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SWORDPLAY THROUGH THE AGES

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by

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Contents

Abstract:

This team researched swords and sword combat through the ages in the Western world and put together a detailed research document on the subject. Based on this research, the team created a video documentary for the Higgins Armory Museum highlighting the various swords and styles of combat of the Western world; the video is approximately 15 minutes long and covers swords from the Viking era to the late 1800s – early 1900s.

Introduction:

One of the hallmarks of the human experience is that it is never static; there is a constant drive to improve upon the experiences of the past to work towards a new and better tomorrow. We humans apply this trait to all aspects of our being, inventing new medicines, creating more efficient modes of transportation, and finding new ways to increase our longevity. However, this is not always used in the interest of preserving or protecting the bulk of humanity; we are as destructive as we are creative, and our improvements in military technologies speak volumes to that effect.

This same kinetic outlook that we apply to our daily lives has been used in the development in sword technologies, one of the most widespread and common weapons until the past two centuries. In the same manner that we constantly changed the sword, we also changed the way we fought with the sword. From early simple designs made for purely offensive maneuvers, to the elegant and complex blades used equally for attack and defense, the sword has been an expression of the age in which it was used. In Medieval times, it was associated with warriors and soldiers because of its value in the military, but by the Renaissance, the sword was becoming more and more associated with the "gentleman" class and their ability to use the weapon outside of the battlefield.

One of the common problems with a museum featuring historical items is that, while the items are secure in their cases or mounts, visitors do not get a chance to see such artifacts in use. The Higgins Armory has an extensive collection of swords, but without seeing the swords in use, visitors do not get the chance to understand how they were really used. While Hollywood has portrayed sword combat in some movies, more consideration is given to making the sword look cool in such circumstances rather than being period correct. With a video showing the swords in

use, it dispels some of these myths and gives a more accurate representation of sword combat, something that members of organizations such as the Armory's own Sword Guild promote with their demonstrations of combat.

In addition to seeing the sword in action, the sword has a long history which many people are simply unaware of. The sword has been present since ancient times and was in widespread use until the late 19th and early 20th centuries. It has also changed greatly during that time, from simple one-piece weapons to elegant designs, and the techniques for using such swords have changed as well. Swords evolved from edged pieces of metal that were swung with force into an opponent into at least two lineages, those that were curved for cutting and those that were pointed for deep thrusts. Swords were an everyday part of people's lives, something that has changed today but the evidence of the sword is seen everywhere. In addition, the techniques and combat are unique for each type of sword, and that much knowledge should be preserved to the best of our ability, rather than buried in the past.

In the effort of preserving these styles and to bring them into the public eye, this team from Worcester Polytechnic Institute has been researching different Western swords and the ways they were used in order to form a video documentary that will help people visualize these swords in settings appropriate to their era of use. The video, which is approximately 15 minutes long, highlights the weapons that were researched by the team and attempts to present them in a fashion that will both be enlightening and entertaining to the viewer. The video shows five different swords: the Viking sword, the longsword, the sword and buckler, the rapier, the smallsword, and the saber, and documents the styles of fighting with each of these weapons. For each sword, basic descriptions of the sword and its use have been provided, along with video from combat sequences using the members of the Sword Guild from the Higgins Armory

Museum. These combat sequences are part of an extensive "reverse engineering" style of recreation, and have helped to enlighten visitors and this team on the true nature of sword combat.

The bulk of our knowledge for the most recent swords, such as the rapier, smallsword, and saber, and to a degree the longsword, has been preserved in treatises on combat written by swordmasters. For more ancient swords, such as the Viking sword, which has few if any surviving treatises, information on sword combat has been gleaned from art depictions from the time and inferred by experimental reconstruction, a form of reverse engineering. Fortunately, these techniques have been researched by modern historians in an effort to reconstruct the systems of combat found throughout the history of sword usage.

The Viking sword was used by the Vikings in their day-to-day life around 1000 AD. From Viking raids to one-on-one personal combat, the sword was the Viking's best friend. It consisted of a straight blade and a handgrip, with virtually no crossbar. The Viking sword was entirely an offensive weapon, and was used in conjunction with a shield as the Viking fought.

The longsword was developed between 1000 and 1300 AD; it had a crossbar, which increased its defensive capabilities and made it a more versatile weapon. Indeed, the longsword could be held with one hand on the blade to make it a short spear, the pommel could be used to bash an opponent in the face, and the crossbar could be used as a hammer or a hook.

By the Renaissance, unarmored civilians began to carry swords as part of their attire. Instead of carrying heavy-bladed swords designed for cutting, they began to use lighter blades with more elaborate hand guards for thrusting and parrying maneuvers. The hand guards became more and more complex to compensate for the lack of armor, and the blade became thinner, more pointed, and lighter, and eventually became the smallsword.

Meanwhile on the battlefield, slashing weapons remained the weapon of choice, especially for cavalry. The saber was the result of this, a one edged blade with heavy influence from Islamic designs, especially the Persians and Turks, used more for cutting than thrusting. The saber fell out of use with the downfall of the cavalry by the end of World War I, but continues to serve as part of the dress uniform of West Point graduates, the Marines, and honor guards for ceremonial purposes.

To more efficiently collaborate on the research, the swords were divided amongst the group members to allow for the most research possible to take place on each weapon. The Viking sword and longsword were researched by Daniel Harty, the rapier was researched by Timothy Mulhern, and the smallsword and saber were researched by Drew Sansevero. Jordan Bentley, the fourth member of the group, researched video techniques and familiarized himself with the video editing process to the effect that he became the director and video coordinator.

The video itself proved a challenge to coordinate. For each sword, a day was planned in advance, often a day when the Sword Guild would be meeting later on, for which the combat sequences would be shot. The team scouted out locations for the shoot and then acquired permission for their use. Some of the shoots lasted longer than the others, but were generally over in a few hours. The individuals in the shoots were comprised of the Sword Guild and the Wolf Argent.

Chapter 1: The Middle Ages

Author: Daniel Harty

Medieval Context –Society and Culture

The history of the Middle Ages extends from approximately 300-1500AD. Its culture evolved through a process of absorption of the ways of life, ideas, and religious attitudes formerly prevalent in the Mediterranean world. An example of this can be seen in the Roman Aristocratic style of ruling that endured as the dominant model for the ruling class of Medieval Europe. Further absorption occurred as Western Europe and the Mediterranean world experienced invasion by various semi-nomadic people from the 5th to the early 8th century AD causing enormous upheaval and confusion, resulting in the transformation of European society and government. Especially influential were the Germanic peoples of the so-called "Barbarian" invasions (5th century) as they, unlike the Mongolians and the Arabs, settled in Western Europe and Northern Africa forming their own kingdom. The dramatic expansion of Islam during the 7th century also played a dominant role in early Medieval Europe, dividing the European and Mediterranean world into three sections, the Byzantine (Eastern Roman Empire), the European (Western Roman Empire), and the Islamic (Muslim). This division of Europe and the Mediterranean into western Christian, eastern Christian and Muslim parts profoundly affected the culture and history of the region. Hostilities between Christians and Muslims became a

fixture of Mediterranean history, noted by the crusades that began in 1095. [Cantor 1993:1,9,89,131].

Until the mid-8th century, the vast Arabic Empire was under one rule. Although their defeat at the battle of Tours in 737 stopped their northern advancement into France, the Muslims remained satisfied with control of Spain. Civil wars of the 3rd century, Germanic invasions, and finally, Arabic military triumph accelerated the process of de-urbanization and helped to produce the feudal and manorial world of 9th century medieval history. Without the Roman Empire, western civilization was forced into self-sufficiency to work out its own institutions and leadership [Cantor 1993:136,137,143].

Farming was the most important economic activity in Europe throughout the Middle Ages. As the land and its produce made up the majority of wealth, ownership or control of land played a large part in the structure of society and distribution of power. The institution of the seigneury (or manor), included a collection of land and men, overseen by a seigneur (lord), who had economic and political rights. The land included peasant holdings, land directly owned by the lord (demesne), and the commons. The lord exercised a power difficult to withstand. His right to issue orders and punish those who disobeyed, allowed him to control the economic endeavors of the peasants, establish judicial rights over the the village or community through his control of the manor court, and to usurp the peasants' rights in the commons. In the manorial system, peasant –serfs labored for the lord in return for land of his own, while in the overlapping 'feudal' system consisting of lord, vassal, and fief, the lord held lands from a king or overlord in return for military services which included fighting in the field, garrisoning strongholds, and rendering aid to the lord.[Gies 1990:18]. Early household vassals were compensated for their

military service with food, housing, and occasionally gifts – a horse, arms, clothing, and other equipment needed for the vassal's activities [Zacour 1969:36,44,45].

By the 8th century, warlords in Western Europe recognized the superiority of armed cavalry and sought to build their armies with mailed and mounted soldiers –the chevalier or cniht (knight) [Cantor 1993:198]. The knight's equipment incurred a heavy expense; full equipment included: the horse, lance, shield, sword and scabbard, helmet, leggings, and mail-shirt (byrnys). The mail-shirt was so expensive in 805 AD that it was only required of landowners holding over 300 acres [Barber 1980:12]. Lords began allotting estates (fief) to their vassals as a means of income for battle, allocating an increasing amount of land into the feudal system.

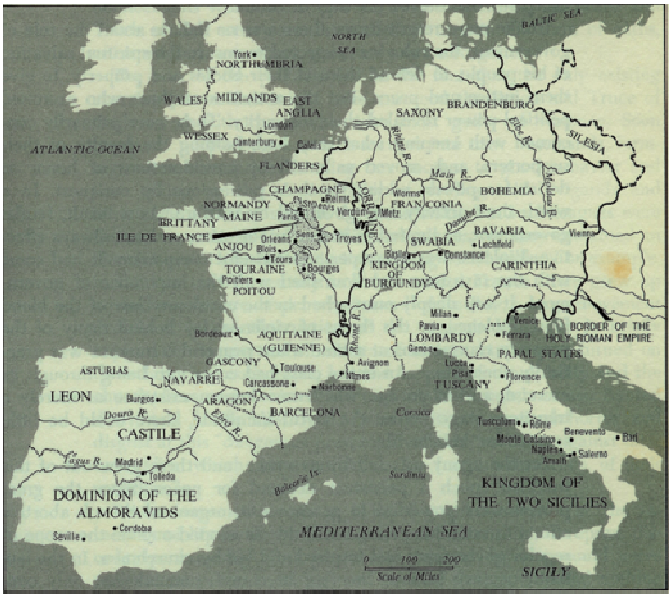


Figure 1: Feudal Europe

The Carolingian Dynasty (arising from the Frankish Merovingian rulers) constantly seeking ways to reconstruct the royal power in France, appreciated the military advantages of investing chevaliers with estates, setting a precedent in granting large fiefs to their aristocratic vassals. Thus the lowly vassal in many instances found himself in the position of importance,

enjoying lordship over one or more manors while the Carolingians continued to equip large cavalry [Cantor 1993:167,199].

The most impressive ruler of the new Carolingian Dynasty was Charles the Great, Charlemagne (enthroned 768). Waging 18 campaigns against the Saxons he established what he considered inseparable, his political dominion and the Christian religion [Zaquor 1969:9]. Uniting large parts of Germany, France, and Italy, he was crowned 'emperor' by the Pope in 800 AD. He established legal code and encouraged scholarship and patronage of the arts. By the late 10th century, Charlemagne was considered the founder of what was then called the *Holy* Roman Empire. The ideas of dividing society into three classes also date back to at least this time period; those who fought, those who worked, and those who prayed [Bartlett 2001:53,101].

By approximately 1000 AD, the fully fledged knight appears with his roots in the Late Carolingian Empire, now a rich man providing military service in return for land-holdings. The knight had to learn skills both in horsemanship and use of weapons. Squires (écuyers, bearers of the écu (shield)) would be placed together in a large household to serve their apprenticeship in arms. The next step of gaining practical experience varied-In the 10th and 11th centuries, private quarrels; and later, large-scale campaigns [Barber 1980:16].

The cult of chivalry began to develop in the late 12th century. Those that tried to make a living by the sword often spent 20 years fighting for their lord before obtaining estates of their own. Without these additional responsibilities they had much time for leisure, listening to minstrels, and tournaments [Barber 1980:19]. With injury and death not uncommon, the tournaments served as a military training preparing the knight for battle. It also served as a business, whereas the captured opponents were held to ransom, just as in real war. The tournament was lavish and spectacular, much enjoyed by the court [Bartlett 2001:116].

Although knighthood was originally purely secular with no religious overtones, the 14th century French knight Geoffrey Charny in his book of chivalry (Libre de Chevalerie) saw knighthood and priesthood as the two great orders of the church. A prayer describing the knight as a kind of secular arm of the church reads as follows:

> "O Lord who established three degrees of mankind after the Fall in the whole world, that thy faithful people might dwell in peace and secure from all onslaughts of evil, hear our prayers and grant that thy servant may use this sword, which by thy grace we bless and give to him and gird on him, to repel the hosts who besiege God's church and to defend himself with thy protection against all his foes."

Charny describes the elaborate procedures and symbolism connected with being knighted. This includes confession of sins, communion, and being dressed in scarlet colored robes which signify that he is sworn to shed his blood for the faith of the Lord and to defend and maintain the laws of the Holy Church [Barber 2001:112-113].

The ceremony of dubbing to knighthood is also described in both the treatises *Ordene de Chevalerie* (probably composed before 1250 AD –author anonymous) and Ramon Lull's *Book of the Ordre of Chyvalry (Libre del ordre de cavayleria)* –the bath signifying baptism and cleansing from sin, the white belt girded on the new knights loins signifying chastity, and the sword placed in his hands to remind him of the duty to protect the weak and uphold justice [Keen 1984:6, 64]. Images of the sword and church also abound in medieval works of art. For instance, St. Paul by his sword –Catalan, 13th century and Christ giving the key to the Pope and the sword to the emperor; a 12th century manuscript of Gratian's textbook of canon law [Bartlett 2001:66,96].

This merging of church and military service combined with the strife between Christians and Muslims provided the impetus for the bloody period known as the crusades. Religious

fervor spurned on by a speech from Pope Urban II ignited several huge armies of western knights and foot-soldiers to march to the Holy Land, storming Jerusalem in 1099 AD. Various crusades continued to serve as a useful tool to turn against heretics, political opponents of the papacy, and rebellious peasants [Bartlett 2001:234,244].

The invention of printing, the beginnings of European expansion across the globe including the discovery of America, and momentous changes in cultural and religious life was a sign of the end of the medieval period. The church failed to meet the challenge of reform, books began to be printed in mass, and the bible became available to any literate person. European states extended their dominion to other continents. The European Middle Ages with its old images of a universal church and a self-contained Europe with its geographically circumscribed boundaries was gone forever [Bartlett 2001:258-261].

Swords and Swordplay before 1300- Ancient, Viking, Medieval Pre-1300

The most basic components of a sword are a blade and handle. The blade is the cutting part of the sword, consisting of at least one sharpened edge and often a pointed tip for thrusting. Dissecting the blade further, the shoulder and tang are introduced. The shoulder is the short section of blade between the handle and the start of the sharpened portion of the blade. The tang is the part of the blade extending from the top of the blade through the handle. The handle of a sword is called the hilt, which is often made from wood covered by leather. Most hilts have a guard, grip and pommel (round part at the bottom of the hilt). The guard protects the hand during swordplay while the grip and pommel prevent the sword from slipping. Swords not in use are kept in a case called the scabbard.

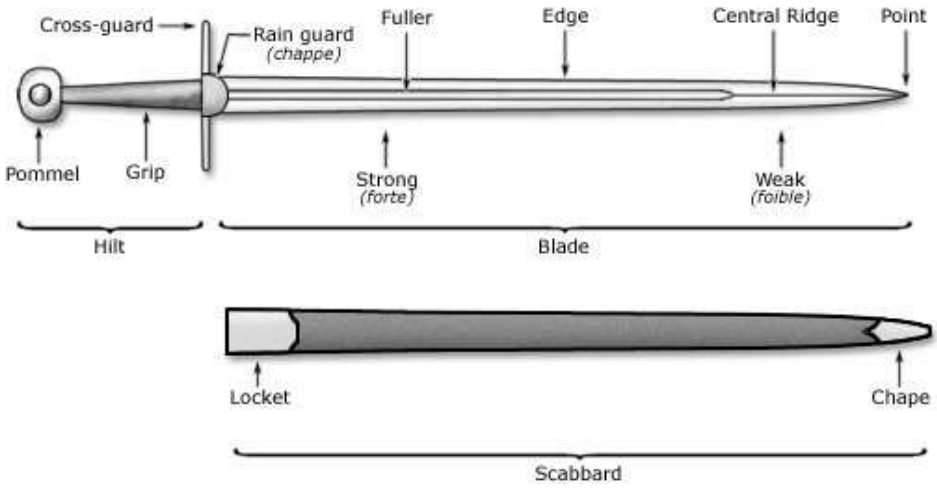


Figure 2: Parts of the sword

The Stone and Flint Age

Ancient swords evolved from daggers and both are identified according to their respective blade lengths. Blades less than 14 inches/ 35.5 cm are commonly considered daggers, 14-20 inches/ 35.5-51 cm are dirks, 20-28 inches / 51-71 cm are short swords, and anything over 28 inches/71 cm are long swords. The shorter blades are designed for stabbing and cutting at close quarters, while the function of longer blades depends more on form. An example would be the rapier's long narrow blade which is better utilized for a thrusting motion than a wider, stouter blade suitable for hacking and cutting as well as thrusting [Connolly 1993: 8].

Before the advent of metalworking, wood and stone were shaped into offensive weapons. Flint and other stones such as obsidian were sharpened to a fine edge through a procedure called pressure flaking. This process involves removing small flakes of stone by applying pressure with a pointed piece of hard wood or antler until the desired form was achieved. The hilts of these early weapons were often made of bone [Connolly 1993: 8, 9].

Pre-Bronze Age and Bronze Age

The first hilted weapons to be made of metal were made from unalloyed copper. The Copper Age continued to limit the length of hilted weapons due to the strain conditions on blades

longer than the dagger class. It wasn't until the development of copper alloys during the Bronze Age that allowed for longer blades, introducing the sword.

These copper alloys, notably tin-bronze, improved the strength of the metal and improved forging techniques. By the early part of the second millennium BC, weapons of greater length started to develop to a limited degree in Egypt and the Near East, including swords with curved blades. In Aegean Greece, bronze smiths began to extend the length of their weapons considerably. In the famous Shaft Graves of Mycenae (Mainland Greece), bladed weapons of three distinct types were found dating from the 15th and 16th centuries BC, all elaborately decorated. These included the long, thin sword known as the "rapier", shorter tapering swords with a distinct handle, and the short dagger. The Mycenaean period continued from 1400 to 1200 BC with swords displaying a variety of flanged hilts on both long-bladed and short-broad bladed daggers. Seemingly, these short bladed daggers became the forerunners of the standard Mycenaean short sword (1200-1100BC).

Likewise, second millennium BC Europe was nearly parallel to the East in its transition from copper to bronze and development of the sword from the dagger. With the superior materials available in the Bronze Age, blades were made longer and rapier types became common. As in Aegean Greece, the Europeans finally developed the method of casting the blade and hilt in one piece solving the potentially fatal problem of a weak joint between the two.

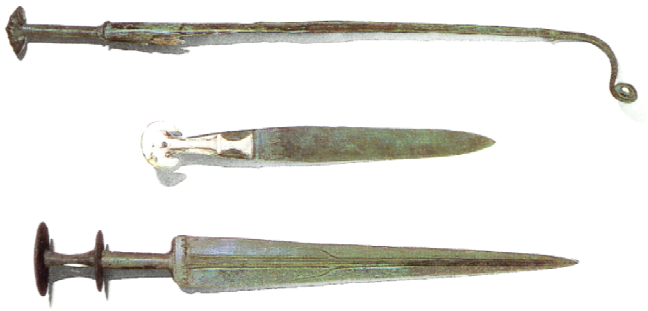


Figure 3: one piece cast

The Europeans were also the original designers of the grip-tongue sword. This classic flange-hilted sword had a long blade, widening to a triangular shoulder with a protruding tongue-like grip. These began to appear, not only in Europe but also in Greece, Cyprus, Egypt and Syria at approximately 1200 BC. Throughout the Bronze Age, iron objects were being produced in small quantity. It wasn't until after 1200 BC that iron became abundantly available in the Middle East and even later, 700 BC, in Europe. Previously, it was assumed that knowledge of iron-working was available to only some early cultures, such as the Hittites and Philistines. However, this is not entirely the case because the technology for working iron was present to some extent in many of the Near East states [Connolly 1993: 9-17].

The Iron Age

The Assyrians dominated the Middle East from 900 to 612 BC. They were the first to take advantage of the superiority of iron in producing weaponry. They were an extremely cruel regime almost constantly at war, with large armies to equip. Iron, much more plentiful in the Middle East than the tin necessary for smelting bronze, could be mass-produced. This suited the Assyrian Empire well, their army being the most technologically advanced for its day. Along with the spear, bow and sling, swords and daggers were included in the regular armament of both cavalry and infantry. The straight slender bladed *Namsaru*, with its elaborately ornamented hilt, was often depicted slung at the waist of the Assyrian soldier [Anglim 2002: 12].

Figure 4: Assyrian cavalry

In Greece, the grip-tongued sword continued its development and by the 10th century began to be produced in iron, gradually evolving into the sword of the Hoplite (a heavily armed Greek soldier of the Classical Period) [Connolly 1993: 20]. An early example of this Mycenaean type 2 sword of iron dates back to 820 BC and has a straight-sided, double-edged blade, 75 cm long. By the time of the Persian Wars, we find the sword of the Hoplite with a shorter blade, 24

inches/ 60 cm long, made of iron with bronze fittings widening gradually then tapering to a point. The tang was flat and quite similar to those made during the Bronze Age. It was essentially for slashing, while swords with longer points could be very effective for a "cut and thrust" motion. By the 6th to 5th century, the *Kopis* had developed as a curved, single-edged sword used as a vicious slashing weapon. Having a huge blade (65 cm long), it was later modified to a shorter cut-and-thrust weapon. This weapon, probably originating in Etruria, became very popular in Greece and Spain from the 6th through 3rd century BC. Spain eventually converted the *kopis* into the *falcate*; a short cut-and-thrust sword with an average length of 45 cm. By the 5th century BC the *Hoplite* and the *kopis* had superseded all other types of swords in the Latin World. The end of this century brings the advent of the Celts to northern Italy, sacking Rome around 390 BC [Connolly 1981: 63].

The Celts

During the early Hallstatt period (700-500 BC), Celtic swords were longer and heavier variants of Bronze Age themes, most with sheaths and elaborate pommels. As with most weapons after 700 BC, Celtic weapons began to be made from forged carbon steel, finished by grinding [Connolly 1993: 18].

During the La Tene period (500 - 1 BC), the Celts continued to develop their sword. The standard sword of this period was of iron and steel. A long, double-edged sword, straight-edged, and slender, it was often pattern-welded. Connolly describes pattern welding as "The technology of strengthening the blade…by welding together strips of iron in various formations to produce a stronger blade, and adding carbon to the edge to make hard steel" [Connolly 1993: 7]. The scabbards were made mostly of Bronze decorated with abstractions of natural designs.

Early blades from La Tene I (450-250 BC) were generally from 55 to 65 cm in length, their shape pronounced. They were pointed and of the cut-and-thrust type. During La Tene II (250-120 BC) the point became rounded and gradually increased to a length of 75-80 cm. Its purpose was exclusively for slashing. La Tene III (120-50 BC) brought a continuation of blade length, sometimes as long as 90 cm. Most were predominately flat-ended [Connolly 1981: 116].

The fact that the Celtic sword could cut right through a Roman shield and the sheer mass of their ferocious charge motivated the Romans to develop a defense system of a heavy javelin, body shield, and a sword called the *gladius* , aiding them to eventually end the Celtic aggression on the continent of Europe in 55 BC [Connolly 1981: 117].

The Romans

From about 100 BC and onward for the next 250 years, all Roman troops were armed with the *gladius hispaniensis*, or Spanish sword. A thrusting sword, it was capable of rupturing mail. An early 1st century *gladius* found at Rheinonheim, Germany had a blade length of 21.5 inches/ 55 cm, with a silver-plated hilt. The Roman *gladius*' resemblance to its early Spanish ancestor is evident in its shape (a long point and slightly waisted middle) but especially in the Roman adaption of the same type of scabbard with a four-ring suspension system [Connolly 1993: 24, 28].

Around the 1st century AD, the Roman *gladius* was abandoned. The point of the new Roman sword became shorter and by the 2nd century AD the *spatha* appeared, a longer, slashing cavalry weapon with a blade varying from 26 to 28 inches/ 65 to 70 cm long and sometimes

longer. The *spatha* was actually of Celtic origin. Although the Roman Empire began to crumble in the 3rd century AD, the *spatha* continued to endure [Connolly 1993: 27].

A new sword began to evolve from the *spatha* by the 5th century AD. A 42 inch/ 105 cm long, straight, double-edged sword dating circa 400 AD (found in Kragehul Muse, Denmark) features a grip with a distinctive waist and 3 raised horizontal ribs for the fingers [Connolly 1993: 30]. As with many Roman swords, this waisted-grip feature has been found on a number of similar swords from the 2nd to 6th century AD. While the Roman sword was a part of their armor, the sword became an integral part of Viking society. This is elaborated in the next section.

The Vikings

The Viking sword was handed down from father to son. The Vikings even went so far as to name their swords and often inlaid inscriptions on the blade, usually of the maker or owner [North 1993: 31-33]. Although the majority of the Viking swords have a broad, double-edged blade with a long channel running through the center, straight, single-edged blades with sharp, tapering points have also been found [Peirce 2002: 20]. The *seax* or *sax* is included in this group and dates back to the 1st, 2nd, and 3rd century.

Viking swords are traditionally classified by form and decoration of their hilts. Blade lengths and weight varied among Viking warriors according to preference, although Geibig's Classification sorts the principle Viking blade forms into 5 types (1-5) according to blade length [Peirce 2002: 15] .

The Vikings had a vast array of sword hilts, although the basic design is similar, consisting of an upper hilt with an upper guard and/or pommel, a single-handed grip, and a cross guard or lower guard. The Peterson's Classification of Sword Hilts is helpful in identifying t 26 main hilt types, displaying these on a graph in chronological order ranging from the 8th to the 12th century AD while Wheeler's typology provides classification for British found swords. The hilts could be plain or very richly designed in intricate interlace, with overlays and inlays of copper, silver and bronze.

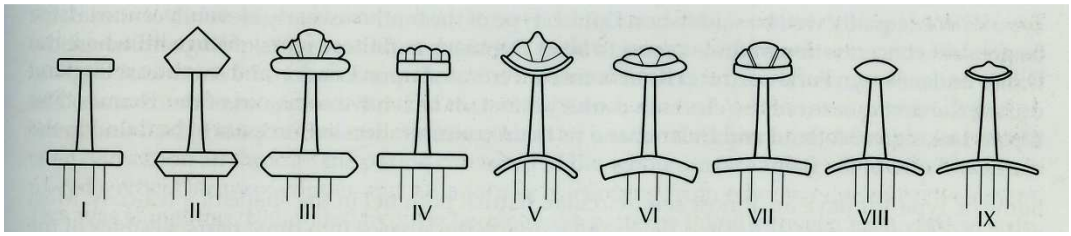


Figure 5: Wheeler's typology

The technique of pattern welding although dating back to the Late Iron Age is especially prominent in the Viking sword lending to a beautiful and unique array of patterns within the blade. Lastly, the inscriptions were often inlayed into the blade's surface by driving small iron rods, representing each letter, into the hot surface of the blade.

Figure 6: Example of pattern weld

Figure 7: Example of inscription

The Viking's reverence for the sword contributed to much heroic sword lore. The Vikings participated in two kinds of duel, an informal one called 'Einvigi', in which there were few rules, and a more formal one called 'Holmgang', literally meaning 'going on an island'. Whenever possible, Holmgang duels were fought on small islets, and if such a location couldn't be found, a space like a boxing ring was marked out on the ground. One of the best descriptions of the Holmganga law is found in the duel between Kormac and Bersi mentioned in Kormac's saga. According to the law, a cloak, ten feet from one end to the other was spread under their feet. Outside the cloak a short distance away, four poles called Hosler or hazel poles were placed forming a box called a Hazelled Field. The one who had been challenged must strike first. If either was wounded so that blood came upon the cloak, he was not required to fight any longer. If either stepped with one of his feet outside the hazel poles he was considered to have retreated and if he stepped outside with both feet he was considered to have fled. The one who received the most wounds was to pay a Holmslausn (indemnity for being released from the fight) of three marks of silver. Over time Viking society became more settled, replacing the way of life of the heroic warrior and his band, but the importance of the sword remained alive in the tales of the medieval Viking [Peirce 2002: 11, 13].

Single-handed Swords and the Knightly Weapon after 1300

The sword of the medieval knight was designed chiefly as an offensive weapon since he relied primarily on his shield or armor for defense. Its form consisted of a single crossbar (*cross* or *quillons*) as a guard, which was either straight, bent, or arched upwards. The blade was usually straight and double-edged, though single-edged examples do occur. It was balanced at the bottom of the hilt by a shaped pommel usually made of metal, and a grip normally made of wood wrapped with leather. After c1250 the hilt was often lengthened to accommodate two hands if necessary, the total length being about 35-40 inches. Towards the end of the 13th century, a larger sword developed with a total length of 45-55 inches. This *hand-and-a-half* or *bastard-sword* always included a hilt long enough for one or both hands. Although actual examples are rare, the true *two-hand sword* (sometimes with a total length of 6 feet or more) is known about as early as the second-quarter of the 14th century AD [Blair 1962:1, 2].

During the 13th century, the sword's emphasis as a cutting weapon shifted toward a thrusting weapon, possibly due to the increasing reliance on plate armor as a defense. From the second quarter of the 14th century, many swords had narrower, sharply-pointed blades with increased rigidity acquired through various adaptations in the cross-section. Most common are cross-sections of diamond, hexagonal, or lenticular shape [Blair 1962:4]. †

In addition to the knightly longsword, single-handed swords were used mostly by civilians, foot soldiers, and huntsmen. Generally they were of similar shape to the long sword, often with single-edged blades. The *falchion* (probably derived from the earlier Scandinavian

sax) was single-bladed with a convex curve, pronounced toward the top, giving it an almost 'cleaver-like' appearance. It was largely restricted to Germany and Scandinavia. From the late 14th century the curve of the blade continued to increase, perhaps due to the influence of the Eastern European curved sword. The falchion's hilt paralleled the development of the long - sword hilt [Blair 1962:5].

† Oakeshott's typology of the medieval sword (a continuation of Peterson's typology of Viking swords) classifies medieval swords into 13 main types, X-XXII. It has proven to be useful as a general guide of sword type and time period [Oakeshott 1964:10-15].

The Treatises

Through the Middle Ages, masters of arms held a prominent place in European society, their skills sought after by many. Schools of arms sprang up throughout Europe with mixed review, as reflected in the city of London archives. There we find repeated prohibitions against fencing schools and the sword and buckler bullies they were thought to encourage [Anglo 2000:8].

Although there is not much documentation about these early schools of arms, many treatises survive that document the combat techniques, rules and procedures, general principles, and personal practices of the masters. The majority of these treatises are Germanic, forming the powerful German martial arts tradition. The 3 most influential authorities are as follows. The first being the 14th century master Johannes Liechtenauer (and his commentators) on unarmored longsword combat, armored mounted combat (horseback) and armored foot combat. The 2nd is the wrestling system of the Jewish master Ott (early 1400's) and 3rd, the treatise of the priest Johannes (Hans) Lecküchner, who composed a verse epitome on combat with the lange Messer

(literal translation “long knife”). His Munich manuscript (dated 1482), is the only medieval treatise following the Liechtenauer tradition to integrate both text and images [Anglo 2000:23].

The Starhemberg Fechtbuch (martial arts treatise) of 1452, is one of the most comprehensive medieval martial arts manuscripts and the best surviving copy of Liechtenauer’s work. It also includes a full version of master Ott’s wrestling with additional brief text by masters Andre Liegnitzer (halfsword, dagger, sword and buckler wrestling) and Martin Hundfeld (halfsword, dagger, armored pinning techniques, and mounted combat). The mid 15th century German master Hans Talhoffer, working in the Liechtenauer tradition, contributes at least a half-dozen manuscripts and hundreds of illustrations, actually posing himself in his Fechtbuch of 1459 [Anglo 2000:25].

The Sword and the Buckler

The German *Fechtbuch* (martial arts treatise) first appears somewhere around 1325 AD. The Walpurgis Fechtbuch, written in Latin, contains 64 pages of illustrations and commentary details including distinctive combat sequences of the sword and buckler. The application of the treatise is for unarmored, civilian combat, with the primary function of the buckler being to protect the sword hand. The chief target is the head, with the use of both cut and thrust. The techniques include wrangling for position and blade contact utilizing principles of initiative and leverage common to the German tradition [Forgeng 2007:153]. Later treatises also include sword and buckler combat. For example, the *Starhemberg Fechtbuch* of 1452 outlines 6 detailed techniques composed by Master Andre Lignitzer using different types of cuts (i.e. the High Cut

and Change Cut), wielding the sword and buckler. Talhoffer's 15th Century Illustrated Manual of Swordfighting and Close-Quarter Combat provides several illustrated plates of sword and buckler combat techniques.

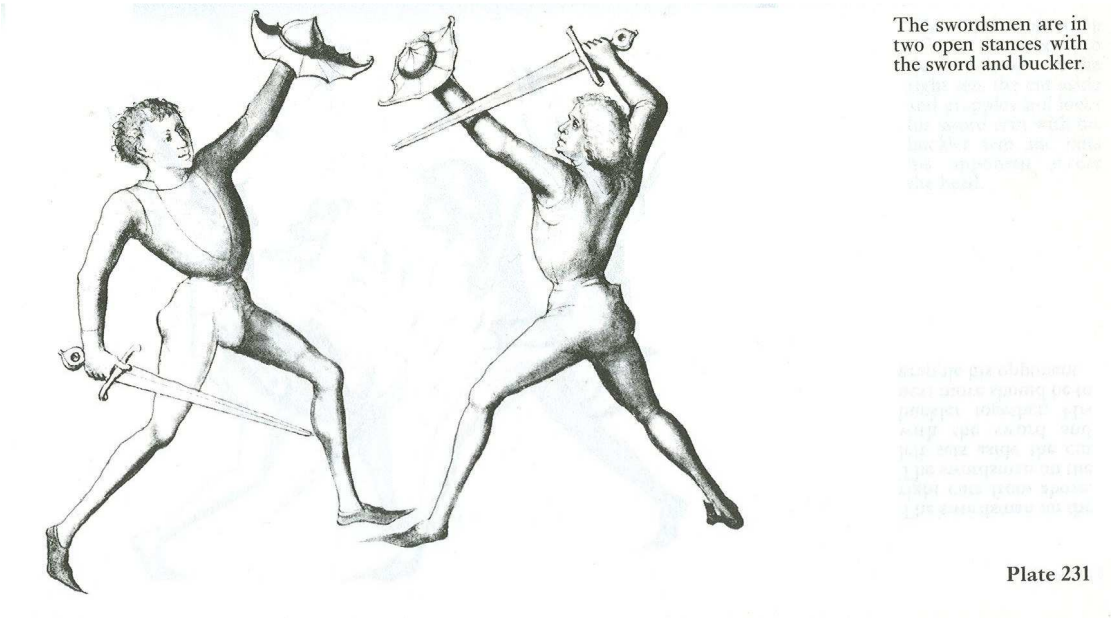


Figure 8

The "Falchion" –*langes Messer*

The *langes Messer* or Messer is considered a variant on the falchion. It is a single-edge, slightly curved sword with a fairly broad blade. The German name literally means "long knife". In the Munich manuscript of Hans Lecküchner's Treatise on the Art of Falchion-Combat, the Messer seems to have about a 2-foot blade with a grip long enough for two hands if needed. Leckücher's text contrasts the slightly convex curve on the front "sharp edge" with thick and unsharpened back "blunt edge". The concave notch at the tip of the back edge appears sharpened for attacks, a technique used frequently in Lecküchner's work [Lecküchner 2007:10].

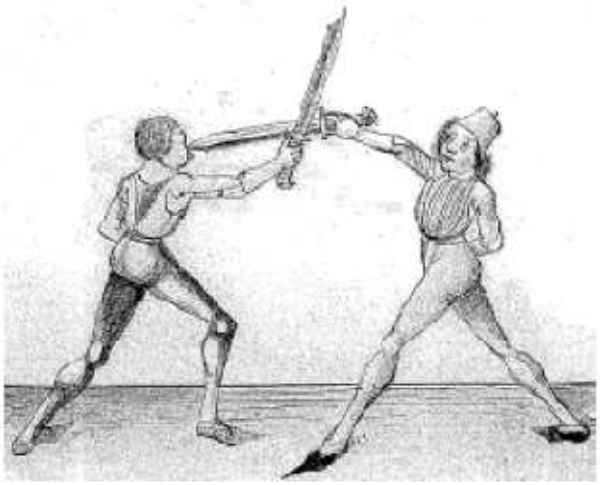


Figure 9
Example of Lecküchner's use of the blunt edge during Falchion combat, "Crossed Guard" [Schrankhut]

The treatise contains several hundred illustrated techniques for "Falchion" combat, possibly the only medieval treatise to make full use of both text and images in the Liechtenauer tradition. Although Lecküchner was heavily influenced by the authoritative text of Liechtenauer's unarmored longsword combat, there are 6 techniques and numerous additional features that really set his style apart from Liechtenauer. The 6 techniques not included in the early Liechtenauer verses are as follows: Winker (Wincker), Running Off (Ablauffen), Snaring (Pnemen), Going Through (Durchgehn), The Bow (Bogen), and Taking the Falchion (Messer nemen).

Half-Sword Combat

Half-sword techniques, useful for armored combat, are described in some of the early treaties – noteably Leckuchner's treatise and the Starhemburg Fechtbuch. Of the later, Andre Lignitzer's Armored Combat with the Half-Sword includes four techniques with counters and six wrenching techniques.

Figure 10

The Longsword

There are a number of treatises on combat with the longsword, first and foremost are the ones by 14th century master Johannes Liechtenauer. Writing in a format known as the zettel,

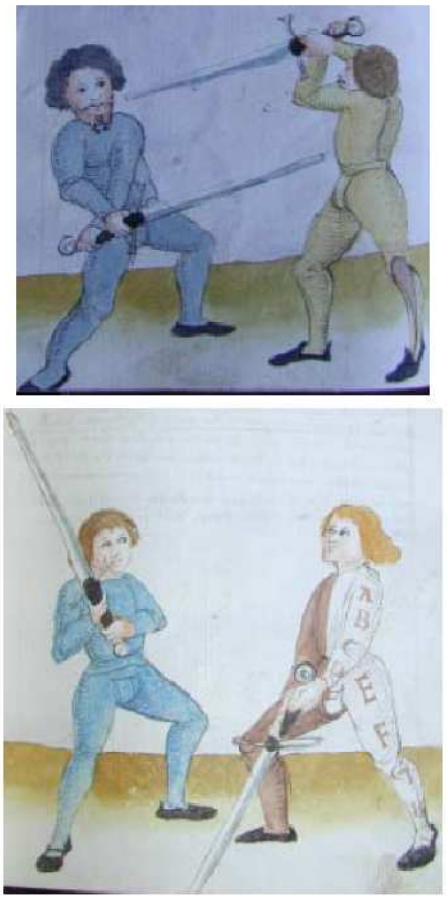
Liechtenauer authored 3 verse epitomes on the longsword, mounted combat and armored combat [Forgeng 2007:155]. The first epitome on unarmored longsword opens with a prologue:

"Young knight, learn
to love God and revere women;
thus your honor will grow.
Practice knighthood and learn
The Art that dignifies you,
And brings you honor in wars.
Be a good grappler in wrestling;
Lance, spear, sword, and falchion
Handle manfully,
And foil them in your opponent's hands.
Cut in and hasten forth;
Rush to, let it hit, or go by.
Those with wisdom loath
The one forced to defend.
This you should grasp:
All arts have length and measure." [Starhemberg 2003:21]

Next come a series of 18 combat techniques written cryptically, perhaps because, as the Starhemberg Fechtbuch of 1452 states prior to providing such explanations (glosses) "He (Liechtenauer) has done this on account of the frivolous fencing masters who treat their art lightly, so that these maters will not make his art common or open with people who do not hold the art in respect as its due."

The 18 combat major techniques are listed as follows: Wrath Cut, Crooked, Thwart, Squinter and Scalper, Fool, Parry, Chasing, Overrun, Set Aside the Cut, Change Through, Pull, Run Through, Slice Off, Press the Hands, Hang, Wind the Openings, Strike, Catch Strokes, and

Thrust with Jabs. Technique 7: The Four Parryings, involves 4 of the above cuts.



Technique 7: The "Four Parryings" [*Die Vier Versetzen*]

Figure 11

The 2nd epitome consists of techniques for armored combat on horseback. In the art of the sword on horseback there are five guard positions. The 1st reads as follows:

"When you sit upon the horse, then hold your sword with your right hand by the grip and lay it with the blade on your left arm."

Figure 12
Armored combat on horseback

Liechtenauer's final epitome covers armored foot combat, focusing on dueling techniques including techniques for sword against lance and finding vulnerable positions in the opponent's armor

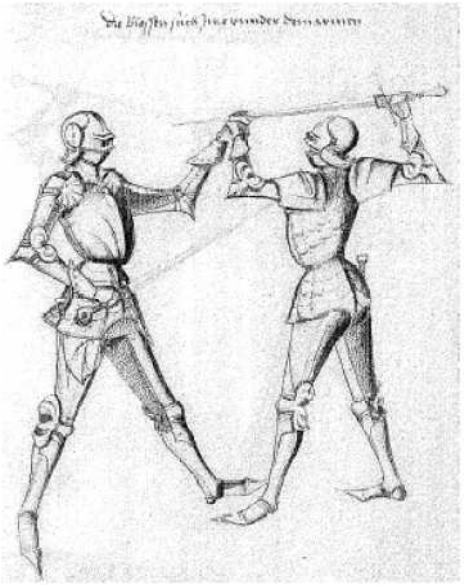


Figure 13
Armored foot combat "seeking the openings"

Liechtenauer's system remained the foundation of German swordsmanship until the longsword lost its status as the principle German personal combat weapon it the early 1600's [Anglo 2000:129].

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Chapter 2: Rapier Combat

Author: Timothy Mulhern

The Rapier arose from the ranks of the middle class in Spain in the course of the evolution of warfare. During the middle ages, the nobility were the only ones to wear armor and generally carried heavy weapons used for powerful attacks. In this manner, combat between two knights was often a test of endurance, strength, and the amount one was willing to spend on a full suit of armor. The middle class, however, rarely used armor and so had to use their weapon and a degree of activity not feasible in full plate to defend themselves. Accordingly, this changed combat into a reliance of skill in place of strength, and quickly gained popularity.

The popular mode of fighting among the middle class was between two armed opponents without armor, save a buckler for parrying blows, and emphasizing the use of the sword over other medieval weapons of choice, such as the mace, flail, axe, and polearms. In combat, thrusts and cuts were made and deflected, and the duelists would have to be quick on their feet to dodge when necessary. Between the 1400s[1] and the 1500s[2], the weapon itself became thinner and more pointed, using thrusting techniques over cutting blows, thrusts that could bypass the bucker with relative ease.

[1] Rapier Temporary Exhibit, Higgins Armory Museum 2nd Floor, May 2007
[2] "Rapier" Wikipedia http://en.wikipedi.org/wiki/Rapier

The "Pyrrhic dance" was a popular display of skill using a sword and buckler during this time, seen as a must at most festivities in Anglo-Saxon England[3]. However, the dance oftentimes degenerated into actual combat and fighting, to the amusement of the crowds. The practitioners of this performance were extremely skilled and were often sought after as teachers for those who wished to learn sword fighting techniques for themselves. The popularity of these "sword masters" soon manifested as "fighting guilds" and schools arose. These sword guilds attracted the least savory persons to their halls and the schools gained very poor reputations, not the least of which was the appellation "swashbuckler," for the manner in which their swords clashed on the buckler. However, many still flocked to these masters, for during the Middle Ages, an unarmed person walking alone was often the target of robbers and brigands, and someone who lacked the requisite skill but still carried a sword left himself open to challenge and attack[4].

Fencing then turned from a sword and bucker affair to largely a rapier and dagger mode of combat. Repeated displays of the rapier's thrust in combat, and how easily it could thwart another's buckler, soon drove the sword and buckler technique out of favor. As the rapier grew in popularity, it spread across Europe and made its way to Elizabethan England, where Italian and Spanish masters gained fame and displaced older English masters of defense. During this time, fencing schools gained a degree of character and were more accepted and respected than in previous times.

This expansion of the rapier's popularity and the spreading of its techniques did little to progress the rapier until the mid-16th century. Around this time, Spain launched a series of campaigns that enabled them to overcome Italy and the Low Countries, which most certainly

[3] Castle, Egerton. "Schools and Masters of Fence" (1892). 21
[4] Castle, Egerton. 21

seeded the Spanish methods across Europe. A side result of this campaign was that Italy, now a unified country, was once again divided into a multitude of city-states, one possibility for the lack of complete records of the rapier for this time frame. The rapier continued to be in use until the early 1700s, when it had become lighter and shorter and transformed into the smallsword. The Spanish and Italians continued to use rapiers until the 1900s, when swordplay fell out of

Figure 14: Rapier, Wikipedia

favor, and now survives only in the sport of fencing.

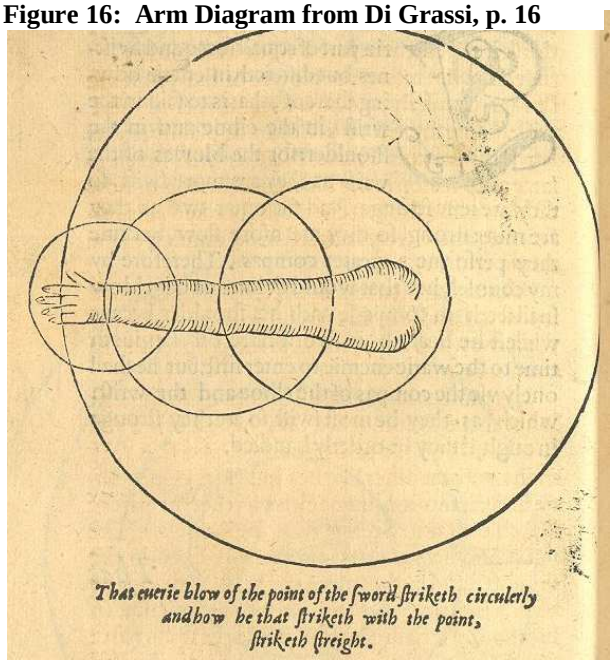
The rapier is a long and slender weapon specifically designed for use between unarmored civilians. The sword's shape emphasizes the use of thrusting maneuvers, although cuts are possible since it remains a double-edged weapon[5]. The rapier has a blade approximately one meter long and is no more than 2.5 cm wide, with a cutting edge from the middle of the blade to the end or with no cutting edge, a trait which would make rapiers with this feature completely a thrusting weapon. The hilts of rapiers were complex pieces designed to protect the hand,

[5] Higgins Armory temporary exhibit

consisting of rings and later solid metal plates in front of the crosspiece to ward off attacks made at the sword hand.

As with all martial arts, each master styled his form of combat with the rapier around personal strengths and preferences. Styles ranged from Di Grassi's scientific view of combat and dissection of the basic parts, to Marozzo's medieval-styled combat, to Fabris' all-or-nothing

Figure 16: Arm Diagram from Di Grassi, p. 16



lunging maneuvers. Just as each style differed in maneuvers and views in combat, so each style used various weapons alongside the rapier, from a buckler or cloak for deflecting blows, to a dagger or second rapier for both offensive and defensive maneuvers.

Di Grassi believed that, by careful analysis and breaking down maneuvers and through

Figure 15: Broad Ward from Di Grassi, p. 22

science, one could master combat as long as you knew the elements of combat. His works are filled with diagrams depicting angles, degrees of freedom in the joints, and figures to best determine the proper course of combat. One such diagram is of the arm, showing it as the radius of a circle emanating from the shoulder, to show the area in which the full arm can be swung. The elbow serves as another radius for a circle centered on that joint, and the wrist another circle, as well as a circle from shoulder to elbow showing where the elbow can be located. It is accompanied by text describing the speed and forces that can be achieved at each joint of the arm, and is closely followed by more diagrams depicting the sword and different areas of the sword and their radii and circles, and a diagram depicting angles and force for a strike from swinging at the shoulder[6].

Di Grassi applies the same scientific study to the position of the body during combat that he does to the position of the weapons and arms. He includes a diagram of how the forward foot should be held at an angle to the body, and the sword arm is on the same side as the back foot. He makes note of the fact that when delivering a thrust, one should make it while stepping forward on the sword-arm side for force[7]. The importance of keeping the sword-side foot straight in the centerline is emphasized throughout his work because of its importance in the thrust: to deliver deep strikes, one must put their force behind the sword and not try to deliver blows while stepping at an angle[8]

On how to hold a single sword, Di Grassi uses three wards: the high ward, the broad

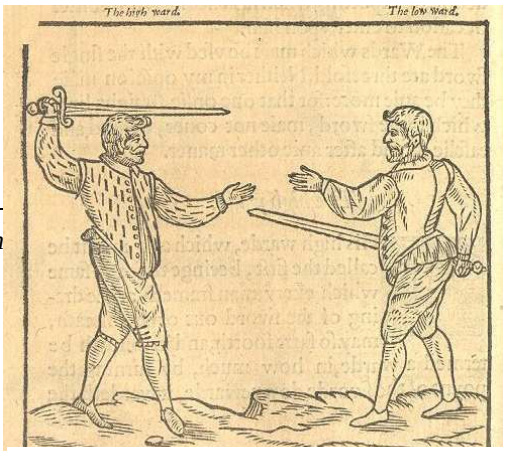


Figure 17: High and Low Ward from Di Grassi, p. 22

[6] Di Grassi, Giacomo. *Di Grassi h*
[7] Di Grassi, Giacomo 20
[8] Di Grassi, Giacomo 24

ward, and the low ward. The high ward holds the sword high and arching down, with the point in the centerline, in such a way that it protects the entire body. In this position, one can step forward and thrust downward with the sword, oftentimes above an opponent's guard[9]. The broad ward holds the sword away from the body with the point inwards in a manner that deceives the opponent into believing that there is no danger from the sword. However, the point of the sword is in the middle and points to the side, allowing thrusts across the middle and can be quite deadly[10]. The low ward is so named because the sword is held low with the point angled upwards. Di Grassi praises this ward as being the strongest ward and the most common, as well as the one from which it is easiest to strike and counter[11].

Thrusting strikes are favored over cutting blows with the rapier because it takes less time to thrust and is more damaging. Using the sword for cutting provides few strikes that are deadly, whereas with a thrust, the sword goes deeper into flesh and can pinpoint vital organs. It is because of this thrusting strike, and the need for the point to go deep into the flesh, that you step with the back foot (the same side as your sword) to provide the extra force to penetrate the body[12]. However, Di Grassi does give a reason for striking with the edge, which is when the point strays from the center and you need to strike. In this case, a thrust would require you return the point to the center and then strike, whereas a cut would only require you to bring the sword back toward the center while attacking an enemy at the same time[13]. Di Grassi provides a pictorial representation of this in his work, where the thrust requires two movements and the cut only one.

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[9] Di Grassi, Giacomo 22
[10] Di Grassi, Giacomo 22-23
[11] Di Grassi, Giacomo 23
[12] Di Grassi, Giacomo 24
[13] Di Grassi, Giacomo 24-25

While the bulk of on combat in Di Grassi focuses on the single rapier, he does discuss combat with additional weapons. In using a dagger, the dagger is held in the other hand and is primarily used for defense. Ones cloak may also be wrapped around the arm as a form of protection, held with enough looseness in the folds as to allow the cloak to deflect blows and to possibly catch the opponent's rapier in its folds. The buckler is also discussed in some detail for deflecting blows, as is the target, a square shield held in a manner similar to the buckler, and the round shield, which is strapped against the arm. He also discusses combat using two rapiers and the difficulty it poses, since one must be proficient with using either hand in combat and able to interchange striking and defense between the two. Di Grassi also has notes on combat with the two-handed sword as well as polearms, which, although present and used during the Renaissance era, were not used to the extent that the rapier was.

Figure 18: Rapier and Cloak from Di Grassi, p. 41

Meyer took a different route than Di Grassi in his views on rapier combat. The rapier was not a product of German invention and combat developed from learning from foreigners about the weapon. Meyer organizes his practices based on how he was taught in his text and organizes rapier combat into two sections, the first being the basics of combat and the second delving into more technique.

Meyer begins with a discussion of the rapier and its use, then explains the five main guards in rapier combat. The high guard or the "Ox" holds the rapier forward, to the side, and above, with the point down in the opponent's face and the sword foot forwards. This position can be altered so that the sword is held back away from your opponent in a high guard meant for a cutting blow; this is high guard for a stroke, as opposed to high guard for a thrust[14]. The high guard can also be executed by holding the sword on the opposite side in the same manner as is held normally, so for a right-handed combatant, the sword would still be in the right hand and the right foot would be forward, but the hand would be held in an inverted position on the left side with the sword pointing downward at an angle from the left. This guard can also be reversed for the stroke maneuver, or can be transformed so that the sword is held straight in front of you and pointing upwards, for a cutting maneuver[15].

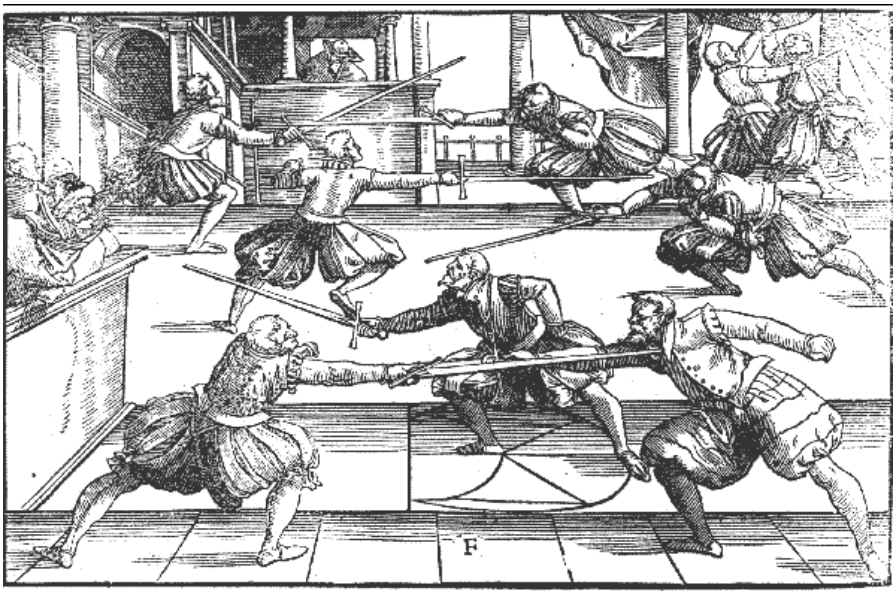

Figure 19: Meyer plate F, Straight Parrying

Meyer also details the low guard in three positions: straight in front, and to either side. In the low guard, the sword is held low and out from the body, with the point towards the ground in the direction of the opponent[16]. The right low ward is executed in a similar manner but the sword being held to the right instead of the center, and the left low ward being the same on the

[14] Meyer, Joachim (transl. Jeffery L. Forgeng) *The Art of Combat: A German Martial Arts Treatise of 1570*. 175-176
[15] Meyer, Joachim 176
[3] Meyer, Joachim 176

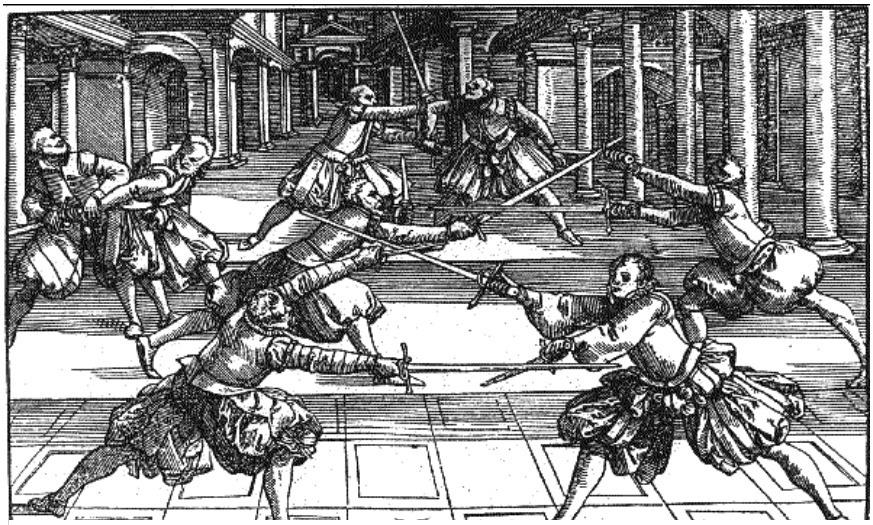

Figure 20: Meyer plate H, Rapier and Dagger

opposite side of the body. Meyer does note that the low guard is rarely used as a guard or for defense, notably because the sword is held low and it would be difficult to raise the sword in time to be an effective defense.

Meyer also details three more positions that differ from the high and low guards in a few key manners. The Irongate guard holds the sword low with the point up towards the opponent's face and can be held either straight in front or to either side, providing a formidable defense as well as being in a position to strike quickly and well[17]. The Plow holds the sword in a position that resembles a low thrusting strike, with the flats of the blade parallel to the ground, the tip pointing towards the opponent's midsection, and the body held over the sword, and also allows for the sword to be held to the side or in the middle[18]. The Longpoint position is held with the sword arm straight out with the sword pointed at the opponent, and unlike the other guards, the Longpoint's three forms are along a vertical line in place of a horizontal one: the point extends towards the face, the belt, or the groin for the three variations on this guard[19].

[17] Meyer, Joachim 176
[18] Meyer, Joachim 177
[19] Meyer, Joachim 177

Figure 21: Fabris Thrust and Counter from Castle, p. 148

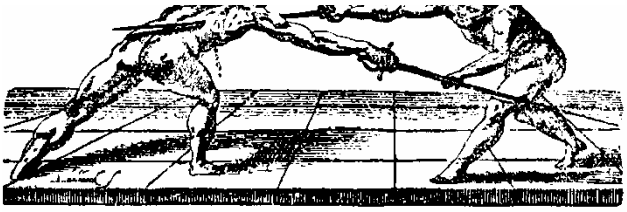

Fig. 59.—Ferita di seconda contra una quarta. A thrust by disengaging and passing, with an opposition of the left hand.—Fabris.

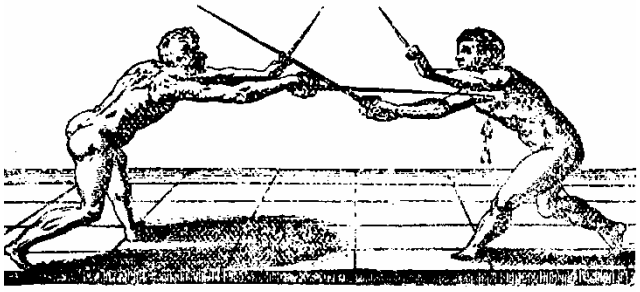

Fig. 60. A counter, on the adversary's thrust in quarta, which is parried with the dagger.—Fabris.

Meyer uses four different cuts, each one with three variations depending on how the sword is held while executing the cuts. The High Cut derives from an overhead motion with the sword, bringing the blade downwards, and is aimed at the head or as a suppressing blow to the side on a diagonal. The second cut is delivered along a diagonal and can cut at the shoulder, the hip, or the thigh. The Middle Cut is a sideways blow aimed at the neck, belt or foot. Finally, the Low Cut is an upwards strike, either straight or on a diagonal, delivered in a manner similar to a high cut[20].

In addition to cuts, Meyer details three thrusts, which can be characterized as high or low (both executed from the side) and the middle, which goes into the Longpoint detailed above. These thrusts can be made to the face, throat, heart, or groin, those being key targets in harming an opponent[21]. Meyer also discusses other uses of the thrust against certain guards, such as the reverse thrust, double thrust, deceitful thrust, and one which he notes that every student should learn, the flying thrust. This is followed by a section on converting thrusts into cuts and cuts into thrusts, used for deception by tricking the opponent into one defense that is completely useless against another form of attack. This is coupled with parrying and the varying forms of said defense, from suppressing an attack to bypassing it.

Fabris was an Italian master during the late 16th century who was an expert swordsman and built his style around the best techniques from other masters. He viewed fencing as being

[20] Meyer, Joachim 177-178
[21] Meyer, Joachim 184-185

above all else on earth, and his works contain reference to practical applications of fencing[22]. His style was characterized by lunging maneuvers, and in depictions from his manuals, the individuals are always leaning forwards into their strikes and guards.

For matters of defense, Fabris used four main guards, with three alternate guards for special circumstances, all of which could be used from any position of the body. The four main guards are detailed as follows: from when the sword is first drawn, when the hand is lowered, when the sword is held naturally, and when the sword is turned inward, which is to the left for right-handed individuals[23]. In his text, Fabris encourages fencers to think of the guard first and then to assume a body position that best suits them. In this manner, the thrust that is to be delivered is determined, because the guards are combined with body position to explore the best possible strike. Fabris explains that the proper position will be the "contra postura," which counters the adversary's centerline and allows for thrusts to be made without changing position, forcing the adversary to reposition himself and open himself to attack[24]. The guard chosen in such a maneuver should be the same as the opponent's for maximum effectiveness in this case.

On the subject of thrusting, Fabris details both thrusts made with a step and thrusts without moving from a single position. In both cases, he warns against overextending yourself, which hampers your defense and leaves you open to attack, a seemingly contradictory statement given how many depictions of his works include individuals lunging into their attacks and defenses. Fabris also cautions that the best time to attack is when the opponent is lunging forwards for his own attack, because it is harder for him to withdraw and a thrust will penetrate deep with little effort on the end of the defense[25]. This may provide some explanation into his

[22] Castle, Egerton 140. Note that this is Castle's record of Fabris' "Schermo"
[23] Castle, Egerton 141-142
[24] Castle, Egerton 142-143
[25] Castle, Egerton 144

depictions of lunging thrusts, because if an opponent is already committed to an attack, and you are delivering your counterattack, the best time would be in the middle of his thrust with you lunging in to deliver your strike.

The Renaissance was a period of change in Europe. It is generally accepted as beginning in Italy during the 1400s in Florence under the Medici family, who were great patrons of the arts. Lorenzo de' Medici, for example, dedicated large amounts of money to several Renaissance artists, including Da Vinci and Michelangelo. However, Lorenzo was not the cause of the Renaissance; it had already begun before his patronage began. It is also a matter of note that these artists were born in Tuscany, and many historians believe that the Renaissance began in Florence because these men were born there.

There were other factors that led to the Renaissance. The conception of "rebirth" was popular because some ancient texts, detailing classical ideas, were found in monasteries, and texts in Greek and Arabic were translated into Latin. Many of these texts were found when the Iberian Peninsula was reconquered from the Moors and the texts incorporated into the Christian world. In addition, texts from the Middle East were studied, including mathematics brought home from the Crusades on the 13th century. The collapse of the Byzantine Empire also drove Greek scholars west, who brought Greek knowledge home as well.

The structure of Italy during the late Middle Ages also was a likely factor in the beginning of the Renaissance. Italy was not a unified country, but rather a collection of city-states, and was the most urbanized section of Europe. The fact that many Italian cities were located in the ruins of Roman cities may have had an effect on the classical nature of the Renaissance. One factor often attributed to the Renaissance is the Black Death and how it

shifted views toward worldly pursuits one the one hand, and the piety that it also enforced that lead to increased spiritualism. However, the Black Death affected all of Europe, not just Florence, so it is unlikely as a factor in the cause of the Renaissance.

During the 15th century, the Renaissance spread outwards from Florence into the rest of Europe. It was greatly aided by the invention of the printing press, which allowed mass printings of books containing ideas that could be spread easily. The Renaissance also tied into the Reformation, as one of the first uses of the printing press was to print copies of the Bible and would later spread Martin Luther's 97 Theses in 1517. The Renaissance is also noteworthy in that it was one of the first times that the people were aware of changes in society and could relate to the past; many references are made to the "ancients," that is the Romans and Greeks, and the "ancient ways."

One of the major changes during the Renaissance was the way in which people thought about themselves and the world at large. The scientific method was conceived during this time, leading to a kind of "scientific revolution," with developments in astronomy, physics, biology, and anatomy. Interest was sparked in political life, leading to more scrutiny of government activity and improving governments overall. A trend toward individuality was developed, which was a view not promoted during the Middle Ages. These factors all played into the development of the rapier, which was a sword for individuals instead of soldiers, and used precise form in place of armor-crushing blows as a means to end combat.

There is much debate around whether or not the Renaissance was an actual improvement on the culture of the Middle Ages. Some historians describe this time as a time of progress, while others point to the increase in poverty, warfare, and persecution as a step backwards. The artists of the Renaissance certainly viewed themselves as progressive, whereas most people did

not view it as a “golden age.” Latin was reverted to its origins, brushing aside its evolution since the classical era, and some historians argued that scientific progress was in fact slowed. James Franklin argued that the true Renaissance occurred during the 12th century, which is when ancient Greek knowledge was rediscovered, and noted that art was the one field in which the Renaissance excelled; in all other matters, it was inept.

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Meyer, Joachim (translated: Jeffrey L. Forgeng) (1570) *The Art of Combat: A German Martial Arts Treatise of 1570.* New York

"Rapier" *Wikipedia*. http://en.wikipedia.org/wiki/Rapier

"Renaissance." Wikipedia. http://www.wikipedia.org/wiki/Renaissance

Temporary Museum Exhibit, Higgins Armory Museum, 2nd floor, May 2007. References included:

- Giacomo di Grassi, *Ragione de apropar l'arme*
- Girard Thibault, *Academie de l'Espee*
- Jeffrey Forgeng, *The Medieval Art of Swordsmanship, A Facsimile & Translation of Europe's oldest Personal Combat Treatise, Royal Armouries MS.!.33*
- Joachim Meyer, *Die Kunst des Fechtens*

Chapter 3: The Smallsword

Author: Drew Sansevero

The Smallsword

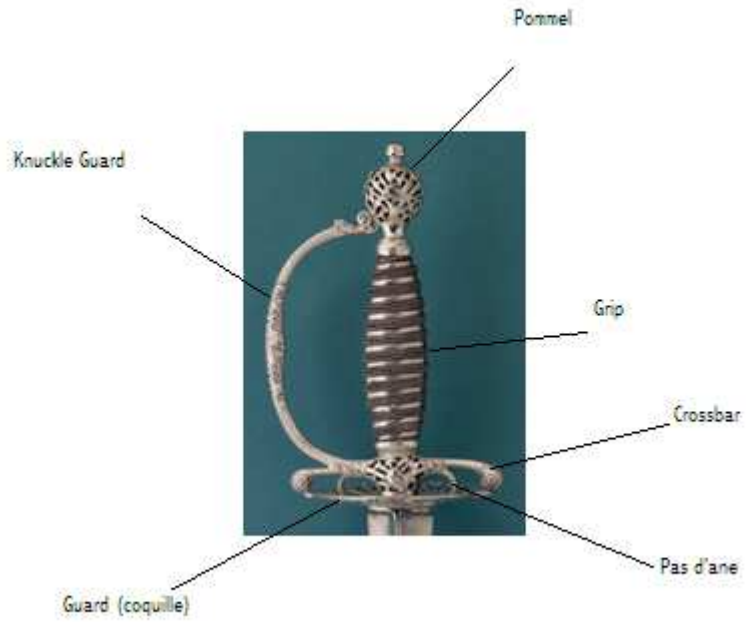
The smallsword is a civilian weapon used during the late 17th century into the late 18th century. It is much smaller than the rapier from which it evolved. The smallsword was developed in France around 1660, and then it quickly spread across Europe. Its popularity came from its light weight and ability for swift maneuvering.

Smallsword Description

The smallsword had an average blade length between 29 and 32 inches. Its weight is only around a pound to a pound and a half. They were not mass produced, but rather customized to fit the user. “A person should proportion his sword to his height and strength.” (Angelo 3) The smallsword consists of two main parts, the blade and the hilt. After each part was individually selected, the tang or base of the blade was fastened into the hilt.

There are three types of smallsword blades. The first is the flat double edged blade which was an earlier style derived from late forms of the rapier. The second blade “had a hollow-ground triangular cross section, combining strength with lightness.” (Coe 69) The unique cross section allowed for faster fencing and higher maneuverability, ultimately granting the fencer an ability to thrust more precisely. However this form of blade had weak edges that tended to crack. The last form of blade was referred to as a Colichemarde. “It had a wide forte then tapered very suddenly to a narrow thrusting point.” (Coe 70)

The second part of the smallsword is the hilt. The hilt itself has three important features, the pommel, grip and guard. The pommel is essentially a decoratively shaped counterweight at the end of the grip. This allowed the sword to be balanced for easy maneuverability. The grip is simply the place where the fencer would hold the sword. The smallsword is a single handed weapon and therefore the grip is not very long. The hilt also contains a crossbar and pas d'ane. The pas d'ane was a design feature passed on from the rapier. The original function was to protect the wielders finger but rarely used on the smallsword. Another feature of the hilt is the guard. Many guards were very complicated including a butterfly or shell shaped coquille (bell shaped guard). The purpose of the guard was to protect the wielder's hand.



All of the smallsword's features could be elegantly embellished with precious metals and stones. Many people owned at least two swords, one to wear out in public and one only for formal court wear. The plain sword was the one worn around town because it would be less of a

target of theft. The most extravagant court swords were usually worn by the wealthy and nobles. Both the blade and hilt were extravagantly decorated making the smallsword a very trendy male accoutrement. “The smallsword had become the most fashionable type of sword” (Coe 67) Scholars even refer to the smallsword as “male jewelry”.

The status of jewelry is supported by the amount of thought and effort put into the ornamental hilts. The hilt designs varied from workshop to workshop with both abstract and figurative designs. Some examples of the intricacies included boldly chiseled panels set at intervals, encrusted work in silver or gold on artificially blued surfaces and carved pierced ivory decorated with scrolling foliage. As the styles changed, old hilts could be traded in for a certain monetary value that could be then used toward the purchase of a new style hilt. Interestingly enough, hilt makers adopted artistic designs including the notable style called Rococo of Meissionier (1693-1750). The Rococo style was responsible for the swirling spiral roping on the grip and pommel of many court swords. [26]

The hilt was the most ornate feature of the smallsword but the blade was also decorated with similar artistic styles. The blade commonly included the cutlers name and address located on the forte of the blade. Phrases were another common etching on the blade. Some phrases translate to “By acting correctly you have nothing to fear” and “Draw me not without reason, sheath me not without honor.” A phrase or figurative design was a signature of some makers and a way to advertise their craftsmanship.

European Society and the Smallsword

[26] Coe describes many different types of elaborate court swords and their designs or styles. He also often refers to the jewelry aspect of the hilts and their artistic manufacturing proccess.

The Renaissance in the 15th to 17th centuries was a time of transformation in art, science and society. It was a formal age that provided strict social rules and "inflexible rules of dress." (Aylward 12) At the end of the Renaissance, the 30 Years' War (1618-1648) broke down the European courts, leaving only France and its ruler King Louis XIV providing an image of security and strength. "The autocracy of Louis XIV, reflecting the mounting ardour of French national feeling, is the dominant fact in the history of Europe from that King's assumption of power in 1661 until his death in 1715." (Fisher 666) Louis was a strong leader, strengthening French dominance militarily as well as making it the cultural and social center of Europe. In the 1700s, logic and reason transcended Europe into an age of Enlightenment. France led the way in art and philosophy, providing many great thinkers and because of their existing dominance they were able to spend the time on cultural and social refinement. The dress for example was very extravagant and ornate. It was at the beginning of Louis' reign that the smallsword emerged from France (1660s) based on a "gradual evolution from the rapier dictated by new theories formulated by French masters of defense" (Aylward 11) The smallsword became a part of the common outfit and its popularity grew. Since France was the cultural center of Europe its trends spread to other countries. During Louis XIV's reign, King Charles II of England was a prominent contributor to the smallsword's popularity in England. "King Charles II adopted a smallsword perhaps setting a fashion although subjects usually set the fashion but his popularity might have swayed the conservative 'private disarmament' population." (Aylward 10) Despite the widespread acceptance of the smallsword in northern Europe, the Italians and Spaniards kept using the rapier.

Smallsword Masters

The French had made the smallsword popular and when it spread, the techniques were developed and taught by French masters. Schools of arms were common, and over thirty of the schools in London were taught by Frenchmen. Nevertheless two of the most important masters were not French, Sir William Hope (1660-1724) and Domenico Angelo (1716-1802). Hope was "undoubtedly the greatest enthusiast of his day." (Aylward) He was a writer and a swordsman but it is unclear if he had his own school of arms. Hope published is first book, The Scots Fencing Master in 1687 at the age of 27. It contained the common method of smallsword fencing along with a meticulous description of standard lessons. Other notable writings included Sword-man's Vade Mecum (1692) which discusses the fundamental techniques and tactics and New Short and Easy Method of Fencing (1707) which breaks down fencing into a few general rules effective for self defense. Hope wrote a number of books, mostly focusing on simplicity and self defense. Here is a complete list of Hope's writings.

1. The Scots Fencing Master, 1687
2. The Sword Man's Vade Mecum, 1691
3. The compleat Fencing Master, 1692
4. The Fencing Master's Advice to his Scholar, 1692
5. A New Short and Easy Method of Fencing: 1st edition, 1707
6. A New Short and Easy Method of Fencing: 2nd edition, 1714
7. A Vindication of the True Art of Self-Defence, 1724

Angelo (1716-1802) was another great master, and a teacher in England. His parents were wealthy Livornian merchants who raised him to follow their profession. At an early age Angelo did however show enthusiasm and skill in horseback riding and fencing, but his training was very basic, nothing more than the formal training any rich child would have. His father sent

him to Paris to study accounting and trade, but Angelo focused more of his time on horseback riding and fencing. Soon young Angelo's skills lead to fame and respect. In 1750 he moved to England, but his father did not approve of his new life style and ended his financial support. Angelo had to make his own connections with London's high society creating a reputation as a skilled horseback rider and fencer. The princess of Wales even declared him as the master of horse-riding and fencing for her sons, one of whom became King George III. This position provided Angelo with a way to start a fencing academy which grew in distinction and became a place not only for students to learn but for famous fencers to meet.

Angelo believed the art of fencing with the smallsword was very sophisticated, filled with elegance and grace. He followed proper French etiquette including only striking the breast and saluting before the duel. He also shunned the use of tricks such as not throwing sand in your opponent's eyes. The duels were to be proper and gentlemanly. Angelo felt that people who were rash and hotheaded could harm each other so he encouraged the use of disarming techniques. In addition duels were not held on the spot, a time and the field of dueling was picked out ahead of time. Angelo did write his own manual, The School of Fencing which multiple editions were published. This piece of work was even included in Diderot and D'Alemberts Encyclopedia which covered all the arts and sciences of the time. Being submitted to the Encyclopedia is a

measure of notability and importance of his contributions to fencing. The techniques Angelo taught are discussed in an appendix.

Decline of the Smallsword

In the mid 1700s the smallsword slowly was separated from fashion as it was put up during meals and put away in certain locations to prevent violence. The culture and social change did not require the sword anymore as a regular dress item. As the sword's use declined, the swordplay lived on in the sport of fencing. The practice swords such as the foil and epee continued to be the fencer's choice to train with and hence the smallsword itself was no longer used in regular dress or schools of arms. The last uses of the smallsword were only for show in a formal setting.

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10. Old Sword-Play. The Systems of Fence in Vogue During the 16th, 17th, and 18th Centuries, With Lessons Arranged form the Works of Various Ancient Masters. London: H. Grevel; New York: B. Westermann:

Chapter 4: The Civil War Saber

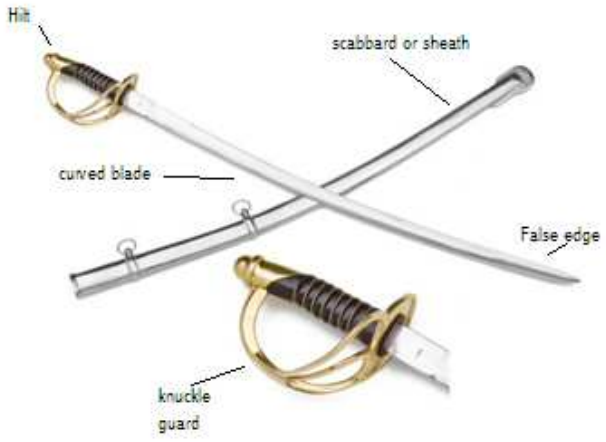
Author: Drew Sansevero

The saber is a curved single edged sword whose exact origin is unclear. However it was used in many different cultures. It is notable that the saber was used as a fencing weapon as well as a military Cavalry sword. Italy had a light weight saber that was used for fencing and "from its slight weight, is capable of more varied treatment than the cumbersome weapons." (Hutton) The first cavalry saber first appeared in Europe with the arrival of the Hungarian light horsemen and gradually came to replace the various straight bladed cutting sword types on the battlefield. This paper will focus on the military uses of the saber. As time went on, sabers became a symbol of rank in many armies in fact the wearing of sabers with formal uniforms continues to this day in some armed services around the world.

Saber Description

The saber itself contains a hilt with a knuckle guard and curved grip. The length of the blade was usually around twenty nine inches. "The blade is divided into three parts: -the tang; the narrow piece of soft metal which fits into the hilt; the forte, the half of the blade nearest the hilt, with which all cuts and points are parried; and the foible, the half nearest the point, with which all attacks are made. We must further observe the edge, the back, and the "false" edge-that sharp of the back which extends from the point to the place where the grooving usually begins, a distance of about eight inches." (Hutton) There are two unique aspects of the cavalry sword that are important to its use on horse back. The first is that it was a heavier weapon that allowed

gravity to assist with the downward cuts on infantry soldiers. The second is the curved blade. In response to the cavalry charges, infantry soldiers used bayonets to fight back, but the curved blade allowed the bayonet to deflect away, sliding off of the saber instead of stopping it. This allowed the cavalry slashes to go unhindered.



Military use of the Saber

A prime example of the military use of the saber is during the American Civil War (1861-1865). The Civil War was fought between the United States (the Union) and eleven southern slave states that demanded the right to secession forming the Confederate states of America. At the beginning of the war only town militias existed which did not adequately provide the numbers needed to fight a war of this magnitude. Two massive armies needed to be created and those armies needed supplies and weapons.

The Civil War was considered to be the first modern war considering it made use of railroads, telegraphs, electricity, photography and other technologies. Neither side previously had

a well organized army, but the Unionist North had an advantage with two arsenals at Harpers Ferry and Springfield. The Confederates were not so fortunate and only had makeshift suppliers providing weapons of variable quality and exported weapons smuggled past blockades.

The North was fortunate enough to have the Ames Manufacturing company in Massachusetts which had been supplying swords to the government since 1832. They were well established and able to make the amount of swords the Union needed for their Cavalry. At first European styled sabers were tested for potential adoption or adaption into the cavalry's arsenal. By 1850 Ames made two French style officers swords that had brass "U.S." etched hilts with blades that had the national motto on them. These sabers were used by Union officers throughout the war. Eighty thousand of this style was made between 1858 and 1865.

The South was not so fortunate in its saber supplies. Union hospital records reported less than 1000 sword and bayonet wounds leading to the conclusion that the Confederate cavalry was not used as extensively as the Union's or they preferred firearms over the saber. At the beginning of the war the Southern Cavalry did carry Dragoon sabers (1840) and the light cavalry sword (1860). The supplies from the North ended and steel supplies in the South decreased rapidly. Notably, Mr. Haiman, a manufacturer in Georgia went to Europe to get supplies needed to make sabers. He ran the blockade and was rewarded by the government and produced 100 swords a week until shortly after the North seized his factory and razed it to the ground.

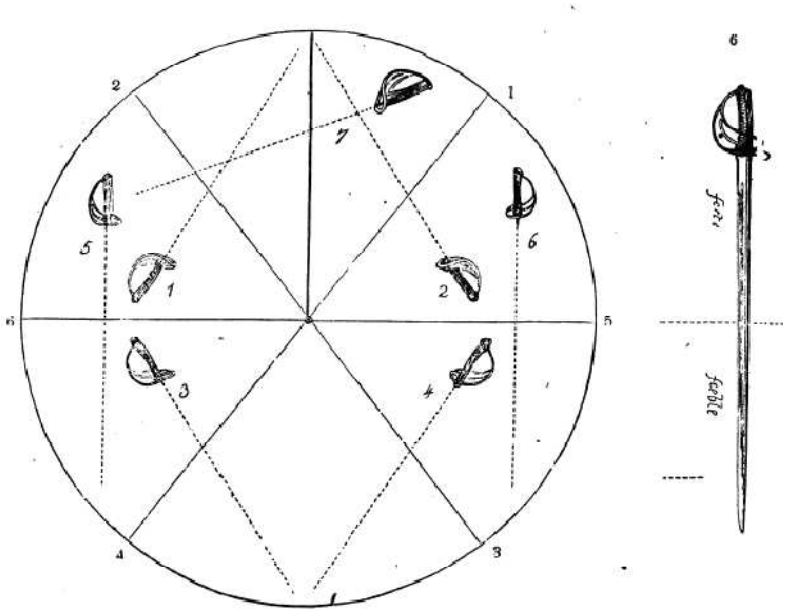
Saber Techniques

As the cavalry of both armies grew mass training was needed. The trainings needed to be simple and easy to swiftly get new cavalry men out into the field. Mounted and non-mounted techniques were taught. Interestingly, manuals for soldiers were distributed to reinforce their

training. Some saber drills used a wooden sword called a single stick to prevent injury during trainings.

Mounted saber techniques included fighting infantry as well as other mounted soldiers. Against infantry a series of slashing cuts were used while blocking bayonet attacks. Against other mounted soldiers, thrusting and slashing was used however the soldier was limited to its horses movement and his back left side was the most vulnerable. Un-mounted practices included series of basic parries.

Matthew Berriman wrote a manual, The Militiaman's Manual (1859) describing the Saber training techniques used in the military. The trainings included movement routines for balance to encourage well placed footwork. Also Berriman covered the seven cuts and seven parries used in saber swordplay. Below is a diagram of the cuts and respective guards.



Saber Decline

The Civil War lead to western movement and the expansion of America. As trade routes were created the military's cavalry was used to protect the western settlements and routes. The swift horses were the fastest way to deal with raiding Native Americans. The Natives however didn't allow the cavalry to charge making the percussion carbine firearm favorable over the saber. Also by World War I the new technology and trench style warfare rendered the cavalry ineffective. This ended the use of cavalry and with it the use of the saber. Notably the saber did remain in the military as a dress sword and symbol of recognition. To this day the saber can be seen in military ceremonies throughout the world.

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Filming Background Information:

Author: Jordan Bentley

Outline:

1. Pre-Production
    1.1. Legal Issues
        1.1.1. Copyright
            1.1.1.1. Stock Footage
                1.1.1.1.1. You can use anything from before 1923
                1.1.1.1.2. You can use anything from before 1964 that has not had its copyright renewed.
        1.1.2. Consent
            1.1.2.1. A sample release form can be found at http://en.wikibooks.org/w/index.php?title=Movie_Making_Manual/Release_Form&oldid=969642
            1.1.2.2. You also need location release forms if you are shooting on private property (such as WPI), a sample can be found at http://www.sonnyboo.com/downloads/downloads.htm
    1.2. Casting
    1.3. Location Scouting
        1.3.1. Always consider availability of electricity (Rabiger 251)
        1.3.2. Sound
            1.3.2.1. Clap once loudly to get an idea of the rooms acoustics. High amounts of reverb may cause difficulty later. (Rabiger 251)
            1.3.2.2. Will the floor creak if a handheld camera is being moved? (Rabiger 251)

1.3.2.3.Be aware of ambient sound, including air conditioning or generators. (Rabiger 251)

1.4. Scheduling

1.4.1. A 30 minute documentary can take between 3-8 days to shoot (Rabiger 252)

1.4.2. Make sure that everyone has a printed schedule of filming.

2. Production

2.1. Stills

2.1.1. It is good to have somebody taking still photos during production. These are normally used for promoting a film, but in our case could be used for the final report.

2.2. Marking shots

2.2.1. Use a clapperboard to make sure you can sync up sound later, especially if you are using multiple cameras.

2.2.2. The best way to record scenes for a documentary is the cumulative setup-take system. There is a setup number for each setup, and a take number for each take. i.e., “3 take 4” or just 3-4. (Rabiger 294).

2.2.2.1.This system requires a lot of notes to be taken while filming.

2.3. Cinematography

2.3.1. Techniques

2.3.1.1.Camera Placement

2.3.1.1.1. 30 degree rule

2.3.1.1.1.1. Cameras should be placed at least 30 degrees apart from each other to avoid jump cuts (Evans 216)

2.3.1.1.2. 180 degree rule

2.3.1.1.2.1. Put an imaginary line through the action. The cameras should all be from the same side of the line. (Evans 214)

2.3.1.2.Tracking

2.3.1.2.1. A Steadicam can be used to provide horizontal tracking shots.

2.3.1.3.Zooming

2.3.1.3.1. Focus

2.3.1.3.1.1.When zooming, zoom in before you start recording and set the focus, then zoom back out and start recording so that when you zoom in you will end with the camera being in focus. (Sadun 20)

2.3.1.4.Shots

2.3.1.4.1. Close-ups

2.3.1.4.1.1.Always use a tripod.

2.3.1.4.1.2.May distort facial features at high zoom levels, sometimes its best to get closer to the subject. (Sadun 24)

2.3.1.4.2. Wide Shots

2.3.1.4.2.1.Good for establishing shots.

2.3.1.4.2.2.Exaggerates distances (Sadun 25)

2.3.1.4.3. Medium Shots

2.3.1.4.3.1.Shows subjects from face to torso, good for interviews.

2.3.1.4.4. POV Shots (subjective shots)

2.3.1.4.4.1.Shows the view from the eyes of an observer.

2.3.1.4.4.2.Follow Shots

2.3.1.4.4.2.1. Follows a subject from behind, might show the back of subjects head and shoulders. (Sadun 26)

2.3.1.4.4.3.Over the shoulder shots

2.3.1.4.4.3.1. A stationary shot that uses the subjects head and shoulder to frame the scene. (Sadun 27)

2.3.2. Lighting

2.3.2.1.Working with lights

2.3.2.1.1. Never put a light under a sprinkler, you may set it off. (Aronson 43)

2.3.2.1.2. Only turn the lights on when you are shooting, they produce a lot of heat, and may make the room uncomfortable or make the lights hard to manage. (Aronson 43)

2.3.2.2. Color Temperature

2.3.2.2.1. Different types of lights (daylight, flourescent, tungsten, etc) cause the objects under them to have a different color tint. This is usually not noticed by the eye, but shows up on camera.

2.3.2.2.1.1. If possible, turn off all lights in the building and rely solely on tungsten lights which have white light. (Aronson 38)

2.3.2.2.1.1.1. LNL should have these available.

2.3.2.2.1.2.If a subject moves from one light source to another with different color balance, they may appear to change color. (Aronson 38)

2.3.2.2.1.3. To compensate for color balance when shooting digitally, before shooting, zoom in on a white piece of paper under the lighting and use the cameras white balance feature. (Aronson 39)

2.3.2.3.Aperture

2.3.2.3.1. Aperture refers to how much light is allowed into the shot by the camera. Better DV cameras allow this to be controlled manually, letting you “iris up” or “iris down” (Aronson 40)

2.3.2.3.2. Aperture settings can be a problem when shooting something against a background that is too bright or too dark. Like focus, the background and foreground might not both come out clear. (Aronson 40)

2.3.2.4.Outdoor lighting

2.3.2.4.1. Bright sunlight causes lots of shadows, and differences in brightness will show up poorly on film. (Aronson 45)

2.3.2.4.2. Neutral Density filter AKA ND filter

2.3.2.4.2.1. Either goes over the lens or may be a built in function of the camera. Darkens the entire scene without changing the color, so that you can better capture on a bright day (Aronson 45)

2.3.2.4.3. Bounce Card

2.3.2.4.3.1. Reflects sunlight to even out shadows (Aronson 45)

2.3.2.4.3.2.On a budget, you can use one of those reflectors people put in their cars windshield to keep it from heating up. (Aronson 45)

2.3.2.4.4. Shooting at night

2.3.2.4.4.1.If you shoot at dusk, there is still enough natural light to shoot with, and the light is more blue which makes it look like night (Aronson 46)

2.3.3. Sound

2.3.3.1.Always record sound as loud as possible without distorting the audio, you can always quite it down in editing, and recording louder will get better quality audio. (Aronson 84)

2.3.3.2.The closer the mic is, the better the sound will be. (Aronson 84)

2.3.3.3.Recording on site

2.3.3.3.1. The ATC does not have many options for microphones. The only solution they offer is a stick microphone and a boom.

2.3.3.3.1.1.These microphones are directional, but not extremely so. If possible, have the back of the microphone pointed at the worst source of ambient sound. (Aronson 85)

2.3.3.3.2. Make sure all unnecessary electronics are turned off. Cell phones should ideally be off, not set to vibrate, as the microphones will pick up interference from calls. (Aronson 85)

2.3.3.3.3. Use headphones when recording audio, the sound that is being recorded will be different from the sound you hear with your ears. (Aronson 86)

2.3.3.3.4. Record Room Tone (Rabiger 319)

2.3.3.3.4.1.Do this by having everyone stand still while the recordist records a few minutes of ambient sound. (Rabiger 319)

2.3.3.3.4.2.This is used so that you have consistent ambient sound throughout your shots at a location after editing, and through cutaways or shots for which sound was not recorded. Otherwise the audience will notice inconsistencies in ambient sound. (Rabiger 319)

2.3.3.3.5. Be careful not to run audio cables parallel to power cables, induction will cause interference. (Rabiger 320).

2.3.3.4.Narration

2.4. Interviews

2.4.1. Types

2.4.1.1.Vox Pops

2.4.1.1.1. Asking the same question to a number of people, and editing their replies together. Good for showing popular opinion. (Rabiger 333)

2.4.1.2. Talking Heads

2.4.1.2.1. Camera placement

2.4.1.2.1.1.Two types

2.4.1.2.1.1.1. On-axis interview

2.4.1.2.1.1.1.1. The interviewee looks directly at the camera, addressing the audience. (Rabiger 334)

2.4.1.2.1.1.1.2.The interviewer should sit low, with his head just below the camera lens so that the interviewee naturally addresses the camera. (Rabiger 335)

2.4.1.2.1.1.2. Off-axis interview

2.4.1.2.1.1.2.1.The interviewer sits to the side of the camera, to enforce that the interviewee is talking to the filmmaker, not particularly useful for this project (Rabiger 335)

2.4.1.2.1.2.Alternatives

2.4.1.2.1.2.1. Throughout the interview, adjust the zoom on the camera. This way later you can condense the interview and avoid jump cuts, as there is not much action on screen during an interview. The eye does not register the first three frames of a new image. (Rabiger 337).

2.4.1.2.1.2.2. You should have standard shot sizes, when you zoom in and out do it to the same size each time. (Rabiger 338)

2.4.2. Working with the interviewee

2.4.2.1.Let them know that most of the footage will be cut out, and not to be worried about small mistakes. (Rabiger 339)

2.4.2.2. Be prepared to steer the conversation in different directions to better suit the interview. (Rabiger 339)

2.4.2.3.Make sure that the interviewee knows that you will edit out the questions, and that they should include all information in their responses. (Rabiger 342)

2.4.2.4. If there were issues in their response, ask them to repeat their answer. (Rabiger 343)

3. Post-Production

3.1. Editing

3.1.1. Video

3.1.1.1.Setup

3.1.1.1.1. It can help to connect an NTSC monitor to the computer so that you can see how the image will look when it is displayed. When you watch it on the NTSC monitor you will see that some parts of the frame are cut off. (Aronson 104)

Human Weapon Season 1 Episode 7 – Krav maga

This series follows two martial artists learning different regional martial arts, leading up to a final fight against an opponent skilled in the art. The show puts an emphasis on individual techniques.

One of the first things that I liked about it was the use of diagrams for techniques. The 3D motion captured animations are out of reach for our film, but we could use hand or computer drawn diagrams to demonstrate the forces involved in an attack. The emphasis of the physics involved in a technique really helps emphasize the techniques importance.

There was a short segment using historical still photographs. When I was studying Adobe Premiere, I learned how to pan across an image, but they used many motions across still images that I could easily implement in Premiere. These included rotation, zooming, panning, flipping, and combinations of those techniques. They applied short cross fades between each picture, instead of varying the transitions.

Throughout the episode, maps are used to track the hosts journey. It helps tie the episode together. We could use a timeline to provide a similar effect, hopefully by adding cohesive elements we can get people to watch more than a few minutes.

Modern Marvels Season 13 Episode 14 – Batteries

The format of this is more like our documentary will be, there is no shown host, just an unknown narrator.

Watching them visit a location where a large battery is housed, I was thinking maybe we could visit the WPI fencing team or some other modern fencing school. This would more have to do with what topics we decide to talk about in the script, but it would be some great footage, and we could do some good interviews.

I notice that because of the lack of action and the heavy narration, establishing shots are especially important, and longer than they would be in a different type of film. Some of the shooting locations we've chosen won't allow for good establishing shots, but we could make up for that with medium shots and some stills to make up the time.

The talking head interviews are all on site, and have a standing interviewee. For most of our documentary, we should probably have seated interviews, in some kind of academic environment to lend credibility, but it wouldn't hurt to interview someone who is handling swords or demonstrating techniques.

George Orwell – A Life in Pictures

The documentary starts off explaining that no footage exists of George Orwell, and that all the footage in the film was fabricated, using existing audio recordings. This is the reason I decided to study this piece, to better understand techniques for reenactment.

One of the first things I noticed was that even though all the footage was taken for a 2003 made for TV movie, some the footage emulated old film reels, showing burns and scratches on the footage, and often in black and white. For one clip they even added the noise of a projector. Even though we will demonstrate techniques from a time when video cameras would obviously not exist, I like this effect this gives and would like to apply it sparingly at times.

There is a noticeable jump cut about five minutes in, where Orwell removes the sheets from a bed twice at two different angles. I can see why edits like this are so undesirable, it confuses the viewer.

One of the fake interviews used an off axis shot. I can see how this emphasizes the presence of an interviewer. Another shot, however, was a close up and was only slightly off axis.

It could be a nice shot for the interviews in our film for short bits of exciting monologue. I notice while watching this that the more dramatic the line, the larger the angle I can use.

Many of the still images used in this are zoomed in too far then the quality of the image would normally allow. I thought this was detrimental to the viewing experience, but if I have to do something like that due to the unavailability of better stills, its good to have seen precedent in a film with decent production value.

I have been assuming up until now that all the reenactments would be shot with hi-key lighting, but I really like some of the low-key shots in this documentary. When the shadows move down the face in some of these shots it creates very mysterious effect, which I would like to incorporate in some of the middle ages scenes if it is appropriate for the script.

Previous IQP

The captions for the talking heads grabbed too much attention. In our film I'd like to have them smaller and more transparent in our film.

The cuts for the demonstrations should be made during action, not after it.

It is too obvious that every scene is filmed in the same location. It is extremely detrimental to immersion.

I didn't like the stills of a sword against a white background. If we photograph any artifacts, we should make sure that the background isn't too boring.

When I started thinking about plans for the film I wanted to do at least one action scene, but after watching the scene at the end of last year's IQP, I think that it has no place in a documentary.

Filming Bibliography:

Text Sources

Aronson, Ian David. (2006). *DV filmmaking from start to finish*. Sebastopol, CA: O'Reilly

Evans, Russell. (2005). *Practical DV Filmmaking*. USA: Focal Press

Rodriguez, Robert. (1996). *Rebel without a Crew: Or How a 23-Year-Old Filmmaker With $7,000 Became a Hollywood Player*. USA: Plume.

Michael Rabiger. (2004). *Directing the Documentary.* Burlington, MA: Focal Press.

Rodriguez, Robert. (1996). *Rebel without a Crew: Or How a 23-Year-Old Filmmaker With $7,000 Became a Hollywood Player*. USA: Plume.

Michael Rabiger. (2004). *Directing the Documentary.* Burlington, MA: Focal Press.

Grant, Mickey. (2003). *Camera & Lighting*. Retrieved September 25, 2007 from Creative Hat: www.creativehat.com/film03.htm

Richards, Roger *Digital Filmmaking Tips.* Retrieved September 29th, 2007 from Digital Journalist: http://digitaljournalist.org/digitalfilmmaker/DVtips/DVtips.html

Movie Making Manual. (2007, September 29). In *Wiki Books*. Retrieved September 29 2007, from http://en.wikibooks.org/wiki/Movie_Making_Manual

Film Sources

Durlacher, Chris (Director). (2003). *George Orwell: A Life in Pictures* [Motion Picture]. UK: BBC

Cambou, Don (Producer). (1995). *Modern Marvels.* [Television Series]. New York, New York: The History Channel.

Weisfeld, Zak (Executive Producer). (2007). *Human Weapon* [Television Series]. New York, New York: The History Channel.

Decuir, Micheal et al (Writer and Director) (2007) *Martial Arts of the Middle Ages* [Motion Picture]. Worcester, MA: Worcester Polytechnic Institute.

Example Call Sheet:

Swordplay Through the Ages

November 4, 2007
Day 2
Jeff Forgengs House
Rev 1.2

Directions

1033 Sutton St.
Northbridge MA 10534

From the N: Take 146S from Mass Pike (or 290) to Central Turnpike exit (just past Sutton Shops & Econolodge).
At end of long exit ramp take left towards Northbridge.
We are 1.5 miles on right, just a few houses past the Northbridge sign.
Small cinnamon cape set back from the road. If you get to a 4-way stop sign you've gone too far.

Contact

Jordan Bentley
860-912-0136
jbentley@wpi.edu
Jeff Forgeng
508-266-0400
jforgeng@wpi.edu

Call Times

Crew should arrive at 9:00am
Cast should arrive by 10:00am

Scene	Character #'s	Notes
Saber Training w/ stick		
Saber Training w/ saber		
Saber being handed over		
Saber Salute		
Walking through camp		
Saber charge		Across stone wall, panning shot, slow motion and regular
Soldiers with guns		Low angle shot, and one from the side
Guns vs swords		Maybe
Inside shot		
Sitting at camp		
Cooking at camp		If we have the props
Playing cards		
Camp establishing shot		

#	Actor	Costume	Notes
1			
2			
3			
4			
5			
6			

Prop	Notes

Crew	
Camera	Jordan Bentley
Sound	Daniel Hardy
Assistant Director	Drew Sanservero

Equiptment	Quantity
Camera #1997	1
Battery for Camera #1997	2
Hi-8 Camera	1
Battery for Hi-8 Camera	1
Tripod	2
XLR cable	1
Shotgun Mic	1
Mic stand/boom	1
Headphones	1
1 pin audio extension	2
earmuffs	1
Mini DV tape	2

Example Release Form:

I consent to be filmed and photographed on November 10, 2007 in connection with the film *Swordplay Through the Ages*. I give consent to be used in said film, any promotional footage for, and any derivative works. I also consent for my likeness to be used in promotion of said film, and in any work based on the film.

signature : _____

name (print) : _____

name (as you would like to be credited) _____

phone number : _____

date : _____

Team Biographies

Timothy Mulhern (b. December 25, 1986) is a Bio/Biotech 2009 student at Worcester Polytechnic Institute. He has been studying history for several years and has had some training in the use of the Japanese katana as part of his martial arts training. He currently is pursuing his Bachelor's of Science in Biology and Biotechnology in the interest of becoming a forensic scientist or field researcher.

Jordan Bentley (b. March 9th 1987) is a Computer Science student at WPI in the class of 2009. He has always had an interest in film, and has been studying it since High School. He is currently working on his bachelors while working for the WPI computer department.

Daniel Hardy (b. ?) is currently a student at Worcester Polytechnic Institute pursuing a B.S. in electrical and computer engineering with concentrations in communications and signal processing. Daniel loves traveling and has done volunteer work teaching English to ethnic minority groups in the Central Highlands of Vietnam. When he's not busy building and testing circuits, you might find him practicing his Vietnamese or jamming on the guitar.

Drew Sansevero (b. August 17, 1987) is a Management Engineering 2009 student at Worcester Polytechnic Institute. He was first exposed to the history of technology freshman year of college and since then has enjoyed studying technological evolution. He currently is pursuing his Bachelor of Science degree in Management Engineering in the interest of becoming a successful manager and overall better person.

From left: Drew, Daniel, Jordan, Timothy

Conclusion:

This project has been an experience besides just into the history of Western sword fighting; it is also in a way a template for the procedures that will follow us into the business world. It allowed us to discover what projects in the professional world will be like, and what our expectations will be as members of those projects. A summary of our findings is below, as well as advice for future IQP teams.

Some of the work did go quite smoothly. Certain video shoots, such as the Viking shoot and the Rapier shoot, went very well, with a lot of good, useable footage that was taken in a timely manner and could be used to extent in the video. For all the shoots, we had good locations relative to the time period and weapons being used, and the actors were in period correct costume. We also had access to the Higgins Armory Museum's library, which was helpful for research and finding images for the video.

Other sections of the work did not go as smoothly. One of the first problems was the loss of a team member after the work was divided up and before research could begin. This led to the work being transferred to another member of the team, who was summarily dropped from the project. Dan did not come into the project until mid-to late A term, which meant that parts of the video and script were delayed several weeks into B term. Some of the communication was misaligned, such as on the day of the Rapier shoot, the actors had a longsword fight ready. We also found that one meeting a week was not enough and that we should have had one member of the team be the "team leader" so that we didn't have as much confusion as we sometimes did. To expand on this, during the first term while everyone was researching, we did not require a team leader because we all had our own research to do. After that, however, with the emails going back and forth between five people, it would have been useful for one person with

everyone's schedules and contact information to be organizing meetings and the project. Around the time of the shoots, we defaulted to Jordan as the project leader, but we only kept this up for the days of the shoot.

For the Rapier shoot, most of the work went smoothly after reserving the Higgins house for the video. Initially, this was met with resistance from the school due to the fact that the proper channels weren't used and that the house was being used the first day we wanted to use it. The proper contacts were used and then we were able to shoot on location in October. Of the material, the Fabris shoot and the Di Grassi shoot were most effective. The camera we had was non-functional for the Fabris shoot, however Bill Short had a SteadyCam and we relied on footage from that for the Fabris section. The Di Grassi section was perhaps the most used footage because of its length; the sequence is much longer than the other sequences from that day and combines to make a very good representation of rapier combat. The Silver material was disappointingly short, and amounted to no more than a few seconds of material for each of the different sequences. It was also interesting that on that day, the Sword Guild brought longswords and performed some of Meyer's combat sequences. This, however, is likely due to the fact that Meyer did live in the Renaissance, and although he did use the rapier, he was more familiar with longswords. We also had a chance to put Tim in the spotlight as Mark Millman and Paul Kentworthy taught him the basics of rapier and sword combat.

The Saber shoot also went well. The background for this setup was at Professor Forgeng's house with a Civil War backdrop. The actors were in Union garb and had muskets, sabers, and single sticks for practice. They also had tents and a diagram showing how a saber would be used in combat. The actors then went through their routine with the sabers, and also did some contact fencing with the single sticks. By the end, they also used the muskets in a drill

and showed us musket vs. single stick combat. We were able to get quite a lot of footage of soldiers using the weapons, as well as footage of likely pastimes of Union soldiers in camp and maneuvers through woods.

The smallsword shoot was done indoors at the Higgins House in the main room, which was spacious enough for the duel to take place and fit the time period fairly well. We were able to obtain footage of the duel, as well as some establishing footage using elements in the room. The only downside was that one of the participants was a woman, and women did not generally participate in sword fighting.

The first medieval shoot was an extensive shoot that covered not only sword fighting, but also fighting with daggers and polearms. This shoot required the most extensive setup of lighting materials and the most effort to change the scenery, as it was done within the Great Hall of the Higgins Armory Museum. We also had the largest assembly of participants, using the Wolf Argent members extensively in the shoot. After filming various weapons being used and described on camera, we took establishing footage of a medieval feast, then proceeded to have a feast of our own in the Hall.

The Viking shoot was perhaps one of the better shoots that we had. This took place in a wooded area with a large Viking tent and a fire pit. We not only took footage of Viking sword combat, we also had establishing footage of Vikings cooking and sharpening their weapons, as well as some of Bill Short in Viking garb moving through the woods as Vikings would have. The majority of the material we took was quite good and found its place in the final video.

The final shoot date was for the armored medieval combat. Two combatants in knight's full plate armor with spears and swords fought using a variety of techniques, and used the sword much the same way they wielded the spear. This also features some wrestling and dagger use.

The project was broken down into research, the script, filming, and editing as the four major sections on which we worked. There were a few things we did with each section that could have used improvement, a summary of which is provided below.

For the research, it would have been helpful if A term, our advisor went over each of our topics with us to give us a general overview of what he wanted per each section. This could be as little as sitting down with us each week with an outline of what he expects in each section, to individual sessions where he tells us exactly which texts would be helpful, since we did put a lot of effort into finding sources only to be told at a later date what sources we *should* have used and what *should* have gone into our document. We also should have done our research in order of the script, which is how it appears in our report; it makes little sense to research techniques of the sword first without researching the era in which it was used or the background of the sword, which is how we progressed this term. This is also where we would want a second meeting each week, to give us a chance to revise our sections and resubmit for review before moving on to the next section of research.

For the script, that should have been done (at least a first draft) A term, and completed by mid-B term. After that, we shouldn't do any more editing unless it is absolutely required and is approved by the advisor, or else the video editing gets further and further behind as the script is constantly changing. It should also be formatted using professional scripting techniques; a large table is not an effective scripting tool and makes the script harder to work with and edit. Perhaps during the PQP, one meeting with the advisor should be all about the script writing process so that in A term, the script can be completed that term.

For the filming process, it is helpful to go into the shoot knowing exactly what techniques will be shown and where they will be filmed. At the Rapier shoot, for example, we knew which

ones were being shot but spent the better part of 30 minutes scouting locations around the site for each shoot. Also, even though it helped in the end, improvisation should be avoided at all costs so that we do not get confused and do not confuse the actors, otherwise we can lose sight of what we started the filming for and get sidetracked. We did have a call sheet for each shoot, but these were ambiguous at best; it may have been better to, a few weeks in advance, observe the sword guild practice their routines and note which ones would go where at the location that we would be filming at.

If the editing process is to be done by one person, then the other team members should be on hand for their respective sections to give advice on which images to use and where to put footage. However, if the entire team is involved, as it was in this project, then each member should get instructed in how to use the video editing software by the member with the editing knowledge, and he should be on hand to help with the process. This scenario should not repeat often, however, as the editing is a time-consuming process which takes away from the other duties of the team members, unless they have no other duties that term. As part of this process, images were sought out from at least 70 years in the past, but we did not have all the copyright information on hand from the start, which made it difficult to find enough images; this information should be provided first to the team so they can plan for the editing process.

There is a specific chain in which to contact for shooting the video on campus locations with weapons. First, after a few possible dates have been determined, the Student Affairs office should be contacted (first floor of Campus Center, next to the bookshop) to make sure one of those dates can be used. After the date is verified, and the actors and team notified, the Campus Police should be contacted so they know of the presence of weapons and, if they are so inclined, can have an officer present.

Contact Numbers

Student Affairs: Janet Richardson, jbrich@wpi.edu, 508-831-5060

Campus Police: Cheryl A. Martunas, cam@wpi.edu, 508-831-5433

WPI Dept. of Facilities Services: 508-831-5500

CC Events office: James Kenary, jkenary@wpi.edu

Boynton hall: Bus. Offices: Mike Curley, mjcurley@wpi.edu

Worcester Public Works dept.: 508-929-1300

Web Sites Used

http://www.wikipedia.org – some background info; links to other sites

http://www.thearma.org/ - pictures and text from manuals of swordfighting

Appendix

Documentary Credits

CAST:

Tannis Boyajian
Kendra Brown
Phillip Dickson
Renie Foote
Paul Kenworthy
Don Kindsvatter
J. Morgan Kuberry
Rachel Kuberry
Pieter Laubscher
Matthew Marino
Mark J. Millman
John O'Brien
Antonia Pugliese
Jenna Reed
Robert Reed
William R. Short
Andrew Volpe
Karl Wurst

Voices:

Jeffrey Forgeng

Documentary Script

Script: Swordplay through the Ages	Last years word count: 1156 for 12:19 mins (does not include interviews because no script was included for those) c 94 words/minute BUT the real length is shorter, due to a long combat sequence. Also note that Word doesn't accurately count the words in these columns, for reasons best known to Microsoft… The text has to be pulled out of the document for a separate word count.
Target c 1800 words	
Current: c1775 words	→Diagram of sword and scabbard, close ups on each component
Narrator: In cultures around the globe, swordplay holds a privileged place among all the martial arts. With its long blade, thrusting tip, and elegant balance, a sword is a complex weapon to use, and those who master its subtleties have enjoyed great respect across the centuries.	→Images of early flint daggers →Images of grip-tongue bronze swords →Talking head clip: Prof. Forgeng explains how change in materials and forging techniques affected the evolution of sword and early development of styles of fighting →Image of sword one cast hilt and blade →Assyrian relief →Image of Greek hoplite sword and soldier →Image of Roman soldier with gladius
Yet we know little about how early swords were actually used, aside from what we can deduce from the form of the weapons. In the Viking Age, around 1000 AD, swords had parallel edges and rather blunt tips, suggesting that they were used mostly as chopping weapons. There was little protection for the hand, making the sword better for attacking rather than defense. Viking Age warriors usually carried a large round shield, which provided most of their protection.	→Image of Viking sword →Video footage of Viking sharpening knife →combat sequences from Viking shoot →close up of Viking warrior with shield →Viking poised for battle(footage from shoot)
By the 1300s, at the height of the Middle Ages, swords had become more tapered, and developed large handguards, which suggests that they were used for both cutting and thrusting, as well as for defensive parrying. This is confirmed by the oldest	→sword images →image: Fiore p55 (king holding sword) →image: Paurenfeindt (ancient book-treatise binding) →image: sword and buckler

surviving treatise on swordsmanship, Royal Armouries Manuscript I.33 [one-thirty-three], written in Germany around 1325. The figures in I.33 carry swords along with a small round shield called a buckler. This was a common combination for unarmored combatants, and often used for civilian self-defense, as well as for an early form of fencing. The combatants exchange cuts, thrusts, and parries, and sometimes even wrestle. The demonstrators are not warriors, but a priest and a student, and at the end of the treatise, we even see a woman named Walpurgis [Val-purg-iss]. In the Middle Ages, swordfighting wasn't necessarily just for knights.	→Images: Talhoffer (wrestling) → Images: I.33 (sword and buckler combat) →Images: Talhoffer (sword and buckler combat) → Images: Lechuchner pp328,329(wrestling) →image: early fencing schools →image: I.33 pp137,21(priest/student) p166(pushing) →image: I.33 pp221,223 (Walpurgis)
Descriptions of knightly swordplay begin to appear later in the 1300s. The typical knight's sword of the later Middle Ages was the longsword, designed to be used with either one or two hands. Combat with the longsword is first described by the German master Johannes Liechtenauer around the mid-1300s, and then by a number of German and Italian masters in the 1400s. Medieval longsword combat was very different from what we are used to seeing in the movies. Unarmored longsword combat involved thrusts with the tip of the weapon, cuts with the end of the blade, and slicing attacks near the hilt, but also a variety of close-quarters techniques that included wrestling, grappling, and even attacks with the hilt. Armored combat called for a different approach, since the sword could not cut through steel armor. Armored knights relied on powerful, targeted thrusts to penetrate the chinks in the armor. To improve his aim, the knight would grip the middle of his blade with his secondary hand, allowing him to target the narrow gaps in his opponent's armor. Grappling techniques were also crucial to longsword combat. The weapon might even be turned around in the hands to be used as a hammer, or it could serve as a lever to pry the opponent's sword out of his grasp.	→Image: longsword →Image: Starhemberg p.29 (Wrath cut) →Images: Lechuchner p.31-32(longsword combat) →Images: Talhoffer (longsword combat) →images of German and Italian masters →Images: Talhoffer (wrestling) → Images: Lechuchner pp328,329(wrestling) →Footage longsword combat from shoot →Images: Talhoffer (armored longsword combat) → Images: Lechuchner pp328,329(armored longsword combat) →image of knight gripping sword with secondary hand
Narrator: The treatises on knightly combat were written at the very end of the Middle Ages, at a time when major changes were beginning to	*Establishing shots of the renaissance* *Maybe footage from a renaissance fair.*

transform Europe. Already by the 1400s, Italy was entering the Renaissance.	
In the increasingly fashion-conscious courts of Italy and Spain during the 1400s, men began to wear swords as part of their civilian attire. To meet the new fashion, a specialized form of civilian sword was developed, called the rapier.	Still shots of a rapier Shot of a man dressed up with a rapier
The rapier evolved from one-handed swords of the Middle Ages, altered to fit the needs of civilian combat. The simple medieval cross-hilt was supplemented with additional bars to protect the unarmored hand. Since the rapier was not intended for tough battlefield use, it could be made lighter and longer, improving the swordsman's speed and reach. These longer, thinner weapons encouraged a style of combat that kept the opponent at a distance, and increasingly emphasized the thrust over the cut.	*Three muskateers still* Rapier guard Long rapier image
	Interview Footage
Swordmasters opened schools in every major European town, and many of them published treatises that document their techniques in detail. Thanks to the printing press, developed in the late 1400s, there is a large number of surviving treatises that describe the techniques of rapier combat.	*Sword school* *Pictures of old books*
Italy was the home of Europe's most renowned rapier masters. A typical example is Giacomo di Grassi, whose treatise on swordplay was published in 1570. Like other swordmasters of the Renaissance, di Grassi took a scientific approach,	Cover of di grassi's book Italian text from book Digrams from book

analyzing sword combat through physics, geometry, and human anatomy. Di Grassi's analysis concludes that the thrust is quicker and more deadly than the cut. He also downplays the role of grappling, which was increasingly seen as an unfashionable way to fight.	
Not everyone was happy with these Italian innovations. The English swordsman George Silver published a treatise of his own, lambasting the teachings of the Italian masters and the fashionable gentlemen who followed them. "We like degenerate sons, have forsaken our forefathers' virtues with their weapons, and have lusted like men sick of a strange ague, after the strange vices and devices of Italian, French, and Spanish fencers… There is no manner of teaching comparable to the old ancient teaching, that is, first their quarters, then their wards, blows, thrusts, and breaking of thrusts, then their closes and grips, striking with the hilts, daggers, bucklers, wrestlings, striking with the foot or knee in the cods." George Silver, 1599. The debate between supporters of Italian rapier combat and those who preferred traditional English styles of swordplay helped inspire Shakespeare's *Romeo and Juliet*, written shortly before Silver's treatise. The German master Joachim Meyer, publishing in 1570, admitted that the rapier was a foreign weapon, but argued that his countrymen needed to learn how to use it so that they could defend themselves against foreign swordsmen. The French also adopted the rapier, though they produced few important masters. Only the Spanish rivaled the Italians in their reputation as masters of the rapier, developing a complex and sophisticated system of swordplay that was respected throughout Europe, though not widely studied outside of the areas of Spanish influence.	
The rapier would survive in Spain and Italy into the 1800s, but elsewhere styles began to change in	*~Moving into smallsword here; some stills and images to provide continuity~*

the mid-1600s. As the Renaissance gave way to the Enlightenment, Europe was increasingly influenced by the culture of France. French sword masters in the age of Louis XIV advocated new theories of combat that focused on small, quick thrusting attacks. The result was a new weapon, the smallsword, which took shape as a lighter, quicker derivative of the rapier.	
The smallsword was short, with an average blade length around 30 inches, and only weighing a bit over a pound. These light blades had little cutting power, and some versions had no edge at all.	
Extravagant decorations made the smallsword an eye-catching male accessory. A smallsword might never actually be drawn in anger, yet the stylish gentleman who wore it was still expected to learn its use.	
Students of the sword sought the services of smallsword masters like Domenico Angelo, an Italian who taught in France and England, and eventually became instructor to the British royal family. Angelo's techniques are recorded in his treatise *The School of Fencing*. For Angelo and other masters, the art of fencing with the smallsword was all about sophistication, elegance and grace:	
"Fencing … justly forms part of the education of persons of rank, giving them additional strength of body, proper confidence, grace, activity, and address, enabling them likewise to pursue other exercises with greater facility." Domenico Angelo, 1763.	
Yet already by Angelo's day, the smallsword was going out of style as a part of civilian wear. It remained a part of court dress for ceremonial occasions, but by the 1800s the sword was no longer a part of a gentleman's daily attire. Only the flexible practice version of the smallsword	

remained in use, surviving to this day as the modern fencer's foil.	
While civilian swords were evolving into light thrusting weapons, military swords followed a separate line of evolution that favored robust blades and simpler, slashing techniques. This line of development led to the saber, a cavalry sword with a single curved edge.	
The saber first appeared in Europe in the 1600s, through the influence of Polish and Hungarian cavalry, who specialized in speed and surprise, and favored a weapon that was suited to swift, mobile attacks.	
By the mid-1800s, the saber was the most common form of sword, and used mostly by the cavalry. Sword production boomed as armies grew in size, and traditional bladesmithing was replaced by factory production. In the United States, sword production was dominated by the N. P. Ames company in Springfield, Massachusetts. Beginning in 1832, Ames secured orders for thousands of swords at a time, which he mass-produced in his water-powered factory, according to standard specifications laid down by the army.	
Mass production also required mass training. As tensions rose between the slave states of the American south and the free states of the north, military preparedness took on a growing importance. Publishers found a ready market for manuals to teach militia officers the basics of military drill, including the use of the saber.	
When the Civil War broke out in 1861, the saber was put to the test. Over the course of the war, Union armies fielded over 300,000 cavalrymen, each of whom carried a saber. By 1865, the Ames factory alone had produced over 80,000 cavalry swords for the Union.	
Yet on the battlefield, the saber had little impact. Union hospitals recorded fewer than 1000 injuries from either the sword or bayonet, compared to total Federal battle casualties around 400,000. The saber remained the emblem of the cavalryman, but	

in reality mounted troops relied more heavily on their firearms.	
Despite the evidence of the Civil War, military theorists of the late 1800s continued to debate the ideal saber for the modern army. Should it remain a curved cutting sword, or did cavalry need a straighter thrusting weapon? The debate involved many leading figures of the day, among them Lord Baden Powell, founder of the Boy Scouts, the global adventurer Sir Richard Burton, and even a young U.S. cavalry lieutenant named George S. Patton: "The days when heroes fought one another while the armies watched, have passed. The use of the sword as now taught does not contemplate the training of such prodigies. Its object is to teach as quickly as possible, a large number of men, the most efficient way of handling their weapons in a combat that will last for minutes and be famous for centuries." Lt. George S. Patton, 1914.	
The debate over the sword's future came to an end in the trenches of World War I. Britain and Germany each fielded 100,000 cavalry at the outbreak of the war in 1914, but machine guns and tanks sounded the final death-knell of military sword combat. Today the sword survives only as a ceremonial weapon and as the sports equipment of the modern fencer. But in recent years, scholars at the Higgins Armory Museum and elsewhere around the globe have begun to translate, study, and interpret surviving manuals on early swordplay, bringing all the tools of modern research to help us understand the history behind this most complex of weapons.	