IQP-48-JLS-0057

The Virtual Armory

An Interactive Qualifying Project

Submitted to the Faculty

of

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for graduation

by

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Keywords: arms and armor, interactive media, museums

Abstract

This project pioneered the interpretation of the Worcester Art Museum's recently acquired collection of arms and armor through digital media. The team developed an infrastructure for delivering digital content through the internet, while researching individual objects and analyzing audience data from feedback iPads in the museum galleries. Based on their findings, the team developed an educational, turn-based sword fighting game for deployment on tablets as part of the exhibition of a sixteenth-century training sword and a combat treatise from 1600.

Contents

Introduction

Back in December of 2013, the Higgins Armory Museum officially closed its doors after 83 years of operation. The Higgins Armory collection is the second largest collection of arms and armor in the Western hemisphere, containing about 2,000 objects. Although the majority of these are from medieval Europe, it also includes items from around the world, some of them more than 3,000 years old ("Virtual Tour"). It began as the personal collection of John Woodman Higgins, a wealthy industrialist who owned a pressed steel factory in Worcester. In 1931 he completed a special building to display his collection to the public, which served as both a museum and a promotion for his factory. After his death in 1961 and the collapse of his company in the 1970's, the museum became a public non-profit, after which the museum's focus was shifted more heavily onto Higgins' impressive collection of medieval armor (Kirby, Smith and Wilkins). In 2014 the collection passed to the Worcester Art museum, where about 100 objects are currently on display.

The Worcester Art Museum (WAM) was founded in 1896 by Stephen Salisbury III and 50 reputable citizens of Worcester, and is the second largest art museum in New England (The New York Times, 1902, p. 3). With the additions of the Higgins armory collection, it now possesses a 38,000-piece collection, representing cultures from all over the world. The WAM features a collection of masterpieces by Monet, Gauguin, and John Singer Sargent, and is also the first museum in the United States to purchase works by Claude Monet and Paul Gauguin (Richard, 2013, p. 11). Furthermore, the chapter house in the museum was also the first medieval building ever transported from Europe to America. According to statistics in 2012, the WAM had an endowment of $90 million, with a $9 million annual budget, and about 46,000 visitors per year (Edgers, 2012, p. 5). It offers many education programs, such as the "Art All-State" program first

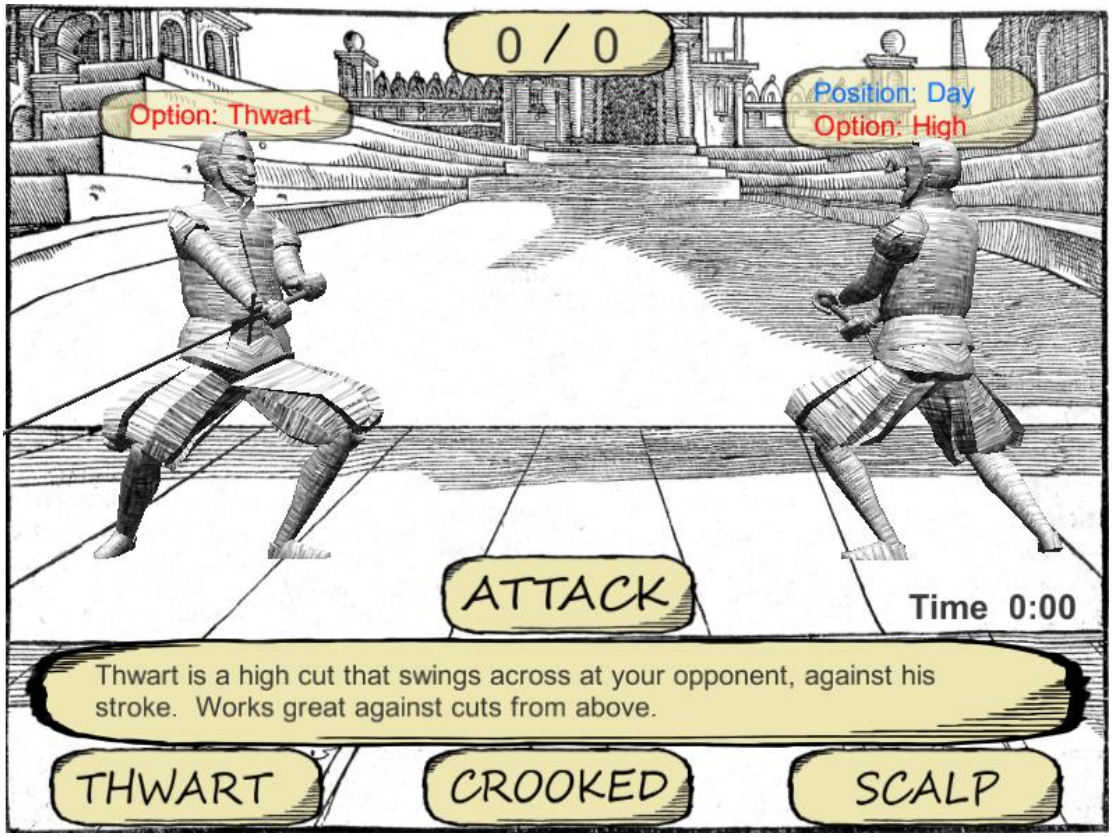
ever founded for high school artists, to provide opportunities for engaging the students' creativity and exploration of the world of art (Worcester Art Museum, 2013, p. 5). Over the next 5 years, the museum plans to create a permanent exhibit where the entire Higgins collection will be accessible to the public through open storage. It also plans to interpret the museum's collection for a broad public, maintain a growing art library and educational program, and encourages an improved base of committed constituents to the museum. To achieve these goals, the Higgins Virtual Armory website and the contained interactive media content plays an important role.

The Higgins Virtual Armory website serves as the front face of the collection's presence in the digital world. Developed by WPI students over a period of nearly 15 years, it now features a wide variety of interactive materials, to engage the public as well as to teach about arms and armor. The collection database precisely stored the information of every piece in the Higgins collection, with picture and video displays of the pieces. There are videos acted and produced by students, who dressed in medieval arms and armor to replay historical scenes, as well as video games to teach the visitors about how knights were dressed in their armor, or jousting worked. To reflect the museum's location and ownership changes, the team did a thorough update of the website, by removing old links and references to the now-closed Higgins Armory, as well as adding links to the Worcester Art Museum, where the collection is now stored.

The primary goal of this project was to promote public awareness of Higgins Collection's new location and ownership, and share knowledge of the arms and armors with both the visitors and online audiences through interactive media. To achieve this goal, the team first conducted extensive research on objects that are currently on display within the *Knights* exhibit. Each of the four team members picked four objects and studied their make, purpose, and history background through books and materials found on the internet. As a result, a total of 16 research papers were written. The team also analyzed data from a feedback iPad in the *Knights* exhibit to evaluate visitor responses to the objects and their display.

In addition to the objects, the *Knights* exhibit also uses various approaches to enhance the visitors' learning experience. Among these, the smart tablets used to show the visitors the vivid history

behind the collections using different interactive media formats such as games, videos, or picture illustrations, are well received by visitors. To enhance this learning experience, a new virtual interactive content was developed in the form of an interactive, turn based combat game, based off the book "The Art of Combat" by Joachim Meyer, as shown in the figure below.



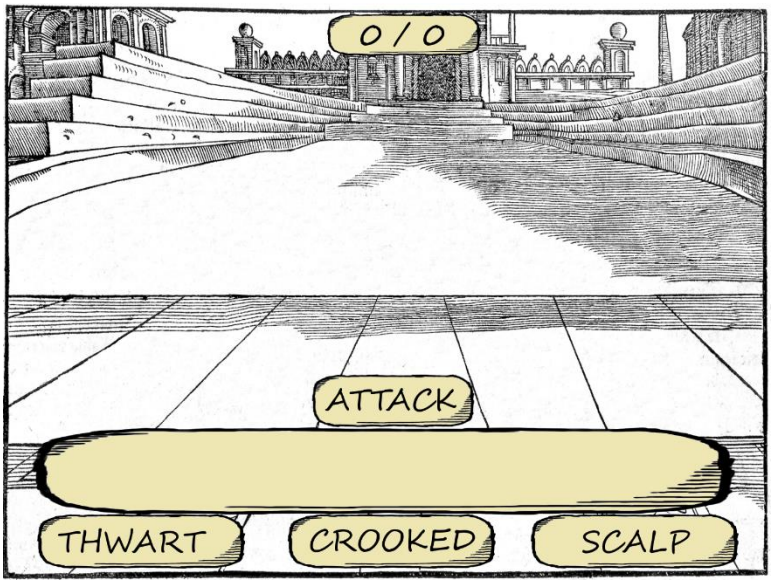
The game simulates a medieval sword fighting scenario using an art style based off the old wood cuts presented in the book. By asking the user to select different sword fight moves and watch the results in 3D animations, the game successfully teaches the public about medieval arms and armor, and draws their interest to visit the exhibit and see the pieces in real life.

Game Documentary

Game Sequence Design

Upon launching the application, the user is presented with a title screen. From the title screen the user is presented with three options: play the game, view the credits, and quit the application. When the user selects “Play The Game” the user is moved to the game screen, where an instructional window will pop up to present the user with instructions on how to play.

The opponent's stance and attack move will be randomly selected and presented to the player. The player is then given the option of three different attacks to choose from. When the player clicks on one the options a brief description of the selected attack will be displayed. When the player then presses the attack button once they have chosen which attack they would like to use. An animation of the player's and the opponent's move then plays out and the score is adjusted accordingly to whoever scored a point that round. The game continues onto the next round until either the player or the opponent reaches three points.



Once the score limit is reached the player is presented with an end screen, either a congratulatory screen or a try again screen. From the end screen the player has the option to either view the credits or return to the main menu.

If the user choses to view the credit screen, the user is presented with some details on the project, and the creators of the game. At the bottom of the credits screen is an option to return to the main menu.

Game Development Process

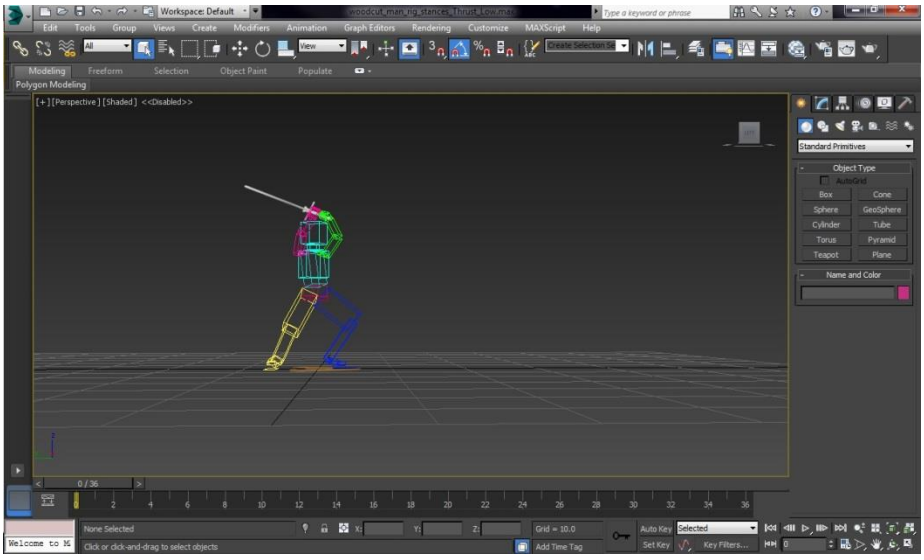
Animation Part:

Author: Joshua O'Connor

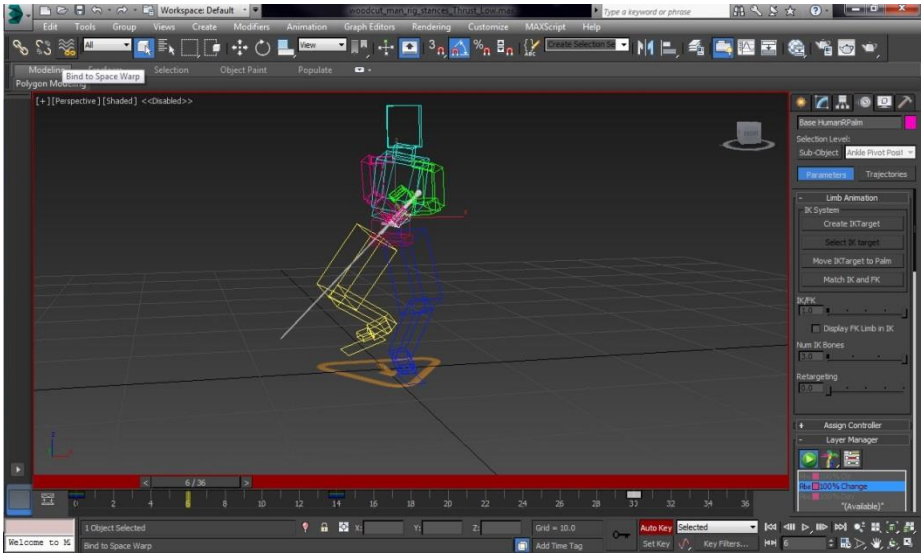
The animation is one of the most important aspects of the game. It will be what the players see and is responsible for teaching them what the techniques we chose to represent looked like.

Autodesk's 3Ds max application is an industry standard for animation. It comes with a basic pre-made human rig that served our purposes well. Mapping the character model to the rig is one of the most difficult parts of the process, as every point of the character model has to be assigned a value that corresponds to the influence of each bone of the rig has on it. Tweaking these values is time consuming but results in a character model that moves without any unnatural looking bends or stretching.

While the character model is being applied to the rig; the rig can still be worked on separately to produce the animations. Seen below are examples of what this process looks like, with the bare rig and sword model being posed to produce the animations.



The rig at the start of the "scalp" animation. Bones are color-coded for easy identification. The sword is a model that is parented to the right(pink) hand, allowing it to be controlled as if it were being gripped.



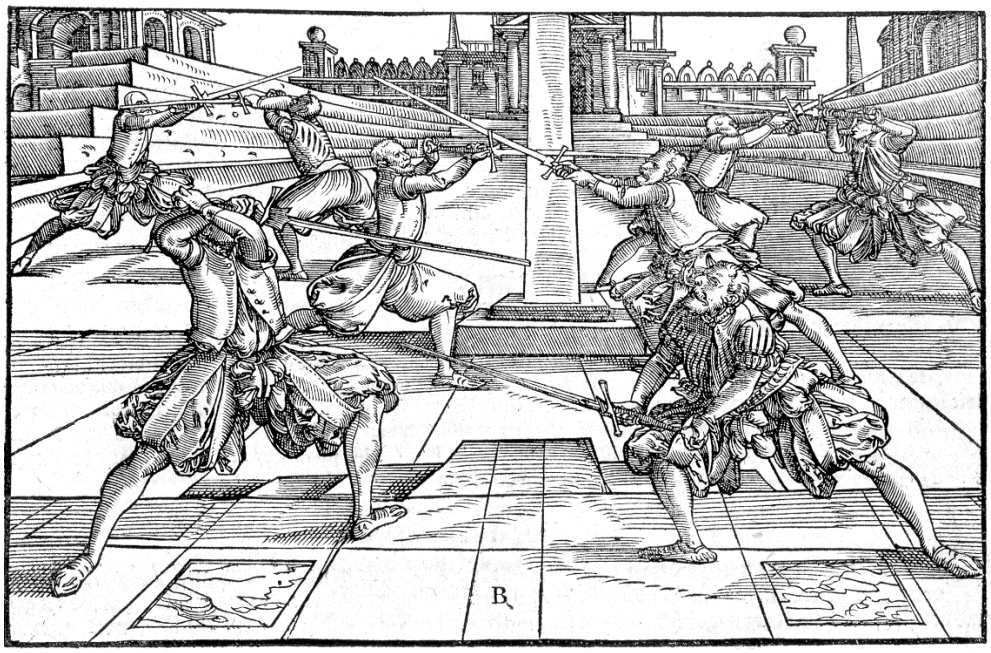
The rig midway through the “low” cut animation. The red border indicates that the program is in auto key mode, where it records each movement of the rig as a key frame.

Once the animations are created, they are saved as a .xml file, which is then loaded into the file where the character model has been attached to the rig. As long as the rig in both files remains unchanged (no bones are added, removed, or renamed) the animations are transferred over without any issue, and the character is brought to life. From here it will be imported into Unity to be integrated into the game.

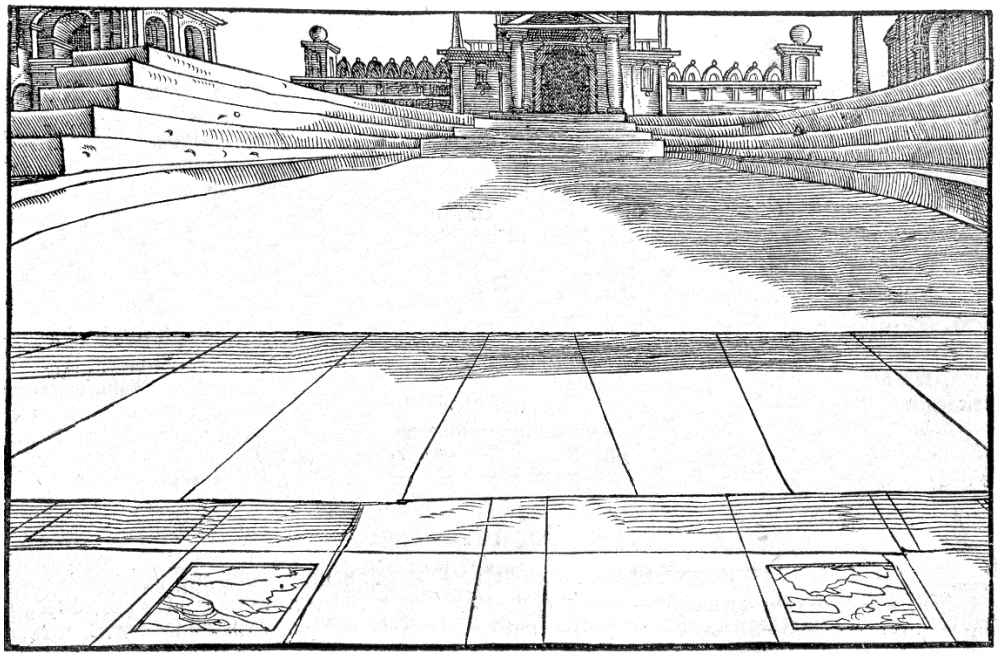
Art Design:

Author: Christopher Ellen

The art style chosen was that to represent the woodcut style from the centuries old woodcuts displayed in The Art of Combat. To do so, the team had to develop unique shaders and textures to accurately display the woodcut designs as in the original images. To produce the different screens that are presented in the game sequence design section, some of the original woodcuts were taken and manipulated using the open-source image editing program GIMP (GNU Image Manipulation Program).



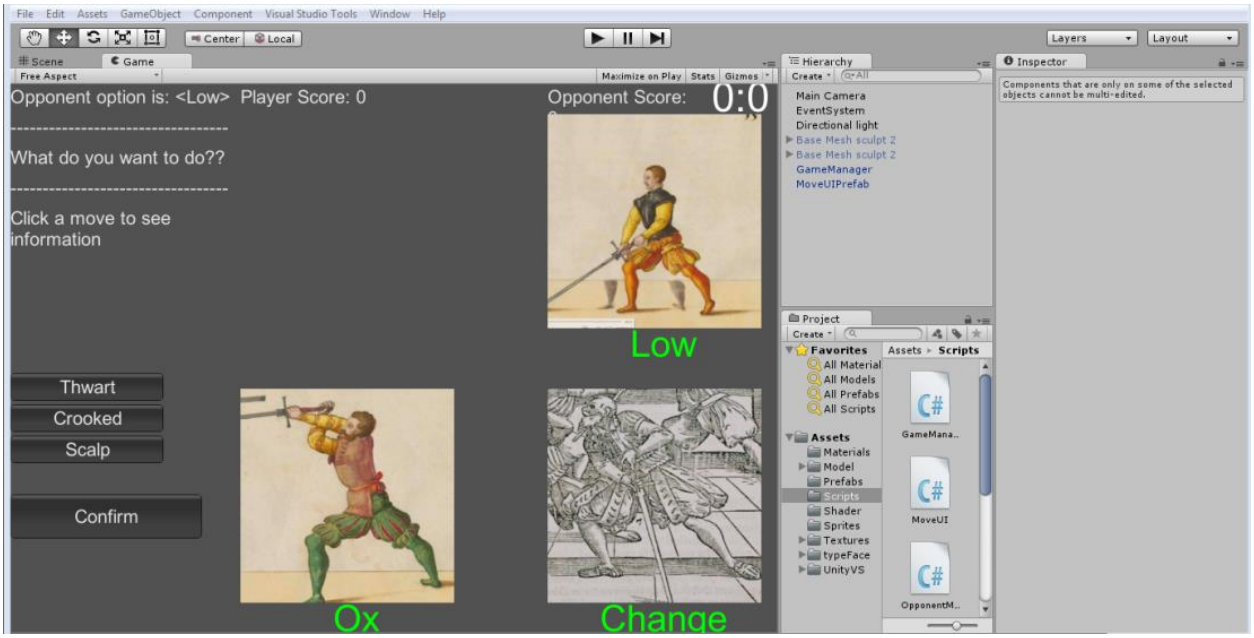
Each of the figures in the original woodcut were carefully removed along with their weapon and any objects that would clutter that filled the image.

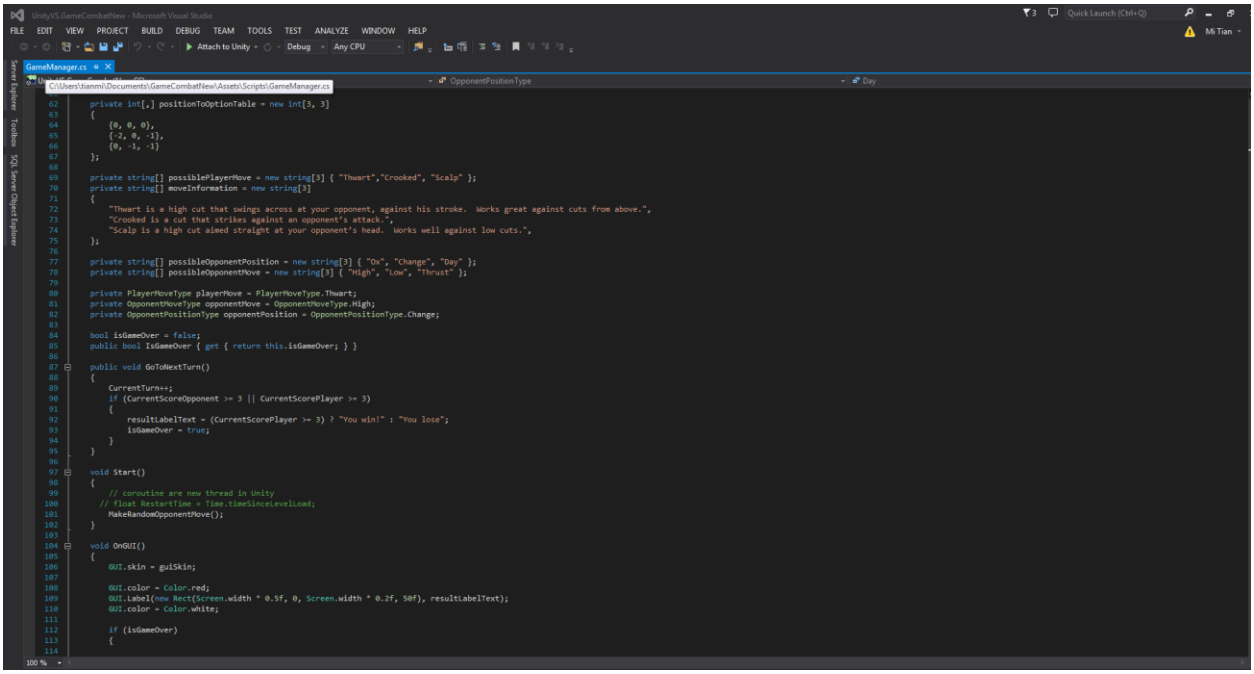


Then all of the empty spaces that were left behind were retouched and filled in to give the appearance of an original woodcut.

Game Development:
Author: Mi Tian

Game





The game was developed using the Unity game engine with Microsoft Visual Studio 2013, as the pictures shown above. A GameManager class was written in C# script to implement the main game logic. It handles all the button events, score update, timer update, and game state UI such as the picture illustration or the 3D model and animation.

The game starts by having the opponent selecting a position randomly. Once the opponent's position is selected, his/her option will be selected based on the probability table shown below. The smaller the number is the smaller chance it may be selected.

Opponent Options / **Opponent Positions**	High	Low	Thrust
Ox	0	0	0
Change	-2	0	-1
Day	0	-1	-1

Once the opponent picks an UI, the screen would update the UIs to indicate the opponent's move, and ask the user to select an option to counteract the opponent. The player's selection will decide the score update based on the table below. For example, if the opponent used "low" and the player selected "thwart", the player will lose the game immediately. Otherwise, the game will update the score, and have the opponent pick a position, followed by a option using the table above, again. Whenever the player or opponent reaches three or more points, the game is over.

Opponent Options / **Player Options**	High	Low	Thrust
Thwart	1	lose	-1
Crooked	0	0	0
Scalp	0	1	0

Modeling: Autodesk Maya and Blender

The character model was created in Autodesk Maya. It was built from scratch using box modeling techniques, starting from a rectangular prism and gradually adding geometry to build the shapes. The model was optimized to be simple with a low poly count to ensure that it would run easily on the iPad. The UV map for the model, which tells the program how to place textures, was created and optimized for the woodcut-style shader effect. The final version was exported to 3DS Max as an .obj file to be rigged and animated.

The sword model was created in a different program called Blender. Unlike Autodesk's software, Blender is free to use by anybody. Using the dimensions measured from a real-world sword used in the book, a model was accurately created. In Blender the sword model was given a basic color scheme to match photographs taken of the actual sword to make sure it looked correct. After it was complete it was converted to a standard .obj file and imported into 3Ds Max to be paired with the character model.

Individual Research Document

Swords

Samurai Spirit – the Legend of the Katana
Author: Tian, Mi

Details

Accession Number
2014.40
Origin
Japan, late 1700s-early 1800s
Artist
Suishinshi school
Materials
Steel; iron; copper; ray skin; wood; silk; gilding
Measure
42" L
Weight
3 lb. 8 oz.

With the official disbanding of the samurai class in the Meiji period (1868 – 1912), the symbolic Japanese sword, the katana, gradually faded out of the historical stage of Japan. Despite its short revival in the form of the Gunto in the time of World War II (Sprague 2013), katanas, and their master samurais, have never regained their original social status as in the golden age of

the Kamakura (1192 to 1336) and Muromachi (1337 to 1573) periods. The collection of katanas has been popular in the 1700s, however, it has never been as popular outside of Japan, as now it is in western popular culture (Kapp 2013). Soldiers, merchants, and collectors pay tens of thousands of dollars to purchase an authentic original katana, or even a well-made modern one, to hang on the wall of their offices and homes. Needless to say, the katana is not a decoration, but an efficient killing weapon. However, it is more of its cultural, historical, and most importantly, spiritual implications that the collectors are chasing for.

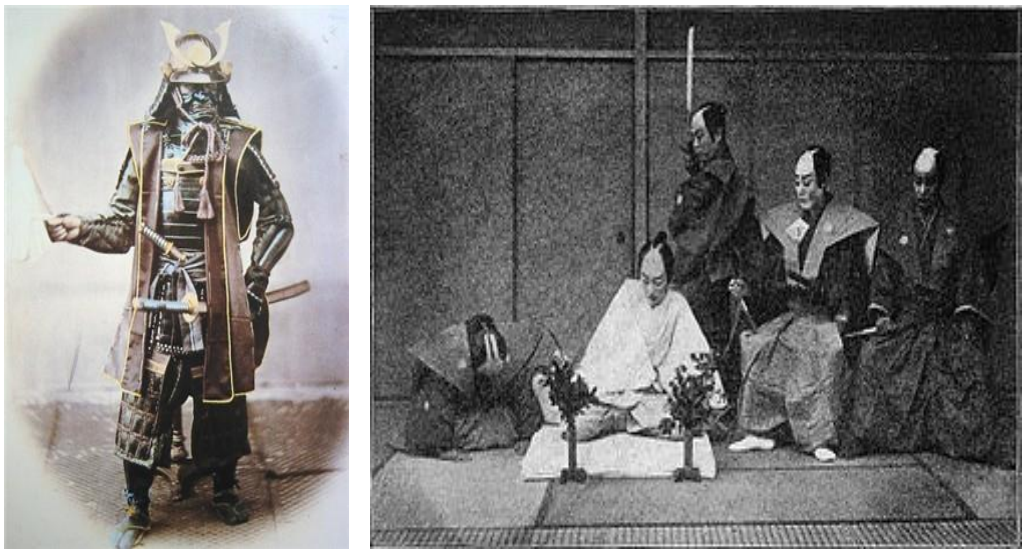


Figure 2. (a) A samurai warrior wears a katana and a wakizashi (courtesy of sword-buyers-guide.com). (b) A samurai performing seppuku. (courtesy of R. B. Peery, in *"The Gist of Japan – The Islands, Their People, And Missions"*)

Most notably, the katana sword is the iconic weapon of a samurai (Sinclaire 2004), although, in fact, a samurai also wore a wakizashi, a 20 inch blade with a 4 inch handle, on their body (Figure 2a). In practical combat, the katana was used as the primary weapon, while the wakizashi was used in close quarter combat situations. For the katana's modern pursuers, what is more meaningful is this equipment combination's strong connection to the samurai's Bushido spirit, which translates

to “the warrior’s way of life”. Bushido consists of a rigid code of ethics that was to be followed devoutly with bravery, honor, and loyalty. A samurai was expected to follow this philosophy without hesitation, and to have no fear of death to defend it (Sinclaire 2004). A disgraced or defeated samurai was granted the highest honor by his daimyo (feudal lord) or enemy to conduct seppuku – a ceremonial, ritual suicide (Figure 2b). In this process, the wakizashi is used by the samurai to perform abdomen-cutting, followed by decapitation by his assistant, using his own katana. Although a violent and disturbing scene, the seppuku procedure is also highly respected by the western audience of samurai culture as the supreme symbol of the samurai’s spirit.

In addition to the faithful dedication of Bushido, the katana sword also represents a samurai’s bravery in battle, and pursued it of perfection in combat skills (Turnbull 2010). In the legend of Amukuni, the father of the samurai sword, the katana sword was originally made to replace old swords, which got broken or badly damaged in the heat of battle. The single edged, slightly curved blade was said to be inspired by the Shinto deity coming into the swordsmith’s dream. After it was produced to replace the old swords, not a single katana was broken in the next battle.

The elite samurai warrior trained for many years in combat skills, including ground fighting, fighting unarmed, fighting with arms, and fighting from horseback. Through years of mastery, the samurai warriors formed strong an emotional connection to their katana, and often named them in a dedication of devotion. It was believed that a warrior’s spirit was contained within his katana, even after his death.

The Katana is also believed inherit the spirit of the swordsmith, as depicted in Japanese sword folklore. The two most famous swordsmiths were the legendary Masamune and Muramasa (Ratti 2009). Masamune’s swords were regarded as some of the most beautifully crafted katana ever

made, whose surviving swords are all priceless national treasures. Masamune's swords are considered the mark of an internally peaceful and calm warrior. In contrast, Muramasa swords are described as bloodthirsty or evil (Figure 2). In one legend, Muramasa is depicted as the student of Masamune, who challenged his master to make a better sword. After working tirelessly, they eventually tested their results, by putting the katana in a small creek with the cutting edge facing the current. The "10,000 Cold Nights" sword of Muramasa cut everything passing its way, and his master Masamune was impressed by his pupil's work. However, when he lowered the "Tender Hands" sword he made into the current, nothing was cut, and the fish just swam up to it peacefully. The contest ended with Masamune drying and sheathing his sword, and his students, Muramasa mocking him for its inability to cut anything. However, a monk had been watching the whole ordeal, and walked over to explain what he saw:

> "The first of the swords was by all accounts a fine sword, however it is a blood thirsty, evil blade, as it does not discriminate as to who or what it will cut. It may just as well be cutting down butterflies as severing heads. The second was by far the finer of the two, as it does not needlessly cut that which is innocent and undeserving." (*From "Nihon Toko Jiten" by Yoshio Fujishiro and Matsuo Fujishiro*)

Figure 3. Muramasa's sword from the Tokyo National Museum (*courtesy of* Tokyo National Museum, 2012)

Another version of the story blames the bloodthirsty Muramasa's sword for taking the lives of many friends and relatives of the Tokugawa shogun in 1603, who later forbade his samurai to wield katanas made by Muramasa. From the historical point of view, the authenticity of these legends are questionable. Because Muramasa was active around 1500 AD as supported by his first dated work in 1501, he would have lived too late to have met Masamune, who lived 1264 – 1343 AD. However, such legends have given the katana more meanings and background stories, adding a feel of mystery to empower katana and the samurai spirit in modern popular culture.

The widely adopted knowledge of katana and samurai culture in today's world, especially in the western world, can be partly due to World War II, in which the ancient katana reappeared in its modified form of gunto. Japanese officers were required to wear a sword in battle. When Japan lost the war, Japanese soldiers surrendered their guntos, many of which then acquired by Americans, and brought back into the US market. Nowadays, the identification, collection, and trading of World War II guntos is an active market both on the internet and in real life.

In the modern world, the katana is still being actively used in swordplay. Kendo derived from swordmanship, but has the opponents use bamboo swords to simulate katana combat. Iaido is the art of drawing and deploying a Japanese sword, which has been developed more into a form of meditation than a practical martial art (Craig 1991). The opponent is often imaginary but real katana (unsharpened) are used. Battodo is the martial art that practices cutting objects with a katana, which is performed at a standing position and does not involve the sword drawing process of Iaido. Like modern katana swordsmiths, the swordplay performer uses their own way to inherit the legendary katana culture, and pay tribute to the traditional samurai spirit.

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Celtic Sword
Author: O'Connor, Joshua C

Probably European

Sword

About 600–500 B.C.E.

Bronze

66 × 4.8 × 8 cm (26 × 1 7/8 × 3 1/8 in.), 2 lb 8 oz (weight)

The John Woodman Higgins Collection

2014.6

Currently on view

Classification: Arms and Armor

Department: Higgins

On display in a corner of the swords section of the Knights! Exhibit is a European sword made of bronze, its blade tinted green from age. The exact origins of the sword are unknown, although it is likely of Celtic origin. The sword dates back to the sixth or seventh century B.C.E., which is around the same time as the hoplite warriors in Greece and the dawn of Roman civilization. Curiously, this time period is the beginning of the Iron Age, and most resources on the time do not even mention the use of bronze by the Celts.

The Celtic people of northern Europe were known to be using iron swords nearly a century before the time of the bronze example hanging in the Worcester Art Museum. The early iron swords from the Hallstatt period (named after an Iron Age cemetery in Austria) show long iron swords based off of Bronze Age themes. Swords from the correct time period of the bronze sword from Celtic settlements in modern-day Switzerland were also made of iron or steel. These swords match the

basic style of the bronze sword, however, having a curvilinear design and double-edged. Bronze is evidently used in this time period by the Celts, but it is used to decorate the scabbards of the iron swords with birds, dragons, and other Celtic designs. It would be the iron swords that the Celts carried into battle against the Romans in the fourth century BC, just over a century after the bronze sword was made. (Coe, 18-19)

If, then, the Celts had been using iron for centuries before and after this bronze sword was made, why was it made at all? There is an account that calls the quality of the Celt's ironworking into question. A passage by the Greek historian Polybius of the victory of the Consul C. Flaminius in 223 tells of Celts whose swords would bend on the first stroke and had to be straightened by the warrior with their feet against the ground; a journal with the account asks why the Celts would go into battle with such useless swords when bronze swords would have been much more reliable and effective. This also appears to be an isolated report and even the journal article expresses doubt to the claim that the Celt's iron swords were so inferior—citing a tradition of breaking swords that are to be buried with slain warriors giving rise to a misconception when found years later(Lang, 3-4). Other accounts point to superb ironworking skills and warriors who would brutally slash through Roman formations. (Coe, 19)

Only a brief reference in a book on European metallurgy seems to clear up the discrepancy in the bronze sword's composition. "From Central Europe Celtic-speaking and iron-using groups travelled westwards into Germany, thence into Gaul and Italy, one group sacking Rome in 390 BCE." (Williams, 60). This passage is significant because the Celts were a tribal culture, and so different tribes would have varying grasps on the art of sword making. It is likely that the bronze sword came from one of these lesser-developed or slower-to-develop tribes. Since the exact origin

of the bronze sword is unknown, it is impossible to narrow down the possible peoples who could have made it.

Or perhaps the sword was made as a template for iron swords. “Iron working was introduced to Europe by Celtic-speaking peoples, and the first iron long (>70 cm) swords were copies of Bronze originals)” (Williams, 49). Bronze swords are relatively easy to make, requiring only a mold and a fire capable of melting bronze (around 950°C) so that it can be poured in and allowed to cool, where it is then sharpened via grinding. Iron swords, however, could not be cast and required forging to get the hardness of the blade correct. Through metallurgical analysis it is clear that Celtic smiths did not practice the quenching process needed to harden iron and steel swords correctly. Instead they employed a technique of piling small amounts of steel onto an iron sword being forged, thereby providing moderate hardness to a blade that did not have to be heat-treated and quenched. (Williams, 50) The bronze sword could have served as a template for one of these iron/steel blade hybrids.

It is important to note that the bronze sword is of the type of sword that inspired the famous roman swords that conquered Europe only a few centuries later. This type, known as Mainze-type, is roughly 20-24 inches long (the bronze sword is 26) and 2-2 ½ inches wide (the bronze sword is listed as 3 1/8, but that includes the pommel at the bottom of the handle). The Mainze-type’s blade is also described as widening slightly before tapering to the tip about ¾ down the length of the blade (Coe, 25). These features clearly appear on this sword and it is reasonable to assume that the

The Roman gladius, a similar Mainze-type sword likely derived from Celtic swords.

later Roman gladius, another Mainze-type, is derived from swords very similar to this one. The gladius is known to be derived from the Spanish short-sword, which itself comes from a Celtic region of Europe. The gladius' larger cousin, the Spatha, is also almost certainly of Celtic origin. (Coe, 28).

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http://upload.wikimedia.org/wikipedia/commons/7/71/Uncrossed_gladius.jpg (Gladius photo)

Swordplay

Author: Ellen, Christopher Michael

WAM 2014.52

Details

Accession Number
2005.02

Origin
Munich (southern Germany), about 1600

Artist
Wolfgang Ständler

Materials
Steel; iron with blueing; wood

Measure
O.L 40 1/8"; blade L. 33 1/2"

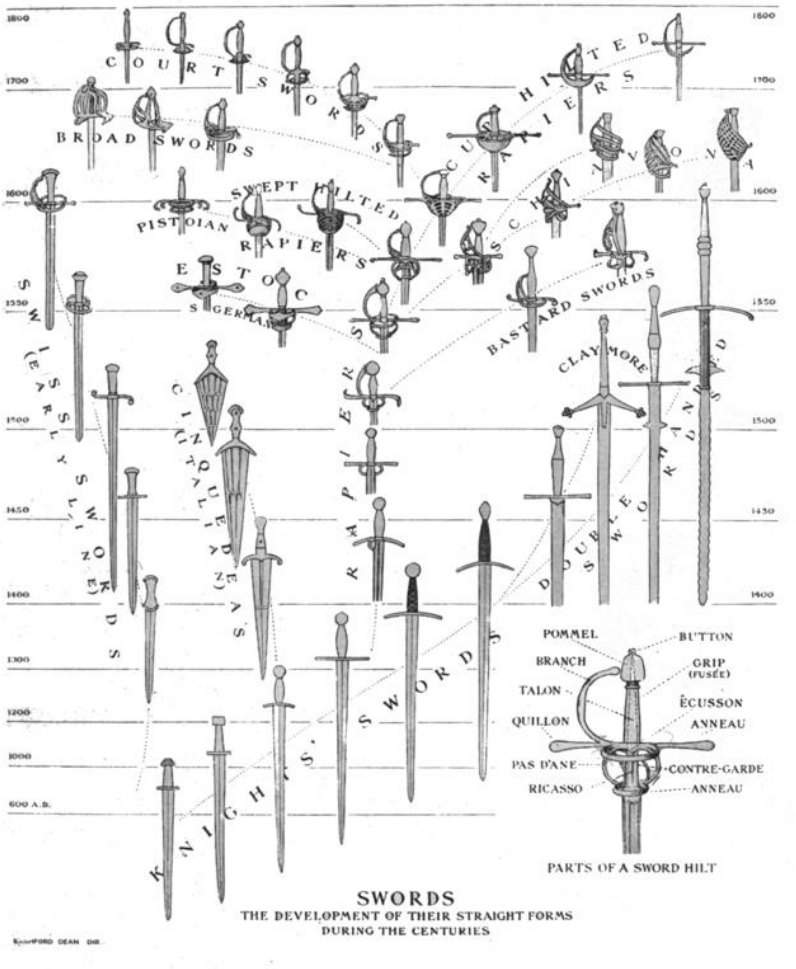
Weight
3 lb. 3 oz.

The swept-hilt sword, as shown above, was made for the guards of Munich Germany around 1600. This piece is currently on display at the Worcester Art Museum, and is a piece of the Higgins Armory collection of arms and armor. This particular sword is a crossbreed style between a rapier and a traditional military broadsword. The swept hilt and a sharply tapered point are typical characteristics of a rapier, and the wide blade at the hilt is similar to a military broadsword.

Man has been ravaged by war since the very beginning. Through conflict we have developed and evolved many new military technologies. It was the blade weapons that stood out on the battlefield and became one of the more dominant weapons for centuries. One of the best well known pieces of military technology during the Middle Ages was the sword.

Swords first appeared during the Bronze Age. Evolving from a bronze dagger around 1600 BC, at this time the swords were fairly short. Then during the early Iron Age swords were being forged from iron. It was not until later on during the Iron Age that smiths started working with steel.

Before swords, spear like weapons were the primary choice on the battlefield. If a soldier were to throw his spear he would have been left without a weapon. With this dilemma soldiers would use swords as a secondary weapon to the spear. (Drews, 192) By the first century BC Roman soldiers were using the gladius, a short sword made with an iron blade, and it was used throughout the late Empire. The gladius eventually declined in popularity as it had a very limited use. A gladius was a short thrusting weapon which meant that it had little effect when wielded from horseback. By the end of the second century AD a longer sword, the spatha, appeared and was primarily used by cavalry. The spatha was a slashing weapon and proved more effective than the gladius, quickly gaining popularity with infantry. By the fourth century AD the spatha was a popular weapon among all Roman soldiers, and was often carried with a dagger. The spatha was a type of straight sword without a cross guard; this is what would eventually evolve into the European sword of the Middle Ages.(DeVries, 21)



It was not until the tenth century that the cross guard was added to the European sword. Previous predecessors of the sword left the wielder's hand completely exposed. This led to many injuries

to the hands and fingers. The addition of the cross guard above the hilt helped to protect the hand and fingers. The first cross guards were only a metal bar that extended out from both sides of the blade.(DeVries, 185)

As with any technology, there is always the demand for improvement. During the early fourteenth century, smiths started experimenting with larger swords. This led to the creation of the swords like the Claymore and the Bidenhänder, both requiring two hands to properly wield. With a longer blade and the swinging power of both arms, a single soldier would have been able to fend off multiple enemies at once. Much larger versions of these swords were also occasionally created but these larger versions were not practical weapons, but instead were used as decorations and during ceremonies. Over time the use of these larger swords slowly died down and was not as common on the battlefield by the mid-1500s.(Oakeshott, 119)

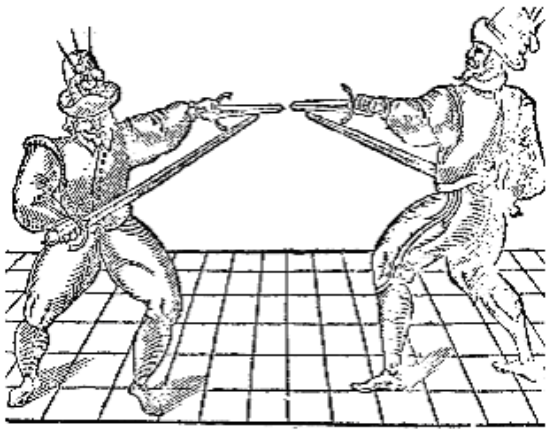
The swept hilt started to take shape during the early thirteenth century. This is the point where you see the sword's hilt start to take on more complex shapes. Starting with the earlier versions, a small ring was placed above the guard to protect the index finger, since most soldiers tended to place their finger there to get a better angle with the blade. By the early fifteenth century another piece had been added to the hilt, a guard running down the hilt from the cross guard to the pommel protecting the rest of the fingers from getting hit. (Clements, 73)

The production of swords really bloomed during the late fifteenth century and started to branch off into different specialty swords. More pieces were eventually added on over time further guarding the hand on some swords. Some specialty swords eventually had a hilt that would protect the entire hand.(Clements, 296)

Every sword is different in some way, which meant that different techniques had to be developed for each type. Most swords can be classified as either a stabbing or slashing weapon, but that does not mean that two different slashing weapons would be used in the same way and every type of sword is not limited to a single style of fighting.(Clements, 30)

Two-handed swords are usually heavier and longer than ones that can be wielded with one hand. Wielding a sword with two hands offers much more control and power to the user resulting in a much more devastating blow. A soldier with a two handed sword can easily overpower others using lesser weapons. The biggest advantage to the two handed sword is its range, so as long as you can keep your enemy at range you don't have to worry about anyone rushing you with a shorter weapon. However due to its size and weight, it tends to be much slower to maneuver giving faster weapons the advantage. If a soldier wielding a two handed sword were to injure one of his arms he would not be able to use the sword effectively.(Clements, 42)

Wielding one handed weapons would often leave the other hand empty. Though one handed weapons can be used by themselves, it would often be paired up with another weapon or shield. For instance, the rapier was often used alongside a dagger. When used by itself the rapier would be used for both offense and defense.(Turner, 58) When paired with a dagger, the wielder has the option to attack or defend with either weapon. This allowed the user to fight at a distance with the rapier and close-in with the dagger. Sometimes the dagger would even be swapped out for either a cloak or a buckler. The wielder could even use two rapiers if he so wishes. The technique when fighting with two rapiers is often called "case of rapiers".(Hutton, 4)



Rapier and dagger, Saviolo, 1595

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Maasai Sword: The Tradition and Ethics of the Lion Hunt

Author: Bickle, Caitlin L

Details

Accession Number
1618
Origin
Maasai people (eastern Africa), probably
1800s
Materials
Iron; wood; leather
Measure
O.L. 25 1/2"
Weight
1 lb. 2 oz.

For the Maasai warrior, the sword and spear are essential both as part of their identity and as tools for self defense, ceremony, and defense of the cattle which are central to their way of life. Warriors act as a sort of standing army, devoted to protecting the people and livestock from aggressive neighbors, predators, and environmental challenges such as drought. This sword is a typical Maasai weapon, with a leaf-shaped blade and wrapped handle. Swords like these are first given to young men when they enter the new warrior age set, and will be carried throughout their adult life (Goldman et. al., 2013).

Age sets are the basis of Maasai society, providing a structure for the distribution of work and responsibility. Every person grows up with their age group, beginning as teenagers progressing together through each stage for the rest of their lives. The transitions between age sets are extremely important events, and each has a ceremony that is performed to celebrate and solidify the change.

The first and most important ceremonies for young boys are the *Enkipaata* (pre-circumcision) and *Emuratare* (circumcision). It begins with the *enkipaata*, during which boys aged 14-16 gather from an entire region into a single area, which takes several months. When all the boys have gathered, they spend a night sleeping in the woods and the next day dancing, which completes the ceremony.

Following this is the *emuratare*, which takes place over 8 days. For the first seven, the boys guard and watch over the livestock. On the eighth day, the circumcision procedure itself is performed. Boys are expected to remain stoic throughout the painful procedure, which is performed without anesthetic. Despite this, it is something many young people look forward to as their initiation into adulthood. They will remain in black clothing for 4-8 months as it heals, after which they officially become new warriors (Maasai Ceremonies and Rituals).

One of the most famous and impressive of Maasai traditions is the lion hunt. Carried out by warriors, the hunt can be done purely for ceremonial reasons or as revenge against a lion who has killed Maasai livestock. It was originally more common for warriors to hunt lions alone as a rite of passage, but as the lion population has declined over recent years *olamaiyo* (organized group hunts) have become more acceptable because they allow many warriors to participate in the kill of a single lion. Before a group hunt begins, the senior warriors select a group of brave men to participate. The primary weapons during the hunt are spears; great honor is bestowed upon the warrior who first spears the lion (Maasai Ceremonies and Rituals).

Honor is an important part of the lion hunt, and there are strict rules all warriors must follow. Successful lion kills honor both the individual and his age set he belongs to; songs are written to commemorate their bravery and the celebration lasts an entire week (Maasai Ceremonies and Rituals). However, killing with methods other than swords and spears, such as guns, snares, or poison, is seen as cowardly, as is killing a female lion who has not harmed livestock. These

types of kills are not celebrated, and the warriors responsible are shamed. Celebration is also (Goldman et. al., 2013).

Fighting lions was more than just a ritual practice for the Maasai; their primary livelihood came from herds of livestock, which had to be constantly guarded from the threat of large predators. Although they once practiced both farming and pastoralism, their primary focus gradually shifted over time until their entire way of life revolved primarily around livestock. For the plant-based parts of their diet, most Maasai relied on trade with neighboring groups, and as with other parts of the culture, the trade system was also segmented by age and gender. Young boys tended large animals, like cattle; adult men were responsible for the trade of these animals, and the women cared for and traded smaller animals and calves (Hodgson, 2001).

In the 1800's when this sword was made, the Maasai people still carried out their traditional lifestyle, raising cattle and killing the lions who threatened them. But today, the traditional practices of lion hunting has become a source of tension between the Maasai people and the Kenyan government. African lions are now classified as a vulnerable species, and hunting them is illegal in Kenya. As a result, the ceremonial lion hunt has been abandoned, but not all Maasai have given up the tradition of killing lions who have killed their cattle. Many of these kills fall outside the protection of self-defense laws.

These types of kills are often overlooked by Kenyan officials; they are infrequent, and usually involve only a small number of lions. Much more concerning to the government are large scale kills done not as revenge against the lions, but rather to draw the attention of Kenya's Wildlife Service to the struggles the Maasai face due to conservation laws. Under the Wildlife Service, many important grazing lands and water sources have been converted to conservation land, making those areas inaccessible to the people who traditionally lived, hunted, and raised cattle there. In

some cases angry Maasai warriors have answered these losses with a large scale lion hunt, hoping to attract attention and give them the leverage they need to protect their traditional lands from the ceaseless expansion of modern Africa (Goldman et. al., 2013).

There is good reason for the government to be concerned for the lions. African lions are currently classified as a vulnerable species, and they could be placed under the protection of the Endangered Species Act as early as 2015 (African Lion, 2014). Lion populations are believed to have decreased by 30% over the past 20 years due to loss of habitat, disease, and conflicts with humans. Multiple groups are currently working with the Maasai people to find a way to protect their essential livestock without causing further damage to the lion populations, and many Maasai support these efforts in the hope that they can find a way to coexist with both the lions and the Kenyan government (Basic Facts About Lions).

The Maasai are deeply tied to the ceremonies which form the backbone of their culture, but these old traditions are difficult to maintain in the face of the dramatic changes in their environment over the past century. The African lion and the Maasai culture are both threatened by these changes, and their old way of life is no longer sustainable. The difficulty now lies in finding a compromise that protects both the wildlife and the people who have built their culture around it.

Armors

Field Armor from a Garniture
Author: Tian, Mi

Details

Accession Number

2014.112

Origin

North Italian (Milan), about 1590

Artist

Pompeo della Cesa (recorded 1571-93)

Materials

Steel; iron; brass; silver; leather; fabric

Weight

47 lb. 15 oz.

In medieval and early Renaissance eras of Europe, full body armor like the one shown above were worn by knights in the fields and tournaments. These armors not only provided the knight with great body protection, but also served as a symbol of the knight's diverse functions and significance in the contemporary society (Eskridge, 1998). In addition to the one shown here, the Worcester Art Museum (WAM) also collects various similar full body armors produced in the 1500s, including the "Maximillian" field armor (404.a-p), the German and Italian three-quarter field armor (2583.a-r) and so on.

This field armor was made in the late Renaissance era around 1590, in the city of Milan in northern Italy. In Renaissance Europe, northern Italy and southern Germany were the two most important regions of armor manufacture, with workshops exporting their products throughout Europe (Breiding, 2000). The history of Milanese armor production in the fifteenth and sixteenth centuries is characterized by a few highly talented individuals and their associated workshops, among them Pompeo della Cesa's name is listed with the legendary Fillippo Negroli (Pyhrr, 1999). These armorers almost monopolized the literature with their high-quality and artistic objects, which were often exclusively made for men of high social rank who were willing to pay huge prices for these noble pieces.

These elements form part of a light-cavalry or infantry armor made for the Neapolitan nobleman Vincenzo Luigi di Capua (died 1627), count of Altavilla and prince of Riccia. The breastplate bears his personal impresa (emblem), a sunburst above the motto Nulla Quies Alibi (No Repose But Here).

Pompeo della Cesa, whose etched signature "Pompeo" is found near the top of the breastplate in the center, was the foremost Milanese armorer of the late sixteenth century. His patrons included Philip II of Spain, who also ruled as duke of Milan; Alessandro Farnese, duke of Parma; and Emanuele Filiberto, duke of Savoy. (courtesy of the Metropolitan Museum of Art)

Pompeo della Cesa and his workshop had their peak in the second half of the sixteenth century, when Filippo retired from making arms (1557). In fact, from 1550s to the time this armor was produced, Milanese armor production had been facing a crisis of constantly declining manufacture orders, especially private orders from the middle and lower levels, that forced many artisans to leave Milan for the more prosperous Brescia. Yet, a few large orders were still documented, many

of which were directly coordinated by Pompeo. As documented in history, Pompeo was active at every level of the arms market, from fabrication of custom-made, luxurious pieces for princes and dukes, to mass production for the imperial infantry (Pyhrr, 1999). Pompeo assumed the responsibility of court armorer in Milan, making richly etched and gilt armors for the leading men of his day, including Emanuele Filiberto of Savoy (in 1572 and 1578), Alessandro Farnese (in 1586), and Vincenzo I Gonzaga (in 1592), as shown in the figure above.

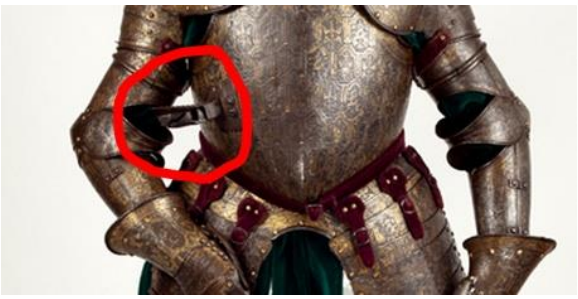
The material and style of armors in medieval Europe evolved through time with a close relationship with weapons used in battles (Eskridge, 1998). The early Middle Ages featured armors made from leather, padded textiles or mail. Mail was very flexible but was only effective against stabbing and cutting weapons such as swords and spears (Blair, 1958). When warriors began to use crushing weapons such as war hammers and axes, stronger armor was needed and plate armor was made like the one shown in this article. Plate armors were combined with close helmets to cover virtually the whole body of the knights, making them very difficult to identify on the battlefield. Therefore, a coat of arms worn over a knight's armor, like the picture below, became his identification. It was often embroidered on a cloth tunic, or surcoat, or painted on the knight's shield (Harper-Bill, 1990).

An armored knight could use various weapons in battle to fight enemies, the most important of which being the *lance* (Gravett, 1992). The lance is a pole weapon designed to pierce an opponent's armor, or dislodge him from his horse. Special lances were also used in jousting tournaments, as shown in the picture below. On the breastplate, a hook is used to rest the weight of the lance when the knight tucks the lance under his arm. This absorbs shock and gives better balance and support.

The full-body armor and close-helmet made it difficult to identify knights in battle. Therefore, coat of arms were used on the knight's and his war horse's surcoats, as well as his shield.

The lance is an important weapon of the knight to pierce his enemy's armor, or dislodge him off his horse. A special lance is widely used in joust tournaments.

The picture shows two knights in jousting armor, from the Tournierbuch of Maximilian I (Hans Burgkmair the Younger, ca. 1540), courtesy of David Luebke, University of Oregon.



The hook on the breastplate of the armor is used to rest the weight of the lance after it is tucked under his arm. (courtesy of WAM).

This field armor is from a garniture. A garniture is a collection of matching pieces that make up an "armor wardrobe". By mixing the various pieces of the garniture, the owner can use the suit for battle, tournament, or parades (Oakeshott, 1980). Wearing the garniture pieces would need the help of a squire. After putting on the undergarment of shirt and pants, the knight and squire attached the armor piece by piece, starting with the feet and working up the body. The helmet and armored gloves were the last steps and were not worn until the moment they were needed. Although the armor was heavy (average weight of full-body armor is between 40 and 50 pounds), the weight was well balanced and distributed over the body, so that the knight in battle or tournament could have good mobility, and be able to mount and dismount his war horse without help from others

(Edge, 1993). Compared to the weight, the heat generated by the sun created more discomfort, and could only be minimally alleviated by wearing tunics over mail.

Becoming a knight in the medieval age was not easy. In order to earn the honor to wear an armor like this, a boy had to be of noble birth, and first be a page from the age of 6 (assistant to ladies or lords of the castle), then a squire between ages 14 and 20 (in service to a knight), finally become a knight after extensive training and successful demonstration of his loyalty and good service to the court (Oakeshott, 1999). Once becoming a knight, he was expected to be both a gentleman and a warrior, in other words, to strictly follow the code of chivalry. These implicated standards for religious, military, and societal facets of life, including defending his religion, protecting those in need, and fighting well and fairly. In essence, the knight's glorious armor, like the one discussed in the article, was often considered as one of the knight's symbolic attributes, that protects his physical being as he was expected to defend his faith.

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Close Helmet
Author: Tian, Mi

Details

Accession Number
2014.11
Origin
Italy (Mantua), about 1535-40
Artist
Possibly Caremolo (di) Modrone (1498-1543)
Materials
Fire-blued steel with gilding, embossing, and incised decoration
Measure
31.8cm X 27.0cm X 34.0cm D
Weight
8 lb. 3 oz.

Close helmets were a military helmet worn by knights and other men-at-arms in the Late Medieval and Renaissance eras, usually as a component of a full garniture (Blair, 1958). This close-helmet from the Worcester Art Museum (WAM), as shown in the picture above, is believed to be the only surviving part of a very fine armor in the late era of the Renaissance period of Italy (1300s to 1500s). In addition to this item, several other close helmets made in the same time period, from Italy or different countries such as Germany, are also in the collection of WAM. These include item 427.a, 1650.a, 19, 415, 427.a, and so on.

The speculated maker of this splendid helmet is Caremolo Modrone of Mantua. In Renaissance Europe, northern Italy and southern Germany were the two most important regions of armor production, with workshops from both regions exporting their products throughout Europe (Breiding, 2000b). In Italy, probably the most dynamic center of armor production during the

fifteenth century was Milan, home to the earliest comparatively well-documented family of armorers, the Missaglias. During the sixteenth century, Milan housed the workshop of Filippo Negroli, who was a descendant of Missaglia, and has been regarded as the most skilled, esteemed, and famous armorer of perhaps all time. The Negroli workshop set up a really high bar for not only the quality of armors, but also their artistic decorations, especially for those produced for the most illustrious clientele of European nobility, such as the item shown in the picture below (Breiding, 2000a).

"This masterpiece of Renaissance metalwork is signed on the browplate by Filippo Negroli, whose embossed armor was praised by sixteenth-century writers as "miraculous" and deserving "immortal merit." Formed of one plate of steel and patinated to look like bronze, the bowl is raised in high relief with motifs inspired by classical art. The graceful mermaidlike siren forming the helmet's comb holds a grimacing head of Medusa by the hair. The sides of the helmet are covered with acanthus scrolls inhabited by putti, a motif ultimately derived from ancient Roman sculpture and wall paintings" (courtesy of The Metropolitan Museum of Art)

Caremolo Modrone, on the other hand, was the best known of Filippo Negroli's contemporaries. Caremolo was born in Milan, but indelibly associated his career with the Gonzaga court in Mantua (Pyhrr, 1999). Caremolo's work was greatly admired by Federico II Gonzaga, the marquis (duke from 1530) of Mantua, and remained his trusted armorer for almost two decades. Federico praised Caremolo as "eminent artist" and "our beloved armorer", and noted that "many times I want to have armors made for me by Caremolo, our armorer, and three or four times a year, according to my wishes and according to the different types that please me". However, Caremolo is best known

for the armors he made for Charles V, such as the Tunis armor as shown in the figure below. Being pleased by a previous batch of delivery, on May 2, 1530, the emperor's armorer wrote from Innsbruck asking for more arms from Mantua, noting that his master was awaiting them impatiently. The maker of these works was possibly Caremolo. Coincidentally, the close-helmet discussed in this document features manufacture and decoration to a set made as a gift for Charles V.

Watercolor drawing of the Tunis Armor, inventario Iluminado, ca. 1544. Real Armeria, Madrid. Apart from the Negroli, few Italian armorers are as well documented as Caremolo Modrone. Yet he remains the most mysterious of craftsmen due to the absence of signed work. The so-called Tunis Armor of Charles V is among the few armors that are generally attributed to Caremolo. It is an entirely gilt harness with simple embossed bands on the tassets (courtesy of Pyhrr, 1999)

From the function point of view, close helmets were widely worn in both battlefields and tournaments in the Medieval and Renaissance eras, very often as the head part of a full garniture (Oakeshott, 1980). The function of the helmet is to protect the vulnerable human head against instruments of personal destruction caused by cutting, thrusting, hitting, and bludgeoning (DeVries, 2007). When used in warfare, arms and armors must be practical, meaning they should afford the most protection and functionality without impairing body movement because of excess weight or inflexible material. Although close helmets and garnitures usually give people the impression that they are heavy and cumbersome, they are in fact not as heavy as commonly believed. A fully armored knight was expected to be able to put on and off his armor, and mount and dismount his

horse without help of others (Breiding, 2000c). In the process of putting on a garniture, the helmet is usually the last step.

Close helmet offers superior protection to the wearer's head. However, not every man fighting in the battle was equipped with fine heavy armors like the close helmet. Carrying the title granted by the monarch, knights were the noble class often seen wearing a close helmet (and a garniture) in medieval literature. The infantry, poorer and less well paid than the knights on horseback, were usually more simply armed, sometimes with nothing more than a quilted jacket with a simple open helmet. For those who could afford it, such as those recruited from town, urban militias, and mercenaries, mail shirts and helmets were common and could be augmented with an additional breastplate (Cosman, 2008).

Close helmets made it difficult to recognize a knight in battle. Heraldic symbols were often used to overcome this limitation. Heraldries were applied on a knight's armor surcoats, shields, and horse armors. Heraldry was evident both on the battlefield and in tournaments, when the two opponents wore heraldries of distinct colors, such as blue and red.

For a glorious knight, these armors not only provided practical protection of their body, but also served as indication of their military and social status (Gravett, 2006). However, the thorough protection from these fully enclosed helmets also imposed great difficulty to recognize or identify a knight in the battlefields. To overcome this problem, various armor designs were featured in the

medieval age, using heraldic symbols on shields, armor surcoats, and horse armors (Harper-Bill, 1990), as shown in the figures above.

The effectiveness of heraldic devices also created problems of their own. For example, it only took a knight to swap his surcoat and shield for those of another to be safely taken for that person. Literatures such as the Arthurian romances narrated many such incidents. At the Battle of Bouvines, Eudo, duke of Burgundy, swapped his surcoat for the coat of arms of the much feared knight, William de Barres. The duke's enemies were terrified by the spectacle of the great "William" approaching, and steeled themselves for the worst (Harper-Bill, 1990).

Another issue brought about by the success of identifying heraldry was the easiness of exposing their owners to mortal danger. The coat of arms not only made it easy for a knight's own men to recognize him, but also his enemies to do so. Some leaders were so worried at being recognized by enemies, that they simply did not wear them in battle. In Shakespeare's version of the Shrewsbury battle in 1403, Sir Walter Blunt appeared like the king himself, and was promptly recognized and slain by Douglas in mistake for Henry IV (Harper-Bill, 1990).

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Teuffenbach Armor

Author: O'Connor, Joshua C

Stefan Rormoser , Austrian, Innsbruck, 1554 – 1565

Armor for Field and Tilt, of Count Franz von Teuffenbach (1516-1578)
1554

steel, brass, lampblack, with modern leather

181.6 × 78 cm (71 1/2 × 30 11/16 in.), 57 lb, 5 oz (weight)

The John Woodman Higgins Collection

2014.80

Currently on view

Classification: Arms and Armor

Department: Higgins

European armor has long inspired the minds of countless people. In the Higgins collection is an example so magnificent it is used to represent the entire collection, the armor of Count Franz von Teuffenbach. This set of armor is special because it is completely original, and so much of its origins are known. As with few sets of armor from the time, it is known for whom the armor was crafted for, Count Teuffenbach. The armorer who crafted the suit is also known, Stefan Rormoser; as well as the date, 1554. (WAM)

Count Franz von Teuffenbach had a prolific military career in mid-sixteenth century Europe. He fought alongside Charles V, the Holy Roman Emperor, at the Ottoman city of Tunis in 1535 and at the city of Provence in modern day France in 1536; he also fought against the invading Turks in Austria in 1543 and served on the war council of Archduke Charles II. For his actions against

the Berbers at Tunis, he received the *Berberoden*, which was etched into the breastplate of his armor nearly twenty years later (Duval, 18).

The armor of Teuffenbach stands as a monument to the era of plate armor. By the sixteenth century there were three major types of armor being produced by the highly skilled armorers: Combat, Ceremonial, and tournament. These armor types are generally easy to distinguish; combat armor is reasonably weighted between 45-65lbs whereas tournament armor can reach 100 lbs. Ceremonial armor is typically the lightest and offers the least protection, meaning only to look impressive. Teuffenbach's armor weighs roughly 57 lbs, putting it in the weight class of combat armor but not excluding it from the tournaments, hence the term "field and tilt" being used often to describe the armor's purpose. Since the sixth century, knights had gone into battle wearing only chainmail to protect themselves. This provided little protection against thrusting and penetrating weapons; so by the time of the late Middle Ages and the advent of projectile weapons such as crossbows, plate armor began to supplement the chainmail, eventually replacing the mail altogether. (Duval, 13)

Armorers would set up shop where resources and energy were readily available. Much like the textile mills in nineteenth-century America that sprang up next to rivers and canals, armories would spring up near rivers that could be used to power the grinding and polishing stones. Forests to provide wood for charcoal and iron ore would also need to be nearby in order to ease transportation and keep the furnaces running. One last vital resource for an armory was international trade, to fuel demand for the armor (Pfaffenbichler, 13). That is why some of the most prolific armories of the medieval period are in the Italian and German regions, notably in Milan, Cologne, and Innsbruck. Stefan Rormoser worked in Innsbruck, whose court workshop had been founded in

1504 by Emperor Maximillian. However it does not appear that Rormoser worked in the court workshop himself (Blair, 114).

A mail-maker, drawn in the late seventeenth century by Christopher Weigel (in the Ständebuch). (Pfaffenbichler, 56)

Production of the mail and plate armor fell to the armorers and their apprentices and was regulated by the guilds. The Guilds were the professional societies of the day. Guilds help to set the price for a certain commodity and to be accepted into a guild a craftsman had to demonstrate exemplary skill in their trade (Duval, 13). Medieval armorers likely began as blacksmiths who specialized in the making of armor; eventually the demand for armor drove some smiths to exclusively produce armor. (Duval, 13) Mail was the primary component of armor until the fourteenth century, but remained in production as late as the seventeenth century in Europe and the twentieth in other parts of the world (Pfaffenbichler; 8,56). To produce the mail, apprentices and assistants would produce the rings and a do the tedious linking, where the master armorer would take over for the final linking of the rings (Pfaffenbichler, 56-57). In Milan, Italy, over a hundred mail shirt makers are recorded around the beginning of the fourteenth century, highlighting how lucrative the trade was at the time. However, in 1340 a Milanese price decree highlights that mail shirts are no longer the main production, instead early forms of plate armor were being made. By 1399 producers of plate armor in Cologne, Germany had broken away from the mail-makers to form their own guild, again highlighting the shift in armor philosophy (Pfaffenbichler, 9).

Venus at the Forge of Vulcan (1606-1623, Worcester Art Museum Collection) depicts many of the elements needed to produce plate armor

The production of plate armor is a much more labor-intensive process. Iron or steel billets had to be hammered into sheets, a task performed either by the master armorer or the iron works. The hammering was done either by hand or by water or horse-driven hammers. Next, the armorer would cut the sheets into the proper shape for whichever piece of armor was being made. This was done by hammering the sheets over variously-shaped anvils with differently-sized hammers until the desired shape was achieved. The edges of parts were rolled over to remove sharp edges and improve the strength of edge pieces. As the shaping was done, the armor was annealed in a fire to relieve internal stresses from being worked. At this point the armor was typically fitted to the owner, as the next step in production made alterations much more difficult. Once fitted the armor was hardened via quenching in water or oil and then tempered in a fire to alleviate brittleness. The exact amount of heat and time being tempered was essential to the quality of the armor but also

difficult to measure precisely; therefore the experience of master armorers like Rormoser was required and the exact process of tempering became a closely guarded trade secret. The hammered armor, blackened by fire,was then sent to the polishers who used water-driven polishing wheels to remove the hammer marks and bring the metal to a shine. After all this the armor would be assembled, usually by a locksmith or the master armorer, with the final rivets, leather, and fasteners (Pfaffenbichler, 62-66).

Armorers such as Rormoser would then hand the armor off to an etcher or other finisher to decorate the armor, usually in-house. Teuffenbach's armor was etched: an acidic solution was used to eat away at and darken a thin layer of the metal to create a pattern. This is how his *Berberoden* was added to the breastplate as well as the images of God the father, birds, cornucopia, cherubs, military trophies, crucifix, and a kneeling knight. These designs are actually re-etched after the original decorations were all but worn away by rusting and vigorous cleaning. (Duval, 18)

Teuffenbach's armor is a testament to Rormoser's masterful craft and an era of exquisite armor design. Plate armor and the techniques of the master armorers fell out of favor with the advent of the firearm. As gunpowder weapons grew more powerful the armor had to get thicker and heavier to protect the owner. Some of the last examples of plate armor were cuirasses worn by cavalry as late as the First World War. From there plate armor was largely applied to machines like tanks to protect the occupants and master armorers were replaced by factory workers operating industrial machines.

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http://www.worcesterart.org/collection/higgins-collection/2014.101.html (WAM entry for Venus at the Forge of Vulcan)

Carabinier Armor

Author: O’Connor, Joshua C

French , (Châtellerault arsenal, Alsace)

Breastplate for a Carabinier
1863–1865

steel with brass; leather; horsehair

44 × 38 × 17 cm (17 5/16 × 14 15/16 × 6 11/16 in.), 10 lb, 8 oz (weight)

The John Woodman Higgins Collection

2014.90.2

Currently on view

Classification: Arms and Armor

Department: Higgins

French , (Châtellerault arsenal, Alsace)

Helmet for a Carabinier

1863–1865

steel with brass, leather and horsehair

37 × 19 × 29 cm (14 9/16 × 7 1/2 × 11 7/16 in.), 3 lb (weight)

The John Woodman Higgins Collection

2014.90.1

Currently on view

Classification: Arms and Armor

Department: Higgins

- See more at:

Currently on display in the Higgins Collection at the Worcester Art Museum is a 150 year old polished brass and steel cuirass from France; sitting only a few paces away is a matching helmet with a brilliant red feather decoration on top. These pieces are the armor of a French Carabinier, a specialized heavy cavalry unit dating from the mid sixteenth century through the French Revolution and Napoleonic Empire all the way to the end of the nineteenth century. These elite troops were present in many of the battles fought by France in that time period, and played key roles in maintaining France's security in the turbulent century following the Revolution.

The term Carabinier comes from their main armament, the carabine or carbine. The Carbine is the term used to describe a long-arm firearm, such as a rifle, with a shortened barrel. The shortened barrel reduces weight and is perfect for the mobile combat of cavalrymen. The Carabinier regiments themselves originate from the mid sixteenth century, when French commander Jean d'Albret began to implement the Spanish way of arming light mounted troops with shortened versions of infantry firearms. These new armaments gave the mounted troops the title of *carabins*, which later evolved into *Carabiniers.* (Pawly, 3)

The organization of the Carabiniers is confused throughout their history. They are repeatedly reorganized into various numbers of brigades, regiments, and squadrons; or integrated into other units. The first handfuls of regiments in the French army were soon disbanded by King Louis XIV in 1679 and the Carabiniers reassigned to two per light cavalry company. This arrangement was later revised in October of 1691 to one Carabinier company per cavalry regiment, then again during the battle of Neerwinden in July 1693 when the companies were combined into an effective single formation; prompting the king to create the *Carabiniers du Roi* which consisting of 100 companies. They remained organized this way until 1758 when they were renamed several times until 1774 when they settled with *Carabiniers de Monsieur.* (Pawly, 4) Then, in the height of the Reign of

Terror, the entire French army was reorganized and the Carabiniers, who until the revolution had been led by aristocrats, were now led by colonels and Lieutenant-colonels. Once Napoleon came into power, the French cavalry was once again reorganized to have two regiments of Carabiniers and regiments were now distinguished by whether or not they were equipped with cuirasses, or armor that protects a soldier's torso (Bukhari, 3). Napoleon himself gave the order to have the cuirass distributed to his heavy cavalry:

> "*I desire you, citizen minister, to submit to me a scheme for reducing the regiments of heavy cavalry to twenty – two of which should be Carabiniers –all four squadrons strong. The last six of the now existing regiments should be broken up to furnish a squadron to each of the first eighteen proposed regiments. Of the eighteen regiments, the first five are to wear the cuirass, in addition to the eighth, which is already equipped in this manner, making in all, six regiments with, and twelve regiments without cuirasses* "
>
> -Napoleon in a letter to General Berthier, Minister of War, September 1802.

Cuirass and helmet of a Carabinier c1816-1824

The Mk1 cuirass dates back to 1802, when this order was given to have the heavy cavalry armored. In this order it was only the Cuirassiers who would receive the armor, and its distribution to the various units took about three years. (Bukhari, 7)

The integration of the Carabiniers into other units is what gave rise to their distinctive armor. At the turn of the nineteenth century the Carabiniers were fairly well mixed with the Cuirassiers, similar heavy cavalry units whose name comes from the iron cuirass they wore. Since their inception the Carabiniers had worn mostly caps and coats made of buckskin or various soft materials instead of hard armor like the Cuirassiers (Pawly); and the Carabiniers

remained an effective force without it until the Austrian campaign of 1809, where heavy losses convinced Napoleon that the Carabiniers needed the same armor as the Cuirassiers. (Bukhari,5)

Carabiniers depicted in the Russian campaigns

The proud Carabiniers were not happy with this decision and protested on the grounds that they were to essentially become Cuirassiers, thereby reducing their role in the cavalry. Napoleon allowed them to keep their unique identity, however, by adding copper plating over the iron and gave the Carabiniers a unique golden appearance (Bruce, 98). It was here that the brilliant armor currently on display in museums was introduced. The iron would later be replaced with steel, and the copper with brighter brass.

As for their helmets, each Carabinier regiment purchased their helmets separately and thus they differed slightly in height, degree of curve, and ornamentation. An attempt was made in 1811 to produce a universal design, but the mass-produced helmets were so inferior in strength to the originals purchased by the regiments that many soldiers chose to keep the older models.(Bukhari,6) Cavalrymen would charge with their heads thrust forward along the horse, so head protection was essential. The helmets of the Cuirassiers and Carabiniers were made of iron unlike most other cavalry helmets in the French and Allied armies, which were typically leather. Despite their ornate design with high brass combs and horsehair plumes, these

French Cavalry attacking British Squares at Waterloo *By Denis Deighton (1792-1827). Depicted are armored French cavalrymen, likely Cuirassiers, attacking British infantry formations at Waterloo. (The British Army Museum, London. Bull, 168-169?)*

helmets provided real protection from blades and low-velocity lead balls that was standard for firearms of the time. Their iron helmets are typically regarded as the best available at the time. (Bruce, 99)

The heavy cavalry of the French army proved very effective, charging into enemy infantry from across the battlefield when they were weak and slicing and smashing through the enemy forces for a decisive victory; this was one of Napoleon's favorite tactics. The Cuirassiers and Carabiniers felt nearly invincible in their armor as enemy blades slid off and bullets bounced. The inconvenience of the armor's weight and decreased mobility was far outweighed by the protection the armor provided (Bruce, 99). This was not to last forever, however. As experienced cavalrymen were lost and replaced by inexperienced recruits, the effectiveness of the charges diminished. By the time of the 1812-1813 campaigns, the cavalry was so ineffective that they were all but slaughtered on the battlefield by the Russians and contributed to the failure of the campaigns. (Bruce, 73)

Damaged Carabinier armor on display at the French Musée de l'Armée

'The Cuirassiers and Carabiniers were not eliminated then, their vulnerabilities had merely been exploited. They were present at the famous Battle of Waterloo, and fought well. By this point the British infantry and their allies had begun to organize themselves into square formations, which made cavalry charges difficult and allowed the infantry to attack with bayonets. (Bull, 168) Artillery fire also proved to be a threat; one unlucky Carabinier was hit by a six-inch cannonball at Waterloo, his mangled armor is on display at the French Musée de l'Armée (Army Museum).

After Waterloo, the war records of all of the Carabinier regiments end (Bukhari, 28). It is reasonable to assume they played only a ceremonial role in the French army and the imperial guard after this point as modern weapons and tactics began to dominate the battlefield, rendering even the armored cavalry dangerously obsolete. The Carabinier's armor remains a shining memorial to an exceptional era.

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(Painting of Carabiniers)

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http://upload.wikimedia.org/wikipedia/commons/8/80/Cuirass_holed_by_a_canonball_at_Waterloo_Antoine_Fauveau_18Juin_1815.jpg (Photo of damaged Cuirass)

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http://vqs61.v3.pair.com:8080/emuseum/view/objects/asitem/3063/1988/invno-asc?t:state:flow=c36ba575-d504-4a6b-9146-a46c7989ad29 (Carabinier Helmet)

Corinthian Helmets

Author: O’Connor, Joshua C

Corinthian Helmets 2014.30 and 2014.7

Greek

Corinthian Helmet

550–450 B.C.E.

bronze

21 × 22 × 30 cm (8 1/4 × 8 11/16 × 11 13/16 in.), 3 lb, 4 oz (weight)

The John Woodman Higgins Collection

2014.30

Currently on view

Classification: Arms and Armor

Department: Higgins

Greek, possibly from the Greek colonies in southern France

Corinthian Helmet

about 550 B.C.E.

bronze

20.3 × 19.1 × 26.7 cm (8 × 7 1/2 × 10 1/2 in.), 3 lb, 10 oz (weight)

The John Woodman Higgins Collection

2014.7

Currently on view

Classification: Arms and Armor

Department: Higgins

Description: 1 piece of bronze. Flattened oblate skull shaped closely to head. Large, transverse leaf-shaped occularia, separated by slightly swelling nasal. Facial opening presents a "T"-shaped profile viewed from front. Cheek pieces arc slightly forward & outward. Borders around occularia, nasal, cheeks & edges pierced with holes for attaching liner (missing). These are bordered by mostly obscured pair of closely spaced thin decorative engraved lines. Lower edge of skull nearly horizontal, rising in a low cusp below ears.

There are twelve helmets representing many locations and time periods on display with the Higgins collection. Two of the helmets however are nearly identical. They are both Corinthian styled helmets, both are made of bronze and date from around 550 to 450 BC. One has a damaged cranium; but is larger than the other, with flanges meant to protect the neck extending further than its contemporary. The other is whole but corroded a little further, hiding two decorative lines that follow the holes not present of the first that are meant to attach a liner that has been lost to the ravages of time.(WAM collection database)

The Corinthian Helmet is a prominent symbol of Greek culture and military honor. There are accounts of the helmet taking a prominent position in festivities, such as the festival of Athena in this account from Herodotus:

Coin or medallion depicting a person wearing a Corinthian Helmet (WAM collection; Accession #1999.445, 190-36 BC)

They celebrate a yearly festival of Athena, where their maidens are separated into two bands and fight each other with stones and sticks, thus (they say) honoring in the way of their ancestors that native goddess whom we call Athena. Maidens who die of their wounds are called false virgins. Before the girls are set fighting, the whole people choose the fairest maid, and arm her with a Corinthian helmet and Greek panoply, to be then mounted on a chariot and drawn all along the lake shore.

- Herodotus, with an English translation by A. D. Godley. Cambridge. Harvard University Press. 1920 Retrieved from

http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0126%3Abook%3D4%3Achapter%3D180%3Asection%3D2

The helmet is even depicted endlessly on Greek pottery, in art, and is even used as a symbol on the coat of arms of the United States Military Academy.

The Corinthian-style helmet originates, as its name suggests, from the city-state of Corinth around the eighth century BC (Connolly, 60) and became an essential part of the Greek soldier's

equipment for over two centuries. The helmet's style emphasized protection of the entire head and face; with the larger example above providing more protection for the neck than the smaller example. This protection came at the cost of mobility, visibility, and comfort (V.D. Hanson 76); however some wearers would also wear a cloth cap or headband to make the helmet more comfortable (Sekunda, 11). The helmet was a technical achievement for its time as it was crafted from a single sheet of bronze, a skill that armorers in the 7th century AD seem to have lost. (Snodgrass, 51) It would evolve slightly over the centuries but would eventually be replaced by helmets that solved the issues of the Corinthian style. (Sage, 55)

The Corinthian helmet was most commonly worn by the hoplite solider, whose name is derived from the Greek word for weapon *hoplon*, and is roughly translated to 'man of arms' (Sekunda, 3) The hoplite is a citizen solider of the Greek city-state that can be classified as a type of heavy infantry and would become the premiere mode of Greek warfare until the Roman conquest.(Sage,14) The Hoplites excelled in the use of the phalanx, a formation tactic that changed little over the hoplites' service. Since many Greek battles took place between the city-states themselves, it is reasonable to assume that hoplites fought other hoplites. (Molloy, 64) This means the Corinthian style helmet often had to defend against the same type of lances and swords the hoplite who wore it carried. The presence of the helmet is sometimes used to determine when the Greeks adopted phalanx tactics, as the helmet's drawbacks in mobility and endurance are mitigated in the large formations and brief contact of phalanx warfare but amplified in one-on-one combat preferred by the Homeric warriors (V.D. Hanson, 67)

Statue of a Greek Hoplite with Corinthian helmet on display in the WAM (Accession #1936.45, Late 6th century BC)

The Corinthian helmet evolved much over its lifetime and even afterwards. It evolved in parallel with another type of helmet in Greece known as the Kegel, which was made of multiple sheets of bronze and had an open face; and both drew influence from the other; however the Corinthian style clearly won out given the sheer number of surviving examples. Initial Corinthian helmets from around 700BC were simple in design, hardly differing in appearance to an overturned pot with parts of the face cut out. As the centuries passed the jaw line and the neckline became separated by a small indentation, which grew into a full cutout of the ear area to improve a soldier's ability to hear. The bottom of the Corinthian began to flare outwards while the Kegel remained straight; the Corinthian then began to straighten out and grow more ornate around 550 BC(Connolly, 60-61), the time of the Persian Wars; where the Spartans made their famous stand at Thermopylae against the Persians wearing the famous helmets (Warry, 35). The cheeks of the Corinthian helmet began to recede from the front of the face and became hinged beginning the full evolution into the Chalcidian helmet of Hellenistic Greece. (Connolly, 61)

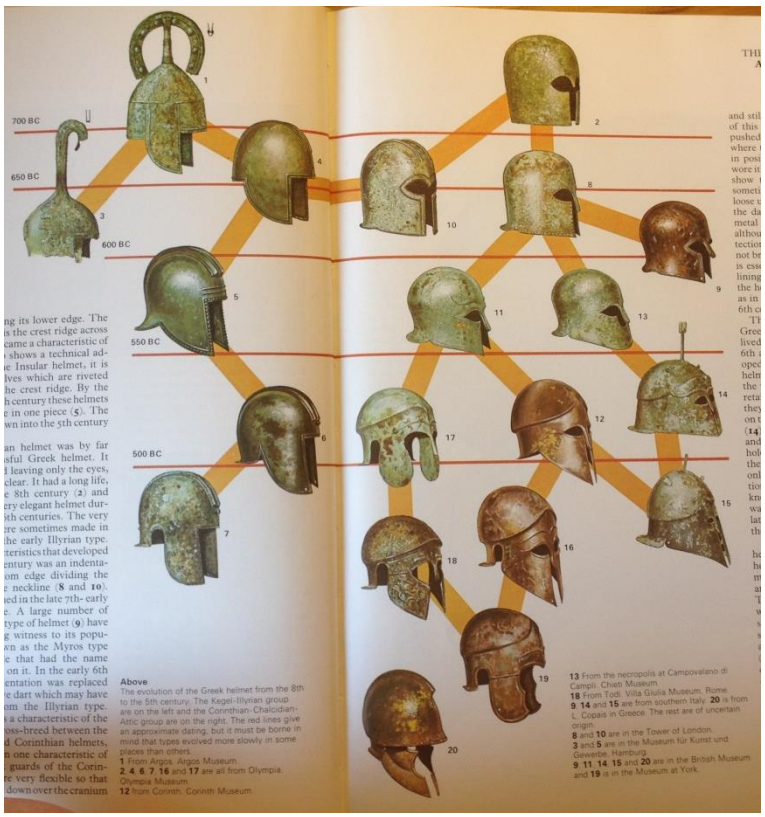
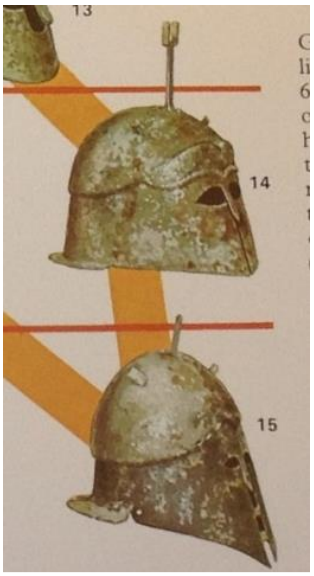


Diagram showing the evolution of the Corinthian style to the right and Kegel style to the left. There is a Chalcidian shown at the bottom. (Connolly, 60-61)

One noteworthy feature of the Corinthian helmet was the cheek guards that wrap all the way around the front of the face. This presented the problem of actually getting the helmet onto the wearer's head, but the brass made the cheek pieces flexible enough to bend when putting on the helmet. This bendability is also what kept the helmet on the wearer's head when they were not in battle and had the helmet tipped up over the forehead as depicted in many Greek pottery scenes; and ended up giving the Corinthian design a new lease on life.



Detail of the Italio-Corinthian helmets shown in the development tree from Connolly, 61

The Corinthian helmet died out as a piece of armor in Greece sometime in the fifth century BC; but it continued to live on in Roman Italy as a fashion article until the first century AD. The Italians began to wear the helmet as a sort of cap, and it continued to evolve in this fashion for centuries, seeing the eye and mouth openings shrink until they disappeared altogether and were replaced by decorative representations. Several examples of these Italio-Corinthian helmets are on display in the British Museum. (Connolly, 61).

Milan Field Armor: How the Renaissance Changed Armor

Author: Bickle, Caitlin L

Knights have been a major part of European culture and consciousness for hundreds of years, but the ideal of the knight as we now know it wasn't born until after the practical decline of knighthood had already begun. As the role of the knight on the battlefield quickly faded with the introduction of more advanced weaponry and battle tactics, it gained new life and a new meaning through the eyes of the upper class. For aristocrats in the Renaissance, the ideal of the knight represented the ultimate expression of wealth, beauty, and strength.

Like many suits designed in the early days of chivalric combat, this one originally had multiple exchangeable pieces that enabled the owner to use it in battle, jousting, and goot tourneys (Higgins Collection). The need for this becomes clear when examining the specific challenges presented by different forms of chivalric combat. Jousting armor must be reinforced on the left side to withstand lance blows, and the eye slit is high and narrow to minimize the risk of facial injury. Armor for the foot tourney, a duel fought on foot in an enclosed area, was much more similar to field armor and would have needed to be lighter and more flexible, and the special reinforcements used in the joust would have only been a hindrance. This early solution of interchangeable parts was convenient, but it quickly fell by the wayside into the sixteenth century as each type of armor became increasingly specialized. In 1590 when this armor was made, interchangeable armor like this would have been somewhat unusual (Belozerskaya, 2005).

Although suits of armor and knightly combat were rapidly falling out of practical use as the Renaissance progressed and military tactics advanced, the chivalric ideals of the Middle Ages were still a source of fascination for many people. Even the concept of a "knight in shining armor" which persists to this day began in the Renaissance; prior to 15th century, plate armor would have typically been covered with fabric, making any decoration on the metal itself pointless. Medieval armor craftsmanship was focused almost exclusively on creating a practical, functioning suit for use in battle. Although these suits were often beautiful in their own way, aesthetics was far from the primary concern.

The Renaissance brought a shift in values; as armor's military usefulness dwindled, its significance in daily life grew rapidly. Knights and pageantry were now a central part of popular culture. This led to the rising popularity of tournament events like the joust, and with it, the importance of decorative armor. Suits became increasingly complex and specialized, meant to function well but also to make a good impression (Sinkević 14).

For upper-class Europeans during the Renaissance, armor provided an excellent opportunity to show off a blend of artistic skill, utilitarian function, and technical prowess. Fashion in armor evolved as quickly as it did in clothing (Sinkević 14). Armor and everyday fashion were closely interrelated. The silhouette and decorations used in armor were often based on clothing; meanwhile, civilian fashion was heavily inspired by military clothes and armor.

This particular suit originated in Milan, Italy around 1590, which was a center of fashion and home to some of the most highly regarded armorers in Europe. The suits of armor they produced were both functional and beautiful. Renaissance era Milan was in many ways the perfect place for decorative armor making to flourish. Artistry and craftsmanship were improving across all trades, and becoming increasingly interconnected. A nobleman's ensemble was expected to look cohesive

and stylish, including the padded jacket under the armor, the cloak over it, the jewelry he wore, the weapons he carried, and the saddle he rode. Everyone from the jewelers to the smiths to the weavers contributed to the visual impact of the outfit (Stuard, 2006).

Owning a suit of armor was about much more than its decorative appearance; it was also a great way to show off wealth and status. Armor was extremely expensive, and served as a commodity item among the upper circles of society, and armor collecting was a popular hobby (Sinkević 16). Each suit would have been completely custom made, perfectly fitted and decorated according to the buyer's specifications, making each completely unique. The more intricately decorated they were, the more expensive they were to make (Brown 92).

Eve centuries after knights in armor left the battlefield forever, we are still fascinated with the beauty and extravagance of Renaissance armor and the culture it represents. We love the romantic notion of knights in shining armor fighting battles for honor and glory, perhaps almost as much as the nobles of the Renaissance did. Medieval knights may have had a greater impact on the battlefield of their time, but it is the honorable ideal of the Renaissance knights that has inspired and fascinated people to this day.

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http://vqs61.v3.pair.com:8080/emuseum/view/objects/asitem/People@6335/8/invno-desc?t:state:flow=0e4588d1-0161-4663-8f27-2f0f3c239436 (WAM Entry for 2014.30)

http://vqs61.v3.pair.com:8080/emuseum/view/objects/asitem/People@6335/0/invno-desc?t:state:flow=510792f8-3c40-4ce6-8d56-cb75b527872a (WAM Entry for 2014.7)

http://vqs61.v3.pair.com:8080/emuseum/view/objects/asitem/People@6335/137/title-desc?t:state:flow=2cf850cf-cf0b-4cfd-9976-8658c392d7ab (hoplite statue)

http://vqs61.v3.pair.com:8080/emuseum/view/objects/asitem/People@6335/74/title-desc?t:state:flow=a2511999-445f-4bdb-bee6-d6eda19b9dc6 (Greek coin/medallion)

http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0126%3Abook%3D4%3Achapter%3D180%3Asection%3D2 (Herodotus quote)

Dagger

The Symbolism of The Phurba – Trinity in Himalayan Religion
Author: Tian, Mi

Details

Accession Number
2014.113
Origin
Tibet, perhaps 1800s
Materials
Cast brass
Measure
O.L. 10 1/2"
Weight
2 lb. 4 oz.

Western popular culture often considers the Himalayan region to be utterly religious and mysterious. Many action movies and video games, such as the game *Uncharted 2: Among Thieves*, choose Tibetan temples in the mountainous Himalayan area to be the place where the hero character finds his treasure, courage, or enlightenment (see Figure 2). The reasons for this depiction are largely due to the ancient history of the Himalayan religions, the mysterious stories behind their religious items, and especially the great dedication from their prayers. These depictions cultivate the western audience's curiosity about the mystery behind this isolated, untouched area, and draw them to pursue the ancient religious items as decorations in their homes. Among these ritual items, an authentic and original phurba is treated as the most magical, powerful, and mysterious one, which can be invaluable for a collector to possess.

(a) (b)

Figure2. (a) The video game *Uncharted 2: Among Thieves*. (b) The main character opens a mysterious world with a phurba. (*courtesy of* Naughty Dog and Sony Computer Entertainment)

Regarding the usage of the phurba, many believe that the original phurba was a ritualized version of a tent stake, as ancient people in the Himalayan area lived in tents in the mountainous areas (Mayer, 1999). As tent stakes, phurbas were believed to immobilize malignant forces from the underground, and establish sacred space in the tent. Spiritually, the phurba was considered as a weapon for subduing and exorcising demons; a meditative tool to drive away the distraction of greed, desire, and envy; and a means to banish, neutralize, or transform negativity and one's ego to full enlightenment. However, in Tibetan Buddhism, practice with the physical phurba is built on three prerequisite practices. The practitioner needs to first practice the awareness-wisdom phurba, the immeasurable-compassion phurba, and the enlightenment and love phurba. Without this solid spiritual and ethical foundation, the abuse of the phurba can rebound seven-fold against the wielders, and even their family, friends, and community (Opsopaus, 2012).

In the Himalayan religion, the phurba is also known as a demon dagger, magical knife, thunder nail, or diamond spikes (Huntington, 1975). Although shaped in the form of a dagger, its power does not derive from use as a weapon. Instead, it is simply the most powerful ritual implement

used by shamans, magicians, and lamas from different ethical backgrounds and spiritual beliefs (Malnati, 2003). Looking at a phurba, the most obvious and important feature is its trinity, which implicates tremendous symbolic significance. As shown in Figure 1, the bronze phurba from Worcester Art Museum is separated into three parts on both the horizontal and vertical axis. Looking along the vertical axis from the top of the handle to the tip of the blade, the phurba has three segments – the head, the shank, and a triangular blade. In the shamanic view, these three parts can represent the head, torso, and legs of the human body (Malnati, 2003), and the heaven, earth, and underworld in the structure of the shamanic cosmology (Shahi, 2002). From a Pythagorean perspective, they also represent the three realms of the spirit (as the essence of the divine), the soul (which brings the divine into active manifestation), and matter (which is animated by the soul) (Opsopaus, 2011).

Horizontally, each part furthermore repeats this tripartite pattern. The head shows three faces of Vajrakilaya – the deity governing and immanent in the phurba (Meredith, 1967) – so that one of them will always face the person handling the dagger. In one layer of meaning, these can also represent Buddha's threefold body: his individual mortal personality, his timeless Buddha nature, and his spiritual joy in teaching and enlightening people (Opsopaus 2011). However, a more common interpretation is that these three faces represent the joyful, peaceful, and wrathful aspects of Vajrakilaya. It should also be mentioned that the wrathful aspect of Vajrakilaya is a compassionate one, which gives the phurba the power to absorb, transmute, and divert negative energies (Mayer, 1999). Based on this symbolism, the shamanic tradition considers the phurba to be the oldest type of medicine tool, which is wielded by the practitioner from the patient's head to feet, and eventually into the earth, so that his/her physical, mental, and emotional diseases can be cured (Malnati, 2003).

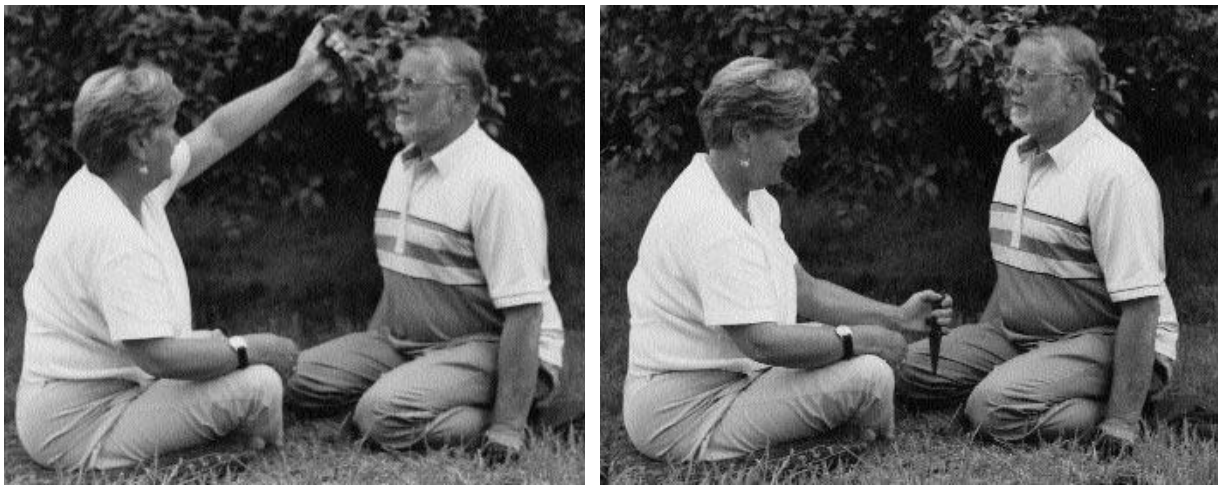

Figure 3. A demonstration of how phurba is used as a medicine tool in Shamanic culture.

(*courtesy of* Peggy Malnati, the author of *Himalayan Thunder Nails*)

Finally, the bottom section of the phurba shows a three-sided blade with its three cutting edges run together at the tip to form a single point. For Buddhists the blades represent the three sins that block the progress of the spirit: the desire and excessive attachment, the aversion, and anger, and the delusion and ignorance arisen from the previous two. The Shamans believe that when the phurba is practiced in the ritual, the Vajrakilaya deity embodies it, and invites and ties these sins to the blade of the phurba, and banishes them through its tip (Shahi, 2002). The tip thus represents the concentration of the mind that has unblocked all obstacles to full enlightenment. By thrusting the phurba firmly into the earth, the demons are considered not destroyed, but immortalized from applying negative effects onto the people, and the world community in general. As shown in Figure 4, in the religious depiction, Vajrakilaya holds a phurba in the left hand, leaving the right hand holding a scepter, another important ritual element in Vajrayana Buddhism, which often symbolizes the active male aspects of enlightenment.

(a) (b)

Figure 4. (a) The Shamanic deity wielding a phurba and a scepter (*courtesy of Blau Stern Schwarz Schloge)*; (b) Ritual scepter and bell (*courtesy of The Tibetan Book of the Dead*).

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Weapons

American Halberds: The Role of Polearms in the New World
Author: Bickle, Caitlin L

Since Europeans first discovered the Americas, they have seen it as a place of great potential. The colonization of the New World provided an opportunity to form a new society, unbounded by the restrictions of European monarchies and social tradition. And yet, although many settlers came to escape elements of their old life, their European origins remained a major factor in everyday life.

When it came to the military, this adherence to tradition was a double-edged sword. European weapons were more efficient than those used by the native people, but the military groups using them were woefully unprepared to face the challenge of an entirely new style of warfare.

The halberd is a particularly interesting case, given that even in Europe they had essentially lost all practical use by the 1600s with the rise of gunpowder-based weapons (Stewart, 2009). In New England, however, there was another factor making polearms a particularly poor choice. Most of the fighting in this area was against the native people, who had no concept of the rank-and-file

formality that was so rigidly upheld in Europe. Weapons specifically designed for that form of combat were useless against a force that was comfortable moving through the thickets and swamps of New England. Colonists carried too many weapons to move efficiently, including unwieldy polearms which were useless in the dense underbrush, while native Americans were typically armed only with spears and bows (Wagner, 2004).

In King Philip's War (1675-1678) this kind of military disadvantage had devastating effects on the northern colonies. A group of Native Americans in Connecticut grew concerned about the negative impacts of Europeans on their lands and culture, and in 1675 they began a series of attacks on the local colonists. These attacks quickly spread as other tribes joined the fight, and by the next year nearly a third of the European colonies had been at least partly destroyed (Norton, 2001). It wasn't until the colonists finally began imitating their enemies' tactics (at the urging of their native American allies) that they began to turn the tide of the war (Drake, 1999).

Despite these failings, records show halberds were required for military duty and possibly even used in combat as late as the Revolutionary War, at which time they were officially replaced by the fusil and the bayonet (Peterson, 1956).

Even after halberds were officially retired from combat, they did not completely fall out of use. Tradition remained a central part of colonial military practices, and halberds lived on as ceremonial weapons. They were often carried by sergeants on garrison duty, and were a staple of governor's guards in both English and Dutch colonies throughout the 17th, 18th, and 19th centuries (Peterson, 1956).

Just by looking at a halberd, it is easy to see why this was the case. Typical halberds were over 8 feet long, and certainly would have looked impressive when carried by a large group of trained

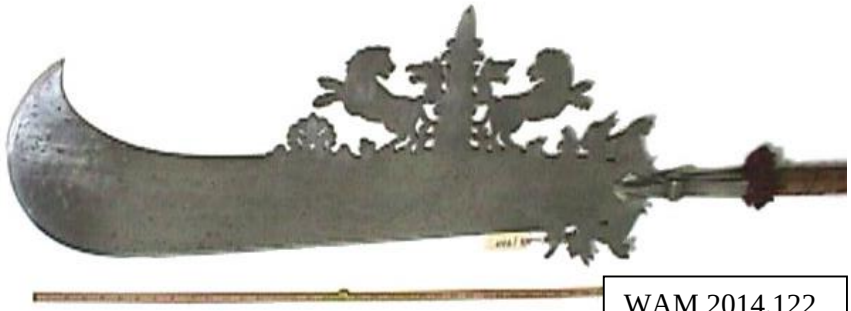
soldiers or guards. Even compared to other polearms like the pike, the axe-like blade of the halberd looks formidable, and offers a large surface to be decorated.

However, artistic functions were often less of a concern in the making and use of halberds, especially by the 17th century. The improvement of gunpowder based weapons greatly increased the chance of arms being lost in battle, making elaborate decoration wasteful. Additionally, the various wars against the native Americans didn't carry the same type of grandeur that was such a large part of European warfare, which led to a focus on creating more serviceable arms for combat. They didn't need to be particularly impressive to look at; they just needed to work. Heavily decorated halberds from this period halberds were typically intended for a much more ceremonial purpose, especially since the large perforated blades that were popular in the late 17th century often weakened the structure of the weapon and reduced its practical usefulness (Dean, 1928).

For a weapon with limited practical function, the halberd has been surprisingly popular throughout the early history of the Americas. Its formidable silhouette and long European tradition have given it a place as a symbol of formal military power. To this day, halberds are used in ceremonial functions by non-commissioned officers in the United States military (Phillips, 2011). Their usefulness long faded away, these stately weapons remain a symbol of the traditional military authority the first colonists brought with them from Europe.

Polearms

Author: Ellen, Christopher Michael



WAM 2014.122

Details

Accession Number
1900

Origin
Italy, 1700s

Materials
Chased and engraved iron; brass; wood; velvet; wool

Measure
289cm. O.L. 112 head L.

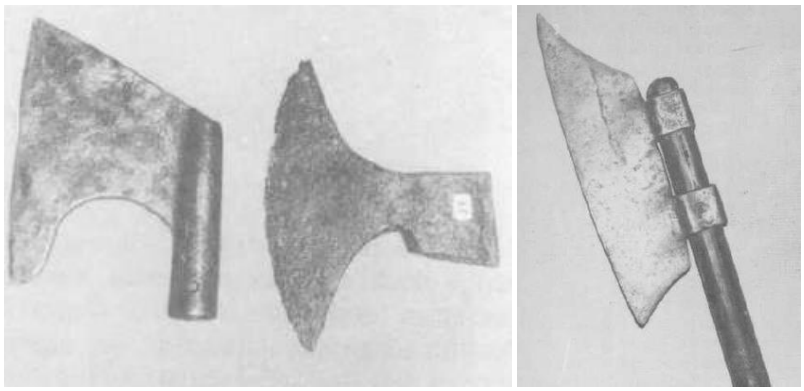
Weight
18lb. 0oz.

The ornamental glaive of a palace guard, as shown in the picture above, is currently on display at the Worcester Art Museum and is a part of the Higgins collection of arms and armor. It was originally used in Italy by a palace guard during the 1700s. This artifact was not intended for military use instead it would have most likely been used as an ornament for a ceremony or parade.

Polearms are defined as a weapon mounted onto a shaft or a pole. Most span from roughly 6 – 8 feet in length, and can be classified acording to their use as thrusting, cutting, percussion, or a combination of types. Though most polearms were designed for warfare and made for an effective weapon, some were used as ornaments. Polearms such as the halberd and glaive are currently still being used today as ceremonial items. (Snook 15)

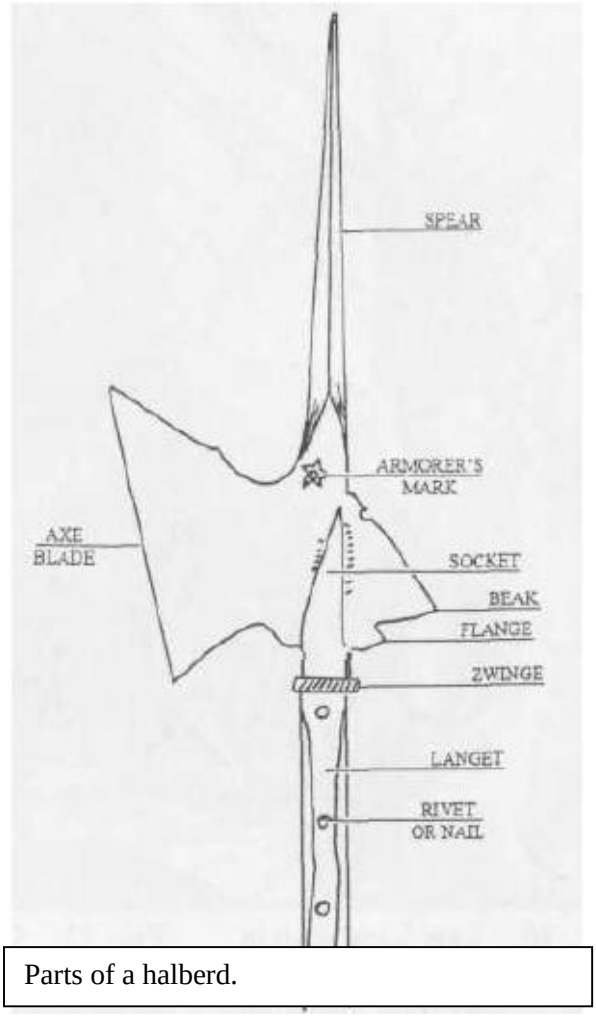
Polearms, with the exception of spears, date as far back as the early 1200s. It is believed that the predecessors to polearms way not have been tools of war, but that of agriculture. The shapes of most polearms resmeble that of agricultural tools such as axes, pruning hooks, and scythes. These earliest forms of polearms would have been used by peasants.(Bashford 152)

Most polearms were developed by peasants themselves. Since most if not all peasants would not have owned any sort of weapons or armor, when it came time for war and peasants were being drafted, they would have brought whatever harmful objects they had on hand, such as farm equipment, and mount it onto the end of a pole. (Bashford 152)



(left) Early axe head, used as either a weapon or a tool. (right) Early form of the halberd.

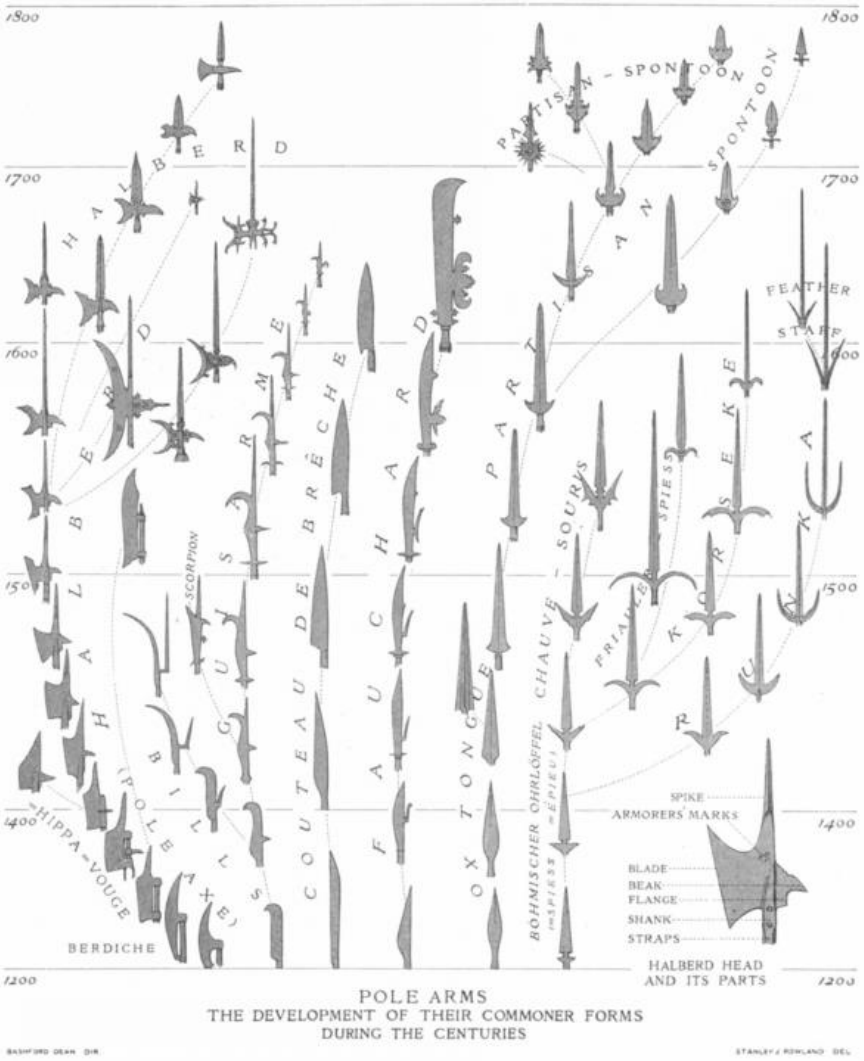
The halberd, a Swiss weapon, is a type of pole axe evolving from the vouge. A halberd had an axe blade on one side of the shaft, a spear head on the end, and a beak on the back. A regular axe head consists of a single eye socket that would have fitted onto a shorter shaft and would have been used as either a weapon or a tool. A different axe head was eventually developed with an elongated blade and two eye sockets, making it more stable on a longer shaft. The combination of an elongated blade and two eye sockets, made it less likely for the shaft to break when the head



Parts of a halberd.

stuck its target. All of the force obsorbed would be distributed along the full length of the head between the two eye sockets instead of on a single point.(Snook 5) The upper edge of the axe head would have been sharpend and could be used as a crude spear. This early form of a polearm would later evolve into the halberd. In the late 1200s the curved edge of the axe head was flattened giving it a rectangular shape. It was not until the 1300s that a beak was added onto the back of the axe head, giving the halberd its well known shape. This beak was primarily used to grapple mounted souldiers and pull them from their horse. The beak also provided a point that could be used for piercing heavy armor backed by the full force of the weapon when swung.(DeVries 28) After the 1500s the rectangular cutting edge was replaced with a concave blade, making it a more effective cutting weapon. Another form of polearm was the glaive, developed in Europe , consisting of a knife or swordlike blade mounted on the end of a shaft. The head of a glaive had a sharpened curved blade edge, used primarly as a slashing weapon.(Snook 8)

Polearms were specialty weapons, meaning that each different iteration of it would have been made for a specific use. The halberds were capable of being used as both a slashing weapon and thrusting weapon, whereas the glaive was primarily a slashing weapon. Polearms would have been used primarly by infantrymen and guards. Due to its length, both hands were needed in order to keep control of the weapon. Like other two-handed weapons polearms had the advantage of reach but lacked in speed.(Snook 6) With the advance in polearms, an infantryman with a polearm would have had the advantage over a cavalryman. Some polearms had some form of a hook on the head that could be used to pull a soldier off his horse. Due to the reach and shape of the weapons, polearms were very effective against cavalrymen. Some were even capable of disabling the horse.(Oakshott 47)



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Horse

Medieval Horses
Author: Ellen, Christopher Michael

Details

Accession Number
583
Origin
Southern Germany, about 1520
Materials
Steel; iron
Weight
3 lb. 2 oz.

The shaffron shown above is a piece of armor that would have been part of a set worn by a horse in Germany during the 1500s. This artifact is currently on exhibit at the Worcester Art Museum and is a part of the Higgins Armory collection of arms and armor.

Throughout history man domesticated and trained certain animals. Most of these animals would go on to play a major role in human history. One of the most important animals used in human history is the horse. Around 3000 BC domestic horses started to appear in many parts of Europe and central Asia and horses have been used in warfare ever since then. (Olsen, 46)

During the Middle Ages, horses played a major role in society and were of great value to farmers, merchants, and knights. Horses were not originally used for farming; instead an ox would have been used for plowing the fields and pulling carts. The harnesses used during the early Middle Ages restricted blood flow and the horse's breathing, making it unable to use its full strength.

Around 200 B.C. a new harness was invented in China, which allowed horses to pull much greater weights than before. By the 8th century, the new padded horse collar made it into Europe. It wasn't until the 9th century that the nailed horseshoe first appeared in Europe. These two new inventions made horses a more valuable farm animal. Not only could horses now work the fields but they could also pull carts with more weight than they could have carried on their backs.(Johnston, 361)

Another important piece of technology was the stirrup. Believed to have been invented in China within the first few centuries A.D. and made its way across Asia, eventually making its way into Europe during the early Middle Ages. The stirrup gave knights much greater stability and is the tool that allowed the expansion of horses in warfare. A rider using stirrups was less likely to fall off while fighting and could deliver a more devastating blow.(Johnston, 362)

During this time horses were beginning to become more important in society, which would make breeding them become just as important. There were many different breeds that would come in all shapes and sizes. One horse could not cover every job needed, so each horse had to be bred for the right job. Breeders in Europe would travel as far as North Africa and into parts of Asia to find the finest breeds. (Hyland, 86) Horses back then were considerably smaller compared to today's horses. The average everyday horse that was used for pulling wagons and farming would have been about the size of the ponies you would find today. The war horse or what was called a "Great Horse" that was used during the period was much larger and would have been about the average size of today's horses.(Hyland, 126) The Great Horse was a highly prized horse and was in popular demand for knights. The best known war horse of the time was the destrier. They were one of the larger breeds of the period and more muscular compared to other horses. These horses were able to carry a much greater amount of weight, suitable for any knight in full armor.(DeVries, 92)

Throughout the Middle Ages there was a constantly growing demand for horses to be used in both warfare and agriculture. A healthy mare will carry a foal for about 11 months before it is born. A mare would only produce one foal per year, often fewer, and on a rare occasion twins. (Johnson, 354) The old ways of breeding horses were not enough to keep up with the demand for horses. Originally the breeders would keep a herd of horses and allow them to breed undirected. With the old way of breeding, foal production was slow and it was not guaranteed that every mare would produce a foal. During the late Middle Ages, breeders started using new breeding practices, where the breeders would direct the horses to mate. These new practices proved successful, and the supply of horses started to quickly catch up to the demand. By the end of the middle ages, there were extensive breeding programs all across Europe and an international market for horses was opening up.(Oslen, 160)

But horses had to be well kept and taken care of. Horses needed constant attention and care in order to keep them healthy. Certain husbandry skills were needed to care for the horse, most often there would have been a stable hand that would care for and feed the horses.(Clark, 157)

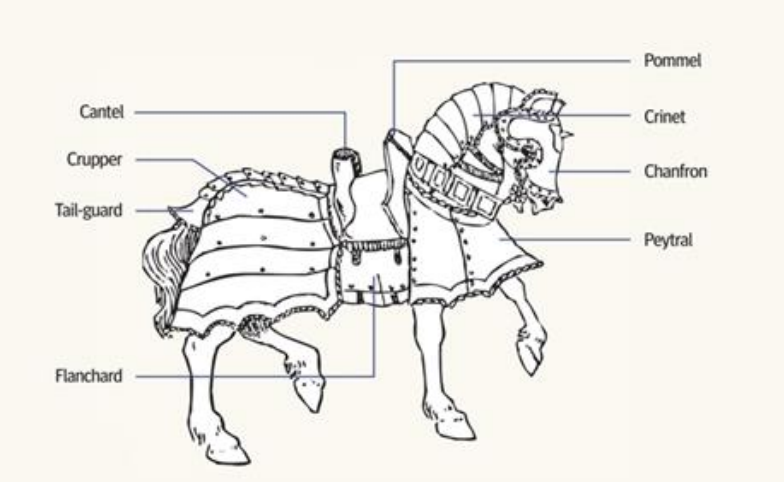
"Curry or dress your Horse twice a day, that is, before water, and when he is curried, rub him with your hand, and with a Rubber: … and ever where the horses hair is thinnest, there curry the gentlest." (*Gervase Markham 1662*)

The care of horses was no easy task. Any noble or knight who owned a horse would have had a stable hand who cared for the horse. Horses had to be well fed with the proper diet, kept clean and healthy, and constantly taken out for exercise. A healthy horse would be curried or dressed twice a day. To curry or dress a horse is to clean its coat. A farmer or stable hand would use a curry comb or horse comb on the horses to clean out dirt and any parasites that may be on the horse. Not

only would a curry comb help clean the horse but the entire process would also help massage and relax the horse's muscles. It did not matter whether the horse was working on a farm or going to war, it would be dressed prior to going to work and more thoroughly upon returning to the stables. This was a very essential part for keeping the horse clean and healthy as well as keeping up its appearance.(Clark, 157)

After a long day of running around and working the fields a lot of dirt and rocks would have built up on its hooves. Cleaning out all the dirt and any pebble that may be stuck under the horseshoe is essential to maintaining a horse. Back then they did not have as good veterinary care as we do today, so it was very important that the hooves be constantly cleaned to avoid infections. A horse with an infected hoof was unable to perform efficiently. Every so often the horse shoes need to be replaced and the hooves trimmed.(Oslen, 181)

Every war horse had to be carefully bred and well trained; this made the care and protection of them a very critical and expensive aspect. This meant that any horse going into battle needed its own armor. Like any knight's armor the horse's armor would have been custom made to fit the horse.(Johnston, 32) Most often the horse's armor would be made to match the design and looks of the knight's armor, though the horse was not as heavily armored as the knight. The amount of armor one could put on a horse is very limited. The horse's legs remained exposed since it is nearly impossible to put armor over a horse's joints without restricting its movement. The horse's armor also had to be light enough to still carry a knight and still allow the horse to move and breathe freely.(Clark, 173)



The armor of a medieval horse

Besides the saddle a horse's plate armor consisted of four main pieces. The shaffron protected the horse's head and would sometimes be decorated with horns or spikes. Some shaffrons would even have either a small cage or cover over the eyes to limit the horse's vision. Limiting a horse's vision was to help prevent the horse from getting scared and throwing its rider off.(DeVries, 182) The crinet provided protection for the horse's neck. It would usually cover the horse's mane and the back of its neck leaving the front exposed. Some crinets covered the front of the neck as well but this sometimes restricted the horse's breathing. The peytral covered the horse's chest and the croupiere covered the rear. Some horses were equipped with a cloth or chain-mail skirt in addition to the plate armor. The horses for cavalry of lower status were usually just equipped with a just a cloth caparison that covered from the head to the rear, but most often had no armor at all, apart from the saddle.(Pyhrr, 10)

Armored horses were a very important asset to a country's military. Some countries even went to the extent of requiring men of any status to keep a certain number of saddled horses. The horses would then be ready for military requisition if needed. These horses would have required extensive training just like any other warhorse. (Pyhrr, 75)

The armored horse is nothing without its rider, for a knight on horseback would have been more effective than one on foot. The use of horses allowed for quicker tactical responses on the battlefield and During the 1300s it was recognized that battles were more effectively won if the

armies were more mobile, this lead to the increase in armed men on horseback. The knights on horseback (cavalry) would have been the ones on the front line and the ones first to charge into battle. Making them ideal for shock tactics where the cavalry would charge into large groups of enemies, often wielding a lance, causing them to disperse and scatter about. This would allow for the cavalry run around picking off single targets and leave an opening for the infantry to run in and join the fight. The cavalry would sometimes even dismount and continue fighting on foot during a battle. (Hyland, 81)

A fully mounted force containing both men-at-arms and archers would have been able to mobilize and conduct campaigns much faster. This tactic was commonly used during the Hundred Years War. (Ayton, 147) Occasionally mounted crossbowmen would be used in a battle, jumping out from the rear ranks to give support by providing either a skirmish screen or a barrage of bolts.(Hyland, 200)

Horses were able to quickly carry supplies and troops in and out of battle making them very effective in when used in guerilla warfare. Before the middle ages, horses were being used for raids, where large groups would run into an enemy's territory cause some damage and then either move onto the next target or retreat back to friendly territory.(Hyland, 37)

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Figures

Henry Herbert: The Second Earl of Pembroke (1534-1601)
Author: Ellen, Christopher Michael

Details

Accession Number
427.a-m
Origin
Northern Italy (Milan), 1560-70
Materials
Steel (once blued) with gilding; brass; iron; modern leather
Measure
O.H. 137.0 cm. (54") as maniquinned
Weight
43 lb. 4 oz.

The armor shown above is a full set of three-quarter field armor believed to have been made between 1560 and 1570 in Milan for Henry Herbert, second Earl of Pembroke. This set of armor is equiped with a closed helmet and has a lot of fine detailing etched into all the pieces. On the right side of the breastplate there is a spot for a lance-rest to be attached. This artifact is currently on display at the Worcester Art Museum and is a part of the Higgins Armory collection of arms and armor.

Henry Herbert was born in 1534 to William Herbert, 1st Earl of Pembroke, and Anne Parr, sister-in-law of Henry VIII. Henry was a very important figure in Elizabethan England, however it was his father William who made all the fortunes of the family. By the time William Herbert died in

1570, he had aquired a vast fortune, making him the wealthiest nobleman in England. On his death, his son Henry Herbert succeeded to the Earldom of Pembroke. (O'Farrell, 1)

Portrait of the Henry Herbert, Second Earl of Pembroke

In the same year that Henry succeeded his father, he was appointed the title Lord Lieutenant of Wiltshire. The following year he became one of the Queen's early advisors. Though Henry was a very important figure in Elizabethan England it was not due to his power in London or in the Court, but his wealth and influence in Wales that gave him his reputation. His family owned a great deal of land and had many political connections. In 1586, he succeeded his father-in-law, Sir Henry Sidney, as Lord President of Wales.(O'Farrell, 2)

As an Earl, Henry would have ruled over a territory in a king's stead. During his time the title Earl would have been equivalent to that of a Duke, but were not de facto rulers in their own right.

The title Lord Lieutenant would have given Henry the military functions of a sheriff. He would raise and be responsible for the efficiency of the local militia units of the county. In the event of an invasion, the Lord Lieutenant would command and supervise over these forces.

Apart from being very wealthy Henry was particularly fond of tournaments and horse racing, and also a great patron of the theatre. As early as early as 1575 he sponsered a group of players known as Pembroke's Men. This troupe went on to perform a number of plays including those written by William Shakespeare. Shakespeare wrote some of his earliest playes for Pembroke's Men and was

one of its chief actors. Henry had passed on his passion for the theatre to his son William Herbert.(O'Farrel, 3)

During Henry's time he had married three times. His first marriage was to Lady Catherine Grey, in an arranged marriage by their parents. However the union was never consummated and in the following year Henry's father saw to the dissolution of the marriage. His second marriage was to Lady Catherine Talbot, who eventually developed a fatal illness and died in 1575 leaving no children. Then in 1577, Herbert married for the third time to Mary Sidney, who achieved a major reputation for her literary works, and together had four children. Henry had two sons William and Philip, who both went on to become the Earl of Pembroke. He alos had two daughters Katherine, who died as a small child, and Lady Anne Herbert who died young.(Owen, 43)

In 1597 Henry's health started to decline. Eventually he passed away in Wilton England on January 19, 1601.(Dictionary of National Biography, 189)

The armor made for nobility would have been special works of art. Armorers would work hand in hand with artists and designers to create the most exquisite pieces. During the middle ages, Italian armor had a large amount of popularity. By the end of the 13th century, Milan had become the center of the manufacture and export of arms and armor. The most important armorers of the time were the Missaglia family of Milan. Most of the armor produced was being exported from northern Italy to all across Europe. Throughout the 15th century, a majority of Western Europe favored Italian armor. (Blair, 79)

Three-quarter armor was a set of armor that would only extend down to the knees with a closed head-piece. The greaves would have been replaced with high boots. This armor was generally worn by the heavy cavalry. Most sets of three-quarter armor by the mid 15th centry did not have a lance-rest. A lighter weight lance that could be supported without a lance-rest had replaced its heavier counterparts.(Blair, 119)

Three-quarter field armor, perhaps for Henry Herbert, 2nd Earl of Pembroke

Being both an Earl and a Lord Lieutenant, Henry Herbert would have required a personal suit of armor. Because of his nobility he would have had his armor crafted from some of the finest blacksmiths and artists. He would have worn his armor while participating in any tornaments or parades. Being a military leader, he would have equiped his armor for going into battle and rallying his troops.

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Game Research Document

Author: Ellen, Christopher Michael

Games in Museums

Many museums around the world are implementing games and other interactive activities into their exhibits. There are hundreds of museum apps that can be accessed both online and through a mobile device. They all provide information about the exhibits or artists that they represent. These games follow a "snack style", where an individual can play a quick and easy game and get something out of it.(Din) Most interactives created by museums are intended to be played only once, with no expectations that the players will return to or continue playing the game. These games are usually played anywhere from 30 seconds up to 15 minutes. Interactive games on site usually provide links to social media and other online activities. These games also provide a way for individuals to explore exhibits and works of art that are not currently being displayed on-site.(Avouris)

Museums are creating intellectually stimulating games that can be played both onsite and online. The goals of these games are to provide brief information about an exhibit in a way that engages guests in fun and exciting ways.(Daprile-Smith) Ways that will make them remember their experience and want to tell others about it and come back for more. Many of these games consists of puzzles, matching games, quizzes, and interactive comic books. Though there is not limit the types and number of games that a museum can produce.(Avouris)

Some museums apply the "Away Time" concept. Games that use the Away Time concept direct individuals back to the museum in some way. Usually luring the game players back into the museums to see the real objects in person. Some games even provide away to claim real rewards by playing the game then returning to the museum.(Din)

Joachim Meyer (1537-1571)

Little is actually known about Meyer himself, other than what he said about himself in his book. Born in Basel, Switzerland, Meyer was a cutler by trade and a self-described German Freifechter (free fencer). During his youth Meyer traveled great distances, where he learned about foreign fencing systems. By 1560 Meyer had joined the Cutler's Guild where he made a living as a cutler. In 1561, Meyer petitioned to gain the rights to organize a fencing event in Strassburg. Records show that by this time he was already a fencing instructor. He petitioned again for a fencing event four additional times in the following years. It was not until his petition in 1568 that he identified himself as a master fencer.(Chidester)

A possible sketch of what Joachim Meyer might have looked like.

One of Meyer's students was Count Otto of Solms-Sonnewalde (1550-1612). Meyer had created a manuscript treatise on the techniques of the longsword, dusack, and rapier for Otto, which remained in his family until the capture of Sonnewalde in 1642. Known as the Lund manuscript, this is presumed to be Meyer's earliest work. Meyer later revised the treatise and published it as the Art of Combat in 1570.(Meyer)

Meyer was as the last known figure in the tradition of the German grand master Johannes Liechtenauer. It was not until his later years that he wrote his fencing manuals and manuscripts. Meyer constructed 3 extensive fencing manuals that would later serve as the basis for other manuals to come.(Chidester)

In June of 1570, Meyer established a contract with Duke Johann-Albrecht I of Mecklenburg-Schwerin to serve as a fencing master. However the journey across Germany during the winter paid a great toll on Meyer's health. He later died on 24 February.(Meyer)

Joachim Meyer was a self-described Freifechter (Free Fencer) of the 16th century. Freifechter was actually a fencing guild founded around 1570 in Prague. They were well known early on to be skilled fighters and rivalling other guilds such as the Marx Brothers, who were the top fencers of the time. (Freifechter)

History of Fencing

Some of the earliest records of fencing come from the Roman Empire. The first recorded events of dueling in a sport-like setting, is that of gladiators. Images from the time period shows pairs of fighters with helmets, spears, and shields. A writer from the Late Roman Empire described some Romans often fencing for fun with sticks that had a ball covered tip.(History of Fencing).

Two fencers from the Renaissance period

European fencing schools date back to as far as the 12th century. Occasionally some fencing instructors would have been paid by rich patrons to produce books detailing their fighting styles and systems. These books are called treatises and often focused on a single weapon. One of the earliest surviving treatise on sword fighting is from Germany and dates to around 1300 AD, this particular one focused on using the sword and buckler. Most of the treatises produced during the 15th century came from Germany and Italy, and dealt with knightly weapons such as daggers,

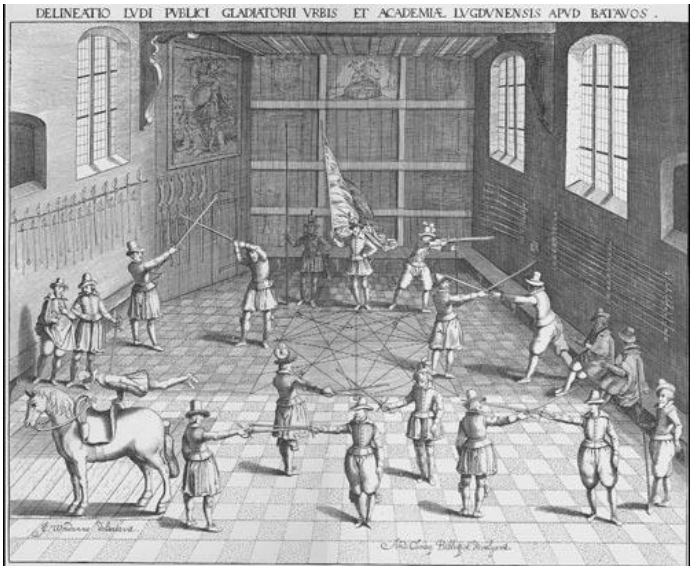
longswords, spears, and poleaxes. (History of Fencing)

With a great deal of changes in social life and an increasing population by the 16th century, carrying around swords became more acceptable in Europe. Thus the number of treatises dramatically increased and so did the number of fencing schools. (History of Fencing)

With the invention of the rapier, the art of fencing dramatically changed. The one-handed sword eventually spiked in popularity and was a preferred weapon by fencing masters over its two-handed counterparts. The fighting styles with the rapier was one of the first recognizable ancestors to modern day foil. (History of Fencing) In France around the middle of the 18th century, the foil was invented as a training weapon. The foil was used to practice fast and elegant thrust fencing. Since the foil still had a sharp point, as thrust weapon it was still very dangerous. In fact, many students actually died from having their lungs pierced by the weapons.(German School of Fencing)

Throughout the 16th and 17th centuries fencing continued to be a popular form of entertainment and in some forms a fashion statement. Though during this time period, it was still a dangerous activity even with protective gear. It was not until the mid-18th century that fencing started to become and organized sport rather than a form of military training. Domenico Angelo, established the fencing academy Angelo's School of Arms during this time. For almost a century, his academy dominated in the art of European fencing. He even established most of the essential rules for posture and footwork that is used in modern-day fencing. Domenico often emphasized on the importance of health and sporting benefits of fencing rather than as an art of killing. As time went on, the combat aspects of fencing eventually faded away until only the sporting rules remained. Fencing has even been included in the Olympics since the first Olympic Games in 1896. (History of Fencing)

Fencing Schools



Fencing School at Leiden University

Sword fighting schools date back as far as the 12th century. Some cities in medieval Europe made sword fighting schools forbidden, such as England and France. By the 15th century, many fencing masters had come together and formed guilds throughout Europe. Fencing masters from the guilds would be higher to train individuals in various forms of sword combat. Then by the 16th century, many swordsmanship schools had formed throughout Europe. Most of these schools were established by well-known fencing masters. The more popular fencing masters were Italian. Many of the earlier fencing schools were to prepare and train individuals for military combat and dueling. (History of Fencing)

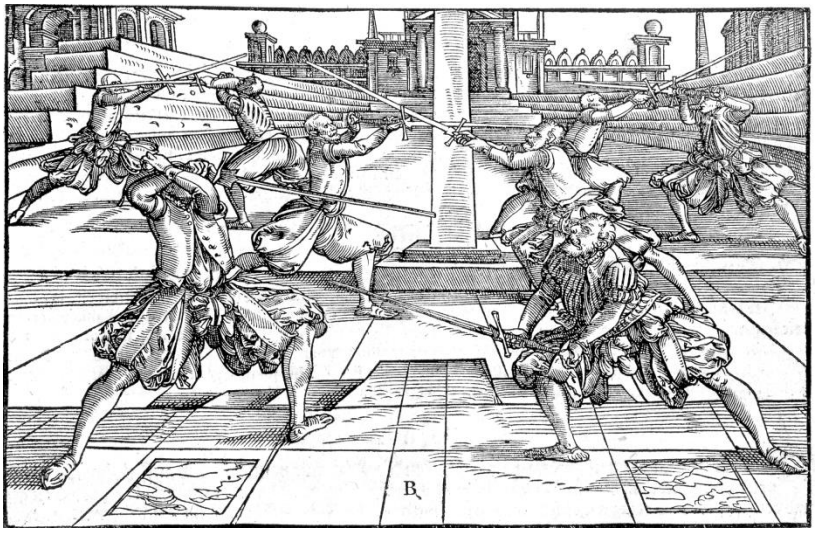
Some guilds still remain today along with some organizations that have formed to continue in the tradition of the old fencing masters. One such group is ARMA (The Association for Renaissance Martial Arts) based in the US, they are dedicated to the study and practice of historical European martial arts of the 15th to 17th centuries.(ARMA)

The Art of Combat

According to Meyer, there are four chief postures along with eight secondary postures. These postures are the stances that the combatants take up and which proceed to attack from. There are four chief or principal cuts, from which all other cuts originated from. Twelve secondary or

derivative cuts. From these cuts come the true Master Cuts. Each combatant is divided into four quarters or target areas. The combatant is divided into an upper and lower, and each of these into a left and right. When a combatant reveals an opening it gives the opponent an advantage if he knows the correct place to strike.(Meyer 51)

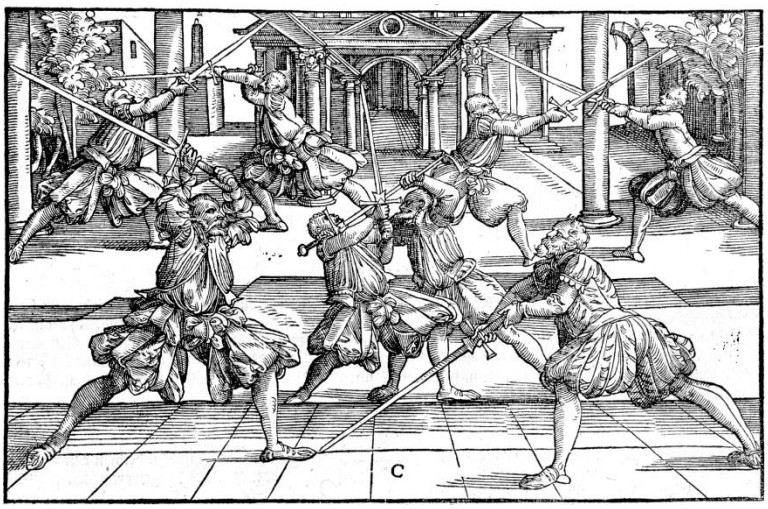
Postures



Left Figure: Ox. Right Figure: Plow.

The Ox posture is allotted to the upper quarters of the combatant. The sword is held with arms crossed keeping the hilt by the head and the point extended towards the opponent's face.

The Plow posture uses the lower quarters of the combatant. Where the sword is held with the hilt close to the forward knee and the point extended towards the opponent's face. This position is used with the intent to thrust.



Left Figure: Day. RightFigure: Fool.

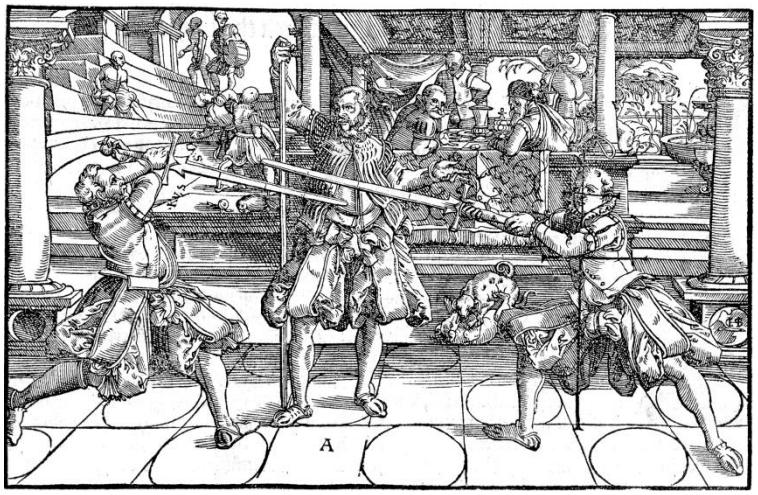
The Day posture also called the High Guard, is executed by holding the sword high above the combatant's head with the point extended upwards. Any attacks delivered from the above is executed from the Day or High Guard.

No proper stroke can be executed directly from the Fool posture. Any cut from the fool is resulted from after successfully parrying the opponent's cut. In the Fool posture, the sword is held out in front of the combatant with the point extended towards the ground.

Left Figure: Wrath Guard. Right Figure: Unicorn.

The Wrath Guard displays a wrathful attitude, and is executed by holding the sword on the combatant's right shoulder so that the blade hangs down behind as in preparation for an attack. Any technique executed from the Day can also be executed from this position.

For the Unicorn, the position is very similar to the Key, however the sword is held upward with the point extended into the air. Whereas with Key, the combatant has the blade rested across his arm. The Longpoint guard is done by holding the sword with extended arms out in front of the combatant's face with the point extended towards the opponent's face.



Right Figure: Longpoint

Left Figure: Key. Right Figure: Change.

In the Key Posture, the sword is held with arms crossed and the hilt in front the combatant's chest, with the blade resting on the forward arm and the point extended towards the opponent's face.

For the Change Guard, the sword is held by the combatant's side with the hilt held close to the body and the point towards the ground.

Left Figure: Cross Guard.

For the cross guard the sword is held out in front of the combatant with arms crossed and the point toward the ground.

High Cut

The High Cut, also known as the Scalp Cut, is a straight cut directed from above directly at the opponent's head. This cut is easily achieved from either the Day or Wrath guards.

Thwart

For Thwart, the combatant positions himself in the Wrath position, as if to deliver a Wrath Cut. If the opponent attempts to cut from the Day or High the combatant proceeds to cut against his opponent's cut.

Thrust

For a Thrust, the combatant holds his sword horizontally with the point towards the opponent. The combatant then extends his arms fully trying to strike the opponent with the point of the sword.

Crooked

When the opponent makes a cut the combatant steps well to the side avoiding the blade. At the same time the combatant swings his blade between his opponent's head and blade, letting the blade shoot well over the opponent's arm.

Low

Starting from a low position, the combatant swings upward to the right cutting across the opponent and ending with the combatant's hands above his head.

Parry

There are two types of parrying. The first parry is when the defending combatant parrys without intent to strike back. In this case the defending combatant is concerned with retreating away from the attacker to avoid being hit. The second parry is when defending combatant parrys the attacker then proceeds to strike the attacker with a single stroke at the same time. According to Meyer, the High cut suppresses all other cuts from above. To counter a High cut, the combatant jumps back to avoid the hit and then makes a cut himself, for it takes more time to recover from a failed High Cut. However the Low cut can take out the High cut.(Meyer 61)

Woodcuts

Meyer had great ambitions for his fencing manual. The most expensive undertaking was getting the elaborate woodcut illustrations. The woodcuts presented in his book *The Art of Combat* are attributed to the SAtrassburg artist Tobias Stimmer.(Meyer) Woodcuts, also known as xylography, dates as far back

as the Han Dynasty in china (before AD 220). A woodcut is when an image is carved into a block of wood, which is then used for block printing on either cloth or paper using inks. It was not until the 13th century that the Chinese technique of block printing arrived in Europe.(woodcut)

Four Horsemen of the Apocalypse, woodcut by Albrecht Durer

The image would have been carved with great care into the wood. The sections of the image that were not to be printed would be the part that is carved away. The areas that get printed would remain untouched and remain flat with the surface of the wood. Once the woodcut was ready an ink roller would be rolled across the surface depositing ink along the surfaces of the wood, then the image could then be transferred onto cloth or paper. However with this method, a mirrored image would have been produced then that of the of the image on the wood.(woodcut)

The technique of hatching originated in the Middle Ages and later developed into cross-hatching during the fifteenth century. Both these techniques were used in many forms of print making throughout Europe. Some of the more sophisticated prints originated in Germany.(hatching)

The first woodcut book illustration dates to about 1461 printed by Albrecht Pfister in Bamberg, this would have been only a few years after print makers started using movable type. Movable type made it easier to print books with text, by allowing for reusable blocks with individual letter or words be moved around rather than having a single block for a single page.(woodcut)

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Conclusion

The research effort on studying the arms and armors in the Higgins collections generated valuable knowledge of the Medieval history behind the pieces. As the central force on, theMedieval battlefield, the knights had access to a rich set of arms, armors, and horse equipment. In our research documents, each of these categories were visited, and multiple pieces were studied and summarized with a broad coverage of pieces from different historical periods and geo-locations. These laid an important basis for our content development, and served as inspirations to the design of the combat game.

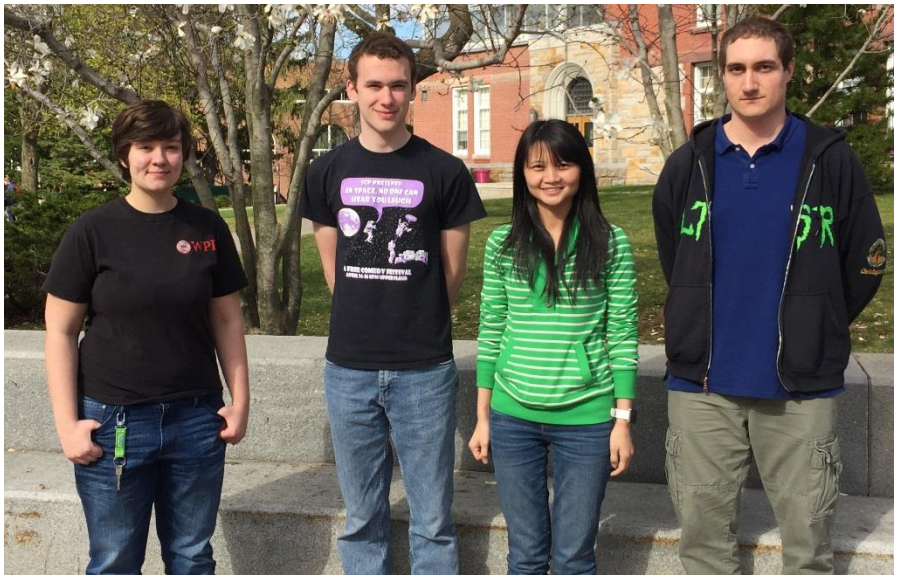
Before implementing the specifics of the game, the team first extensively surveyed the state-of-the-art of the Higgins Virtual Armory digital content. Each of the team members produced careful analyses on a sub part of the Higgins Virtual Armory website, and identified and updated old links and references to reflect the new location and ownership of the collection with Worcester Art Museum. This allows the visitors to be aware of the changes, so that the Higgins collection can maintain the interest and attention of its great audience population.

The team members also did a careful analysis of the visitors' feedback to the new Higgins Exhibit Room in the Worcester Art Museum. The categorization and summary of the comments allowed us to know the points that can be improved to give the visitors a better experience. Also very importantly, it showed us the power of interactive contents on smart tablets in educating the visitors regarding histories and stories behind the collections, in the various formats of games, videos, or picture illustrations.

The combat game designed and developed by the team generated new digital content to enhance this learning experience. The design of the interactive, turn-based combat game was based on

documentaries of real sword fighting techniques in the Medieval age. Using graphical user interface elements, models, animations, and a scoring system, it successfully simulates an engaging medieval sword fighting scenario using an art style based off the old woodcuts. Through selecting different sword fight moves and watching the results in 3D animations, the visitors to the museum can be entertained, as well as educated about medieval arms and armor history. It is also our hope that this game can draw the audience's interest to continuously revisit the exhibit and see and experience the pieces in real life.

Appendix A – Team Biographies



Charlie Bickle

Charlie Bickle is currently a WPI junior pursuing a degree in Interactive Media and Game Development. Their primary focus is digital painting, but they also have a solid foundation in 3D modeling and the artistic and design aspects of game development. They joined the project based on their existing interests in the Higgins collection and the Worcester Art Museum.

Christopher Ellen

Christopher Ellen is currently a senior at WPI pursuing a degree in Robotic Engineering. He Graduated from Northern Essex Community College with an associate's degree in Mechanical Engineering and transferred to WPI in the spring of 2014. He

Mi Tian

Mi Tian was born in the spicy city of Chengdu, Sichuan in China. She came to US in 2011 to study Computer Science in Worcester Polytechnic Institute. She was in charge of all the technical development

side of the virtual armory IQP project using the Unity game engine and Visual Studio with C#. Mi's hobbies include dancing, reading, and cooking.

Joshua O'Connor

Joshua O'Connor is currently a junior at WPI pursuing a degree in Mechanical Engineering and a minor in Aerospace Engineering. He has experience in animation from his high school robotics team and WPI classes and an interest in history.

Appendix B – Original Project Proposal

Introduction

The Higgins Collection

The Higgins Armory collection is the second largest collection of arms and armor in the Western hemisphere, containing about 2,000 objects. Although the majority of these are from medieval Europe, it also includes items from around the world, some of them more than 3,000 years old ("Virtual Tour"). It began as the personal collection of John Woodman Higgins, a wealthy industrialist who owned a pressed steel factory in Worcester. In 1931 he completed a special building to display his collection to the public, which served as both a museum and a promotion for his factory. After his death in 1961 and the collapse of his company in the 1970's, the museum became a public non-profit, after which the museum's focus was shifted more heavily onto Higgins' impressive collection of medieval armor (Kirby, Smith and Wilkins).

In 2014 the collection passed to the Worcester Art museum, where about 100 objects are currently on display. Over the next 5 years, the museum plans to create a permanent exhibit where the entire collection will be accessible to the public through open storage.

The Worcester Art Museum

The Worcester Art Museum (WAM), which was founded in 1896 by Stephen Salisbury III and 50 reputable citizens of Worcester, is the second largest art museum in New England (The New York Times, 1902, p. 3). In spring of 2014, the museum absorbed more than 2000 objects from the Higgins Armory (Edgers, 2013, p. 5). With these additions, it now possesses a 38,000-piece collection, representing cultures from all over the world. The museum features a collection of masterpieces by Monet, Gauguin, and John Singer Sargent, and is also the first museum in the United States to purchase works by Claude Monet and Paul Gauguin (Richard, 2013, p. 11). Furthermore, the chapter house in the museum was also the first medieval building ever transported from Europe to America. According to statistics in 2012, the WAM had an endowment of $90 million, with a $9 million annual budget, and about 46,000 visitors per year (Edgers, 2012, p. 5). It offers many education programs, such as the "Art All-State" program first ever founded for high school artists, to provide opportunities for engaging the students' creativity and exploration of the world of art (Worcester Art Museum, 2013, p. 5).

Project Mandate

Our project mandate is composed of two major parts. The first is updating the Virtual Armory website to reflect the Higgins Collection's new location and ownership. This will be done by removing old links and references to the now-closed Higgins Armory, as well as adding links to the Worcester Art Museum, where the collection is now stored. The second is generating new

virtual interactive content for the Higgins collection. This content will be designed to further the current strategic goals of the museum.

WAM Gallery Observations

Charlie Bickle

- The color in the Knights! display is very odd. Everything being painted the same color is kind of interesting, but the pinkish color that was chosen is strange and doesn't make much sense.
- The "Helmutt" graphics are very cute and well done. I like how they are very small and placed near the floor, it seems like that should really help children engage with the exhibit.
- I like the use of iPads throughout the museum. They seem to be pretty well placed and intuitive. The laminated exhibit guides are a little less convenient since they are often located at only one point in the room and visitors have to carry them back when they're done.
- There definitely seems to be a push towards making the galleries appear visually cleaner, with nothing on the walls other than the art. It looks nice, but is inconvenient in practice. I really preferred the wall plaques because they provided a convenient reference right beside the objects. It was nice to get quick information while looking at the art without having to travel across the room or ask one of the guides.
- I don't entirely understand some of the attempts to combine modern and old artwork. Things like the Chapter House and the modern chairs inside are both very cool individually, but they don't seem to fit together very well.
- I talked to one of the docents on a second visit. She explained some of the themes that were being represented in the Knights! Exhibit, like the room with the swords encircling the video room about modern warfare. It's obvious that a lot of really impressive thought was put into the symbolism and juxtapositions in the exhibit, but unfortunately it seems like

there are too many ideas crammed into a small space with not enough information to guide visitors through the process of making those connections.

Christopher Ellen

- There are racks with stools on them located throughout the museum. Available for guests to borrow as they visit the galleries.
- I talked with one of the docents and viewed some of the comments about the Knights exhibit, we all appeared to agree that the Guns Without Borders presentation was out of place and inappropriate to younger viewers.
- Some of the galleries have pamphlets that gave information about the are in it. The pamphlets were limited to the galleries that did not have any information about the art located right next to it.
- Some of the tablets are at a low position, have small text, and are locked at an awkward angle making it harder to read for taller guest and those with poor eyesight. Some of the tablets are also limited to a single item in the gallery.
- Some of the galleries are very quiet and the slightest sound will echo throughout. Some of these galleries have wooden floors that creek when someone walks by.

Mi Tian

- There is a gauntlet at the entrance of the gallery that visitors can touch and try. It is very interactive and cool. I wish I can try more armories like this one.
- Good explanation for the picture (the Workshop of Jan Brueghel the Elder). Without the description on the tablet, the visitors cannot easily understand the story behind the details of the picture.

- Many fun factors to attract the children and make them interested. For example, there is dog looking like a professor at many places. It is very engaging for kids.
- If it is possible, I wish the gallery can give more items for the visitors to touch or try. My friend told me when she visited Higgins lab before it was closed, she could try a helmet on. She took a picture of it and used it as her Facebook profile picture. It was a memorable experience for her.
- Most of visitors will be curious to see how they would look like with the armors on, but it is impossible to try the real armors. Maybe we can do a virtual armor try-on demo using a Xbox Kinect body tracking sensor, like some shopping malls in Europe do.
- If possible, I wish the plates on the wall can give a short sentence about the background of the items. For example, some swords had interesting shapes. I wonder how do solider used it in battle. Right now, there is only the name, the origin, and the time of the sword.

Joshua O'Connor

*I deleted my running commentary by mistake. These are the points I remember:

- 3/4 armor mannequin needs arms, it looks silly.
- Kid's corner toys are a cool and engaging idea.
- Info on pieces should be more visible: more ipads/better positioning. It took me 5 minutes to find info on carabinier(although this was partly my fault for not taking the time to play with the displays)
- Music bleeding in from elsewhere. I hear vaudeville, Queen, and opera all at once. It doesn't fit the vibe the armor gives

*Running commentary resumes:

- Magnifying sheets by katana are heavily scratched, could they be replaced by something more durable?
- Passed couple reading board by a display of ceremonial swords, they didn't seem to understand which sword was with which description, maybe add visual details (ex, sword with squiggly blade) or photos
- Oh a public feedback room, that's an interesting addition I've never seen before.

Website Documentation

The Virtual Armory Overview

The Virtual Armory is designed to store and showcase the work created by IQP teams from WPI working in collaboration with the Higgins Armory Museum. It is broken up into 5 tabs: Home, Fun, Learn, Higgins Armory, and Innovation.

Home Tab

The Home tab is the first page a user sees when visiting the Virtual Armory. It contains a Welcome paragraph and a slideshow of the various projects on the site, includes images and brief descriptions of the projects (see Fig. 1).

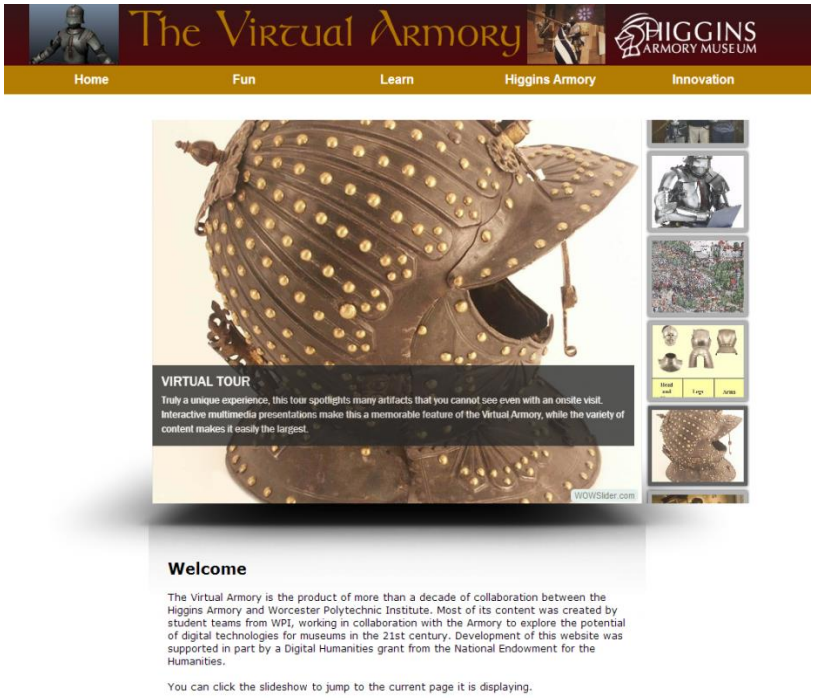


Fig. 1: *Virtual Armory* homepage and project slideshow

Fun Tab

The *Fun* tab offers various interactive demonstrations to engage the visitors to learn knowledge of the Higgins armory collections. There are five sub-tabs under this tab:

- **Virtual Joust**: A 3D video game in Unity made to simulate jousting in the medieval age (see Fig. 2a). The game can be played as a download or using the Unity web player. The game includes a filmed live-action tutorial, a practice round against a dummy, and three rounds against a virtual knight. In addition to the game itself, the page provides information about the rules, armor, horses, and arenas used in jousting. The project was funded by a $50,000 digital Humanities grant from the National Endowment for the Humanities.

- **Squire's Challenge**: A video game that teaches different arms and armors by letting the player play as a squire who serves the knights by handing them the right weapons and armor pieces (see Fig. 2b). Directions for play are listed next to the game.
- **Dress-a-Knight**: An interactive armor try-on game designed to teach the player about armor by having them put armor pieces on a knight in the correct order (see Fig. 2c). Directions for play are listed next to the game.

(a) (b) (c)

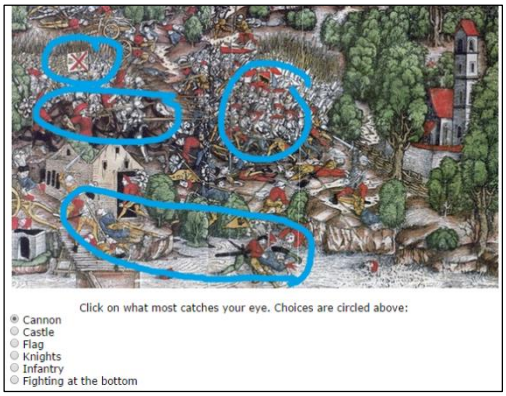
Fig. 2. Three video games in the *Fun* tab: (a) Virtual Joust. (b) Squire's Challenge. (c) Dress a Knight

- **Arms in Action**: A series of 13 short videos each within a minute, that demonstrates about the arts of combat (see Fig. 3a and 3b). Videos are sorted into 3 categories: 900's Viking, 1400's Medieval, and 1500's - 1700's Renaissance. Each section contains several videos of demonstrators in period clothing. The tab also includes a link the the Higgins Academy of the Sword webpage, which provides information about combat classes at the Armory.

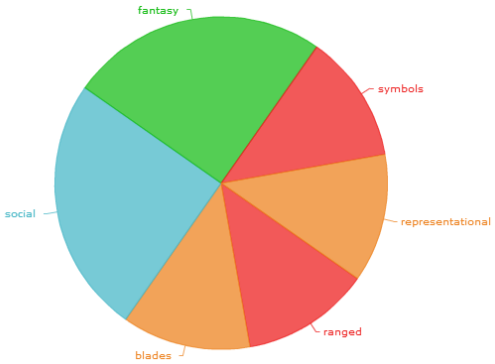
(a) (b)

Fig 3. demonstrations from the Arms in Action video series: Viking (a) and Medieval (b)

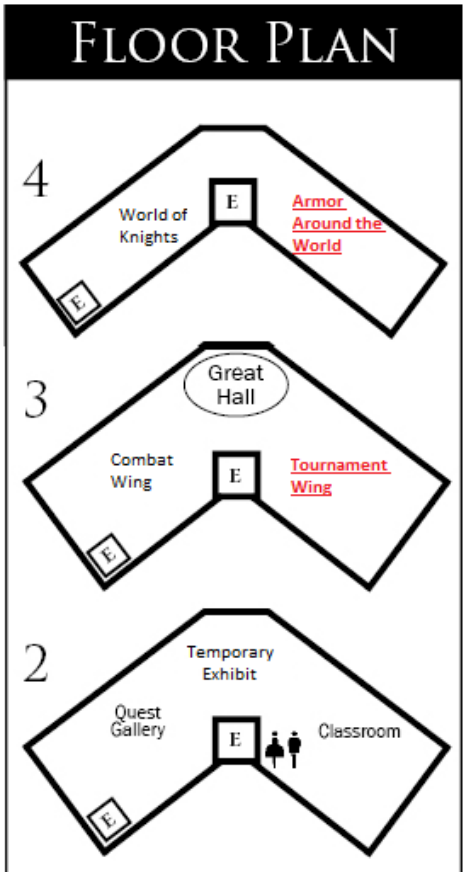
- **Personalized Tour**: A series of online questionnaires that engage the visitors by asking them nine short preference questions (see Fig. 4a), which are used to create personalized tour maps. It also displays a pie chart of the visitors interest in categories such as blades, ranged, polearms, symbols, fantasy, religion, animals, and social (see Fig. 4b). The finished map includes images, upcoming events, a layout of the museum with interesting objects highlighted (see Figure 4c), facts the visitor might find interesting, and the visitor's recommended Medieval Career.



(a)



(b)



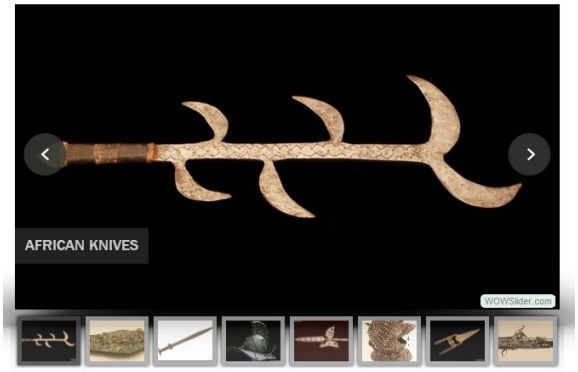
(c)

Fig. 4. (a) *Personalized Tour* online questionnaires. (b) Example *Personalized Tour* pie chart of interests. (c) A tour map generated based on the questionnaire (suggested areas in red)

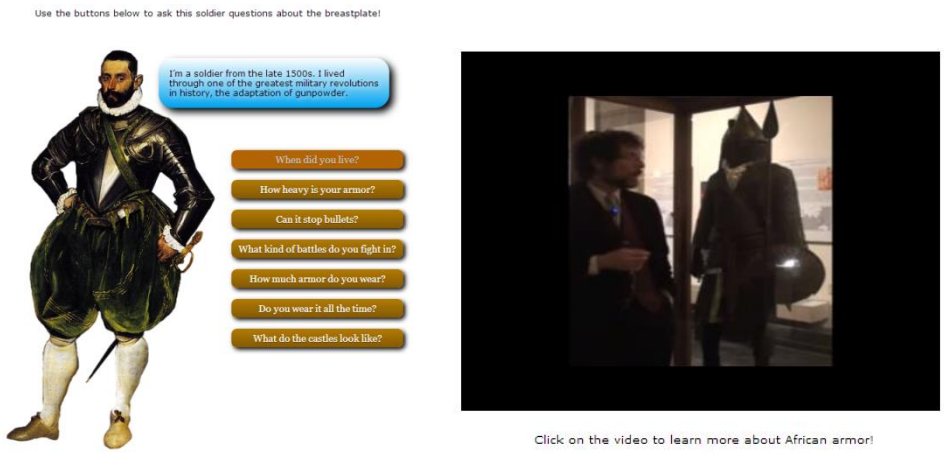
Learn Tab

The *Learn* tab uses multimedia materials (e.g. photo gallery, videos, sound, and games) to help the visitors learn about the background of arms and armors, as well as the historical stories behind them. It includes four sub-tabs under it:

- **Virtual Tour**: This tab shows the visitor through a portion of the Higgins Armory collection (about 20 items in total). A slideshow displays several of these objects on the central page (see Fig. 5a). By clicking objects the visitor can view detailed pages about those objects, many of which feature interactive sections including games, videos, and sound files (see Fig. 5b and 5c). These interactive elements help put the objects into historical context by describing how they were made and used. The tour objects are also sorted into eight sub-tabs representing different categories of arms and armor:
- **Armor**: Showcase of five different armor artifacts, including helmets, full suits, etc.
- **Swords and Daggers:** Six swords and daggers from various regions and ages.
- **Staff Weapons:** Three different spears and axes.
- **Ranged Weapons:** Long-range weapons, including two firearms at the moment.
- **Ancient, Islamic, Asian, and African Arms and Armors**: There are four individual sub-tabs each showing weapons and armors from a different age or region.
- **Unusual Arms**: Arms with unusual shape or functions.



(a)



(b) (c)

Fig. 5: Interactive elements in the *Virtual Tour*: (a) a slideshow, (b) a small game, and (c) a video

- **Explore a Battle:** A picture of a woodcut about *The Battle of Dorneck*, showing the roles of knights, cannons, and pikemen in combats. Subparts of the picture can be zoomed in through pop-up windows (see Fig. 6).

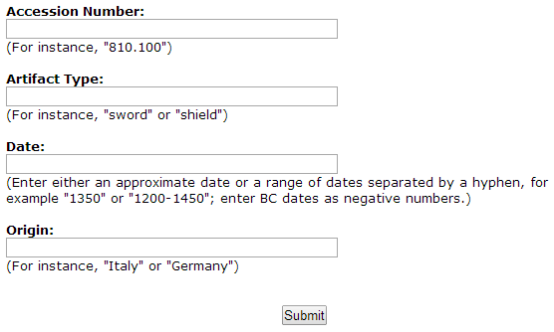
Fig. 6: The *Explore a Battle* tab showing *The Battle of Dorneck*

- **Arms in Action:** Duplication of an identical page in the *Fun* tab.
- **Dress-a-Knight:** Duplication of an identical page in the *Fun* tab.

Higgins Armory Tab

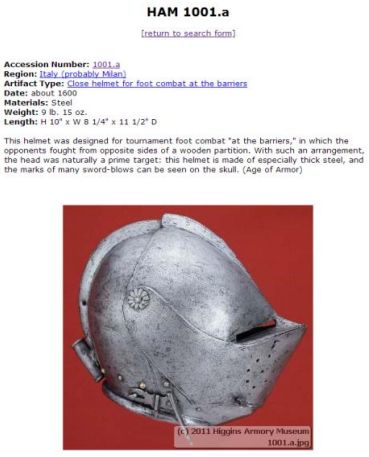
The Higgins Armory tab includes specific information about the collection itself, as well as the now-closed Higgins Armory Museum. It is meant to allow the visitor to experience the objects in the collection in a way that is similar to what they might see at the museum.

- **Collections Database:** The collections database allows users to search the collection by accession number, artifact type, date, and origin (see Fig. 7a). Search results are displayed as a small image of the object along with its basic information (see Fig. 7b). Clicking a search result leads to a more detailed page which displays high-resolution images and more detailed information including the object's size, weight, and materials (see Fig. 7c). In some cases a brief history of the object is also included.



(a)

(b)



(c)

Fig. 7: (a) Database search fields, (b) basic search result and (c) detailed object page

- **Virtual Tour:** Duplication of an identical page in the Learn tab.
- **Arms in Action:** Duplication of an identical page in the Fun tab.
- **Personalized Tour:** Duplication of an identical page in the Fun tab.

Innovation Tab

This tab describes the “behind the scenes” process of how WPI teams created each project on the site. Plus signs (+) on each of the other tabs link to the corresponding innovation tabs for those projects.

- **Virtual Joust:** Includes detailed descriptions of the creation of the Virtual Joust Game along with images of the game being played and created, download links to the source materials of the game, and html links to other parts of the same page.
- **Virtual Tour:** Includes detailed descriptions of the creation of certain virtual armory pieces, sorted by 3D Models, Static Images, and Mini-Videos. Also included is the Teuffenbach Pilot, an experiment in QR codes being used in the armory.
  - Included items:
  - Teuffenbach Pilot

“This was the test component for the Virtual Tour, taken from the museum's existing audiotour-a great way to reuse existing assets, particularly since hardware issues had made it necessary to retire the museum's audiowands. This content was made accessible by QR code, effectively allowing visitors to supply their own audio hardware. An obvious and easy next step would be to add visuals to the audiotrack.”

  - 3d Helmet Model

- 3d Spearhead Model

- Point-and-Zoom Musket

Higgins Armory Museum #3620

- Mouseover Sword

- Artifacts & Illustration with Voice-overs

Bronze Age Urnfield Scene

- Artifacts & Cuirassier Dialogue (Text)

- Click-through Pikeman slideshow

- 3D Katana Model and Video

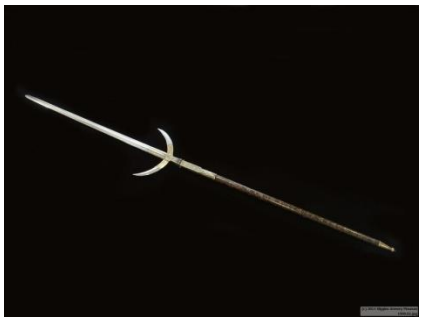
- Click-through Jamadhar Slideshow with Videos

Jamadhar

- Text Slides and Live Action Warhammer Combat Mashup

- Multimedia Musket Mashup

- Folding Spetum, African Arms



- **Explore a Battle:** Includes the following paragraph and the image used in the actual “Explore a Battle” Page, as well as a download link to the source material for “Explore a Battle.”
    - “ Technically quite simple in design, this interactive offers an easily adaptable framework for digital presentation of visual primary sources. The woodcut of the Battle of Dorneck has pop-ups with detailed close-ups and explanatory text: the data is stored in an xml document, making the content relatively easy to manipulate, and the structure could easily be repurposed by replacing the images and rewriting the xml content. The interactive was created by Kevin McManus in 2009-10.”
- **Dress-a-Knight:** Includes the following paragraph and an image of the suit of armor used in the “Dress-a-Knight” game and three students assisting a fourth don replica armor.
    - “As part of their IQP project "Arms and Armor in the Age of Machiavelli" in 2003-4, Derrick Custodio, Wilson So, Orion Samson, and Brandon Light developed this Flash-based game, photographing a reproduction suit from the museum's collection to serve as the model, and incorporating a fifteenth-century text that describes the process of armoring a knight for combat.”
- **Personalized Tour:** Includes the following paragraph and an image of the knight holding a computer and name entry form from the “Personalized Tour” page, as well as a download link for the tour’s source.
    - “This interactive uses a lighthearted questionnaire to create a visitor profile, generating a personalized museum map that suggests a few objects that might

be of special interest, along with a related upcoming event, and some kind of "fun fact." The content for the map is stored in xml files, making it relatively easy for it to be edited or updated by museum staff. Created by Robert Bass, Daniel Cotnoir, Jeffrey Elloian in 2010-11."

- **Collection Database:** Includes two large paragraphs about the photo-documentation of the collection's ~5000 artifacts as well as two images of some of the students who helped with various artifacts (see Fig. 8). Page also includes a download link of the Collection Database Source.

Fig. 8: Student IQP teams working on the collection database

- **Squire's challenge:** Includes the following text as well as a small image of the game being played, a link to the game's source and a short notice on the contents of the download and where to get the source editor.
  - "This Flash-based game combines simple yet addictive physical gameplay with a sense of humor, while subtly teaching players the names of various arms and armor items. Created by Runzi Gao in 2011-12."

Arms in Action: Includes two paragraphs on the creation of the "Arms in Action" videos, as well as two images of the film crews working. Link to "Arms in Action" page works.

QR Codes

“Sallet” Helmet: 2608 users.wpi.edu/~virtualarmory/QRPages/Sallet2608.a/

Page includes:

- a single-sentence random fact about helmets, usually accompanied by an image, which changes each time the page is refreshed
- a link to a helmet game in which the player has to identify the region a helmet is from (see Fig. 9)
- a link to the Higgins Artifact Collection page about the “Sallet” helmet

Fig. 9: Helmets Around the World game

Knightly Sword: HAM 2036.1

users.wpi.edu/~virtualarmory/QRPages/KnightlySwords2036.1/

Page includes:

- a single-sentence random fact about knightly swords, usually accompanied by an image, which changes each time the page is refreshed
- a link to a sword-making game in which the player can put together an image of a sword with different blades, grips, and pommels (see Fig. 10)
- a link to the Higgins Artifact Collection page about the knightly sword

Fig. 10: A partially finished sword from the QR sword making game

Crossbow: HAM 2006.01

users.wpi.edu/~virtualarmory/QRPages/Crossbow2006.01/index.html

Page includes:

- a single-sentence random fact about crossbows, sometimes accompanied by an image, which changes each time the page is refreshed
- a link to a crossbow game in which the player has to choose which crossbow bolts to use against different enemies (see Fig. 11)
- a link to the Higgins Artifact Collection page about the crossbow.

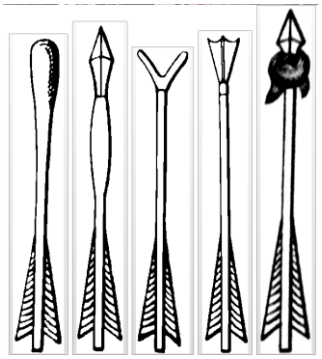


Fig. 11: Different bolt types from the QR crossbow game

Coronel: HAM 2610.7 users.wpi.edu/~virtualarmory/QRPages/Coronel2610.7/

Page includes:

- a single-sentence random fact about coronels and jousting, sometimes accompanied by an image, which changes each time the page is refreshed
- a link to a polearms game in which the player has to identify different polearms by name
- a link to the Higgins Artifact Collection page about the Coronel lance tip

Katana: HAM 1860 users.wpi.edu/~virtualarmory?QRPages?Katana1860/index.html

- Opens Katana page on iphone 4s, but the Virtual Armory when copy/pasted on a computer browser.
- Includes a youtube video, a feedback button, button to the Higgins Museum,and a catalogue button that leads to the katana's catalogue entry.

Katana

Katana (sword)
Japan, late 1700s-early 1800s
Materials: Steel; iron; copper; ray skin; wood; silk; gilding
Weight: 3 lbs. 11 oz.
Accession Number: 1860

Feedback | HIGGINS ARMORY MUSEUM | Catalogue

Higgins Ruby on RailDatabase

Overview

The site is an online database documenting the artifacts that are currently a part of the Higgins Collection. The site scales to fit the screen of the device that is accessing the website.

Home Page

The home page displays the artifact of the day in the center of the page with a brief description about the artifact. Clicking on either the image or the description brings you

to the artifact's page. On the right there is a search bar that allows users to search for a specific artifact. Beneath the search bar is an option to filter through all the documented artifacts by time period. On the bottom of the search column there are the options to list the artifacts by accession number or limit it to only the artifacts currently on display in the museum. At the top of the page, there are links that bring the user back to the home page, the Higgins collection section on the Worcester Art Museum website, The Virtual Armory, and the about page.

Artifact Pages

Each individual artifact has its own page dedicated to it. These pages give the name of the artifact at the top of the page. Directly below the name is an image of the artifact. To the right of the image are some details about the artifact including the accession number, origin, materials, size and weight. Beneath the image is a detailed description of the artifact and any comments left by the curator. Some artifact pages contain a Bibliography citing any sources that were used. At the bottom of the page is an option to ask someone associated with the Higgins collection any questions a user may have about a given artifact. Some artifacts have additional images; these images are listed on the right of the page below the details section.

- Not all artifacts are fully documented; some share a general image with others and lack any descriptions.

About Page

The About page gives a short description about the Higgins collection.

- About the application: a brief description about the application

- About the author: introduces the author
- Dedicated to Jay Levitt: makes a dedication to a friend

List of Changes for Higgins Sites

The Virtual Armory:

Homepage:

- **Header:**
- Upper right corner still says “Higgins Armory Museum” and shows HA logo

Fun:

- **Arms in Action:**
- Under the 900s Viking, 1400s Medieval, and 1500s-1600s Renaissance links, there is a description of and a link to the Higgins Academy of the Sword

Innovation Tab:

- **Virtual Joust:**
- Link to the Unity game engine is broken
- Under “Armor” It lists the armor being modelled in “Autodesk Maya” while under “Arena” it lists the creation of the arena being in “3DS Max” both are Autodesk products and should probably both be credited as such.
- All download links to game assets appear to work
- **Virtual Tour:**

- All links work
- **Explore A Battle:**
- Download link to the source material for “Explore a Battle” works
- **Explore A Battle:**
- “Jump” link works
- **Personalized Tour:**
- Download link for the tour’s source works
- **Collection Database:**
- Download link of the Collection Database Source works
- **Squire’s Challenge:**
- link to the game’s source works
- short notice on the contents of the download and where to get the source editor (link still works)

Higgins Ruby on Rails Database:

- Add a little introduction to the homepage rather than just having the artifact of the day displayed.
- Replace the current picture of the author with an actual photo of him.

The link in the top right corner still says Higgins Armory Museum and brings the user to the Higgins sight.

Project Work plan

A term: Project Planning

1. Decide on a final product
2. Finish the project proposal

B term: Object research papers

1. Submit a draft for the first object research paper
2. Finish the first object research paper
3. Submit a draft for the second object research paper
4. Finish the second object research paper
5. Submit a draft for the third object research paper
6. Finish the third object research paper
7. Submit a draft for the fourth object research paper
8. Finish the fourth object research paper

C term: Beta version of final product

1. Create a list of art assets to be created
2. Create a list of features to implement
3. Produce placeholder assets for project
4. Create a working beta version

D term: Final product and report

1. Playtest beta version (for games or similar content)
2. Make changes based on playtest
3. Finish all assets for the project

Finish the project report

Weekly Deliverables

Week 1

Submitted through email by Tuesday, 09/09/2014:

1. Type up individual assignments:

1. Paragraph about Higgins collection (Charlie)

2. Paragraph about WAM (Mi)

3. Annotated bibliographic entry for The Age of Armor (Josh)

4. Annotated bibliographic entry for the compendium of sources (Chris)

For the meeting on Thursday, 09/11/2014:

1. Look through Virtual Armory site and WAM site

    - VA: http://users.wpi.edu/~virtualarmory/virtualtour.html#.VBOLDvldXYs

    - WAM: http://www.worcesterart.org/

2. Visit the museum and write down 5 bulleted observations

Week 2

Submitted through email by Tuesday, 09/16/2014:

1. Documentation of Higgins websites:

    - Split up work on tabs 2, 3, and 4 of the Virtual Armory site, QR codes, and 2nd database (http://higgins.lostpapyr.us/artifacts)

    - The goal is to capture the look, feel and content of the site

    - Don't write up duplicated content twice (like the 5th tab of the VA)

    - Can use headings, bulleted lists, descriptions, screenshots, etc.

- We should be writing about 1 page each, plus images

3. Write up parameters for generating new content

4. Edit last week's content based on feedback

For the meeting on Thursday, 09/18/2014:

1. Typed write-up of bulleted observations about the WAM galleries

2. List of changes that need to be made to websites, e.g. old links

- We should each do this for the sections we are writing about in the documentation

Week 3

Due by email as soon as possible:

1. Remaining list of changes for armory sites

2. Individual lists of 4 armory-related items to write about (include ID numbers)

Submitted through email by Tuesday, 09/23/2014:

1. Edit last week's content based on feedback

2. Finalized individual list of items to write about

- Bulleted ideas for topics to write about that relate to the objects

- 6 titles for bibliography with APA citations

3. As a team, look at the WAM Strategic Summary and make a bulleted list describing how it connects to our project mandate

Project Mandate: Update the Virtual Armory and generate new content relating to the collection

4. As a team, come up with 10 ideas for what new content to generate

Week 4

Submitted by email for Tuesday, 9/30/14:

1. Pull together materials from this term:

    - Intro: WAM paragraph, Higgins paragraph, project mandate paragraph

    - Initial outline for work plan: what we want to get done each term

    - Everything else we've written should be included in appendices

2. Individual updated bibliographies: about 8-12 sources per object, with citations for each

3. Updated object topics: refine ideas to one central theme for each object

For the meeting on Thursday, 10/2/14:

1. Be prepared to discuss your planned topics for the 4 objects you chose

Summary of Visitor Feedback of iPad

Summary of the Knights! Survey

The Knights! Exhibit in the Worcester Art Museum included a visitor survey station in the back where visitors could provide feedback on the exhibit on an iPad and enter for a chance to win free membership to the museum. The survey consisted of six questions with multiple choice responses and a chance to provide feedback. We were given the responses in the form of a spreadsheet and have summarized them below. For each question we have listed percentage of responses and total responses followed by comments that have been categorized by the type of response and grouped based on their similarity. Inappropriate responses have been omitted from the summary but included in the total count and repeated responses were counted and listed as one entry in a group with multiple responses.

Survey Dates: March - Nov 03, 2014
Total Number of Responses: 315

Executive Summary:

Question 1: How did you hear about the Worcester Art Museum?

- Friend and family recommendations were the biggest reason for visitors to come.
- Most visitors heard about WAM through school, news advertisements, family, or were themselves returning visitors.
- Only 7 responses came specifically because of the Higgins Collection.

Question 2: What was your reason for coming into the Knights! Gallery?

- More than half of those who responded came specifically to see the arms and armor.
- More than a quarter of those who responded were already visiting the museum in general.

Question 3: Please give 3 words to describe your first impressions/ feelings about the gallery.

- Overall, about half of the guest enjoyed the Knights exhibit. There were some, about an eighth of the responders, that are disappointed at the current state of the exhibit. Most of the guests that have visited had visited the Higgins armory in the past, and are looking forward to seeing more of the collection on display.

Question 4: Check if you used any of the following educational tools?

- Visitors like the tablets and the labels provided and find them helpful, however many feel that they are too sparse or do not provide enough information. Perhaps our project can augment this somehow. Visitors also appreciated the educators on hand in the exhibit. A few commenters also took the opportunity to ask questions about the exhibet, such as the pink horse out front.

Question 5: What could we do to make the gallery/interactive features more appealing to you?

- The visitors really want to get hand-on experiences of the objects. Interaction is the key. They need to be able to either directly touch or try the item, or use some interactive tools such as the tablet and an educator to engage them. Our project can help by making the experience more interactive.

Question 6: Please provide any additional feedback/comments below:

- Visitors want to see more of the Higgins collection and a larger display space.
- Visitors had a mixed response to the batman suit, with slightly more people expressing positive feelings than negative. More information about why the suit is there might make it fit better with the exhibit.
- The Guns Without Borders section received an equal balance of positive and negative responses. Some felt it was inappropriate, especially for children, while others thought it was interesting. More of a warning or barrier might need to be provided to prevent children from being unintentionally exposed to this area.

Survey:

Question 1: How did you hear about the Worcester Art Museum? (select all that apply)

Friend/ Recommendation 33.2%
Other* 25.4%
Museum Website 19.5%
Newspaper* 13.6%
Museum Signage 10.7%
Billboard 8.4%
Social Media 8.1%
Television 5.9%
Radio* 3.3%
PublicTransportation 2.5%
Other Cultural organization 2.5%

Total Responses: 271
*if so which one/ add comment below
Comments
Total: 111*
*Inappropriate comments have been removed from the total of 111.
Responses:

- **Why they came/how they heard of WAM**
  - **Teachers/students/Schools 14 responses**
    - "I am an art teacher in Worcester."
    - "Danforth art"

- “Wpi told me about it”
- “Field Trip” **2 responses**
- “Email from school”
- “Growing up, coming here several times with my Burncoat High a School Art Magnets class”
- “Took art lessons recommended by my teacher”
- “School- wsu”
- “School Project”
- “WPI”
- “Professor”
- “School trip.”
- “School project”

- **News Source 18 responses**

- “Boston globe magazine” **5 responses**
- “NPR” **2 responses**
- “T&G”
- “NEMA”
- “Telegram” **2 responses**
- Online **2 responses**

- “Went online looking for stuff to do... Found this”
- “Chronicle channel 5 and gotohpc.org staycations”
- “Metro west daily news”
- “WBUR”
- “Taunton daily gazette”
- “Worcester News Paper”

- **Returning visitors 18 responses**

- Members **5 responses**
- “artsWorcester member”
- “Been here before”
- “I have loved this place ever since I started”
- “Worked here for years”
- “I've been coming here since I was five (now 28)”
- “Always have known you are here. Visit 3 or 4 times a year”
- “Visited before”
- “Been coming for years”
- “I took classes here”
- “Been coming here since I was young”
- “I live fairly close to to the museum and have been here a few times.”
- “I have been several times in the past”

- **Other 23 responses**

- “Just by (happy!) accident. We're from Westhampton, Mass. We'll worth the drive.”
- “All of the above”
- “Through a suggestion”
- “Grew up in worcester”
- “Word of mouth”
- “I go to museums frequently”
- “Longtime jnowledge”[knowledge]
- “I was born here and took art classes at age nine or so”
- “Moved here and heard about it”
- “Drove by and saw the knights advertisement”

- “Passed by it in a car”
- “Local”
- “Prior knowledge”
- “I don't know it before I'm come in the exposition room.”
- “Lifelong Worcester resident”
- “It's down the street from my house<3”
- “I'm from Mass.”
- “We 've know about it for so long I no longer remember how we first heard about it.”
- “It was free this month”
- “I'm a Worcester rat”
- “Recommended I'm trip advisor”
- “Live in area”
- “We live in the area and grew up with the museum”

- **Family 17 responses**

- “Family! I'm only 10, but this is the second time I have been here! I live in Philadelphia, PA but I came here once with my cousins and grandparents and this time with my best friend and my grandparents again!”
- “My mother told me and my brother about it. I also used to take classes here.”
- “My parents grew me up surrounded by art and introduced to the WAM when I was in kindergarten.”
-

- **Higgins Collection 7 responses**

- “Through the Higgins Armory website.”
- “From Higgins armory”
- “thing gins armory museum”
- “Higgins moved here”
- “From the Higgins before closing”
- “I was looking for the armory museum and found it had been closed and part of the collection was on display here. O”
- “History teacher worked at higgins armory”

- **comments made on exhibit/museum instead. 9 responses**

- “Beautiful in making war seem so inter grated with glamour and art. Love the wall colors and lighting”
- “I probably wasnt sure about the exhibit. Allot of possibly and maybe made the placards sound indecisive”
- “Fabulous opportunity”
- “This was a very interesting exhibit the artwork is amazing.”
- “The Worcester art museum is awesome you can see every thing about stuff from the past”
- “Cool”
- “I was an awesome boss kid then and I loved batman and all the knights”
- “Thank you”
- “good Muesem so far”

Question 2: What was your reason for coming into the Knights! Gallery? (select all that apply)

Specifically came to see arms and armor 55.8%
It was a part of my general museum visit 28.4%
Heard about the exhibition in the press 17.6%
Other (add comment below) 11.6%
Came on a recommendation 9.7%
The space seemed family friendly 4.1%
There was a program in the space I wanted to attend 3.3%
Total Responses: 267

Comments
Total: 53*
*Inappropriate comments have been removed from the total of 53.

- **Reason for visit**
  - **Higgins collection**
    - "Since the move from Higgins armory wanted to see what was on show"
    - "Former armory patron"
    - "Loved the Higgins armory"
    - "To see the remnants of a great museum falsely stripped of its artifacts too soon"
    - "Wanted to see the Higgins transition."
    - "I went to Higgins armory museum and it closed and I heard the armor was here so I came."
    - "Aurmor"
    - "Knew Higgins closed, wanted to see what they did with it all"
    - "I visited the Higgins Armory years ago and was excited to see the collection now that it's part of WAM."
    - "Hand seen it at the Higgins museum and wanted to revisit"
    - "I always really liked higgins armory museum and now it's great we can walk here."
    - "My teacher who worked at Higgins armory named Charles brought us"
    - "When we entered the museum the information desk they gave us suggestions that was one of them."
    - "I was brought by my neighbor! Now she owes me."
    - "I really like knights and my grandma wanted to see them"
    - "I wanted to see what wam has done with the Higgins collection"
    - "We were Higgins Armory members."
    - "I was upset the armory had closed, so while I was in the area, I was dead set on viewing the greatest part of history."
    - "Memories of Higgins. One of my favorite museums"
    - "Loved the Higgins armory; visited for nostalgia."
    - "Higgins armory"
    - "To see the transferred portions of the Higgin's collection."
    - "New from Higgins"
    - "We had been to the Higgins and wanted to see the collection again"
  - **Museum Visit**
    - "I was here for the blues summit and stopped by."
    - "The gift shop and my family made me"
    - "Cub scout elective...visit an art museum."
  - **Knights!**
    - "It cemented our decision to visit."
    - "I knew my boyfriend would love it"

- "Love knights"
- "My boyfriend likes knights"
- "Seemed interesting to visit"
- "Best part"
  - **Other**
- "Batman suit"
- "Heard about it from a friend"
- "The sign"
- "Heard about the inter actives"
- "I got couriers"[curious]
- "Free"
- "We'll u see I really like the night time so I wanted to come"
- "It looked rad"
- "Also came for Guns without Borders"
- "Worcester state assignment"
- "I needed to take a picture with Batman while I was dressed like Batman."
- "Professor assigned the exhibit"
- "School paper"
- **Comments made on the exhibit/ museum instead**
  - "Why is there a pink horse?"
  - "I hated to see what it looked like"
  - "Disapointed Compared to the higgens museum this is very small display. Audio would add to the information"
  - "Miss the Higgins, but glad to have some of this collection on display!"

Question 3: Please give 3 words to describe your first impressions/ feelings about the gallery: - Responses

Total responses: 228*

*Inappropriate and duplicated responses have been removed from the total of 228

Comments

- **Impressed/enjoyed the exhibit**
  - “Interesting, powerful, interactive”
  - “Authentic amazing fantastic”
  - “It is cool”
  - “Organized, Integrated, Historical”
  - “Unique amazing beautiful”
  - “Spectacular well lit great presentation”
  - “Astonishing, enjoying, and fun projects”
  - “Interesting loved,and treasured”
  - “Wonderful space”
  - “Impressive, entertaining, educational”
  - “Lovely, inviting, informative”
  - “Amazing interesting great addition to WAM”
  - “Interactive, accessible, so close up,”
  - “Wonderfully interesting”
  - “Diverse, interesting, evocative”

- “Cool interactive exciting”
- “Beautiful informative interesting”
- “Awesome Captivating Cool”
- “Incredible, amazing, and nice.”
- “Interesting, informative, interactive”
- “Very interesting, educational, thought provoking”
- “Interesting creative fun”
- “Awesome, fulfilling, informative”
- “Amazing, fruitful, intelligent”
- “Impressive, educational, exciting”
- “Amazing, enlightening, fun”
- “Colorful family wonderful”
- “Welcoming and NOT overwhelming - Higgins at time”
- “Excited, impressed, fascinated”
- “Historical beautiful loud”
- “Exciting historical educational”
- “Interesting educational unexpected”
- “Intricate, impressive, awe-inspiring”
- “Very good for whole family”
- “I like it. It is very original display”
- “Lovely. Beautiful edgy”
- “Awesome, cool, extremely old fashioned”
- “Excellent”
- “Wonderful, well done”
- “Well curated”
- “Incredible, beautiful, impressive”
- “Short diverse interesting”
- “Brilliant”
- “Classy, fun, dazzling”
- “Interesting. Artistic”
- “Educational interesting resourceful”
- “Interesting,heavy,fancy”
- “Magical, interesting, aesthetic”
- “Extensive Bright Interesting”
- “Fascinating, exciting, overwhelming”
- “Very good exhibit”
- “Fun interpretation”
- “Loved higgins loved this”
- “Varied, impressive, cool”
- “Awesome informative excitement”
- “Great, amazing, incredible”
- “It was very interesting.”
- “This actually looks cool!”
- “Very nicely done”
- “Great Amazing Joyful”
- “Awesome, interesting”
- “Wow woah love it”
- “Fun interesting different”
- “Awed Impressed Enthralled”

- “Interesting”
- “Fanciful, impressive, well lit.”
- “Cool.interesting.fun.”
- “Amazing, educating, and interesting!”
- “I love it”
- “Nice , interesting, torn”
- “Amazed, excited and interested.”
- “Beautiful, ornate, educational”
- “Wow cool interesting”
- “Cool, descriptive, informative”
- “Enlightening Fascinating Intriguing”
- “Amazing, outstanding , Beautiful”
- “Very well presented”
- “Awesome, interesting, educational.”
- “Beautifully set up”
- “Neat, small, easy to see.”
- “Blew my mind”
- “Amazing, incredible, exciting”
- “Amazing, cool, fascinating”
- “Great expressive and intriguing”
- “Nice, interesting, informative”
- “Beautiful amazing outstanding”
- “Awesome, dark, interesting”
- “Magnificent”
- “Cool interesting neat”
- “Awesome, amazing, breath-taking”
- “Unique, vast, awesome”
- “Striking”
- “Informative, fun, interesting”
- “good spectacular fabulous fantastic awesome stupific”
- “Old,historical, awesome”
- “Super duper fun.”
- “Amazing and creepy”
- “Fun lovely horrifying”

- **Disappointed**
  - “Disappointing when compared to higgins”
  - “Misunderstood thematic intent”
  - “Mediocre indecisive”
  - “Very very confused”
  - “Nostalgic, sad, missing”
  - “Not very medieval”
  - “Professional incomplete minimal”
  - “Incomplete minimal organized”
  - “Disappointed, not kid friendly”
  - “scant disappointing slapdash”
  - “Disappointed sad curious”
  - “Small, sterile, disappointing”
  - “Boring,violent,and small”
  - “Sparse, loud, ornate”

- “Disappointed”
- “Disorganized, strange, unorderly”
- “Disappointed bummed skimpy”

- **Want to see more of the collection**
- “More armor please”
- “So much is missing.”
- “Not much here”
- “Too small, more armor/weapons!”
- “Different small left out alot”
- “Wish there was more”
- “Awesome, educational, cool”
- “Great show more”
- “Need more exhibits from Higgins collection”
- “Small compared to Higgins”
- “Great but small compared to the rest of the armory”
- “Interesting, informative, more!”
- “Bright, well designed, sparse”
- “Novel, thoughtful, sparse”
- “Interesting. Sparse.”

- **Other**
- “Kinda dark, eh?”
- “War, wicked knife”
- “Heavy metal artwork”
- “Sad, coolended, knowledged”
- “Thought provok”
- “Where's the glass”
- “Women , striking, context”
- “Regal. Middle Ages. Chivalry.”
- “Very nice but miss the deep musical voices of Higg”
- “Good for kids.”
- “Ok,we'll presented,not as good as Higgins armory”
- “Imaginative, sobering, impressive”
- “Great job new Director”
- “Saddened, surprised, excited”
- “Visual educational”
- “Different,small,odd”
- “More art, less history than before”
- “It was great but I think everything can be in case”
- “Stimulating modern connection”
- “Lively ambitious imaginative”
- “Old, cool, and heavy”
- “Cool dress up”
- “Sad, happy, and definitely relieved”
- “Currently Reserving judgment”
- “Detailed, heavy, blunted”
- “Very varied”
- “Loud, accessible, new”
- “Very nice but I miss higgins”
- “Physical variety atmospheric”

- "More for kids"

Question 4: Check if you used any of the following educational tools? Responses

Read the wall labels 83.4%
iPad interactives 55.4%
Audio Spotlights 12.1%
Art Cart 7.2%
Children's Books 10.9%
Magnifying Glasses 49.7%
Touch Labels 46.1%
Helmutt the Dog Family 23.8%
Family Gallery Guider 4.4%
Talked to an Educator 24.6%
Took a tour 2.4%
TOTAL 247

Comments

- **Wall Labels**
  - Usually easy to read information about items, though some were unlabeled or it was hard to find the label.
- **Tablets**
  - Being forced to browse through an iPad rather than being able to read information next to the artifacts is more difficult. Not enough tablets around, other information about the artifacts and their historical contexts is sparse or nonexistent.
  - The iPads were a good idea
  - iPads were helpful,
  - More interactive touchscreens, like the painting deconstruction
- **Audio Spotlights**
  - Speakers with stickers
  - Signage should be more dyslexic friendly (more audio).
- **Educator**
  - A security person or two, but pleasant and knowledgable.
  - Educators were helpful
  - The woman who told us about the batman costume was very nice and helpful.
  - Charles from Higgins brought and taught me about the armor
  - Educator was awesome!
- **Magnifying Glasses**
  - Magnifying glasses are too scratched to be of any use.
- **Helmutt the Dog Family**
  - That dog looks strange now
- **Children Area**
  - Always a good idea to put the children's area directly next to the deadly weapons exhibit (negative sarcastic comment).

- **Other comments**
  - I would very much like to know why the horse at the front is bright pink and not some other color.

Question 5: What could we do to make the gallery/interactive features more appealing to you?

Responses Ratio

More medieval pieces(less bat man, stay focused) 20%
Other 20%
Touch and try on objects, more interactive features 17%
It is already very good 10%
More context information about the items(labels,history) 9%
Make things larger(display, labels, etc) 5%
Kids area is good, add more interactive toys 5%
Demonstrations and video or interactive game presentations 4%
More tablets, and more accessible(earbuds) 4%
Better lighting(esp for old folks) 3%
Have an expert staff or tour guide, maybe dressed as a knight 3%
TOTAL 136

Comments

- **No need to improve, very good already**
  - I would do nothing to change it, it was great
  - N/A, in my opinion the gallery was well run and a lot of fun.
  - Fine as it is
  - Nothing, it was awesome
  - Nothing. It's great already
  - Not much really
- **Touch and try on objects**
  - I wanted to walk through the arches but it said paws off!! I think people, especially kids, will want to walk and run through there!
  - More stuff I can touch
  - Wear the armor
  - You could have more things you could touch
  - Try on more armor
  - More hands on stuff
  - Touching a the items like a sword handle and to feel the weight.
  - Add more things people can touch.
  - Show more of the collection, more to touch or try.
  - Allow people to try on armor (replicas)
  - Touch the swords and swing them around
  - Something to give a sense of the weight/heft of different weapons would be neat.
  - Let me try on the steel amor and walk around with a sword and take pictures
  - It'd be cool to see a few more things similar to the try on gauntlet. I'd love more of Helmutt showing things off!!
  - More touch and feel stuff
  - More hands on activities
- **More context information about the item's history**

- Make more information about the artifacts available. Having unlabeled weapons leaning against a wall is not a compelling presentation.
- More labels
- Add more background to the pieces
- Talk even more about the history behind the pieces of art and armor.
- More weapons and maybe lessons on how to use them back in the day
- Better descriptions of they pieces. Their utility and distinctiveness
- More context for items displayed. Less uncertain sounding descriptions. Less helmutt. Kids love arms and armor. A gimmick isn't needed
- Maybe add a little more insight on how battles took place.
- Footnotes, eg garniture
- More descriptions of the history of the armor
- Descriptions for more of the items, info on how they were used, better lighting in some areas

- **More medieval pieces and less irrelevant objects**
  - More medieval pieces
  - Get rid off batman he has absolutely no reason for being in a ancient/medieval armor display. He's taking up room that could hold another suit of armor
  - More of collection shown
  - More ancient armor and arms, less anti gun propoganda
  - And more ancient Romans stuff
  - No guns with knights
  - Add more medieval exhibits
  - More armory less batman
  - I would include more pieces actually related to medieval Knights.
  - Lose batman
  - Get rid of guns without borders display
- **Have an expert tour guide**
  - Have an armorer or armor expert on staff.
  - A guided tour with a knowledgable staff member
  - I hoped there would be a knight there in real armor to explain simple things to the kids. Like a meet and greet.
- **Better lighting**
  - Better lighting where it is appropriate. Older folks need it.
  - Better lighting
  - Better lighting
- **Video or game demonstrations**
  - Demonstrations, video presentations.
  - Turn down the music and have longer armor demonstrations
  - Videos to learn about pieces.
  - More interactive stuff. Maybe more videos or things to read about knights - historical background
  - Videos of the armor/pieces, how they were used, where they came from, etc.
- **More tablets and make them more accessible**
  - Earbuds
  - More tablets
  - Games about the gallery on iPads
- **More features in kids area**
  - Add a kids room with big chess

- Kids things/interaction that's kid friendly...where are the blocks and gamMore toys like at the Higgins. My kids lived the playroom.es?!
- Bring back kids interactive knights section
- Stuff more kid friendly
- Add some games to the children's area, other wise it's perfect!

- **Make things larger**
- Make it bigger! (Wishful thinking)
- Bigger
- Make it larger.
- Bigger displays

Question 6: Please provide any additional feedback/comments below:

Subject	#Response(s)	Ratio
The exhibit is good	21	29%
Add more displays and suits of armor	9	12%
Batman	9	12%
Guns Without Borders	8	11%
Include more information about objects and definitions	4	6%
Lighting is too dim	3	4%
Music	3	4%
Organization is poor	2	3%
Include live demonstrations	1	1%
Display original Helmutt dog	1	1%
It’s nice to see related artwork	1	1%
The interactive features are helpful	1	1%
Other/Unrelated	10	14%
Total Responses	**73**	**100%**

*9 inappropriate or blank comments were removed from this total

Responses:

- **The exhibit is good (21 responses)**
  - Awesome job!
  - It was nice that they took in the armor
  - Always a treat at WAM
  - Love this museum
  - It was fun!
  - Liked it
  - Just keep the good work!
  - Nice exhibit!
  - It was awesome!
  - It was a good exhibit
  - I brought my grandchild and loved it
  - This was a very good exhibit and I will visit again.
  - It was wonderful
  - This exhibit is awesome
  - I think it was a wonderful visit and I enjoyed the galleries and loved simply everthing.
  - Awesome
  - I love it you guys are great never close down.
  - I like it
  - Keep up the good work.
  - I love this exhibit. I've visited many times.
  - Your doing a great job
- **Add more displays and suits of armor (9 responses)**
  - I loved the visible shape of the armor. Kind of wish there were more suits though.
  - Sad to see so little of Higgins collection displayed
  - Would like to see more armor.
  - Hope there is more of the collection to come
  - Too small
  - I liked the suits of armor but wish there were more displays
  - add more collection items
  - I miss the size of the Higgins collection, but I appreciate what the WAM has done with the space it had. The sword exhibit especially shows off a wonderful selection from all around the world and is perfectly organized. I'd love to see more from the Higgins collection on display someday.
  - Way too sparse
- **Batman received mixed responses. Some people were really excited about it, but others were confused why it was included (9 responses: 44% negative, 56% positive).**

Negative (4 responses):

  - Batman has to go
  - Batman does not fit here.....
  - Why is there a statue of batman in the exhibit?
  - My initial impression is... not to try to hard to force contemporary connections. ...Batman [didn't] really work for me. I think it is okay to take the past on its Own terms.

Positive (5 responses):

  - I was excited to see Batman.

- More batman stuff is good
- I enjoyed seeing batman among the nights of the past.
- the batman was a nice surprise
- Got a kick out of batman

- **The Guns Without Borders section received mixed responses. Some felt it was inappropriate, especially for children, while others thought it was interesting (8 responses: 50% positive, 50% negative)**

Negative (4 responses):

- The gun violence section is inappropriate for families
- For an exhibit about knights I thought the very skewed inclusion of gun violence was unnecessary.
- I understand the rationale, but the exhibit on Central America did not really work
- Th section highlighting the horrors of war, while apt, detracts from the artistic and culture of the art of arms and armor, lumping any such items in with a bland anti violence sentiment.

Positive (4 responses):

- Thank you. For including the violent photos and commentary of the drug cartels.....it is important that we do NOT romanticize weapons
- Glad you did the GWOB exhibit in the middle of the armor glorifies war exhibit
- The photographic exhibit from Latin America were a bit shocking, though powerful. Perhaps curtains for the little ones?
- loved the guns without boarders exibit

- **Include more information about objects and definitions of unusual terms like "garniture" (4 responses)**

- Needed more information about the function of the swords
- Definitions of terms such as garniture and saffron.
- Sword of justice should have a translation for the German inscribed on the blade.
- Nice exhibition. But more historical information would be good

- **Lighting is too dim (3 responses)**

- Dimly lit arm our makes appreciation of engravings difficult.
- Better lighting please, no pun intended but it feels like a dungeon
- Please add more lighting!

- **Music (3 responses: 67% negative, 33% positive)**

Negative (2 responses):

- My initial impression is… not to try to hard to force contemporary connections. Twentieth century songs… don't really work for me. I think it is okay to take the past on its Own terms.
- The music is distracting, and its connection to the collection not readily apparent.

Positive (1 response):

- The use of musical examples was original and stimulating.

- **Organization is poor (2 responses)**

- Felt as though curation should have had a single thematic focus and provided more context, and more organization to the content, in keeping with that focus. Print materials helped but layout and intent were not clear from the organization of the galleries.
- poor display plan

- **Include live demonstrations (1 response)**

- Any live demonstrations?

- **Display original Helmutt dog (1 response)**

- Where is the dog that inspired Helmut?

- **It's nice to see related artwork (1 response)**

- Loved the artwork displayed in conjunction with the armory pieces.

- **The interactive features are helpful (1 response)**
  - It makes it much easier to learn with interactive features

Question 7: How often do you visit the Worcester Art Museum? (click one)

First visit 36.1%
No Response 22.2%
2 - 6 Times a Year 20.3%
Once a Year 17.4%
More than 12 Times a Year 2.2%
Once a Month 1.5%
Total: 315

Question 8: How many Adults are in your group?

1 21.2%
2 41.5%
3 8.8%
4 4.1%
5 1.2%
6+ 1.5%
No Response 21.2%
Total: 315

Question 9: How many Children are in your group?

1 19.6%
2 14.9%
3 5.3%
4 1.5%
5 <1%
6+ 1.5%
No Response 56.1%
Total: 315

Question 10: What is your age?

Under 18 23.4%
18-24 14.9%
25-45 20.0%
45-65 14.9%
Over 65 5.3%
No Response 21.2%

Total: 315