set up, I created an image in Photoshop at 5100 x 3300 pixels at 300 pixels per inch. I chose this size because it is at a good resolution for printing. In order to create a more interesting composition and show more information about the gun [8], I chose a two-point perspective. This three-quarter view conveyed more information and made for a more dynamic concept.

In order to achieve the desired two-point perspective, I had to create a perspective grid, which I did using the Polygon tool technique previously mentioned [10], and illustrated in Figure 46.

When I started sketching in the weapon, I realized that it was not going to fit where I placed it, so I moved the whole grid and sketch, seen in Figure 47.

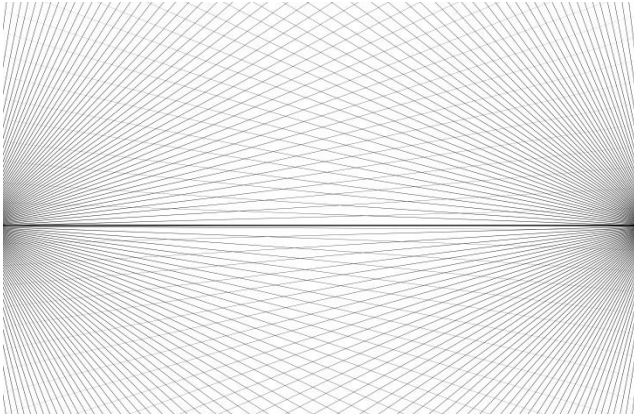


Figure 46: Hand-Painted Weapon Perspective Grid

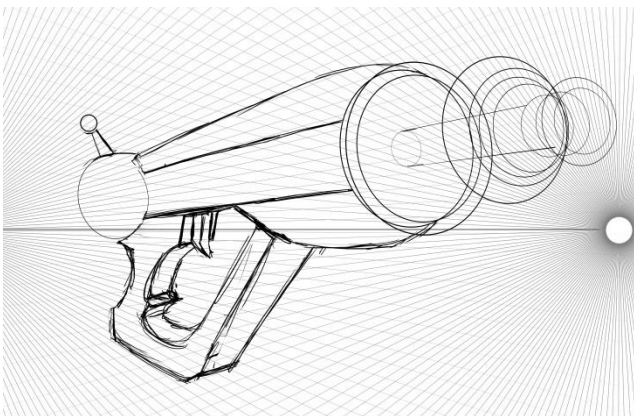


Figure 47: Hand-Painted Weapon Perspective Grid with Weapon Sketch

I made the gun sketch “free-hand” using the solid tapered brush, and used the Ellipse tool and the Transform tool to place the rings at the barrel of the gun.

Once I was mostly happy with the sketch and perspective of the gun, I then blocked out the shapes with solid color, chosen from my color palette in Figure 37, dividing it up into sections to which I could apply Clipping Mask layers. On these layers, I could add details without having to worry about painting outside the lines, so to speak. See Figure 47, below. To narrow down selections, I used the various Selection tools, usually the Lasso tool, and then used the Quick Mask to accurately paint in my selections.



Figure 48: Hand-Painted Weapon Blocked out Colors

With the colors blocked out, I could then create color swatches based on those colors in order to keep consistent throughout the rendering process. I placed the color swatches on a separate layer that I could turn on and off, move around the canvas, and access as needed. As I used more colors along the way, I added to the swatches so that by the time I got to the final environment concept, I went from eight colors to twenty.

After this stage, it was just a matter of going from section to section, rendering the volumes and defining the shapes through shading and highlights. I also had to define the materials that comprise the gun. In order to achieve a metallic look, I referred to my weapon reference images to see how light and shadow created patterns on the guns, following the contours of their shapes. I tried to achieve this same look using the Gradient tools and by adding and subtracting colors with the soft round and hard round brushes and erasers. Creating a metallic look is easiest with a dark base color on which to apply highlights, so I changed the white color of the main body of the gun to black.

To complete the metallic look, I applied layers of images of metal and set them to Overlay. Doing so added more visual Texture to make the material quality of the image more obvious to a viewer [8], or at least that was the goal.

Since I wanted the gun handle to be more of a leather or plastic material pretending to be leather, I used the same overlay technique but with an image of leather. Otherwise, I continued to use the same shading techniques on all parts of the gun.

In Figures 49 and 50, you can compare the gun with and without texture overlays.



Figure 49: Hand-Painted Weapon Rendered with No Overlays



Figure 50: Hand-Painted Weapon Rendered with Overlays

In order to create the rivets and the text, I used the Layer Styles in Photoshop, experimenting with various settings and combinations of Bevel & Emboss, Outer Glow, Inner Glow, Stroke, and Drop Shadow, which produced a metal-like shine that appeared to be embedded in the metal of the gun.

As this was the first of the concepts, it was at this point that I had to create the background presentation for the image. The ray-gun box art image in Figure 6 influenced me the most. I found an image of outer space on Wiki Commons to use as the basis of the background and manipulated it using a blue gradient layer and a mask layer, going with the primary color schemes of many of the science-fiction book covers. To create that old box or book cover look, I found and applied textures of paper and torn book covers on CGTextures.com, masking off areas using layer masks. I put them in the corners and along the sides to frame the composition.

The next major aspect of the background was the yellow-orange band and title. Orange is the complementary color of blue on the color wheel [8], and using the two colors in combination causes the band to stand out sharply from the background. To temper it and unify it more with the focus of the image, the gun itself, I added a red gradient.

I now had to establish the font I would use for the title. Looking again at the reference in Figure 9, I found two fonts that seemed to fit the retro style. For the large letter, I used Magneto, and for the rest of the text, I used Century Gothic in bold italic, as it appeared to best replicate the font in the reference.

For final touches, I applied an Overlay layer of the star-field image to the gun, to simulate as if the metal were reflecting the space around it. I added some light, and slightly humorous advertising text to the image, in homage to the ray gun box design. I also added for scale reference, as a best practice [1], a side view of the gun held by the character's robot hand. I took the side view from the refined thumbnail, altered it by inverting the colors, and drew the robot hand from scratch.

Adding the side view further helped with the Balance of the composition by filling in an empty area of the image, but without detracting from the gun [8]. It created an "X" composition [4], forming a diagonal pattern of white going from top left corner to bottom right corner, which countered the paper tears in the opposite diagonal corners.

Figure 51 shows the final hand-painted weapon concept.



Figure 51: Hand-Painted Weapon Final Render

It took seventeen hours and thirty-five minutes to create the hand-painted version of the weapon concept. That does not include the one hour it took to create the background template I would use for the rest of the project.

Having finished the hand-painted version of the gun, I moved on to the paint-over version. The first step was to open up 3ds Max and start modelling the gun. I did this by applying the original refined thumbnail image as a material to a plane. From there, I could model the pieces of the gun to fit the exact proportions I originally designed. Since I did not have to care about unwrapping the model, or about proper modeling techniques, such as worrying about welded vertices or triangle count, I could quickly cobble together the gun to look as good as possible.

Then, I imported the final model I built into Mudbox, where I could apply pre-made lighting, in this case the Chapel lighting preset. I also created materials and applied them to the different objects that comprised the model. This created quick base colors that I could use later in Photoshop. I was also able to add reflection to these materials to simulate metallic surfaces. To differentiate the handle, I used the bw_coralTiled stamp brush, set to randomize, and sculpted in the texture. On top of this, I did not use a material with the same level of reflectivity as I did with the rest of the gun. I rotated the gun to a two-point perspective position, and then added Mudbox's Viewpoint Filters options, including Ambient Occlusion, Cavity Ambient Occlusion, and the Non-

photorealistic option, which created a line-art version of the gun. I took screen-captures of it, shown in Figures 52-54.

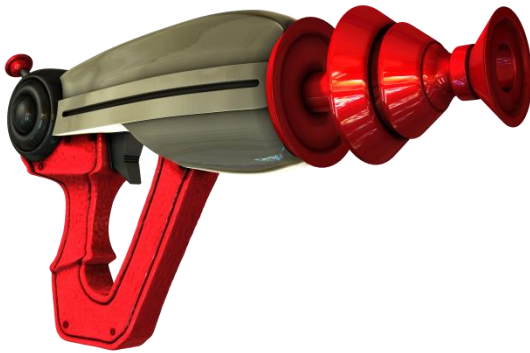


Figure 52: Mudbox Screen-Capture 1

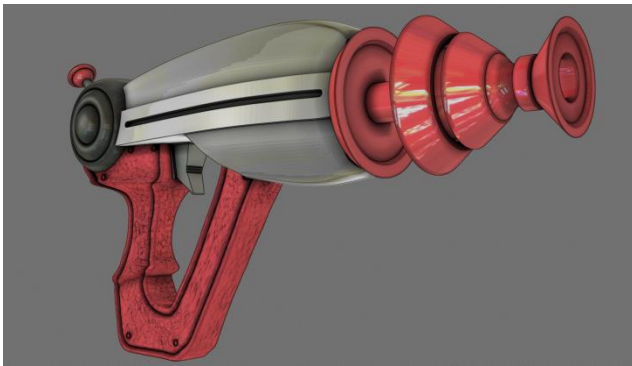


Figure 53: Mudbox Screen-Capture with Non-photorealistic Set 1



Figure 54: Mudbox Screen-Capture with Non-photorealistic Set 2

Using these images as the basis for the gun, I put them in a layer in the Photoshop file with the background and color swatches, so I could make sure the colors matched my original choices.

Just as with the hand-painted version, I proceeded to paint the gun, section by section, using the soft round and hard round brushes, erasers, and Gradient tool to create the same effect as in the hand-painted version. Only this time, I had accurate lighting on the guns that I could use as a guide. I used the Smudge and Blur tools to blend and obscure some of the details in the screen-capture image.

I applied the same metal and leather overlays to the gun, as well as the outlined screen-capture to help make the model of the gun look less like a model and more like a painting. The screen-capture turned out to be a little darker than I liked, so I used Brightness/Contrast and Levels Adjustment Layers to

brighten up the image to match the brightness of the hand-painted version.

To speed up the process, I copied the layer of the serial number and applied it to the image, using the Perspective and Transform tools to match it up to this version of the gun. I took the time it would have taken to recreate this text into account.

Figure 55 shows the final render of the paint-over gun.



Figure 55: Paint-Over Weapon Final Render

It took ten hours and fifty-three minutes to complete the paint-over gun, not including the hour it would have taken to make the background image.

b. Character

Upon completing the weapon, I moved on to the character, this time beginning with paint-over. In Mudbox, I took the generic human character model and imported it into 3ds Max. I then used this model as the basis for placing a model of the robot arm, which I created in a similar fashion to the gun model. I also modeled other “hard surface” aspects of the character, such as the shoulder pads, the collar, the belt, and the holster. You can see this model in Figure 56. I then re-imported this character model with accessories into Mudbox and used the sculpting tools to fully model the character to the specifications of the refined thumbnail.

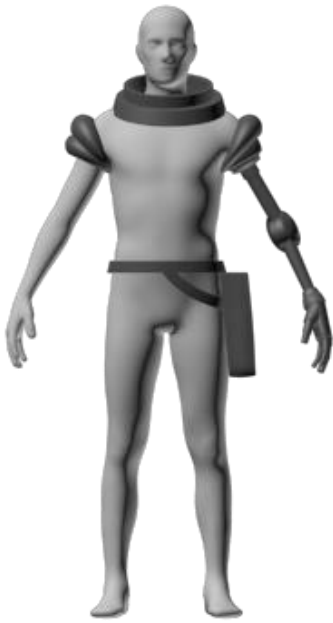


Figure 56: Mudbox Generic Human Model Modified

Then, just as with the weapon, I applied different materials to the model to create the metals for the arm and accessories. I also applied colors to the character by directly painting onto the model, using Mudbox's Paint tools.

With the model fully sculpted and painted, I endeavored to use the Pose tools in Mudbox to create bones in the model that can be used to manipulate the limbs of the character. I posed the character in what I can only describe as a "ready for action" stance, with head slightly down and aimed in the direction of his gun – he is supposed to be a space action hero, after all. The Pose tool is quick, but perhaps not as precise as rigging and skinning a skeleton in 3ds Max. There was some warping to the model that I had to paint-over and hide in the angle of the screen-capture I took. You can see the warping in the chin in particular from Figure 57 to Figure 58.

I also placed the weapon model in the holster for the final screen-capture to show scale. I had to adjust the holster to actually fit the gun, so the proportions of the design changed.

Just as with the weapon paint-over, I put the screen-capture image of the character into the file with the background I made. I then went section by section, using the Gradient tool, soft round and hard round brushes, and erasers to create a more painted look for the character that resembled the gun. In this case, to create the color palette, I sampled colors from the screen-capture. I applied the metal image overlays to add texture to the metal parts of the character, as well.

In order to add the helmet from the refined thumbnail, I modeled a sphere in 3ds Max, and imported it into the Mudbox file. I applied a translucent, reflective material and took a render of it separately from the character. I then applied the screen-capture to layer set to Hard Light, and copied it three times for the desired effect.

The face needed the most work, because I did not model the eyes or paint the hair very accurately, and the lighting caused the lips to look too feminine. I had to spend more time hand-painting the face, using the lighting and colors as a guide.



Figure 57: Screen-Capture of the Character without Pose



Figure 58: Screen-Capture of the Character with Pose

For the orthographic view of the character, I used screen-captures with the Non-photorealistic Filter applied. In Photoshop, I set the layer to Divide and copied it three times to create the white outline look.

I added descriptive text, in a similar vein to the advertisement-like text I used with the weapon concept to provide a little humor to the image. The composition itself is straightforward, with the character basically centered. I used the text and the orthographic views of the character in an attempt to balance the four corners of image.

For the character's color scheme, I chose a mix of the two color options I created for the refined thumbnail in Figure 31, going for a balance of white to red, creating an alternating Rhythm down the body [8], with red acting as a bold addition, rather than too dominating of a color. I also chose to give the character darker skin and lighter hair to continue that alternating dark/light pattern.

Figure 59 shows the final render of the paint-over character.



Figure 59: Character Paint-Over Final Render

It took twenty-one hours and forty-six minutes to complete.

To make the hand-painted version of the character, I sampled colors from the paint-over version and used it as a photo reference. I began with a rough sketch, then a silhouette, and then a refined sketch, so I could judge the proportions. When I found them off, I used the Transform tool to stretch and scale the image to better fit the paint-over concept. Figures 60-62 illustrate the initial sketches I made.

I then went through and blocked out the main shapes with the appropriate colors, just as I did with the hand-painted gun. See Figure 63. Since I had the paint-over version as a “photo reference,” I knew how the lighting should look.

When I found that the proportions of the collar would not fit with the helmet, I super-imposed the paint-over image and used it to scale the collar in the hand-painted version, much like I would do with a photo-reference that I might have used to trace over.

Once I finalized the proportions, using the same soft round and hard round brushes, erasers, and Gradient tools, I rendered the image. I also applied the metal image for a texture overlay on the metal parts of the character.

Figure 64 shows the final hand-painted version of the character concept.

It took seventeen hours and fifty-nine minutes to complete the hand-painted character.

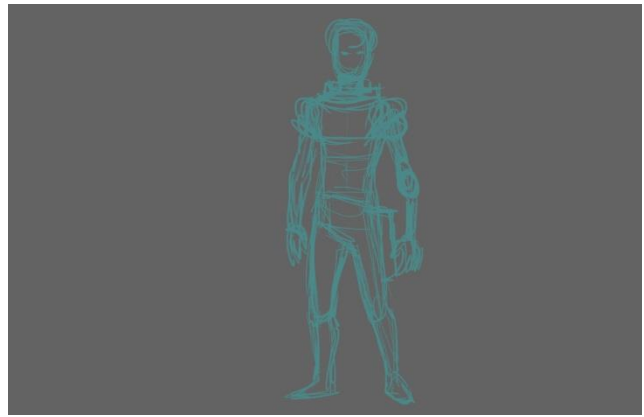


Figure 60: Hand-Painted Character Rough Sketch

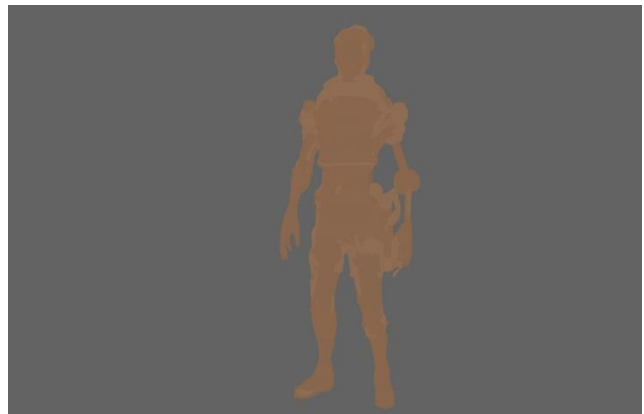


Figure 61: Hand-Painted Character Silhouette



Figure 62: Hand-Painted Character Refined Sketch



Figure 63: Hand-Painted Character with Blocked out Colors



Figure 64: Hand-Painted Character Final Render

c. Environment

Finally, I rendered the environment: first a hand-painted version and then the paint-over version.

For the hand-painted version of the environment, I took the refined version of the environment thumbnail (Figure 41) and used it as the basis for the painting. I scaled the image to fit the concept template and added a little more to it fill out the top and bottom as the original thumbnail was drawn in slightly narrower proportions.

With the composition already set up from the thumbnail, I then went through and blocked out the colors, as previously done. I chose the colors by sampling from the other concept images. Figure 65 shows the flat color version of the environment. This time, I used the concept background of the star-field as the background outside of the windows. I added a mask to the layer to create the cutout that I could easily edit without ruining the original image.

For the environment concept, I chose to keep the yellow banner, and I named the ship the Mars Ultor-IV, continuing my “red” naming theme. Mars Ultor is in reference to the Roman cult of “Mars the Avenger” [15], and the number IV is in reference to the fact that Mars is the fourth planet from the Sun.

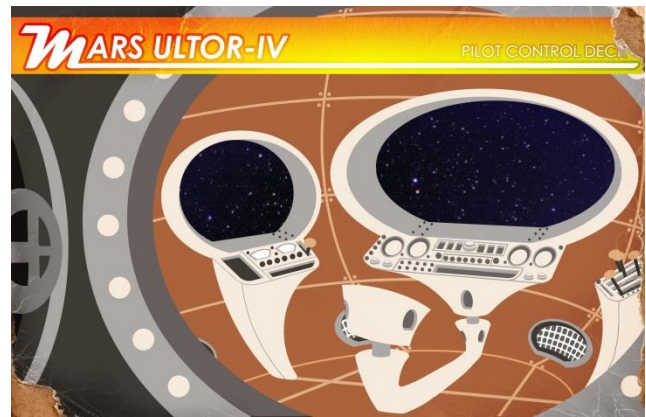


Figure 65: Hand-Painted Environment Blocked out Colors

When it came to rendering the effect of metal for this image, I had already had experience in making the metal parts on the character. I applied the same colors and shapes to the environment.

I used a brush I had made for another project that resembled a bolt, and applied Layer Styles (Bevel & Emboss, etc.) to create a metallic feel. I used so many layers with so many of these Layer Styles on the individual buttons and other console details that I had to change from a .PSD file to a .PSB file, which is the “Large Document Format” in Photoshop. Otherwise, the .PSD file caused the computer and the Wacom Tablet to lag.

I applied multiple layers of metal overlay to add texture and depth to the painting [3]. Just as with the refined thumbnail, the Ellipse tool made smooth curves throughout the image.

To create the grates, I used the Custom Shape tool to make a grid. Using the Magic Wand, I selected the squares of the grid, and using the Refine Edge menu, smoothed and contracted the selection until the shape became rounded. I filled the selection with black, and then using the Layer Styles Bevel & Emboss set to Outer Bevel, I adjusted the settings to create something like the look of a metal grate.

Figure 66 shows the final render of the hand-painted environment.

It took fifteen hours and one minute to complete the hand-painted version.



Figure 66: Hand-Painted Environment Final Render

Lastly, the paint-over environment began in 3ds Max, where, like the weapon and character before it, I took the

refined thumbnail and applied it to a plane. I did my best to model the parts of the environment to the specifications of the thumbnail. Unlike with the weapon or character, the environment thumbnail was not in an orthographic view. Rather, I would call it rendered in a loose hierarchical perspective. When I built the models, I had to build them to work amongst themselves. I started with a large curved shape to represent the ship walls and built around them, as if I was furnishing a room.

Similar to Photoshop, I used the equivalent of “copy and paste” once I modeled one of the repeating buttons, dials, and levers. When all of the modeling was complete, I imported the whole set into Mudbox. While there, I had to adjust the framing opening to fit the camera’s perspective, trying my best to recreate the feel of the refined thumbnail. I knew that it would not be the same, because now I was composing the image using accurate perspective. Still, I was able to scale some of the objects and move the console room closer to the frame to better simulate the original.

I applied materials in Mudbox to simulate the reflectivity of metal and blacked-out the windows, knowing I would use a Layer Mask on them to reveal the star-field image. I then applied the Gallery lighting preset since it best recreated the look of the hand-painted concept.

The first screen-capture I produced is in Figure 67. Figure 68 is the version I used with the adjustments described above. Figure 69 uses the Non-photorealistic Filter effect, which I used as a layer overlay to create an outline and more hand-drawn effect in the image.

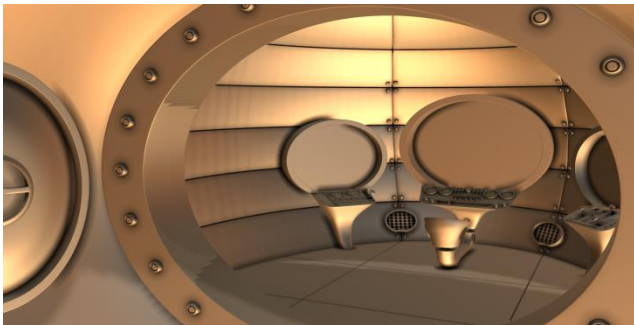


Figure 67: Paint-Over Environment Screen-Capture 1



Figure 68: Paint-Over Environment Screen-Capture 2

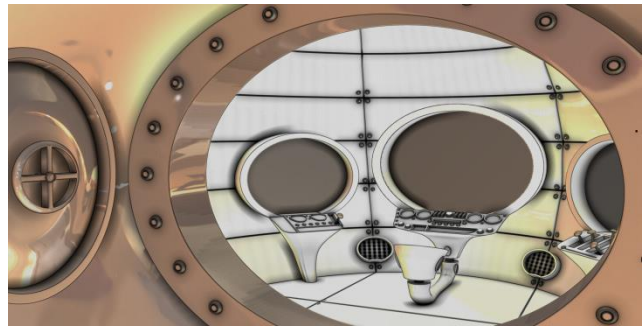


Figure 69: Paint-Over Environment Screen-Capture 3

Taking the screen-capture into Photoshop, I noticed that the frame of the image did not quite match up with the thumbnail, and did not fit well with the yellow title line, creating a visually displeasing intersection. I used the Selection tools and Quick Mask to separate the foreground from the background, and used the Transform tool to stretch the layer into a better shape. I then took the background and scaled it up to bring the important details closer to the viewer. You can compare Figure 70 to Figure 71, shown below, to see the slight difference.



Figure 70: Paint-Over Environment with No Manipulation



Figure 71: Paint-Over Environment with Manipulation

The next step was to paint the materials, first by cleaning the image up. I used the Smudge tool to quickly get rid of some of the reflection that looked too specifically like the gallery image that the light preset in Mudbox applied. Then it was a matter of using the Gradient tools, soft round and hard round brushes, and erasers that I used throughout this project

to create the sort of airbrushed look that the weapon and character have, and to try and recreate the look of the hand-painted version.

To create console details, I copied and pasted the Layer Styles I used in the hand-painted version to more efficiently make the glass-like dials. I did take into account the time it took to make those Layer Styles and added the time in to the total.

Figure 72 shows the final render of the paint-over environment.

It took thirteen hours and twenty-two minutes to create the paint-over environment concept.



Figure 72: Paint-Over Environment Final Render

After analyzing which techniques worked best for me through the weapon, character, and environment, I moved into the Manipulate step to render all three aspects into one final concept.

5) *Manipulate*

The fifth step, Manipulate, is the optional step of taking advantage of the digital painting program you use, in this case Photoshop, to “play” with the rendered piece [1].

In the final combination concept, I took the paint-over version of the environment and copied and pasted pieces of the chair to recreate the “Chairbot” I made in Figure 27, thumbnail 34. On the other hand, I drew its arms from scratch since they were simple shapes, and I had already had practice making the robot arm style from working on the character. You can see the start of “Chairbot” in Figure 73.

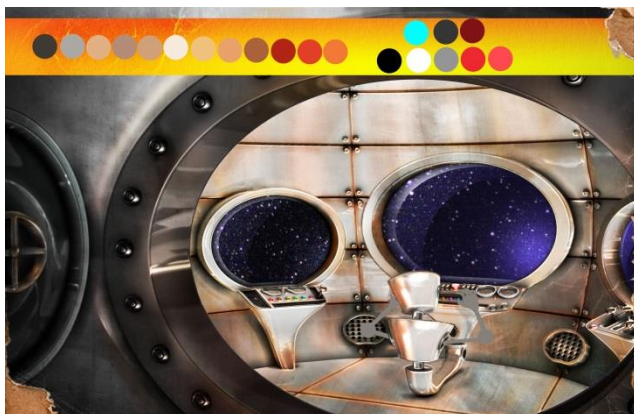


Figure 73: All-Together Concept “Chairbot”

I added the character into the image by taking a screen-capture of it and the weapon in a new pose. Mudbox’s posing tools are slightly limiting, and because my experience with them is even more limited, I could not fully pose the character as wanted. To get his leg up on the frame, I copied and pasted a leg and drew over it to get it to fit the image correctly. I did not quite like the position of his human arm, either, so I used the Lasso tool to isolate it and the Transform tool to rotate it into a better a position. Figure 74 shows the original screen-capture from Mudbox, which you can compare to Figure 75.



Figure 74: New Character Pose Mudbox Screen-Capture



Figure 75: New Character Pose Edited

To create a fist, I took a photo of my own hand in a fist, scaled it to the correct size, and used it as a paint-over reference. In order to get the colors to match up, I sampled them from the previously created concepts. You can see the photo of the fist in Figure 75, above. I continued to manipulate the image, by using the Transform tool to rescale aspects that seemed out of proportion compared to my original concepts and by harvesting and reusing elements from the other concepts, such as the helmet.

In order to better integrate the character and gun into the environment, I sampled colors from the background and applied a layer of those colors set to Overlay. I also used the metal texture overlays to add more depth and texture to the shadows on the character. Finally, I created a copy of the character on a separate layer, flipped it horizontally, warped it using the Perspective and Warp tools, set the layer to Soft Light, and reduced the opacity to twenty-five percent. This way I could fake a reflection of the character on the metal walls near him.

For the composition of this concept, I decided to take the character and pop him outside of the frame. Using Overlap to create depth in the scene [8], I put him in front of the title border. The character stands out and emphasizes his importance in the composition. He also acts as a framing and guiding object. Following his body leads the eye to his bent leg, which points to “Chairbot” in the interior of the scene.

For the title of this concept, I decided to use the character’s name because he is the most important aspect of the composition. Additionally, I included the subtitle “Captain of the Mars Ultor-IV” as the environment was the next most important thing in this image. The gun, at this point, is merely an accessory, and it did not seem necessary to point to it. It

already has prominence of position since the character is holding it up for the viewer to see.

By manipulating my previous work, I was able to create a fourth concept in which I was able to experiment and show something I had actually just considered a joke. However, “Chairbot” is an aspect of the environment, or even a secondary character, that adds another layer to the story of the universe in which the main character exists.

Figure 76 shows the final All-Together concept.

It took eleven hours and forty minutes to complete the image.



Figure 32: All-Together Concept Final Render

C. Conclusion

By following the five-step process and applying the digital and traditional painting techniques I researched, I was able to produce concept art for a weapon, a character, and an environment using two different major methods: hand-painting and paint-over. Each technique had its merits and quirks, and each produced, I hope, a decent concept that conveyed my intention to present pieces of a retro science-fiction universe.

IV. RESULTS

Following the five-step process laid out by Paul Richards [1], using paint-over and hand-painting techniques, I created seven concepts over the course of this thesis project. I had decided to compare these techniques by applying each of them to the same subject, a weapon, a character, and an environment. I intended to judge the results of these techniques by both the subjective appeal of the two different images I produced for each subject and by the objective time it took to create the images. In the end however, there was a third criteria by which to judge my results: personal preference.

A. Using the Five-Step Process

My overall assessment of the five-step process, Think, Thumbnail, Contour, Render, and Manipulate [1], is that it works. It is a very methodical way of organizing how an artist brainstorms ideas, filters through them to pick the best ones, and then applies those ideas by creating an image.

I started with the character, and going through the five-steps, I found myself trying to jump ahead from the Thumbnail step to the Contour step. This immediately caused problems and

delays. I had to take a step back and decide whether to make a male or female character. I also had forgotten the importance of creating silhouettes, and when I did sketch the silhouettes, the process of figuring out the character design went much smoother.

Having learnt my lesson through the experience with the character, the weapon's Thumbnail to Contour process went more quickly.

The environment was more difficult, in part, because I had not decided on interior or exterior, but also because there were more aspects to think about. It was not just a chair but also a chair in a space ship, which meant a console, buttons, levers, walls, windows, floors, and more to design. Although this process took longer, I did not feel like I had wasted any time on it, unlike with the character.

In my experience, the key to using the five-step process is to actually use it. Going through every step in order saves time and the frustration of rework later.

B. The Concepts

1) Weapon

While working on the hand-painted version of the weapon, I was quite convinced that my perspective was accurate, thanks to the perspective grid. It was only after the completion of the paint-over version that I noticed the inaccuracies. I realized that I had altered the look of the barrel of the gun in order to insure that the gaps between the rings could be seen, even though that was incorrect in the sense of proper perspective. The orthographic view of the gun in the image took care of conveying this information, but I wanted to show it in the final render.

Looking back at my research, I remarked that most all of the weapon concepts I saw were only shown in an orthographic side view [3]. This would have solved my perspective problems in the hand-painted version, but would not have created as dynamic of a composition. In judgment of the final products, the paint-over method created a more appealing image when it came to the perspective.

Rendering the metallic look of the weapon was also much more difficult in the hand-painted version than in the paint-over. Creating a reflective material and lighting it in Mudbox had a great advantage over trying to figure out the way metal should look and be lit by hand. I did have reference images to help me create the hand-painted look, but it would never be correct and specific enough to the actual shape of the weapon I designed. Judging the results of the material, I would also conclude that paint-over was superior.

The time it took to create the hand-painted versus the paint-over also favors paint-over, with a difference of six hours and forty-two minutes. I should also take into account that in the hand-painted version, I already had figured out things, like which texture overlays to use, what colors to use, and what composition to place the gun. I had already some experience with making the gun, so it is no surprise it took less time to complete the paint-over version. However, this likely could not account for more than an hour of time, and five-plus hours of work time saved still seems significant.

As for the ease of using paint-over versus hand-painting, I found that building a simple hard-surface object in 3ds Max, taking it through Mudbox, and then into Photoshop took five

hours and thirty minutes. Getting the gun set up in Photoshop for the hand-painted version up to the point in Figure 45, took about the same amount of time at five hours and twenty minutes. Based on the time criteria, I would call it a draw for hand-painting and paint-over. Based on how comfortable I felt using the techniques, I would also call it a draw, as both are tedious set-up processes. The only preference I would note here is that in the hand-painted version, I did have to go back and fix areas that I felt I blocked in incorrectly compared to the refined thumbnail. For the paint-over version, I did not have to make any such adjustments.

In the final analysis for the weapon, overall, I would want to use the paint-over technique again when trying to concept a weapon in any non-orthographic view.

2) Character

Modeling the character for the paint-over was relatively easy, especially since I had the basic human model from Mudbox as a guide. Using that model saved a lot of time that might have unnecessarily gone to building a character base mesh from scratch. Sculpting in Mudbox is much like painting and is very intuitive once you know the interface. I could rapidly paint the character into the desired shape. As positive as the sculpting process was, I will say that using the Mudbox model could be limiting. The "generic" model is ostensibly male, and if I had been building a female character, it would have taken more work to sculpt it into the correct shape.

The main flaw with using Mudbox to create a character would be its Pose tools. I call them the flaw, but more appropriately, the flaw would lie with me, since I had never used the Pose tools before. I could have rigged and skinned the character in 3ds Max, but I knew that personally takes me a long time and is not something I like to do, or something I assumed many concept artists would know how to do. Using the pose tools in Mudbox seemed a quick method of achieving what I wanted. Had I modeled the character myself in 3ds Max, I might have done so in the pose I needed from the start.

As with the weapon, using the materials and lighting presets in Mudbox made rendering the image in Photoshop a simpler and more accurate process. I was more or less assured that the metal was going to look like metal.

When it came to create the hand-painted version of the character, I had the advantage of already figuring out the pose and character proportions, as well as the look of the materials. I had essentially created my reference photo with the paint-over concept.

The painting process itself was practically the same for both methods, and the results do not feel particularly different to me. Again, this is because I was using the paint-over as a photo-reference, so the lighting was more or less just as accurate. Had I started with the hand-painted character instead, it would likely have been the same experience as with the weapon. I cannot really judge the paint-over or the hand-painted versions on the results of the rendering and proportions, but as with the weapon, there is no doubt that the materials rendered through paint-over have lighting that is more realistic.

There is the same problem judging the time it took to make each image. The paint-over version took twenty-one hours and forty-six minutes, while the hand-painted version took

seventeen hours and fifty-nine minutes. That was a difference of five hours and forty-seven minutes, which is not insignificant.

However, I calculated that it took ten hours and thirty-minutes to create, paint, and pose the paint-over model (before taking it into Photoshop), which was essentially the time it took to create the “reference photo” for my hand-painted concept. Taking that time into account, it would mean that the hand-painted version took twenty-eight hours and thirty-one minutes, or six hours and forty-five minutes more than the paint-over version.

On the other hand, assuming I had only used my refined thumbnail as the reference, it took only three hours and thirty-eight minutes to set up the hand-painted version, getting it to the point in Figure 63, versus the ten hours and thirty minutes it took to prepare the paint-over model.

When it comes to time efficiency, I would have to say that the paint-over version was better, because I did use it as at the reference image, and that is time I have to add on to the hand-painted version.

Finally, judging the ease of using paint-over versus hand-painting, I have to find them equal. As stated above, sculpting in Mudbox does feel remarkably like painting. It feels familiar to using Photoshop, and therefore is easy to use. The actual painting process in Photoshop is the same. The only downside, as I discovered in the All-Together concept, would be the Pose tool. I believe with practice, though, that it would be less of a hindrance. In the future, I would use either method, depending more on my mood than on any objective criteria.

3) Environment

Rendering the final hand-painted concept for the environment was an easier process than all the other concepts that had gone before. I had had so much practice with the style and techniques in the previous four images that creating a concept had become routine. I expected that the lighting and materials in the paint-over version would create a different result compared to the hand-painted version, but now I could alleviate some of those differences by my experience in painting metallic objects in the previous concepts.

I could also expect that building the models for the paint-over version was going to take quite a bit of time. I had to model twenty objects to create the scene, as opposed to eight for the weapon.

It took four hours and fifty-four minutes, to get the hand-painted environment to the state in Figure 65. That equivalent in the paint-over version took eight hours and fifty minutes. That does not take into account the five hours and thirty minutes to make the refined thumbnail that I used as the basis of the hand-painted version, for what that is worth.

The overall time difference between the two techniques was only one hour and thirty-nine minutes, in favor of paint-over. In the world of video game development, that extra hour and thirty-nine minutes could be very significant to reaching a deadline, but it did not personally feel like a huge win for paint-over, as compared to the weapon and character concepts. I would judge the two methods equal on the time criterion.

I felt the rendering of the materials to be comparable, though of course the paint-over version is more realistic, if the point of a concept is to convey information, the hand-painted

one does the job. A telling anecdote: When I showed the two images to my co-author, Professor Farrell, he began by asking if the hand-painted version was the concept and the paint-over version was a render of the 3D model I made from that concept.

I also noticed that I felt more in control of the composition when I did not have to necessarily worry about accurate perspective. I could show the chair at an angle that revealed more of how to model it even if it was not “correct.” I could also frame the image as I thought looked best. In the paint-over, I felt constrained by being “right.”

I enjoyed creating the hand-painted version, subjectively speaking, so I am not fully pro-paint-over for this particular environment render. Objectively, however, the paint-over did take less time, and it is accurate. Overall, I have to judge in favor of paint-over for this final environment concept.

In future, I could see how paint-over would be immensely important to creating an accurate concept. If I was trying to do a more complicated three-point perspective composition, for example, I would not even bother thinking about a hand-painted version.

4) All-Together Conclusion

The last thing I will discuss is the All-Together concept, where I combined all three subjects, weapon, character, and environment, into one image.

Since I had mixed results with the efficiencies and, I will call it, “joys” of working with paint-over and hand-painting techniques, I went with a mix of methods for the All-Together final concept.

Paint-over means a more accurate image in terms of perspective and rendered materials. When perspective is correct, proportions are also more likely to be correct. In addition, when an artist makes a 3D model for a paint-over, they can reuse it to create a different composition. For example, if I wanted to show the environment from the opposite angle, I could very quickly rotate the camera to the angle I want in Mudbox and take a new render.

Yes, I would have to paint it again, but it took me four hours and fifty-four minutes to get the environment set up in Photoshop when I had already put in the time to figure out the composition in the refined thumbnail. I can easily imagine taking ten hours to redraw the environment at a new angle in a new composition.

Conversely, since I have had a lot of practice rendering metal robot arms over the course of this project, I feel quite comfortable hand-painting them in a few minutes. I did this by using a hard round brush to block out the shapes and colors, then using the Layer Styles to create a metallic look with metal texture overlays, and a gradient shine applied. Even if I did reuse the robot arm model from the character, I would have to switch to a new program, opening the file with the arm, make a copy of it, re-pose each of them, and render them. Then returning to Photoshop, I would have to place them in the scene, possibly having to use the Transform tool to manipulate them into shape, and then I could start painting them.

What I can conclude about working with these two methods is that in the end, it is all about personal preference, and what seems right at the time. It is about the artist knowing what kind of results they can get and what they are capable of doing

artistically. It can even just be about the artist's current attitude. So long as the concept art communicates what the artist intended, then the concept is a success regardless of the method used.

V. CONCLUSIONS

The process of creating concept art is one of refining and communicating ideas [1]. Artists use their knowledge of visual language, the elements and principles of design, to communicate their ideas effectively. Concept artists in the video game industry not only use the fundamentals of design, but they also use their technical knowledge of programs, like Photoshop and 3ds Max, to create their concepts more efficiently.

Artists, whether traditional or digital, use the same basic process to generate ideas and their final product [1][3][4]. They Think, Thumbnail, Contour, Render, and Manipulate [1]. This process is an indispensable way for an artist, or anyone, to brainstorm and hone in on a good idea.

At the rendering stage, there are generally two approaches to creating concept art. Concept artists create their art directly on paper or digitally in a digital painting program, or they use the technique of paint-over, which involves the building of a three-dimensional model and using pictures of it as a basis for a digital painting [3].

For this thesis, I followed the concept artists' process. I created a weapon, a character, and an environment, and for each I painted a concept using both hand-painted techniques and paint-over techniques. I discovered that when it comes to creating hard-surface or mechanical objects, particularly in a non-orthographic pose, such as a two-point perspective, it is more efficient time-wise, and produces a more accurate image, to use the paint-over technique. This proved true for the weapon on both counts.

For the environment, the time difference was only slight, but that was likely because I had already put in so much time into the refined thumbnail that I used as the basis for the final hand-painted concept.

Paint-over was not a drastically more efficient technique for the character, in the sense of time. In fact the hand-painted version, on the surface, seems to have been more time efficient. However, in this case, because I already had the more accurate paint-over version to work from as a reference, much of the time that I would have taken figuring out the proportions, pose, and color of the character was already covered.

What I did not follow very carefully in this thesis is how the concept artists' process fits into the game development process. Though I made a design goal, and I had strict deadlines, as well as a simulated art director, I did not really have a game in mind. I did not have a game engine as a guideline for how complex or how simple I would need to design my concepts. Nor did I have any thoughts about the viewpoint of the game for which I was designing. Had I known I was creating a first-person shooter, I might have rendered the weapon from that perspective rather than a three-quarters view. My main concern turned out to be the efficiency and use of techniques rather than entirely simulating the reality of game development.

This is not to discount the importance of time efficiency when creating concept art for videogames [2]. With looming milestones and strict deadlines, judging the usefulness of a technique by time makes sense. Judging it by the results is equally important, but weighing that judgment by how comfortable I am using the technique also feels equally important, since the purpose of this thesis was to discover the best workflows for creating concept art for myself.

As was reiterated to me in the Manipulate stage, wherein I made a final concept combining all three subjects, using paint-over is not as immediate and spontaneous as hand-painting. Paint-over creates very realistic results, but it is very mechanical and lacks feeling while making it. This is a very subjective analysis, but while I was making these images, using paint-over always felt like a chore, like painting by numbers. Sculpting the model of the character in Mudbox felt more like painting than the painting did.

In the end, I learnt to appreciate how useful paint-over is to creating accurate, more-technical images. I would certainly use it to create beautifully rendered production art. However, for concept art, the refined thumbnails I made would likely have served just as well and taken much less time.

VI. REFERENCES

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Digital Repository: \\smu.edu\Files\Guildhall\$\Thesis\C20\Smith Victoria

Victoria Rehfeld Smith was born in Portsmouth, Virginia in 1982. She has a bachelor's degree in sociology and anthropology from Carleton College in Northfield, MN, USA in 2004; a juris doctor, focusing on intellectual property law from Seattle University School of Law, Seattle, WA, USA in 2007; and a bachelor of fine art degree, specializing in drawing and painting, from the University of North Texas, Denton, TX, USA in 2012. Currently, she is pursuing her master's degree in iterative design, specializing in art creation, at

the Guildhall at Southern Methodist University, Plano, TX, USA to be completed in 2014.

Prof. Joel Farrell is an Art Creation lecturer at the Guildhall at Southern Methodist University, Plano, TX, USA. He has worked as a Senior Character Artist at Day 1 Studios and EA Chicago, as well as worked as an Environment and Character Artist at NuFX, Inc. He has also worked as a 3D artist, Graphic Designer, and Animator at Echo 3 New Media. He has worked on games, which include *F.3.A.R.*, *Fight Night Round 2*, *Def Jam: ICON*, *NBA Live*, and *NBA Street 1* and 2.