5-2019

Off the Top: Look Development for a Viking Story Grounded in Historical Authenticity

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OFF THE TOP: LOOK DEVELOPMENT FOR A VIKING STORY
GROUNDED IN HISTORICAL AUTHENTICITY

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Fine Arts
Digital Production Arts

by
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May 2019

Accepted by:
Dr. Eric Patterson, Committee Chair
David Donar
Tony Penna
Abstract

This thesis showcases the background research and production of assets for an animated short film, *Off the Top*. This film tells the story of two Viking men who have a physical confrontation, which is resolved by the end of the narrative in a comedic fashion. This project draws elements from Viking history and culture to drive the design of the environment and characters in the story. Additionally, this thesis presents several methods for creating visually interesting props, environments, and characters that leverage procedurally-driven techniques for both modeling and surfacing.
Artist Statement

Why is it that from the moment we set our eyes upon someone, we have already created in our minds a picture of who that person is? We see the size or shape of a person and immediately assume that it provides some insight into their temperament or attitude, or what they are like or what they are good at doing. There are many such stories of quick judgments based on appearances just in reality TV talent competitions. Susan Boyle stunned the world because she had the voice of an angel, but she looked the part of a frumpy British housewife. Pop star Kesha scored a 1500 on her SAT, a fact which shocked many tabloids and Internet columns, because pretty, blonde musicians are not usually smart too, right?

For this project, I wanted to draw from my own personal experiences as someone who has often surprised others with talents that they never knew I had. People are diverse and multi-talented, and it really should not be such a surprise when we find out that someone has an ability or passion that doesn’t fit our expectations of them.

Secondly, I place great identity in my hair and the way I wear it. I have had many different hairstyles over the years and I use my hair as an outlet for personal expression, and I wanted this project to explore the themes of hair and its cultural significance. The relationship between men and hair has a lot of history and it varies among cultures, and I wanted to tell a story about a man with long hair through the lens of a culture that appreciated hair.

Thirdly, I wanted this project to be the result of a singular vision: my own. Group projects and collaboration have their place, but I was interested in telling a personal story and being responsible for every step of that process. This project has been a painstaking labor of love, as it required me learning a lot and jumping around between so many different areas of production. It involved storyboarding, historical research, producing concept art, modeling, surfacing, rigging, lighting, and even some animation. Some of those steps I was already comfortable with, but some required a lot
of consultation with other students and online resources before I was able to produce usable assets. Nevertheless, the final product is one that I am proud of and which demonstrates all that I have learned during my studies.

Why am I making a story about Vikings and drawing inspiration from Viking history and culture? I’ve always had an appreciation for the Viking aesthetic, both in terms of their artwork and in terms of what we know about the way they kept their hair. Additionally, I’m interested in societal expectations of masculinity and how the Norse people’s appreciation and care for their hair differed from the “dirty warrior” image that is portrayed in modern media. This film tells the story of a Viking character who is skilled at throwing axes, swords, and knives, but who uses his unique talents to give his fellow Norsemen haircuts, rather than engaging in warfare. I was inspired to create a story that draws from Viking history in an honest and grounded way, and avoids falling into stereotypes when representing their culture. The designs of clothing, axes, the longhouse environment, and the ornamental decoration on those items are all based on real Viking artifacts from the Viking Age. Specific Norse artists are not referenced, as there are no Viking artists who are known by name.
Dedication

I would like to dedicate this thesis to all of my family and friends who have supported and encouraged me throughout all of my studies. I am very lucky to have so many people in my life who truly believe in me as a student and an artist.
Acknowledgments

I would like to thank Eric Patterson for serving as my chair and for giving me the tools to improve my work from both an artistic and a technical background. Thanks to David Donar for always pushing me to improve story and character, the two pillars of successful animation. Thanks to Inson Kwon for introducing me to ZBrush and teaching me how to produce production-ready character models. Thanks to Tony Penna for giving me a practical foundation in lighting and mood, and for providing a different perspective than the rest of us in the digital world.

Finally, I am incredibly grateful to the many DPA students who have come before me and who are in the program now, for their mentorship and for their open and collaborative attitudes towards learning. The constant exchange of ideas and creativity in the DPA space is worth more than any textbook or tutorial. I would like to especially thank Austin Brennan, Chris Cornejo, Paul DeBaun, Cassidy Lamm, Losha MaGee, Dan Raitz, Thomas Rapp, Christian Sharpe, Zach Shore, Thaddaeus Wassynger, Geneveive Watkins, and Alex Young for always being available to brainstorm ideas or to give helpful advice.
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Chapter 1

Background

For a while now, I have been fascinated by Scandinavian and specifically Viking culture. The Viking people have a rich history, and their civilization had many parallels to our own, but it seems as though oftentimes their entire existence is seen through a very narrow lens, and the modern picture of the Viking people and their way of life is decidedly skewed towards the fantastic, where every man was a pillaging warrior that tore through northern Europe in search of a noble death in battle that would earn them a place in Valhalla. In reality, though warfare and the continued expansion of territory was an ever-present part of life, the vast majority of Norse people made their living in agriculture, a skilled craft, or trade.

One of the ideas that I wanted to incorporate into my story was the idea that a character is not always what he seems. Sometimes people appear to fit a certain stereotype or class of person, but they have interests or skills that seem incongruent with that image. Speaking personally, over the years I have dabbled in a pretty large variety of hobbies and topics of general curiosity that do not make a whole lot of sense when looking at what I study or what I plan to do for a living. I do not recall when it started, but I have always taken pride in having an interest in so many different things, and I almost take it as a challenge to dive into a hobby that I have no connection to. When I was in high school, I started doing musical theater. I had no real interest in it before then, but I had a few friends that were into it, so I auditioned for some shows and got a decent role or two.

Later, in college, I developed a strong interest in learning French, and by extension learning other languages. I am not yet fluent in any language other than English, but I can typically read news articles in French, and I am starting to understand some basic Swedish syntax. I got absorbed
into learning about languages and how languages share so many elements with each other, but at some point branch off and start forming their own patterns of speech. Languages are alive and dynamic, and I find it silly that people develop a sense of superiority for knowing one language over another, like Americans who look down on those that do not speak English.

Over the years, I have also continued to pursue interests in digital and film photography, indoor rock climbing and bouldering, electronic music composing, 3D modeling and animation, hiking, home theater technologies, and college football, and devour every bit of information I can find about space exploration and reusable rocket technologies, electric vehicles, and computational photography. I think it is important to cultivate as many interests as one can handle, as it makes for a more well-rounded and reasonable individual.

1.1 Viking Culture

The inhabitants of Scandinavian Viking towns were frequently multi-talented by necessity and combined trades. [49] In order for them to survive and thrive, it was often necessary to take up skills that might in later years become more specialized fields of work. As Kirsten Wolf writes, “There is, however, no indication that these craftsmen formed a new or separate class of (urban) citizens during the Viking age, because much of the work could be done in rural communities and could be combined with other occupations[.].” [64] This served as inspiration for my barber character, a man who has talent with his axes and swords, but has found a novel way to use that skill in order to provide a service to his fellow townspeople, and by extension, a way to earn a living.

1.2 Viking Art

For Vikings, the patterns sewn into their clothing and etched into their tools were more than just a quick flourish to add visual interest. There is a lot of history behind those patterns, and they can be divided into distinct movements over the several centuries that the Vikings lived and flourished. The artworks produced by Vikings between the ages of 750 AD and 1125 AD are some of the only true artifacts of culture from the Viking times that have survived to the present day. [44] From what archaeologists have been able to glean from careful examination of artifacts found in Viking excavations, Viking artwork was primarily ornamental in nature. The Vikings were
Pragmatic people, and there are only a few known examples found for evidence of artwork that was created simply for the sake of art or for telling a story. Typically, any artistic expression was used for decoration of homes, clothing, and tools, giving beauty to objects that would be regularly seen or worn. The Norse artists used different methods depending on the items being decorated, carving the intricate patterns into the wooden beams of a longhouse or other structure, sewing patterns into the trim of clothing, or inlaying precious metals into the heads and handles of weapons such as axes and spears. [56]

Figure 1.1: 7th century Viking helmet, decorated with gold patterns and garnets. [19]

Though rare, there are a few examples of Viking art that are not ornamental in nature. The Oseberg Ship was a burial vessel found preserved in a burial mound in Norway, and contained a tapestry that depicts a scene that scholars believe is a burial procession. The procession includes two rows of horses, a cart that appears to contain the bodies of those buried with the ship, and a large number of men and women walking behind. The women are seen wearing dresses with long
trains and coats. Many of the men and women are carrying spears. Based on their weapons and their clothing, the women in the tapestry appear to represent the valkyries in Valhalla, welcoming in the fallen warriors who died in noble combat. [63]

Figure 1.2: Depiction of a Viking burial procession on the Oseberg Tapestry [30]

In addition to the Oseberg Tapestry, several picture stones have been found in Gotland, an island off Sweden in the Baltic Sea. These picture stones contain a series of narrative images, several of which depict well-known stories from Norse mythology. One picture stone shows a beast that looks like a snake or a dragon, along with a man that appears to be illustrating the story of Sigurd the Dragon-Slayer, a figure from Norse poetry that was famed for fighting and killing Fafnir, a great dragon. This same story appears in a carving on a stone face in Ransundsberget, Sweden. This carving depicts Sigurd sticking his sword into the underbelly of Fafnir as two other great beasts encircle the composition. Several figures are included that show Sigurd at pivotal points in the story, including a scene in which Sigurd cooks Fafnir’s heart over a fire and eats it. As the story goes, Sigurd burns his thumb when checking to see if the heart is done cooking, and when he sticks his thumb into his mouth to relieve the burn, he accidentally drinks some dragon’s blood. This gives him the ability to understand the birds that are shown perched in a tree above him. These birds tell Sigurd that his foster father, Regin, is planning to kill him so that he can have the dragon’s treasure (a dragon’s love of treasure appears to be a common theme among most European stories that include them), so Sigurd kills him instead. This scene is seen to the left of the Ransundsberget rock inscription. [63]
Though the vast majority of Viking art is indeed decorative in nature and portrays zoomorphic or botanic figures, these tapestries and stones show that Norse people did have an appreciation for storytelling through art. Those rare tapestries or scenes carved in stone that do tell a story drew from either Norse mythology to depict images of valiant battles, or from their personal experiences of significant events. [63]

Throughout every phase of Viking art, one motif that shows up repeatedly is that of the animal. There is not one specific animal, and indeed at times it is impossible to tell the species or even family of the animal that is carved into wood or stone. The beast underwent many different transformations during the three centuries of Viking art, from fairly natural and proportionate figures to elongated ribbon-like abstractions. The thin, interlacing mesh of animals can be traced back to Roman gold coins and medallions that reached Scandinavia in the first half of the first millennium. Other Roman artifacts that made their way into the Scandinavian peninsula provided inspiration for the Viking Age art movements, as they too were decorated with animal designs. Similar movements made their way to Anglo-Saxon England, Ireland, Scotland, and other Germanic parts of Europe. These animal motifs appear to be purely aesthetic in nature and without any
mythological or spiritual significance. [32]

1.2.1 Broa/Oseberg Style

The Broa/Oseberg style originated around 750 AD, and is the first of the Viking art movements that is widely recognized. This style comes from a pair of archaeological finds in Sweden and Norway. A group of bronze bridle mounts was found in Broa on the Swedish island of Gotland, and the Oseberg burial ship in Norway exhibit similar enough design that historians classify them as the art period. [32] It is characterized by its tightly curled tendril terminals, the heads kept always in profile, the round eyes, the round and tightly curled snout, the small and slightly curved mouth, and its limbs which have been distorted into extremely elongated tendrils. The flow of Broa pieces follow even and nearly geometric curves, with pear-shaped loops, multiple-loops, triquetra-knots, and S-shapes predominant. The patterns are tight, with minimal negative space, frequent double-contouring, single-strand ribbons, and double-strand ribbons. Compositions are clean and geometric. Basic compositional lines are repeated, and large-scale symmetry is common, with differentiation in the finer details. Compositions are frequently separated by frames. Several motifs are present, including ribbon animals with long bodies and stylized features, geometric framework, and gripping beasts, animal figures that curl in on themselves and have claws gripping their own limbs. [39]
1.2.2 Borre Style

The Borre style is named for a collection of gilt-bronze bridal mounts found in another ship burial in the Oslo Fjord area that date from around 850 AD - 950 AD. The Borre style is very geometric, with its patterns consisting of very precisely measured curves and shapes. Unlike the previous style, Borre patterns are also far more uniform in thickness of line. Tendrils do not taper off near the terminal, but end in half circles. Tightly curving limbs twist through each other, often ending in the “gripping beast” motif. Tight, symmetrical knot designs that form a chainlike structure are a trademark of the style as well. [32] The use of symmetry was likely the result of both a desire for pure aesthetically-pleasing design as well as the utilitarian purpose of the work. [37]

When deciding what art style I wanted to use to decorate my customer’s tunic and the weapons that the barber uses, I chose the Borre style because I found the geometric shapes and even line thickness translated well to the design of my characters. My characters, props, and environment are all quite stylized, with strong shapes but simplified details, and the Borre style works with that
foundation. The patterns are readable from a distance and are easily adapted to repetition, so when I wanted to take one of the sample patterns below and use it to decorate the hem of the customer’s tunic, it was a simple task of cutting off the ends of the pattern and repeating the interior section.

Figure 1.5: Components of the Borre Style [38]

Jonas Lau Markussen includes on his site several template patterns that are free to use for non-commercial projects. These graphics are not exact replicas of designs found in Borre artwork, but they do follow the conventions and principles that are known about Borre ornaments found in Scandinavia from 750 AD - 1125 AD. I used several of these assets when texturing my characters’ weapons and the customer’s clothing. [38]
1.2.3 Jelling Style

The Jelling Style began around the 10th Century and continued to be popular for around 75 years. Jelling artwork features heavily-stylized animal figures that follow S-shapes and intertwine with each other. Hip joints were often represented with distinctive spiral shapes, and heads were always seen in profile. Jelling patterns were not as dense as Borre patterns, so more of the background was visible behind the animal figures. Additionally, the Jelling style was occasionally integrated with other styles in the same artwork. [13]
1.2.4 Mammen Style

The Mammen style built off of the Jelling style and was common around 950 - 1025 AD. The Mammen Style features more naturally-proportioned animals than the Jelling style, and includes many different kinds of animals, including mammals, snakes, and birds. Additionally, Mammen pieces included a lot of plant-like ornamentation that branched from and around the animals. Compositions tended to be asymmetrical. [41] [13]
1.2.5 Ringerike Style

The Ringerike style emerged around 1000 - 1075 AD, and derives many of its elements directly from the Mammen style. The animals are similarly proportioned, feature similar poses, and the heads of both are typically seen in profile. Plant motifs are also seen again. Unlike the Mammen style, the Ringerike beasts have teardrop-shaped rather than circular eyes. Also, tendrils tend to branch out in a radial fan pattern and end in tightly spiraling knobs instead of the tongue-like shapes that terminate the Mammen tendrils. [42] [13]
1.2.6 Urnes Style

The final recognized style of Viking art is the Urnes style, which was prominent around 1050 - 1125 AD. The Urnes style is notable for its extremely stylized creatures that have been elongated into ribbon-like shapes that at first sight are hardly recognizable as animals. Long, twisting figures are drawn into curves that loop in opposite directions, forming intricate figure-eights and S-curves. Compositions would often feature elements with two distinct thicknesses, with creatures being made of heavy lines and decorative vine-like ribbons made of thinner lines. Urnes patterns were often carved into wood. [43] [13]
1.3 Chiaroscuro and Tenebrism

While the production design of this project draws from the history of decorative Viking art found in the few documented examples of weapons, clothing, ships, and other Viking Age artifacts, for the look of the final film I was inspired by a technique used by painters that have no relation to the Vikings. I have always found myself drawn to the works of painters that use the *chiaroscuro* technique to create compositions of extreme visual interest. Chiaroscuro, which literally comes from the Italian words for light, “chiaro,” and dark, “scuro,” is the style of painting and photography that uses a high contrast between light and shadow to represent objects in a manner that is far more three-dimensional than the methods that came before it. Originally, chiaroscuro referred to a type of drawing with a medium-dark paper, on which the artist would use a lighter paint to add areas of light, and an ink to add areas of shadow. When an artist starts with a light canvas, they have to paint in the dark areas of the composition, in essence painting the areas that are defined by the
absence of light. By flipping those colors and starting from darkness, the artist takes the role of the light itself, choosing very selectively the areas that will be visible. This heightened contrast allows the artist to direct the viewer’s eye very intentionally to the figures emerging from darkness, and the heightened relief of faces cast into partial shadow creates very dramatic and often emotional scenes. [46]

Though some scholars argue that elements of chiaroscuro existed as early as in the periods of ancient Greece and ancient Rome, it did not really come to full bloom in Europe until the 15th century. One of the first European artists to really develop the look of chiaroscuro was the great Renaissance artist Leonardo da Vinci with works like his 1482 painting \textit{Adoration of the Magi}. Over the next few centuries, the look of chiaroscuro was pushed further and further, coming to a head with the works of the artist Caravaggio and his followers. [46] Caravaggio was an Italian painter working in the late 16th and early 17th centuries, and his works portrayed Biblical stories in vicious and bloody detail. His use of chiaroscuro took the elements of light and shadow and pushed them to their extremes, and was even given its own name: \textit{Tenebrism}. Tenebrism is derived from the Latin word for darkness, \textit{tenebrae}. The works of tenebrism often portray light figures set against a backdrop of inky blackness, with the illumination of the scene coming from a specific source in the scene, or else from a distinct point just off the edge of the painting that casts the forms of the subjects into sharp relief. Other major artists working with chiaroscuro and tenebrism techniques include Rembrandt van Rijn, Peter Paul Rubens, and Gerrit van Honthorst, to name a few prominent examples. [45]
In *Adoration of the Magi*, da Vinci uses large sections of light and dark as distinguishing features between the holy Son of God and his worshippers. The clean, white shape of Christ and the Virgin Mary are centered in the frame, drawing the eye directly to the most important focal point. The contrast between the light, pure values of the two figures contrasts strongly with the darker figures surrounding them, creating a divide both compositionally and thematically. Christ condescended to become flesh, but he is still separate from sinful humans. This painting gives one of the first and strongest examples of how chiaroscuro could be used to enhance the themes present in a piece of art.
Figure 1.12: Rembrandt, *Tobit and Anna with a Goat*, oil on canvas, 1645 [61]

Figure 1.13: Caravaggio, *The Calling of Saint Matthew*, oil on canvas, 1600 [23]
This painting by Caravaggio depicts the moment when Christ first called upon Matthew to become a disciple of his and to follow him. Matthew at the time was a tax collector, and Jesus found him and asked him to give up his ways and be “born again.” The bright light falling from the open window onto the faces of the tax collectors has an intensity to it, as though Jesus is throwing back the curtains and exposing their greed, and Jesus is calling Matthew to step into the light and to live honestly. In the gospel of Matthew, Jesus says “No one can serve two masters, for either he will hate the one and love the other, or he will be devoted to the one and despise the other. You cannot serve God and money.” (English Standard Version, Matthew 6:24) Caravaggio has managed to infuse his painting with these themes through his use of heightened contrast – in this moment, Matthew stands at a crossroads between serving money (his old life) and serving God (his life from this point onward).

Figure 1.14: Gerrit van Honthorst, *Supper Party*, oil on canvas, 1619 [58]
In both of these paintings, Gerrit van Honthorst demonstrates a beautiful use of highly isolated artificial light to bring drama to his work. Honthorst was often called Gherardo dell Notti (Gerard of the Night Scenes) because he used candlelight as the primary source of illumination in so many of his paintings. In *Supper Party*, Honthorst uses his candlelight to create a scene that seems small and intimate. By keeping the overall light levels low and choosing to illuminated the faces from just a few candles, it evokes a sense of familiarity and friendliness. Since the hours after the sun goes down are often prime hours for socializing, the viewer already has a sense as to the nature of this gathering of people.

*The Dentist* uses light rather differently, even though the appearance is quite similar. In this scene, a dentist is removing a man’s tooth and is surrounded by many onlookers. The people are lit by a single candle that is being covered from view by the hand of the man holding it. This light is used purely for dramatic effect. It draws the viewer’s eye straight to the face of the man who is in intense pain. The emotions and storytelling of this scene are very effective due to van Honthorst’s very intentional use of lighting. [4]
1.4 The Cultural Significance of Hair

For animals, hair is a biological adaptation that serves several different purposes. In cold environments, fur gives insulation and warmth, trapping heat in the air between hairs and stopping animals from freezing to death even in extreme temperatures. The arctic fox, for example, is one of the most resilient mammals to live in an Arctic environment. It can survive easily in temperatures below -40°C, and by merely doubling is metabolic rate, survive in temperatures as low as -120°C. [48] Additionally, in different animals fur can serve as waterproofing, protection from other animals, and camouflage. [36] [26] As humans developed clothing, however, hair ceased to serve any of these vital functions and became a primarily vestigial feature. [47]

Now, hair is useful primarily as decoration, as showy plumage to attract the opposite sex or just to demonstrate individuality. [27] Hair has long been a means by which people can express themselves, their personality, and their beliefs. It is also an extension of the culture and the environment in which we live, and whether we wear our hair in accordance with or in opposition to cultural norms carries a lot of meaning.

1.4.1 Beards

Facial hair has a special place when it comes to talking about the significance of hair, as it is (generally speaking) restricted to males. Facial hair develops for boys during puberty, and coincides with other bodily changes that young men go through at that time, such as the deepening of the voice and the development of a more muscular physique. As a result, in many cultures there is a distinct connection between a man’s beard and his masculinity, and the ability to grow or not grow a beard is seen as a direct reflection of that masculinity. [54] In Jewish culture, growing a beard is thought to be a statement of religious devotion, associating the upkeep of facial hair with upkeep of spiritual well-being. [28] As Eitan Press, owner of beard balm company “Aleph Male” puts it, “Jewish beard culture is literally thousands of years old. Moses had a beard. King David had a beard. The custom for Jewish men to anoint their hair and beards with sacred oil goes back to the Bible.” [28] The ancient Greeks considered beards a sign of great honor, and they took special care of their beards, even going so far as curling them with tongs to create hanging curls. [25] Finally, though Vikings are often depicted as fierce, bearded men with blood and dirt speckled throughout their hair and clothing as a sign of constant battle, the reality is that they were fairly well-kept,
bathing regularly and using implements such as picks and combs to keep their beards relatively clean. [33]

Figure 1.16: Bust of Homer, demonstrating early beard curling fashion
Chapter 2

Story

2.1 Inspiration

Getting the story right was perhaps the hardest part of this project. I wanted to tell a story about Vikings that drew from Norse culture for its setting and people, but which wasn’t a story about dragons or Norse mythology. As mentioned above, I decided to tell a story about a man of unexpected talents, as well as a man with glorious hair.

My story is loosely inspired by old Looney Tunes short films, where a character throws all kinds of weapons and dangerous objects at their enemy, only for their projectiles to barely miss, or for them to be thrown at just the perfect angle to cut off a character’s clothes without harming their body. I love that imagery of a whirlwind of swords that ends up doing nothing but shaving off a few whiskers and cutting a pair of suspenders. My story is told in that same vein, though in the setting of a fairly realistic Viking longhouse.
2.2 Boards

Figure 2.2: Shot 1
Figure 2.3: Shot 1

The story opens with a shot of a barrel full of weapons. Within a moment, the audience has already formed some sort of idea of what kind of person owns all these weapons. He might a warrior type, someone who is violent and blood-thirsty. Clearly, he cares for his weapons, as they are all well-kept and clean, though not without some usual wear and tear. A hand reaches into frame and pulls a sword out of the barrel.
In shot 2, we see a human-shaped dummy made of wood and rope pushed against the wall. It appears to be a training dummy for practicing sword work and various combat moves. I was inspired by martial arts movies Ip Man and Kung Fu Panda that use these anthropomorphic figures for training, allowing them to practice precise moves and attacks against something with
proportions similar to that of human targets. This target dummy is the second visual red herring for the audience. Seeing the dummy, combined with the weapons from the previous shot, is likely to make people think that Leif is preparing for battle or at least for a conflict with another person. Then, Leifs boots come into the frame from above as he plants his feet in front of the target. The stance is strong and masculine, reinforcing the warrior image.

Figure 2.6: Shot 3

In shot 3, we get our first look at Leif. He is a chiseled and muscular man, with a very robust beard and an angry-looking demeanor. The fact that he is not wearing a shirt adds to the appearance of a warrior type—a brawny man with minimal clothing and primitive nature. He scowls.
In shot 4, we see that he is holding a weapon (a beautiful sword). He winds up and launches it at the practice dummy with all his strength, letting out an enormous grunt in the process. He is evidently strong, and is very practiced at throwing weapons. To the audience, it appears as though he has struck his target.
In shot 5, the camera cuts to an eye-line match of Leif’s point of view, looking at the target dummy. His sword has missed the dummy and is instead embedded into the wall just to the side.

Shot 6. Cut back to a closeup of Leif’s face. He appears angry and upset at having missed his target. The subtle hinting of rage underneath the surface furthers his savage warrior appearance.
Figure 2.11: Shot 7

Figure 2.12: Shot 7

Shot 7. Cut to a closeup shot of the barrel with several weapons in it. Leif enters the frame and grabs all of the weapons in one sweeping motion, lifting them out of the barrel and out of the frame.
Figure 2.13: Shot 8

Figure 2.14: Shot 8

Shot 8. Leif is standing in a power stance facing the camera, with feet planted. One axe dangles from his right hand while the rest of the weapons are held in the crook of his left arm. He stares down his target with an intense expression. He is irritated but focused, looking to correct his form and leave no doubt in his own mind about his precision and skill. He winds up and launches
the axe over the camera, then again and again until he has thrown every weapon in his hand. He
stands up and surveys the results.

![Figure 2.15: Shot 9](image)

Shot 9. We cut again to the side view looking down the longhouse. Several axes and swords
are sticking out from the target dummy’s silhouette. Leif looks pleased with himself.

![Figure 2.16: Shot 10](image)
Shot 10. Cut to a close-up of Leif. For the first time, he smiles. He may be a fierce warrior, but for the first time, we see a hint at his good-natured side.

![Figure 2.17: Shot 11](image)

Shot 11. Cut to the front door of the longhouse. Three loud bangs are followed by the door slamming open, being almost thrown of its hinges. A round, burly man with unkempt hair and

![Figure 2.18: Shot 11](image)
beard is standing in the doorway. This is Bjrn. Bjrn looks like he has a personal vendetta out for Leif.

![Figure 2.19: Shot 12](image)

**Figure 2.19: Shot 12**

Shot 12. Eye-line match to close-up of Leif. He scowls, cementing in the audience’s view the idea that these two are enemies.

![Figure 2.20: Shot 13](image)

**Figure 2.20: Shot 13**
Shot 13. Cut to a close-up of Leif’s right hand grabbing Bjrn’s right hand in a kind of handshake.

Figure 2.21: Shot 14

Shot 14. Leif and Bjrn’s faces enter the frame from the left and right sides, respectively, bringing their faces close to each other in a tense stare-down.

Figure 2.22: Shot 15
Shot 15. Cut to a medium shot of Leif grabbing Bjrn’s around the torso and throwing him out of the camera frame, towards the wall.

![Figure 2.23: Shot 16](image1)

Shot 16. Cut to medium shot of a seat against the wall, into which Bjrn slams with a thud, his hair flying about.

![Figure 2.24: Shot 17](image2)
Shot 17. Cut to medium shot of Leif grabbing weapons from another barrel, in the same manner that he did in shot 7.

Shot 18. Cut to wide shot of Leif facing the camera again. As in shot 8, he plants his feet and launches axes and swords past the camera.
Figure 2.27: Shot 19

Shot 19. Cut to a wide shot of Björn in profile, sitting against the wall, with swords and axes appearing to have gone straight through him, pinning him to the wall.

Figure 2.28: Shot 20
Shot 20. Cut to a close-up of Bjørn in front-view, revealing that none of the weapons have harmed him, but they are embedded into the wall behind and around him, each having come within millimeters of his face. Strands of hair start to fall away, for the sharp blades of the weapons have actually given him a fresh new haircut.
Shot 21. Cut to an extreme close-up of Björn. He has a look of terror in his eyes, but he looks around him and realizes he is ok, and he has a fantastic new look. He smiles.

See Appendix A for the full set of storyboards.
Chapter 3

Characters

3.1 Inspiration

The first challenge with this project was to create a compelling story with interesting characters. I wanted to tell a story that represented me in some way, as this is a very personal project and it was important that create something unique to my own perspective. As an artist and as a person, I have often been told that I’m not what someone “expected I would be like.” I don’t necessarily fit the persona that would be expected of someone in my field of study or appearance. I found myself drawn to the idea of a character that that seemed to be a dichotomy of two very different character types merged into one and decided to base my story off this experience of averted expectations.

I like the idea of a character who appears to be one thing on the outside but has a very different set of goals and or a very different personality from that which they present to the world. This is actually an incredibly common approach to coming up with characters that audiences are interested in, because if we as an audience could look at a character and immediately know all that there is to know about him or her, we have no reason to follow their story. This is especially true in animated films, which give filmmakers and writers the opportunity to tell stories about animals and other non-human characters that desire to partake in some human activity, or who possess attributes unlike those typically attributed to their species.

Take for example, Remy, the protagonist in the 2007 Pixar movie Ratatouille. Remy is an aspiring chef who dreams of cooking in a great Parisian restaurant, and he’s inspired by the words
of the late celebrity chef Auguste Gusteau, who makes the claim that “anyone can cook.” Remy has innate skill with food and understands the delicate way that flavors can combine and interact within a dish to create a delicious and savory experience, and he has an incredible sense of smell that helps him detect if food has gone bad or if it is contaminated with mold or poison. Unfortunately, Remy is a rat. Despite having the knowledge and ability to cook, he faces extreme obstacles before he is able to exercise his talents, both because his father forbids him from venturing outside the rat colony to explore the human world (and by extension, the world of fine dining), and because the humans do not take kindly to the idea of a rat running about their kitchens. This contrast between primal characteristics and individual desires allows for many interesting character moments when they are at odds with each other.

As another example, the 2010 Disney movie *Tangled* has a scene in which the two protagonists, Rapunzel and Flynn Rider, are escaping from Rapunzel’s tower and they make a quick stop at a local pub, which turns out to be full of thugs and crooks. Far from being an unfortunate accident, Flynn Rider takes Rapunzel to this pub in a concerted effort to dissuade her from going out into the real world, because it’s scary and full of terrible people. Despite Flynn Rider’s plan, Rapunzel discovers that all of these brutish characters have dreams of their own, most of which hardly fit the frightening image that they give off. The group of men demonstrate such aspirations as being a classical concert pianist, finding the perfect lady to settle down with, putting together charming floral arrangements, exploring interior design, perfecting the art of mime, and baking “sublime” cupcakes.
The song, *I Have a Dream*, works so well because the imagery of each of these uniquely churlish men showing off their idiosyncratic skills is quite funny. One never expects the person behind a beautiful piano performance to be equally capable of crime and murder, but this scene shows what a hilarious idea it is.

![Figure 3.2: A thug who bakes? Crazy.](image)

One of the character designers who worked on this film was Jin Kim. Kim worked on designs for Mother Gothel, Pascal, Maximus, and others. I really enjoy the use of exaggerated volume in his characters, which is used to particularly great effect in the pub thug designs. The large bodies and small heads, along with otherwise unusual proportions, really sells the idea that they are stronger than they are intelligent, and that they are little more than ugly beasts of battle. This sets up the wonderful about turn when it turns out that many of them are quite gentle. Additionally, I am very drawn to the beards and dace designs that he came up with for the king, which are highly stylized and provide a dignified and masculine look with beautifully simple shapes.
Lastly, to bring in an example from a hand-drawn animation, Kronk from Disney’s 2000
sleeper hit *The Emperor’s New Groove* is a hulking henchman to the willowy villain, Yzma. Despite the fact that he is undyingly loyal to this evidently evil woman who plots to murder Emperor Kuzco to take over the throne, Kronk himself is not a very bad guy. He’s large and muscular and he does Yzma’s dirty work, but when he’s not being pushed around by her to commit unspeakable transgressions he is great with kids, loves cooking, and shows himself to be quite the fan of “exotic bird bingo.” Many times throughout the film, something will happen that causes Kronk to think back to an earlier experience of his that seems more befitting a Bob Fosse type than an evil henchman. For example, when Yzma and Kronk take a detour to a local diner, Kronk thinks he recognizes Pacha from somewhere, but he can’t put a finger on where. He cycles through high school wrestling, metal shop, Ms. Narco’s Interpretive Dance (two semesters, where he was usually in the back because of his weak ankles). Just through this one conversation, the audience gets a quick glimpse of the eccentric and multi-layered character that is more than just his job description.

![Figure 3.5: A henchman who bakes incredible spinach puffs? Crazy.](image)

According to The Bancroft Brothers Animation Podcast, a podcast hosted by animators Tom and Tony Bancroft, the lead character designer on *The Emperor’s New Groove* was Joe Moshier. Joe Moshier at the time was interested in being an animator, and worked as a rough in-betweener for *Hercules*. Disney saw that he had a talent for character design, so they brought him on to a
film that was at the time called *Kingdom of the Sun*, and was meant to be a production in the vein of *The Lion King* and other somewhat serious Disney classics. Moshier produced a character design package for the film, which subsequently was shut down, then revived and retooled into *The Emperor’s New Groove*. Though the story had changed considerably, much of Moshier’s style made it into the final film.
Figure 3.6: Kronk artwork by Joseph Moshier [50]
In addition to the character design package by Moshier, Tony Bancroft worked on Kronk and created the model sheets (used as reference by the animators). These two artists worked together to establish the overall look of the characters in the film, and they chose to focus on very clean designs based heavily on primitive shapes. As Moshier said in an interview with the website Animation Art Conservation, “My main focus was making sure the shapes spoke clearly because when people
respond to a character, you are noticing the shapes and the gesturing.” [18] These shapes show clearly in the final designs, and I was especially inspired by the use of sharp lines and simple shapes in Kronk’s face. His clearly defined jaw, trapezoidal neck, and sharp cheekbones served as guidelines for my final design, along with his generally muscular body and tight-fitting clothes. Kronk’s design is that of a refined shape that has been reduced to its essence.

Pacha, on the other hand, is a much rounder character, with softly curving edges and large, bulbous forms. In sharp contrast to the edges and corners of Kronk’s design, Pacha is more of a balloon. His large body is draped in a poncho that hides his exact shape. He is not muscular (or if he is, his muscles are underneath a lot of fat). He is initially seen as a less threatening character than one with Kronk’s body type. I draw on Pacha’s overall shape as I designed Björn, who is meant to be seen as less refined of a character than Leif.
3.1.1 Clothing Style

When I decided that I wanted my story to focus on a pair of Viking characters, I knew that I wanted to ground them in historical realism. The goal was not complete, museum-quality accuracy, but I wanted to avoid the inaccurate designs and weaponry portrayed in fantasy games and media like God of War. While Kratos is a very interesting character visually, his tattoos, his clothing, and his weapon deviate quite a bit from what a real Viking would have had. His tattoos, for example, cover large portions of his body and face with bright red patterns. There is some evidence that Vikings had tattoos, but as skin deteriorates quickly after burial we have never found archaeological proof. According to History of the Net, an Arab traveler named Ahmad Ibn Fadlan, a scholar from Baghdad, met some Norse warriors during his travels:

At one point he mentioned that all the men were tattooed from the tips of their fingers to their necks. The tattoos were dark green figures of trees and symbols. It is likely, however, that the tattoos were probably dark blue, a color that comes from using wood ash to dye the skin. [52]

While this account of Ahmad Ibn Fadlan indicates that tattoos might have been common among warriors, the style of tattoo that Kratos has and its intense red color were not.

Figure 3.10: God of War’s Kratos does not represent a typical Viking
The absolute last thing I wanted to included in my character designs was the classically misattributed horned helmet, which there is no evidence of any Viking ever wearing, but which seems to be an indelible icon of Viking culture. It is so pervasive in our depictions of Vikings that a horned helmet has almost become shorthand for their entire people group. A search for “Viking icon” in Google images returns dozens of images of bearded Vikings with hornet helmets adorning their heads, including the logo for the NFL team the Minnesota Vikings, possibly the most recognizable Viking figure in American culture.

![Figure 3.11: The dreaded horned helmet appearing in a video game character](image)

Instead of armor and helmets, I focused on the day to day clothing that Vikings would have worn when tending the farm or working inside their homes. A typical outfit for a Norseman provided protection from moderately cold temperatures while still allowing freedom to move and work. The main garment was a tunic made of wool, called a *kyrtill*, which fell past the waist or as low as the knees, depending on the wealth of the owner. Because material for clothing was costly, the wealthier citizens could afford more cloth than strictly necessary, so they displayed it by having longer tunics.
made. The end of the *kyrtill* was left quite wide, to allow for a large range of motion. This tunic was fairly simple in appearance, but followed a surprisingly complex pattern. The result of this was a tunic that fit snugly, but did not restrict movement around the arms and shoulders, an important development when handling farm tools and weaponry in the cold. The neck of the tunic usually had a keyhole neckline, but other shapes were not uncommon. The hem of the neckline and the cuffs were decorated with brightly colored wool. For the very wealthy, silk trim embroidered with gold or silver thread was a possibility. [55]

![Figure 3.12: The typical tunic, trousers, leg wrappings, and shoes of a Viking man.](image)

Below the tunic was worn a pair of trousers, typically made of wool for warmth. The Norse people wore a wide variety of trousers, and both slim and baggy styles were common. Some trousers were open at the ankles, whereas others ended in built-in socks, like footie pajamas today. The legs could be worn loose or tucked into boots or leg wraps, depending on the comfort of the wearer and on the weather. Leg wraps kept warmth in when the weather was very cold. Finally, trousers did not have pockets, so Vikings had to find other ways to carry their personal belongings. Often this carrying items by hanging them from the neck or in a leather pouch around the waist. [55] [14]
Shoes and boots were simple and made of leather, typically goat skin, and crafted using a method known as the “turnshoe technique.” The shoes were sewn together inside out, then inverted, keeping the stitching on the inside and protecting it from the elements. Unfortunately, the leather did not hold up well in the environment, and a pair of shoes might only last a few months. Basic fasteners were used, usually either leather laces or small toggles, as shown below. The toggles were adjustable to allow for sizing differences and the stretching of leather over time. Most shoes went up to the ankles, providing protection from the snow, but some examples of calf-height boots have been found. [55] [14]
3.2 Concept Art

Figure 3.15: Leif, the barber
I settled on a large, muscular Viking named Leif, who wants nothing more in life than to give people stunning haircuts. This man is skilled with a blade, but not the kind you might expect. I liked the idea of a warrior character who throws axes and is talented with a sword, but who uses
those skills for more delicate purposes. I chose to keep Leif shirtless, because in the context of the
story he is inside his longhouse next to the warm fire, and he has been practicing throwing axes
when the story starts. In practical terms, this also serves the purpose of allowing the musculature
of the model to be put on full display. I spent a long time sculpting the arm and back muscles in
ZBrush, and I wanted that detail to be visible.

The customer, Björn, on the other hand, is rather round and tubby. I wanted a visual
contrast to the tall and muscular Leif, so Björn is soft in all the places that Leif is chiseled. I gave
him a red tunic to give nice contrast to the blues and greens found in Leif’s design. His tunic has a
pattern sewn into the cuffs in the hem, in the Borre Style. This pattern is shiny gold, indicated that
Björn is relatively wealthy. He can afford artisan haircuts from a man that specializes in creating a
unique experience for his customers.

Figure 3.17: Björn, the customer
3.3 Modeling

3.3.1 ZBrush

To model both of these characters, I used the 3D sculpting program ZBrush. Before 3D sculpting became popular, a variety of less intuitive methods were used to create models, including box modeling, NURB curves, extrusion, and more. The power of ZBrush comes from the fact that it allows a modeler to focus almost entirely on the design and shape of the model first, then worry about topology later. Though box modeling is still widely used for non-organic modeling, sculpting has largely taken over for the creation of organic and especially humanoid models. Nevertheless, many artists and studios still find it more efficient to create a base mesh using one of the polygonal methods before finishing the last details in ZBrush. This technique allows greater control of mesh topology and UV layouts. [12]

To start each of my character models, I loaded the concept art to put in the background of the front and side views. I then inserted a sphere and began clipping out general regions to get a rough face shape. I repeated the process to create a neck and torso. I then used ZBrush’s insert body parts brush to add simple arms and legs to which I could add musculature and veins and wrinkles. I used the dynamesh tool to merge all the shapes into a single body. Once I was satisfied with the general proportions, I started to fill out the volumes of the head and body using the clay tubes brush and the smooth brush. Then, when I was happy with the overall shape, I went in with the trim dynamic brush to add sharp edges to volumes that were too smooth and added details like creases and folds using the dam standard brush.
At this point in the sculpt, I realized that my character was veering away from the stylized concept art and towards something that was more realistically proportioned than I wanted. I decided to completely overhaul the proportions and sharp features of the face and bring it more in line with
the concept. One of my primary goals for the Leif character was that his design would be more refined and reduced to basic shapes and exaggerated features. Leif represents the male aesthetic that has been carefully groomed and shaped. His cheekbones are sharp and evenly defined, his nose is pointed and angular, and his beard is finely chiseled. These qualities, along with the beautiful hair and highly muscular body portray Leif as the idealized masculine form. This is the distillation of male Viking archetype.

Figure 3.20: Total restructuring of face to more closely follow character design artwork, add beard, hair strands, and color
To model the characters’ hair, I used ZBrush’s Curve Brush feature and made a few of my own brushes to create hair tubes. For these characters, I wanted the hair to be stylized and have very distinct volumes. For Leif’s long-haired updo, I started by creating the underlying form with a sphere that I formed into an almond-shaped blob. This acted as the base for the hair tubes to follow when I activated the snap curve to surface functionality in ZBrush.
I drew several dozen hair curves on top of the base mesh until it was completely covered, then added the loops for the bun shape and a few dangling strands along the side of the face, to create a slightly messy look.
3.3.2 Retopology

Because ZBrush produces a model with several million polygons, it is necessary to create a simplified version of the mesh using a method called retopologization. The goals for a good remesh all relate to making later processes more painless, such as rigging, UV unwrapping, and animation. A good remesh should have as many polygons as necessary to recreate the shape of the model, but not necessarily all of the fine details, as those can be recreated using displacement mapping, bump mapping, or normal mapping. A good remesh should also be created so that polygons are not extremely distorted when the model is animated and put into unusual poses. Lastly, a good remesh should have edgeflow that allows for simple and easily hideable seams when UV unwrapping the mesh. ZBrush has a few built-in tools for retopology, but they are not particularly robust and they often automate too much of the process, making decisions that any decent artist would avoid. I chose to use TopoGun to retopologize my models.
3.3.3 UV Unwrapping

UV unwrapping is the process of making cuts in the 3D mesh and flattening out the model into 2D space so that textures can be mapped to it. To unwrap my models, I used Maya’s included unwrapping tools. However, when it came to unwrapping the hair, I brought the hair geometry into Blender. Blender has a few different sets of tools to unwrap models than Maya does, including one that I have found extremely useful: follow active quads. This tool lets you unwrap any object, then align faces in the UV grid so that all edges are at a 90 degree angle to each other and following the U and V axes. I needed this tool so I could unwrap the hair tubes and flatten the UV islands into the grid. By using the “follow active quads” tool to make the UVs for the hair pieces perfectly rectangular, I could later add a vertically stretched noise texture to make them look like actual hair.
Figure 3.26: Leif’s body UV unwrapped with a texture added to show UV scale

Figure 3.27: Leif’s hair UV unwrapped into rectangles that are oriented in the same direction
3.4 Surfacing

There are several different methods for adding textures to a 3D model. The easiest method is to simply find photographic textures from an online database and apply them directly into the UV space. Typically, these textures will be made seamless in a program like Adobe’s Photoshop before being applied to a 3D model, as this allows the artist to tile the texture to find the correct scale. With some extra effort, the artist can map that texture into the other material properties of the shader, such as roughness or bump, to create a more realistic material. This texturing method is easy, but it does not typically provide very photorealistic results.

The next method is to use a 3D painting program such as Allegorithmic’s Substance Painter or The Foundry’s Mari to paint directly onto the 3D model. This technique is the predominant method of texture generation for hero assets, as it gives the artist much more control over the final look of the material, as they offer the ability to paint different channels, such as the diffuse color, roughness, and metallic properties.

Finally, the last method of adding textures to a model is through procedural generation. Procedural textures use mathematical functions to create variation in color and value, based on either UV coordinates or 3D coordinates. Maya includes several different procedural noise nodes, each their own uses and sets of parameters for achieving a certain look. These textures can then be used to affect the various shader properties to mimic specific real world materials. Generally speaking, procedural materials are best suited for creating raw materials, such as rock, concrete, dirt, and even wood. They are very useful for materials that need to be applied to several different non-hero props.

For this project, I decided to combine hand painting in a 3D program with the power of procedural textures.

3.4.1 3D Texturing Packages

For texture painting, I decided to use several different programs, so that I could have a chance to test their feature sets against each other improve my skills with each. For Björn, I used Mari for all of the skin and clothing. For Leif, I textured all of his clothing in Substance Painter, but I textured his skin in ZBrush using the polypaint feature.

To paint Björn’s skin, I started with a base light pink color in the diffuse channel. I then
added three separate layers for redness, blueness, and yellowness, and painted the general color regions of the body and face with a soft brush. This gave me the base color for his skin that I would then alter with procedural noise, on which I elaborate below. The process for painting Leif’s skin in ZBrush was similar, but with slight differences in layer usage due to ZBrush limitations.

![Figure 3.28: Painting the color regions of Björn’s skin in Mari](image)

### 3.4.2 Procedural Noise

To add flesh tone variation and a general roughness to Björn’s skin, I added two procedural textures in Mari, one a general noise texture and the other an “oil” texture, then brought down their opacities and changed the blending modes to something more subtle. This gave me a nice stylized texture that looked like the splotchy skin of someone who lived in Medieval times, without being too realistic with skin pores or whiskers.

![Figure 3.29: Adding two kinds of procedural noise to Björn’s skin in Mari](image)
To create the appearance of grime and dirt on Björn’s clothing, I added another oil texture that simply darkened certain areas of his trousers and tunic. It’s not overwhelming, but it’s enough to break up the visual sameness of a perfectly clean set of clothes, as it’s unlikely that Vikings were able to keep their clothes perfectly clean while working in their fields.

Finally, to create the appearance of hair strands in both Björn and Leif’s hair and beards,
I created shaders in RenderMan that used fractal noise had been scaled in one direction in the UV space. As I mentioned before in the UV unwrapping section, the grid-aligned UVs allowed me to take a simple fractal texture, squeeze it horizontally and stretch it vertically, and map it directly to the hair geometry, resulting in a very hair-like texture, because the linearity of the fractal texture follows the geometry of the hair tubes. For the head hair, I created a fractal texture that was smooth and purely vertical, as both of my characters have straight hair. For the beards, however, I added UV noise in Maya’s place2dTexture node, to give the appearance of wavy beard hair. I also added a light reddish color to the beard texture, as I wanted their beards to have a slight color tint.

Figure 3.32: Base color, procedural grime texture, and final color for Björn’s clothing
3.4.3 Displacement

Rather than just having the textures affect color, I also took advantage of RenderMan’s
tremendous displacement features. In ZBrush, I baked out displacement maps that describe the
differences between the high resolution model and the remeshed model, then attached them to
my RenderMan shaders and was able to reproduce those details at render time. Additionally,
RenderMan allows the use of a single color texture as displacement input, so I took the red channels
from my hair and beard textures and used them to affect the displacement of each. The end result
is hair that has depth and texture that can be art directed and changed quickly, without the need
to manually sculpt each strand.

Figure 3.34: Using fractal textures to displace hair surface

3.5 Rigging

To facilitate posing the characters and the future possibility of finishing this short film, it is necessary to create rigs for them. Rigging is the process by which a poseable armature is added to a model, as well as the steps taken to attach the model to the armature and create controls that an animator can use to pose the model. As completing the short film is outside the scope of this thesis, I decided I would only rig Leif as a proof of concept. I rigged Leif in Maya, using the default system of joints to create a basic skeleton with a joint at every human joint location. I also created
a simple rig to pose his apron. Leif has IK legs with knee target controllers, FK arms and hands, basic face controllers, and an eye controller which follow his torso.

Figure 3.35: Leif’s animation rig

Figure 3.36: Leif’s face controllers
3.6 Renders

Figure 3.37: Leif final render

Figure 3.38: Björn final render
Figure 3.39: Leif final render

Figure 3.40: Björn final render
Chapter 4

Props

4.1 Weapons

4.1.1 Inspiration & Research

A Viking’s weapon was one of his closest companions. Though organized warfare was not an everyday occurrence, disputes between Viking men were regularly and legally settled through the use of weapons. Vikings were not lawless Barbarians for settling confrontations with the use of swords and axes, they were a people with a high regard for honor. It was the expectation of the time that Viking men would defend their honor to the death, and any attempt to diminish a man’s honor had to be answered. The typical manner of answering this affront was with a duel or a reprisal attack, but a reprisal attack had the special permission of being allowable towards any adult male of equivalent status in the family of the offending party. As a result, Viking men had to be on their guard, and most had a weapon close at hand at all times. [56]
A Viking man usually would not have had more than a single weapon, as they were very expensive to make and iron was scarce. According to Medieval Scandinavia: An Encyclopedia, our knowledge of weapons is based heavily on archaeological excavation of Viking graves, bogs, and the occasional loose find. Roughly 4,000 grave cites have been cataloged, among which have been found more than 2,000 swords, 1,500 spearheads, and 2,300 axes. Interestingly, far more weapons have been found in Swedish and Norwegian burial cites than those in Denmark. Once Christianity was
introduced to the Norse people around 1,000 AD, there is a sharp falloff in weapons found in grave sites. During the Migration Period of 400 AD - 600 AD, graves were found to contain between one and four weapons, including swords, lances, and spears, with a single lance being the most common subterranean companion. From 600 AD - 1050 AD, graves contained between one and three weapons, with an axe being the most common. The amount and selection of weapons buried with a man depended on his wealth and status. A poor man would be buried with a simple axe and shield, while a wealthy man would be sent to the afterlife along with his shield, helmet, coat of mail, sword, axe, and spear. Very few individuals could afford this full array of implements. [49]

Those that could afford precious metals often decorated their weapons with intricate patterns of inlaid silver or gold.

Figure 4.2: A silver-inlaid axehead in the Mammen style, 900s AD [7]
4.1.2 Concept Art

Figure 4.3: Concept art for the barber’s weapons

For the purposes of my story, I decided to equip the barber with an array of axes, swords, and a knife. Though it was rare for someone to own all of these tools together, it was not impossible, and without them my story of a barber who throws axes would not be possible.

4.1.3 Modeling

To create the models for each of these weapons, I used the free 3D package Blender. I used Blender because it had a few specific tools for working with Bézier curves that I don’t know how to replicate with ZBrush or Maya.

For axes 1, 2, 3, and 5, I started by inserting a Bézier curve and aligning it to the most important edge of the model. I then duplicated this curve and repeated the process with every edge on the axe, to ensure that each curve would have the same number of subdivisions and that the
subdivisions would be roughly equally spaced. Once each edge had a corresponding Bézier curve, I converted to curves to vertices and edges. I merged the vertices that were at the intersections of curves, then filled the surfaces between those edges. Blender has a very useful tool called “fill grid,” which takes an even-numbered loop of edges as input, and fills it with a grid of faces that conform to the curvature of the outside edges. This is incredibly useful, as you can model the top and bottom edges of a curvy shape with Bézier curves, convert to polygons, grid fill, and be left with a model that has perfectly-spaced faces in the middle, preventing distortion. If I had box modeled these axes, I would have had to do a lot more manual work moving vertices to make them look smooth. Axe 4 was created using box modeling, as it was a much simpler shape that didn’t require the precision of curves.

Figure 4.4: Using Bézier curves to model an axe head

For the axe handles, I once again turned to Bézier curves. Another useful feature of Blender is the ability to quickly and non-destructively add thickness to a curve. To model the axe handles,
I added a Bézier vertex at each end, increased the radius of the “Bevel” option in Blender’s curve settings, then manipulated the size of the Bézier handles to change the radius of the curve along the length of the axe handle.

Figure 4.5: Using Bézier curves to model an axe handle
Finally, I UV unwrapped the weapon models in Blender so that I could export them as OBJ files and texture them in another program. I use Blender for UV unwrapping because it has a much more intuitive method of unwrapping than Maya 2016 does. In Maya 2016 (the latest version of Maya that is compatible with the DPA pipeline), the default workflow is to unwrap objects by slowly selecting faces that are roughly facing in the correct direction, unwrapping them with a planar projection, then unfolding the resulting UVs in the UV editor. Sometimes it is necessary to unwrap one object with multiple projections, then stitch the UV islands together afterwards. With Blender, you can simply choose which edges you would like to be seams, apply them, then unwrap the whole object. It is also repeatable, so any edge that is marked as a seam will remain a seam until you unset it. With Maya, if you unwrap faces that have already been unwrapped, any seams going through those faces will be reset. Blender does not suffer from this problem which hinders artists, so I prefer it. I took care to place the UV shells in ways that made sense for texturing later. For example,
I knew I wanted the sharpened edges of the blades to look as though they had been ground down with a metalsmith’s stone wheel. This results in a linear pattern in the metal, because all the blade has been ground down in a consistent direction.

![Figure 4.7: The sharpened edge of an axe demonstrates a linear pattern in the metal](image)

To take advantage of this, I separated the faces of the axes that represented the sharpened parts and put them in their own UV shells. Later on in the texturing phase, I could add a simple linear noise pattern in the metallic shader and have a realistic result.
4.1.4 Surfacing

To create the textures of the axes, I took the models into Substance Painter, a physically-based texturing program that allows for procedural materials and the ability to add effects like worn down edges and dirt accumulation to an entire object without resorting to painting masks by hand.

One of the elements of Viking weaponry that I really wanted to make sure carried through to the final renders was the use of ornamentation and patterns. As mentioned above, I was inspired by artwork from the Borre period, and I again used the template patterns made by Jonas Lau Markussen to decorate my weapon props. [38] To create these ornamental patterns, Vikings would inlay gold or silver into the axe heads, axe handles, sword blades, and sword hilts. In Substance Painter, I was able to recreate this effect by adding a gold material to the entire weapon. I added a black mask to the gold layer so that it did not appear anywhere, then painted white into the mask.
where I wanted to the gold to be visible. I used Markussen’s graphics as brush alphas, so I could paint them right onto the object. Finally, I added a height channel to the gold material and set it to -0.01, so that wherever the gold designs appeared, they would also be slightly inset into the wood or metal material.

4.1.5 Renders

![Figure 4.9: Final render of all weapons together in RenderMan](image)

4.2 Set Dressing

4.2.1 Inspiration & Research

One of the archaeological finds that helped historians gain an understanding of typical Viking tools is the Mästermyr Chest. Mästermyr is one of the largest fens in Gotland, an island in the Baltic Sea off the coast of Sweden, before it was drained in the early 20th century. In 1936, a farmer was plowing a field in Mästermyr when he unearthed a wooden chest of tools which had been preserved in the marshy soil. The chest had a surprisingly modern design, and contained the largest single collection of metalworking and carpentry tools that we have from Viking times. The lid was attached by means of iron hinges. A few other chests of similar construction have been found, some
Several examples of buckets created during the Viking Age have also been found in various parts of Scandinavia and the British Isles. Buckets were made of wood and held together with either wooden or metal bands, often copper, iron, or an alloy. Oftentimes the metal was engraved with designs featuring the twisted animals, spirals, and weaving ribbons examined in section 3.1.2 Viking Art Patterns. [24]
In addition to weapons such as axes and swords, every Viking man had a shield for protection in battle. Shields were large, round, and made of wood, with a handle in the middle. They were about 80-90 centimeters in diameter, depending on the size of the man who carried it. Shields were crafted of planks of wood that were butted together and fastened with three bars of iron or wood. The rim of the shield was likely reinforced with leather or rawhide to keep the wood from breaking when hit with an opponent’s weapon. In the center of the shield was a dome of iron that protected the wielder’s hand, called a boss. Some existing shields appear to have been painted, rather than
covered with another material. [57]

Figure 4.12: Trelleborg Viking Shield - National Museum of Denmark [15]

For seating, Viking longhouses had built-in seating in the form of raised platforms along the walls. Chairs in the Viking Age were rare, seemingly thought to belong to wealthy citizens. More commonly, three-legged stools were used in the home and in workshops. [65]
Finally, I decided I wanted a training dummy for Leif to throw axes at. As far as I can tell, there are no historical examples of training dummies in the shape of a person to practice throwing weapons at, but I wanted Leif to have a target, so I took some liberties with this prop. As no real-world counterpart has been found, I looked to video games and films for reference material. World of Warcraft has practice dummies that I was inspired by, and I used their basic idea of a dummy made of an upright post with planks of wood for arms, then added a pumpkin as a head. In actuality, pumpkins were a new world discovery and thus would not have been present in Scandinavia before the 1400s, but for the purposes of my story I decided to pretend as if they had been. I wanted a round target that could stand in as a head, and would make sense in the context of a training tool by exploding and spilling “flesh” if hit by an axe or sword.
Figure 4.14: A practice dummy from the game World of Warcraft [5]

Figure 4.15: Concept art for a throwing target that resembles a person
4.2.2 Modeling

I modeled these props in Blender, for the same reasons I modeled the weapons in Blender. There are several features built-in to Blender that make modeling props easier. One specific feature that Blender offers is its wide selection of object modifiers. Modifiers in Blender are applied to a mesh non-destructively. They allow the artist to model an object in a straightforward manner, then apply different effects on top that can be combined, adjusted, and removed at any time. A few modifiers that I find indispensable to my work are the mirror, array, displace, and lattice modifiers. I also use the subdivision surface modifier for all of my work, but it is not necessary when creating props that will later be brought into Maya, as Maya already has subdivision surfacing, but it works slightly differently.

To illustrate these modifiers, here is the process for modeling the Viking bucket.

Figure 4.16: Basic box modeling of wooden plank
Figure 4.17: Adding reinforcing edges to plank

Figure 4.18: Using the array modifier to instance the plank around a pivot point
Figure 4.19: Adding metal bands by spinning three sets of edges around the center point

Figure 4.20: Modeling one half of the handle and supporting metal bands
Figure 4.21: Using the mirror modifier to non-destructively create the other half of the handle

Figure 4.22: Using a lattice modifier and adding noise-based displacement to add visual interest
4.2.3 Surfacing

For these background prop elements, I challenged myself to use only procedural shaders in Renderman to add texture. No texture painting of any kind was done; the textures are 100% procedurally generated based on the geometry and the UV space. All texture was created using Maya’s 2D texture nodes, which I then processed using a combination of UV transformation nodes, color ramp nodes, and pxrBlend nodes.

To create the wood shader, I first looked at a bunch of different photos of real wood grain. I tried to create a basic wood grain noise by scaling Maya’s fractal noise to roughly match the proportions, but when the noise was scaled too far in one direction, certain striations became apparent. To combat this, I added a second noise node and used its output to offset the UVs in the U direction of the main noise. The secondary noise node had been scaled down in the U axis so that the variation in value mostly depended on the V axis. When I used this texture to displace the original noise, it shifted each row of pixels in the UV space together. It still had some degree of vertical lines visible, so I rotated the UV space that the main noise node used to generate textures. For a background element, it decently resembled wood grain.

Figure 4.23: A natural wood grain pattern [9]
After researching more of structure of wood and looking at examples of wood in the real world, I realized that my stretched and distorted fractal noise pattern might resemble wood grain in a passing glance, it wouldn’t hold up to any kind of serious scrutiny. There is variation in the
noise value and it follows a fairly linear pattern similar to that of wood that has been cut down the
length of the tree, but it doesn’t exhibit anything close to the rings commonly found in real wood,
or the variation in scale and value contrast of features in the wood.

My second attempt at generating realistic wood grain built on the first, specifically the idea
of plugging the output of one fractal noise node into the UV offset input of another. This time, I
decided to start with very low level noise, so that I could see the effects of each new input variable
precisely.

Figure 4.26: The primary noise used for wood grain

Next, I added a secondary noise node that would be used to displace the UVs of the primary
noise. Instead of making a noise texture that used only the V axis as input, as I did in my previous
wood shader, I decided to take advantage of both dimensions. This meant that rather than displacing
each row of pixels as a unit, I could displace pixels independently from those to the left and right.
Additionally, I kept the scale of the displacement noise quite large, and the contrast low, for reasons
that will be explained below.
I then plugged the output value of this secondary noise node into the “UV offset” input of the primary noise node. Keeping the contrast of the secondary noise low meant that the primary noise would not be so distorted that it became complete visual chaos. The primary noise’s UV coordinates were shifted horizontally according to the value of the secondary noise, so they tended to shift in general blobs. Large white regions of the secondary noise meant that the primary noise UV positions were shifted more than the dark regions. Small details in the secondary noise created banding patterns in the primary noise.
Finally, I scaled the result down in the V axis to create the linear pattern seen in real wood. Because the primary and the secondary noise nodes each had their own scale attributes, I added a few attributes to the initial place2dTexture node that allows the artist to control overall scale of the wood texture, the scale of the displacement texture, and the aspect ratio. Adjusting the fractal levels of the secondary noise allows for smoother or coarser grain movement. Adjusting the fractal levels in the primary noise allows for simpler or more detailed grain. Lastly, the artist can adjust the amplitude and ratio controls in the primary noise node to fine-tune the visual contrast of the noise.
Figure 4.29: After squashing the noise in the V axis

Figure 4.30: Adjusting fractal levels adds detail to wood grain noise
4.2.4 Renders

Figure 4.31: Renderman shader setup for procedural wood material

Figure 4.32: Mstermyr chest with procedural wood and iron materials
Figure 4.33: Viking bucket with procedural wood and copper materials

Figure 4.34: Viking shield with procedural wood, iron, and leather materials
Figure 4.35: Throwing target with procedural wood, rope, and pumpkin materials

Figure 4.36: Lund stool with procedural wood material
Figure 4.37: Detail render of Lund stool’s procedural wood material
Chapter 5

Environment

5.1 Inspiration & Research

When choosing a setting for my story, it was important to take into consideration the scope of the project and what would be attainable for a one-man crew. It also had to be visually interesting, spatially appropriate for staging the action that I wanted, and reflective of the characters and their history.

I had initially considered staging my story outdoors, having my barber throw weapons towards a target in the picturesque fog of a morning in the mountains, but I quickly realized the amount of work that would be needed to model a beautiful mountain landscape, trees, grass, and all the various bits of a Viking farm that would make sense in that scenario. I determined that it would be better to keep the story indoors, where I didn’t need to worry about landscapes and foliage, and I could have a lot of fun with the light and shadow from a single fire. I started by researching the kinds of houses and buildings that Norse people in Scandinavia built and spent much of their lives in. As I am setting this story in the time period of 850 AD 950 AD, it was important to base my design on buildings built during or before this era (as some buildings lasted into the beginnings of the Borre period, despite being built during the Broa or Oseburg periods.)

In Scandinavia, the typical Viking dwelling was a large, rectangular building known as a longhouse. A longhouse’s particular construction depended on the region and its available resources. Timber, stone, and turf were the most common construction materials. The walls of a timber building could be made of a variety of materials as well, including planks of wood, a lattice of twigs
and mud known as wattle and daub, or even a sloped mound of earth that made longhouses look like oddly-shaped hills with doors and chimneys. [32]

In the pre-Viking Age, longhouses were typically split in two separate parts, with animals occupying one section known as a byre, and humans occupying the other. By the time of the Viking Age, it became more common to have separate stable buildings for the animals, so that people didn’t have to deal with the smells and diseases that came with livestock. The buildings varied in size, from about five to seven meters wide and anywhere from 15 to 75 meters long, depending on the wealth and status of the owner. Early longhouses had roofs were supported by two rows of posts that split the building lengthwise into three corridors. Later in the Viking Age, the two rows of pillars fell out of fashion and roofs were instead supported by the side walls and crossbeams which spanned the entire width of the building. This created a far more open interior, much of which was occupied by a single great hall. In the center of the hall was a stone hearth with a continuously burning fire for light, warmth, and cooking food. Along the sides of the hall were slightly raised benches built into the walls that were used as both seating and a place to sleep, when appropriately outfitted with blankets and furs. Oftentimes, smaller rooms would be built by partitioning off parts of the great hall. [32]

5.2 Modeling

To model the longhouse, I again used Blender for the reasons I mentioned in the previous sections. The mirror and array modifiers allowed me to model a single pillar or rafter, then fill out the rest of the structure with instances of each that could still be edited non-destructively. For example, I could continue to tweak the thickness and exact placement of the support beams after I had added the mirror and array modifiers. By using these modifiers instead of manually mirroring and duplicating each piece, I could see what the total structure would look like while only having to adjust the vertices for one object. This technique is great for buildings for a few reasons. First, it reduces the amount of manual modeling that needs to be done. As a byproduct of that fact, it minimizes unnecessary overhead when making changes late in the modeling process, as there is no need to make hard commitments to certain decisions like the exact length or width of a building. Thirdly, it makes it possible to great a variety of buildings that come from the same basic design, so if you want to create a small village of longhouses, you can make several of them of varying size.
and proportion without having to start from scratch each time.

Figure 5.1: Modeling the initial elements of the longhouse structure in Blender

Figure 5.2: The longhouse wooden structure after adding mirror and array modifiers
5.3 Procedural Techniques

In addition to the mirror and array modifiers, Blender’s displacement modifier was also critical for my modeling process. Using mirroring and arrays to create a building creates by nature a very uniform and non-organic design. While this style of modeling is great for architectural renders and beauty shots of gleaming modern buildings, it doesn’t work very well when modeling buildings from the 9th century that were put together by hand with imperfect tools. There are slight variances in every step of construction that result in a rather uneven structure, but one with a lot of character.

To recreate this variation in the shape of the building, I first added a simple subdivision modifier to each object, which kept the shape of each wooden beam but added geometry to displace. I then added a displacement modifier to each object that takes a noise texture as input. I chose Blender’s Blender Original noise algorithm, which is a fractal noise generator. I created a few different noise textures at different scales, as some objects looked better with large scale displacement, like the pillars along the sides, while others looked better with small scale displacement, like the small pieces of wood, or the wicker panels that I added to the openings at each end of the roof.

Figure 5.3: The longhouse structure after adding subdivision and displacement modifiers
Figure 5.4: Wicker lattice before displacement

Figure 5.5: Wicker lattice after displacement
Chapter 6

Lighting

6.1 Cinematography Inspiration

When establishing the look of a film, one of the most important considerations is lighting. When used with intention, lighting can be incredibly effective at establishing location, time of day, mood, weather, and even character. Good cinematography does a little bit of all of this, while not drawing attention to itself by looking unnatural with regards to the available light sources in the scene.

One cinematographers who served as a source of inspiration for me during this process was Roger Deakins, CBE. Roger Deakins is one of the most influential people working in the film industry today, due to his eye for simplistic but striking imagery and the way he plays with light in the films he works on. Rather than creating theatrical lighting designs that wow audiences or make every shot look like a magazine cover, Deakins prefers to work with shadows. His films make phenomenal use of natural light sources, often evoking comparisons to the works of chiaroscuro and tenebrism explored in the beginning of this paper. In an interview with NPR, Deakins revealed:

“A lot of people say [The Shawshank Redemption] is nicely photographed, and I think it is,” he says. “And I think it’s the simplicity that makes it well photographed. It’s not like these are necessarily fantastic images; it’s really about the content. It’s not about making great images.”

“I like simplicity,” Deakins reiterates. When he’s lighting a scene, especially, “I like using
natural sources. I like images to look natural as though somebody sitting in a room by a lamp is being lit by that lamp.”

Figure 6.1: Natural ambient lighting in *Skyfall* [8]

This screen capture from the 2012 James Bond film *Skyfall* serves as a wonderful example of the way Deakins uses natural lighting to enhance the setting. In this scene, Agent Bond is attempting to track down the employer of Patrice, a now-deceased mercenary who attempted to assassinate him. There, he meets Sévérine, one of Patrice’s accomplices and fellow employee of the film’s villain, Raoul Silva. Bond correctly asserts that the bodyguards in the casino are not just for Sévérine’s protection, but that she is being controlled by Silva against her will. Bond asks to meet her employer, to which she agrees, but only if he promises to kill Silva.

The way the lights cast both Bond’s and Sévérine’s faces into near-equal proportions of light and shadow mirrors the thematic balance of good and evil, as Sévérine is working with the enemy, but she is not quite an enemy herself. The use of low-angled lighting coming from the bar top and from lights that are below eye-level casts both characters in an unusual light, shrouding intentions in mystery and making it difficult to make an accurate judgement of character. There are layers of deception and doubt at play that are reflected in the lighting choices.

On a purely aesthetic note, one of Roger Deakins’s stylistic tendencies that I appreciate is the relative lack of rim lighting. Rim light is used to accentuate the outline of people and objects onscreen, and when it is done with subtlety, it can be a very pleasing effect. Unfortunately, rim lighting in films and television is often far too strong for the scene, causing unnecessary distraction. This is especially true when the light is completely unmotivated by the sources of light that are in
the set and environment. *Game of Thrones*, for example, has a lot of wonderful cinematography and is frequently praised for bringing the quality of big-budget films to the small screen. I find, however, that it still traces its lighting roots back to those of typical television, with smaller budgets and quicker turnaround time necessitating lighting that gets the job done efficiently, even if it is not quite as appealing. Take this shot from Season 2 as an example:

![Unmotivated rim light in Game of Thrones](image)

In this shot the characters are in a room that does not have any light sources other than candles and fire, but there is an intense cool light that outlines every single character. The only way those specular highlights would be possible is if there are lights hanging just above the edge of the frame (which is the real world explanation), but that doesn’t make any sense in the world of the characters. This is a deliberate choice by the show creators, as it makes certain all faces are readable at all times, but I prefer the shadows and cinematic quality of Deakin’s work.
Roger Deakins has served as “visual consultant” on all of the *How to Train Your Dragon* films, as well as several other DreamWorks Animation films since 2010, and his fingerprints are clearly evident in the lighting design of each. [34] This image from *How to Train Your Dragon* shows Hiccup doodling and working on designs for elaborate contraptions by candlelight. The sides of his face and arms that face the candle are illuminated in a soft glow, but the rest of him falls realistically into deep, inky shadow. Little to no rim light is found in this scene, and that aesthetic continues for the rest of the film.

Finally, this still from 2017’s *Blade Runner 2049* demonstrates Deakins’ penchant for silhouettes and light that is congruent with its environment. In this scene, there is a pool of calmly rippling water onto which a shaft of light from a skylight falls. The light bounces off the water and
onto the walls in a beautiful caustic pattern, providing the only light in the scene. As a result, this character (a replicant designed as an exact duplicate of a character from the original *Blade Runner*), is cast into deep shadow, without any unmotivated light to illuminate her. Narratively, the nature of this character is unknown until she literally reveals herself by walking into the light.

6.2 Tonal Studies

Before lighting the shots, I drew a series of tonal studies from several of the storyboards that represented a range of camera angles and positions that would be required for the final film. I added light and shadow to create interesting compositions that most importantly directed the eye towards the most important part of the shot. Using Roger Deakins’ style as my guide, I did my best to create realistic lighting scenarios based on the firelight that is present in the longhouse.

![Figure 6.5: Tonal study for shot 2](image)
Figure 6.6: Tonal study for shot 4

Figure 6.7: Tonal study for shot 8
6.3 Renders

Figure 6.8: Shot 2 lit and color corrected

Figure 6.9: Shot 4 lit and color corrected
Figure 6.10: Shot 8 lit and color corrected
Chapter 7

Conclusion

Throughout the course of this project I have learned a lot about Viking culture and what it takes to develop the look of a short film. A good film requires a captivating story, interesting characters, and a design language that supports both. The work that goes into every step of a film’s production is immense, and I now have a greater appreciation for the research that is required. A filmmaker cannot hope to tell a story that involves a specific culture without having a deep understanding of their people, their values, and their customs. In studying the Viking culture, I learned about how they lived, how they kept their families, how they settled conflicts, how they dressed, how they arranged their villages, how they made a living, and so much more. When I set out to tell a story about a Viking barber who throws axes to give haircuts, I didn’t have nearly that much knowledge, but it helped me to ground my story as much as possible. Even stories with cartoonish action and character designs can be set on a realistic foundation, and I believe I accomplished this here.

By having control of every step of the creative process, I was able to achieve my vision for the concept and look of a short film. From creating an original story, to character designs, to modeling the characters and environment, to texturing, to rigging, to lighting and rendering, being the sole artist working on this project had many challenges that required ingenuity, research, and sometimes just long hours to solve.
7.1 Future Work

For future work, I hope to complete the character rigs to the degree that I can animate my story. I also will be researching the ways that I can achieve some degree of soft body simulation for the Björn’s hair, as at the moment it does not react to movement, and I need it to move both as his body moves and as it is being cut and falling to the during the final shot of the story.
Appendices
Appendix A  Storyboards
Appendix B  Color Script

Figure 1: Scene 1 Shot 1

Figure 2: Scene 1 Shot 2
Figure 5: Scene 1 Shot 5

Figure 6: Scene 1 Shot 6
Appendix C  Character Renders
Appendix D  Weapons Renders
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