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UNITED STATES MILITARY ACADEMY

ENGLISH ARMOR AND ITS RELATION TO TACTICS: 1415-1515

HI499: SENIOR THESIS

SECTION S2

PROF CLIFFORD ROGERS

By

CADET VAUGHN JOHNSON. '18, CO I3

WEST POINT, NEW YORK

04 MAY 2018

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INTRODUCTION:

Nations do not conduct warfare in the same manner as all other nations that they may go to war against or with. A nation may share general characteristics of warfare with other nations, but every nation is made up of different components. Some nations will have more of a particular type of resource, others will specialize in a particular kind of warfare, and the culture of the people may drive them towards a particular style of warfare. Another way nations differ from each other is their relationship between their technology and tactics in battle. This paper will focus on what the relationship was between England's armor technology and battlefield tactics from 1415 to 1515.

In order to analyze this relationship, the development of armor throughout 1415-1515 needs to be understood. Armor has several components that contribute to its effectiveness on the battlefield. This paper focuses on the shape of the armor, the metallurgy of the armor, the thickness of the armor, and the weight of the armor. The shape of armor will provide insight into what the armor was designed to do: what were the designers of the armor trying to get weapons to do when the weapons came into contact with the armor. The metallurgical change will show the strength of armor from different periods during 1415-1515. With an improvement in metallurgy, the thickness and weight of armor can be reduced because it is no longer necessary to have so much metal to achieve a similar degree of protectiveness. On the other hand, thickness might stay the same or even increase if the designers of armor found it necessary to put more steel between the fighter and the weapons used against him. Changes in weight can demonstrate how much the fighter valued his mobility and endurance versus increased protection. These components then need consideration in relation to changes in tactics on the battlefield.

To determine if there is tactical change in English battles during 1415-1515, the components of tactics need analysis. The components of tactics analyzed here are the changes in weapons, changes in the composition of the army, changes in the choice of topography, and changes in the preference for offense versus defense. Weapons are the thing on the battlefield that armor is directly attempting to counter, so changes in weapons or armor will have ramifications on each other. A change in the composition of the army, what type of soldier is fighting, is important because different types of soldiers have different needs, expose themselves to different types of threat, and have to perform different tasks in their armor. A cavalryman does not have to use his body the same way an archer does, and the archer does not have to use his body in the same way as a dismounted man-at-arms. Where an army chooses to fight has tactical implications; different positions provide advantages and disadvantages. Finally, an army preferring to be on the offense or defense will expose the soldiers to different kinds of threats and demands. A defender does not have to move around the battlefield as much, but an individual attacker may be more concerned about delivering the strongest blow possible, which could be impeded by armor. Alternatively, by being the attacker, a soldier may expose himself to more danger so more protection would be of the utmost importance. These components of tactics, when compared with the components of armor, will further the understanding of what soldiers valued during 1415-1515.

The relationship between armor and battlefield tactics during 1415-1515 England will help further the understanding of how humans utilize technology. This paper will look into if technology drives battlefield change or if battlefield change drives technology or both. The paper will help assess the relative value of trying to use technology to manipulate the battlefield, versus manipulating technology to fit the battlefield.

HISTORIOGRAPHY:

Tobias Capwell's book *Armour of the English Knight 1400-1450* explores the development of armor throughout the first half of the fifteenth century. A problem that Capwell runs into is the fact that there is not a large collection of surviving armor from this period. Capwell's solution to this problem is the use of effigies of English knights that died throughout the period.¹ Effigies are the main three-dimensional source for the interpretation of armor that has survived to the present day from fifteenth-century England.² Having a three-dimensional representation allows the observer to see how different pieces fit together better. Three dimensions can also show more accurately where on the body the armor fit. This solution allows Capwell to trace stylistic changes in armor to include the addition of new pieces of armor, the changing in the design, which areas are more or less protected, and to see where the pieces are designed to move. Another reason why effigies are useful to use is that there is no evidence that the sculptors used stock designs; rather, each was uniquely made.³ Effigies are also known to have been quite expensive, which leads Capwell to believe that the patrons would want their likenesses to be captured accurately.⁴

Capwell's premise for why the English would have their own distinctive armor style is because the English were tactical trendsetters, so since other armor styles were designed for other types of tactics, the English would need their own type of armor.⁵ To help solidify his claim that the English were tactically trendsetters Capwell points out that the English were able

8. ¹ Tobias Capwell, *Armour of the English Knight: 1400-1450* (Great Britain: Park Communications, 2015),

² Ibid., 30.

³ Ibid., 43.

⁴ Ibid.

⁵ Ibid., 6.

to defeat the French even when the English were outnumbered.⁶ In order to understand the English change in armor and why it was different from other countries Capwell looked into the tactics that the English used versus what other countries use. The Italians, Capwell points out, were predominately using shock cavalry troops.⁷ The English, however, were using archers combined with dismounted knights and men-at-arms as their primary tactical unit.⁸ Capwell claims that since these men were fighting on foot, they were using primarily two-handed weapons, which would require the men raise their arms above the heads, unlike the shock cavalry troop who would be mainly aiming downwards.⁹

Capwell's work is a wonderful foundation to explore how changes in armor relate to changes at the tactical level of war. A limitation of Capwell's work is that effigies cannot provide information on if there was a change in the weight of armor, nor can they be relied upon to discover if there was a change in thickness of armor. Effigies cannot be weighed in a useful way to tell how armor weight changed, and effigies are made out of stone making all measurements for thickness impractical. Also expanding Capwell's work to the entirety of the fifteenth century could show more distinct changes.

Alan Williams' *The Knight and the Blast Furnace: A History of the Metallurgy of Armour in the Middle Ages & the Early Modern Period* is an in-depth look on how metallurgy developed and the use of metallurgy in arms and armor throughout Europe. Williams looks into how metal was forged into different items for war and how to strengthen metal.¹⁰ Williams also

⁶ Ibid., 5.

⁷ Ibid., 6.

⁸ Ibid.

⁹ Ibid., 20.

¹⁰ Alan Williams, *The Knight and the Blast Furnace: A History of the Metallurgy of Armor in the Middle Ages & the Early Modern Period* (Leiden: Brill Academic Publishers, 2003), 877, 893.

explores how effective weapons, longbows, crossbows, polearms, swords, axes, and firearms are against armor.¹¹ Williams uses both the thickness of armor and metal quality to understand how armor progressed over time.¹² A weakness of Williams' research is that majority of the armor used for thickness is centered on the second half of the sixteenth century. The armor is from different locations around Europe, which can be a strength because the general trend is observable, but it does not help with the understanding of different tactics from different regions; for that the data must split apart. Williams, moreover, is mainly focused on the protective capabilities of armor. That consideration must be taken into account in combination with other aspects of the functionality of armor in order to improve the overall understanding of the purpose of armor design the way it was.

Matthew Strickland and Robert Hardy's *The Great Warbow: From Hastings to the Mary Rose* is a tactical exploration of the bow throughout English history. This work is useful because of the tactical exploration of key battles throughout the fifteenth century and how the role of the bow changed throughout. Strickland and Hardy analyze, among others, the battle of Agincourt, the combats of the English civil wars of the fifteenth century, and the battle of Flodden.¹³ Strickland and Hardy look at where in the formation the bow is used and what tactics archers employed in battle.¹⁴ They also look at how armor responded to the development of the bow.¹⁵ Strickland and Hardy's work is extremely useful for the exploration of the question trying to be answered throughout this paper. *The Great Warbow* provides the perspective of people trying to defeat armor rather than people trying to improve armor against weapons. Strickland and Hardy

¹¹ Ibid., 936, 945.

¹² Ibid., 913-915, 740.

¹³ Matthew Strickland and Robert Hardy, *The Great Warbow: From Hastings to the Mary Rose* (Gloucestershire: Sutton Publishing Limited, 2005), 318, 369, 395.

¹⁴ Ibid., 365.

¹⁵ Ibid., 266.

also proved experimental data on the energy delivered and range of different bows. This will prove useful against Williams' research on how effective armor was at stopping or turning impacts of different energy levels.

Malcom Vale uses the development of arms and armor to better understand changes on the battlefield in his book *War and Chivalry*. By understanding how the battlefield changes, Vale is able to better understand the change in war and changes in chivalry.¹⁶ Vale provides an overview of changes in fifteenth-century warfare in Europe. Vale focuses on the changes in the weight of armor throughout the fifteenth century to describe the technological change and has a useful table that demonstrates those changes.¹⁷ He also draws the connection between changes in the weight of armor and different tactical choices made by different countries.¹⁸

Synthesizing the different elements of the analysis presented by each of these authors will produce a better understanding of the role armor had on the tactical changes on the English battlefield during 1415-1515. Capwell provides a way to use effigies and armor changing armor styles to understand how the English preferred to fight in the first half of the fifteenth century. Williams demonstrates the importance of metallurgy and thickness is in making armor more effective against the weapons of the day. Strickland and Hardy explain the tactics of the English during the fifteenth century, and the role bows played it. By focusing on the bow Strickland and Hardy provide a different perspective on armor, that is how to defeat the changes in armor. Vale uses changes in armor to understand how cultural changes in the medieval world occurred and how different countries attitudes created a different style of fighting. Bringing these methods

¹⁶ Malcom Vale, *War, and Chivalry: Warfare and Aristocratic Culture in England, France and Burgundy at the End of the Middle Ages* (Athens: The University of Georgia Press, 1981), 100.

¹⁷ *Ibid.*, 184-185.

¹⁸ *Ibid.*, 121.

together and focusing on the English during 1415-1515, a better understanding of the relationship of tactics and technology will emerge.

METHODOLOGY:

In order to gain understanding the relationship between changes in armor and changes in tactics in English warfare during 1415-1515, the timelines of changes of both armor and tactics need to be understood. The first timeline is that of armor during 1415-1515; the second timeline is that of tactics during 1415-1515. The timelines of both armor and tactics need to have several subcategories in order to gain an understanding of what, if anything, is changing. Armor needs to be broken down into the categories of the shape of the armor, the metallurgy of the armor, the thickness of the armor, and the weight of the armor. Tactics need to be broken down into the categories of the changes in weapons, changes in the composition of the army, changes in the choice of topography, and changes in the preference of offense versus defense. The categories that need examination are known the manner in which to examine them must be understood. The armor categories will be examined first and then move to the armor categories.

The armor categories need examination in several different methods. The shape of armor will be examined using Capwell's technique of examining effigies and continuing his examination through the year 1500 A.D. The key is here is find additions or subtractions to armor styles. Williams' work will enable the tracking of the hardness of armor. I will examine changes in thickness mainly based on a selection of armor, helmets, and breastplates, from the Metropolitan Museum of Art that date from different periods throughout the fifteenth century. I measured each piece of armor in a multitude of places. The helmets were measured above the right and left eye, right and left temple, and the back of the head. The breastplates were measured over the heart, the left side of the breastplate, and the bottom right (covering the stomach region).

This method was necessary because few historians or curators have made such measurements in the past, especially for fifteenth-century pieces. However, I will supplement my measurements with data provided by other scholars to the greatest extent possible. The weight of armor uses the information from the Metropolitan Museum of Art and the Wallace Collection. The downside to examining the pieces from these museums is that they are not purely English pieces; they are from all over Europe. However, they will provide a general trend in how the thickness and weight of armor changed over time.

The tactical categories need examination in three different battles for the English. The three battles are Agincourt (English versus French, October 25, 1415), Towton (York versus Lancaster, March 29, 1461), Flodden (English versus Scots, September 9, 1513). In each of these battles, the weapons that the English use, as well as those used against them, will be examined. The goal is to see if there is a significant change in the weapons used to defeat the enemy. Then changes in the composition of the army will be examined. This category includes how much of each type of soldier is included in the army, where those different types of soldiers arrayed on the battlefield. The choice of topography for the battle will be examined. This section will include topics such as weather, ground conditions, elevation, and natural obstacles. The final category for tactics is the preference for offense or defense. This will be determined by pre-battle actions, actions during the battle, and responses to enemy action.

ANALYSIS OF ARMOR:

Capwell's effigies analysis will start the examination of armor changing over the fifteenth century. At the beginning of the fifteenth century, English helmets were bascinets with

aventails.¹⁹ A mail aventail is a piece of mail that is worn under a helmet, particularly helmets that stop at the jawline, which is meant to protect the neck and upper shoulders. For a reference look at the picture below, the figure on the right is wearing an aventail. This method maximized the flexibility in the neck while still protecting the neck from slashes. The English also wore cuirasses with some flexibility built into the sides.²⁰ They also had full arm and leg protection with “small side-wings.”²¹ These side-wings would protect the inner elbow and knee. Their gauntlets had short cuffs and an hourglass appearance.²² This period also has a mail skirt to protect the upper legs.²³

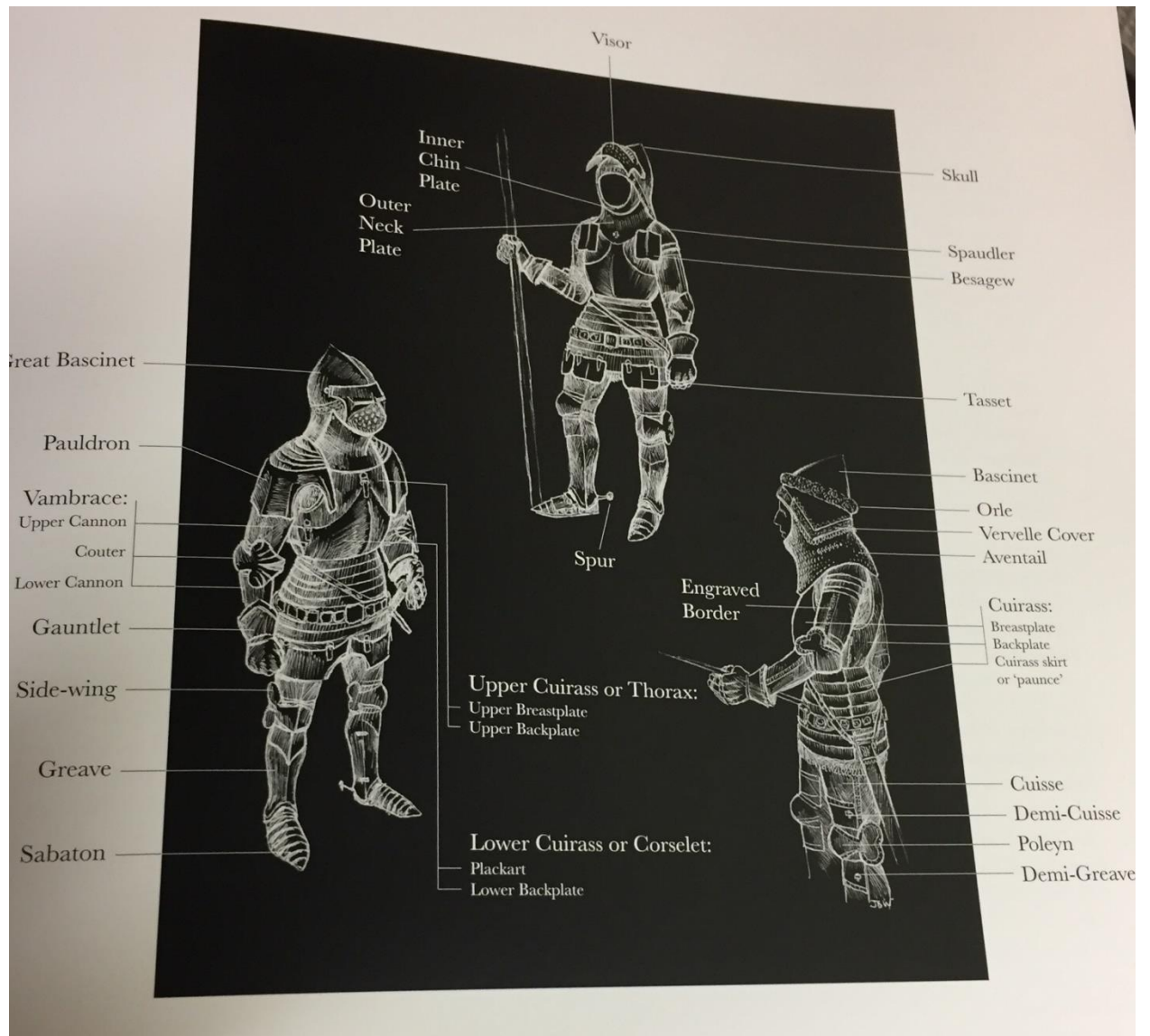
¹⁹ Capwell, *Armour*, 56.

²⁰ *Ibid.*, 56.

²¹ *Ibid.*

²² *Ibid.*

²³ *Ibid.*



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Within the first ten years of the century, the English added besagews, oval plates, to protect the shoulder joints.²⁵ The snout on the bascinet had become rounder, and the mail aventail was replaced with a plate aventail.²⁶ These plate aventails were “composed of hoop-like

²⁴ Ibid., 3.

²⁵ Ibid., 60.

²⁶ Ibid.

plate, producing a more rigid defense which yet provides a similar level of mobility.”²⁷ The cuirass skirt adds a triangular piece of metal to protect the groin.²⁸ On the legs and arms, the side-wings are replaced with rondels, round disks of metal larger than the side-wings.²⁹ This change demonstrates that the English needed additional protection at their joints when they were fighting. The English were also concerned about flexibility as can be seen in the plate aventail. Instead of creating a solid aventail they still incorporate an element of flexibility.

The English make further adjustments to the bascinet after the second decade. A plate of metal extended down from the helmet to cover the front and back of the neck.³⁰ Mail makes another appearance to go under the new neck plate, it also extends to the shoulders.³¹ This suggests that the hoop system was not working well enough to prevent attacks to the throat. The backplate of the cuirass is now a solid piece, the backplate used to be three separate pieces latched together, and is hinged to the breastplate.³² Having the backplate riveted together provides greater security and stability as opposed to having the backplate strapped together.

Following the third decade, Capwell finds that the bascinet continues to become more rounded and that the neck plate is starting to shape more for the chin and throat.³³ The cuirass skirt extends all the way to mid-thigh and “tassests [are] introduced as narrow, oblong plates strapped to the front and sides” of the skirt.³⁴ These indicate that the English developed a growing need to protect a larger portion of their legs beyond what a single piece of plate on the thigh could provide. The besagews became fluted, similar to ridges running the length of the

²⁷ Ibid.

²⁸ Ibid.

²⁹ Ibid.

³⁰ Ibid., 64.

³¹ Ibid.

³² Ibid.

³³ Ibid., 192.

³⁴ Ibid.

piece, and concave.³⁵ There is also much less exposed mail worn; the only areas where mail is the first line of defense is the inner elbow and knee.³⁶

In the final decade that Capwell examines, 1440-1450, the cuirass skirt is shortened, but the tasset is extended effectively cover the same amount of area.³⁷ The majority of the armor has become fluted at this point in development, in some areas, there are diagonally fluted instead of vertically.³⁸ On both the legs and arms the rondels have been replaced with large side-wings.³⁹

The effigies from England after 1450 are rather scarce. I was able to only find two from the 1460s and one from 1484.⁴⁰ To supplement the lack of English effigies I will also use effigies from other European countries of the period. The effigies from the 1460s show that the English removed the tasset and extended the length of the cuirass skirt to the mid-thigh. This is similarly done in both Scotland and Germany during the 1460s and 1470s.⁴¹ For the shoulders there is contradicting evidence for whether there are rondels or not, seeing as how both before and after the rondels are not included, I believe the inclusion of rondels to be an exception rather than the rule for the 1460s. The German effigies still show the use of rondels, but the Scottish does not. For the elbows there are either the wings as before or the rondels, most likely the rondels. For the effigy from 1484, the major change is that the cuirass skirt is shortened to the upper thigh, but it also lacks the tasset. The German armor appears to have something like a tasset, but it is still much shorter than in earlier decades supporting the trend of shortening the cuirass skirt.⁴³ Both

³⁵ Ibid.

³⁶ Ibid.

³⁷ Ibid., 200.

³⁸ Ibid.

³⁹ Ibid.

⁴⁰ "Effigies & Brasses," Effigies and Brasses, accessed May 3, 2018, http://effigiesandbrasses.com/search/?year=1451&year_end=1500&tags=&institution=&name=.

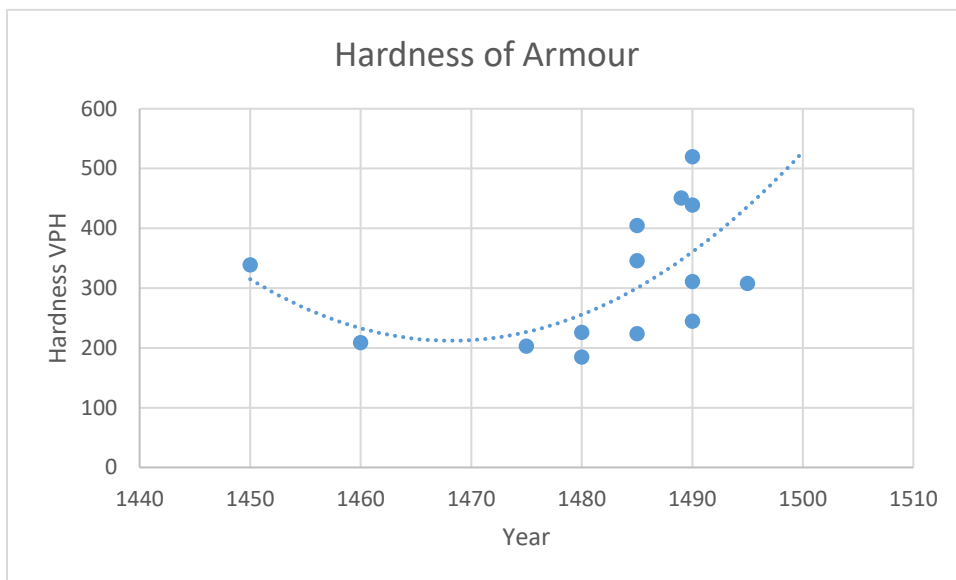
⁴¹ Ibid., <http://effigiesandbrasses.com/2923/2480/>.

⁴² Ibid., <http://effigiesandbrasses.com/1215/1277/>, <http://effigiesandbrasses.com/2924/2481/>.

⁴³ Ibid., <http://effigiesandbrasses.com/2929/2486/>.

of these periods seem to be following the armor design from the last decade Capwell described except for the removal of the tasset. There are two reasons why they may have removed them. The first being that the tasset may have gotten in the way while they were fighting. The second explanation is that the quality of their leg armor improved, so the extra layer of metal became redundant. A general trend cannot be established here because there are too few sources of effigies after 1450.

The most detailed information available for the fifteenth century Williams provides is the hardness of Innsbruck armor. The armor pieces that he looks at are dated from 1450 to 1500. Williams measures the Vickers hardness (VPH) levels of 14 different pieces of armor. The earliest piece has an oddly high VPH level, but generally as the years progress the average VPH level increases.⁴⁴ In 1460 the VPH level was 209 and by 1490 the VPH level around 381.

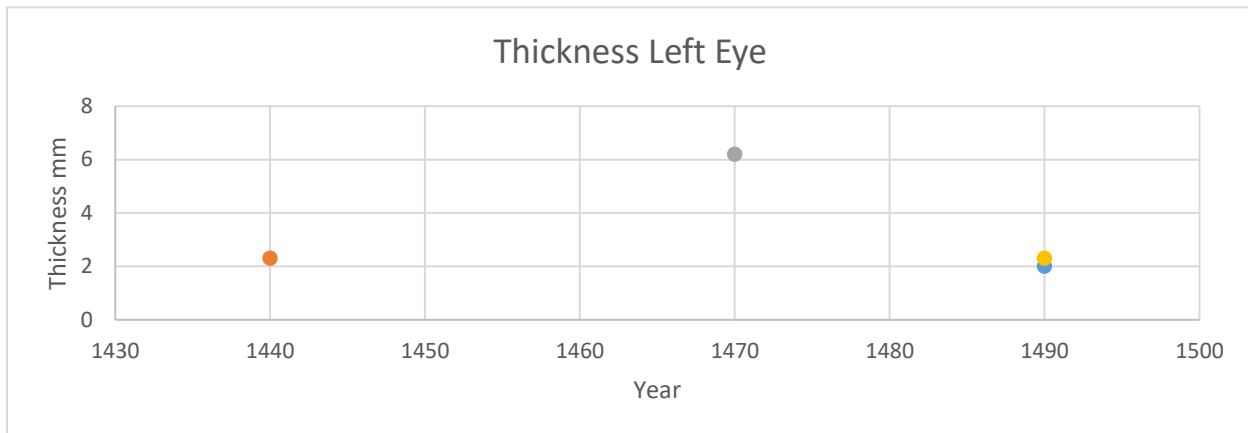


As the years progressed the hardness of armor got higher. This provides greater protection for combatants in battle. There is a lack of armor from the earlier periods, but it seems that there is a

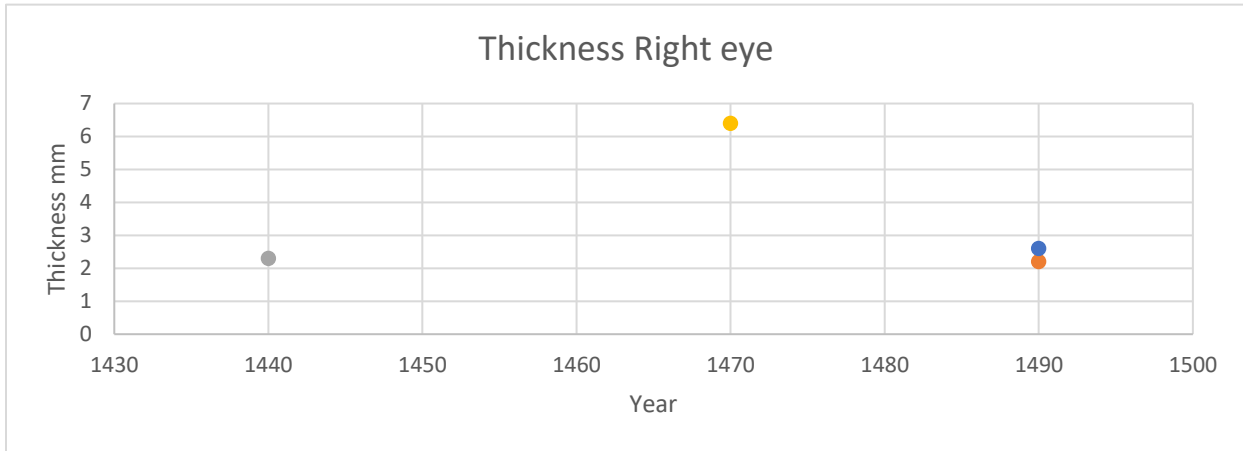
⁴⁴ Williams, *The Knight*, 452-453.

steady progression upwards on the hardness of armor. This would indicate that trying to increase armor hardness was a constant effort rather than a direct response to anything.

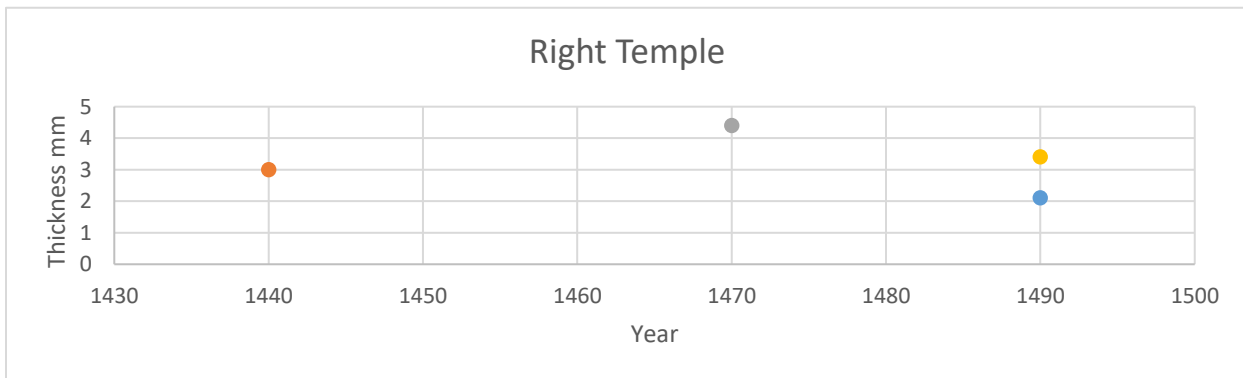
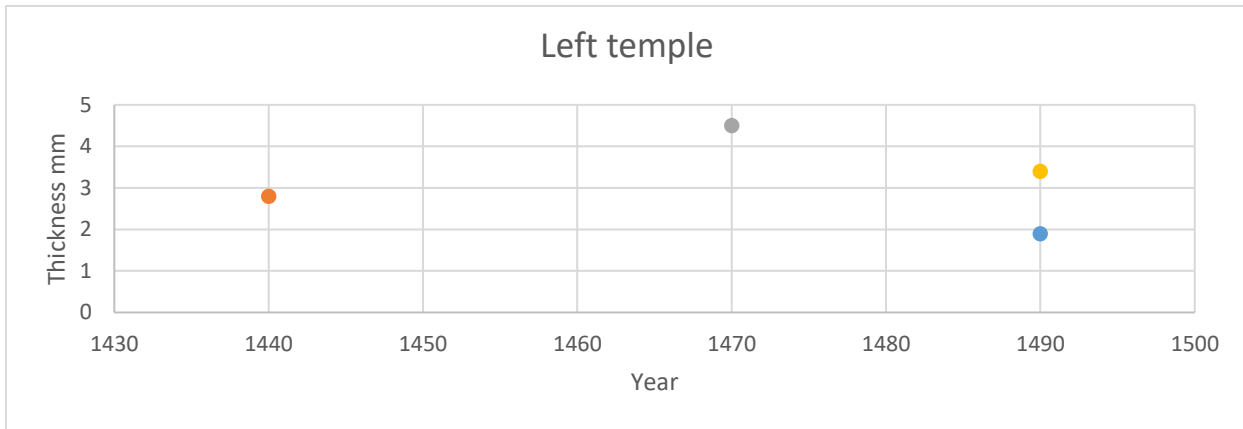
The thickness of helmets was tracked in for different locations, the right eye, left eye, left temple, right temple, and the back of the helmet. The thickness above the left eye is relatively the same in the 1440s and 1490s.



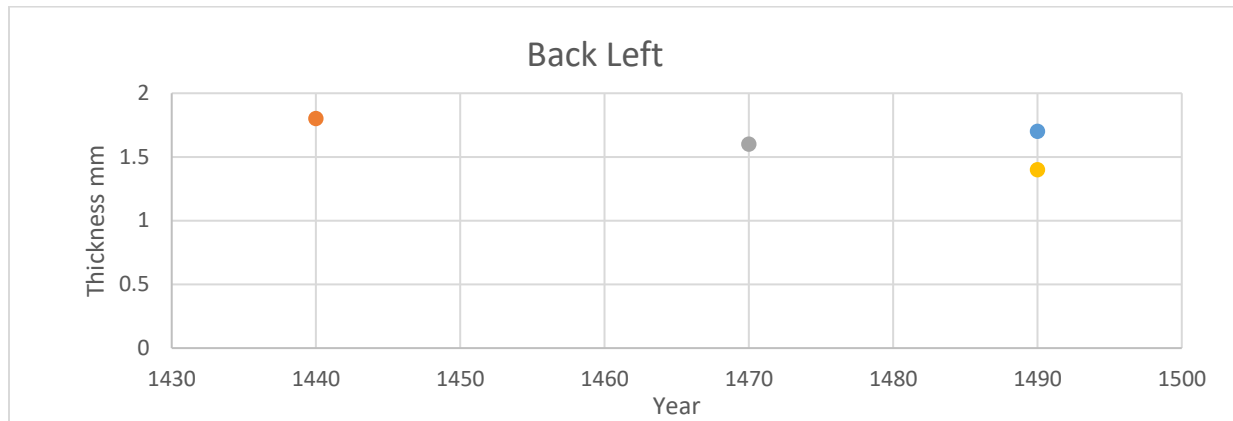
In the 1470s the thickness is almost triple than either of the other two periods. This could be because the hardness of the material improved from 1470 to 1490 so it was not as necessary to put as much material into the helm, making it lighter and cheaper. The hardness from 1470 to 1490 improved by 2.5 times. The weight of helmets, as will be explored more later corresponds to the increase in thickness. The 1470 has the second highest weights of 154 ounces, that is about a doubling in weight from the 1390s. However, more samples need to be found and measured to see if the trend holds. This analysis holds true for the right eye as well.



For the temple area the pattern is the same, but instead of being three times as thick, the helmet from the 1470s is only twice as thick.

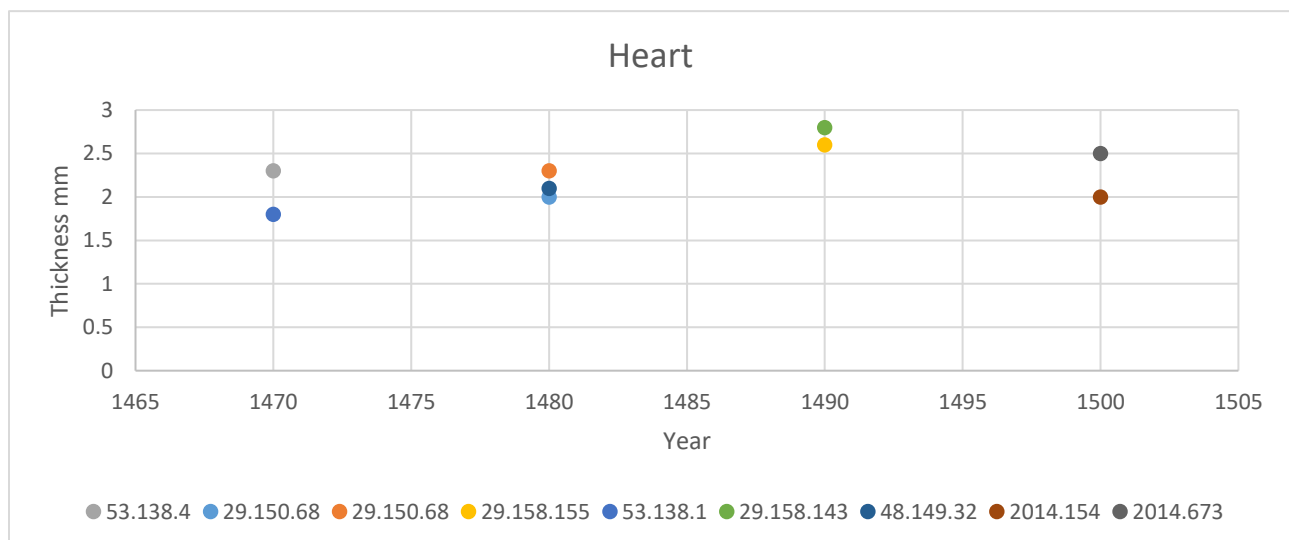


On the back of the helmet, the thickness has a slight decreases but is relatively stable throughout the decades.

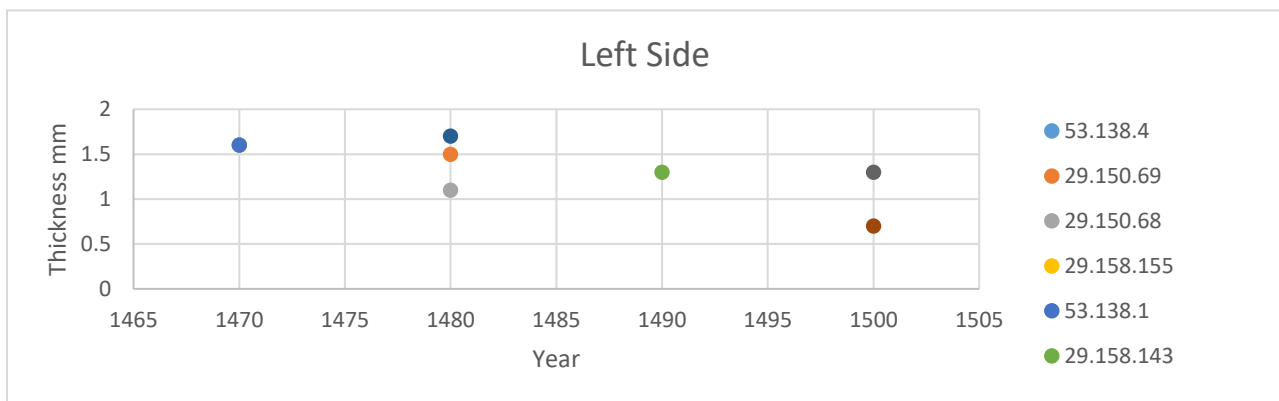


An explanation for this could be that combatants were not getting attacked in the back of the head so armorers took out the extra material so that the overall helmet would be lighter. Many of Capwell's explanations for changes in armor is that the new design provided greater flexibility while adding protection. Having a lighter helmet would play into this idea.

The thickness of breast and backplates were measured in three areas, over the heart, on the left side, and on the bottom right of the armor. The thickness over the heart appears to increase by about thirty percent from 1470 to 1490.



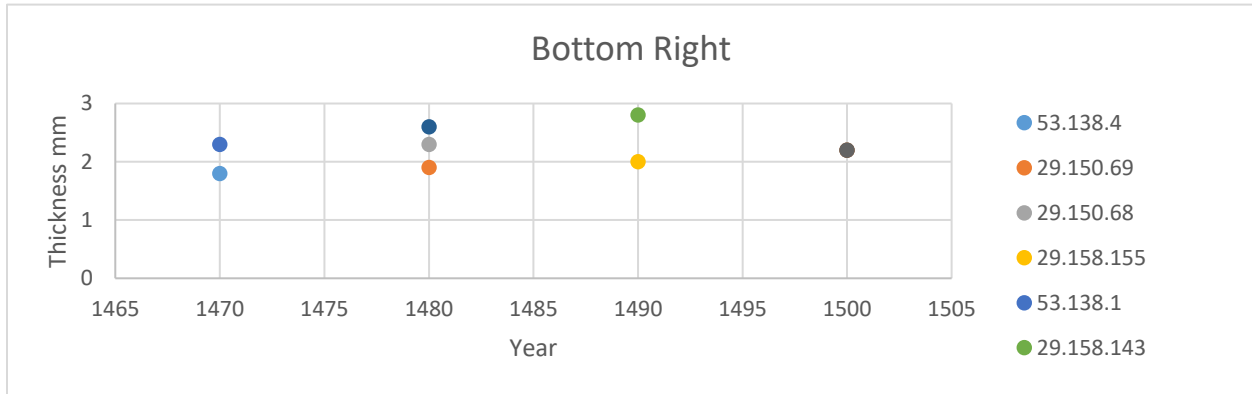
However, after 1490 the average thickness decreases again by about twenty percent. A similar explanation to that of helmets seems to be reasonable in this circumstance as well. The thickness of armor on the left side decreases at a steady rate from 1470 to 1500, starting at 1.6 millimeters and decreasing to 0.7 millimeters. Williams provides a system to evaluate the effectiveness of armor. Williams' formula is $E = \frac{80 * T * T * W}{\cos A}$.⁴⁵ E is the energy in defeat armor, T is the thickness of armor, W is the coefficient of the quality of armor, and A is the angle of attack. If it is assumed that the armor of 1.6 millimeters has the worst quality of armor and the armor of 0.7 millimeters has the best quality of armor, as well as the angle is 45 degrees, then it is revealed that the 1.6 millimeter armor takes 144.815 joules and the 0.7 millimeter armor takes 83.156 joules. Since it does not make sense for the effectiveness of armor to go down then a conclusion for this part of armor could be that the left side of the body became a less of a concern as time progressed. So, instead of putting material in area that is not important the armor design decided to put the material in the area that was more important, over the heart for example, while still maintaining the same weight.



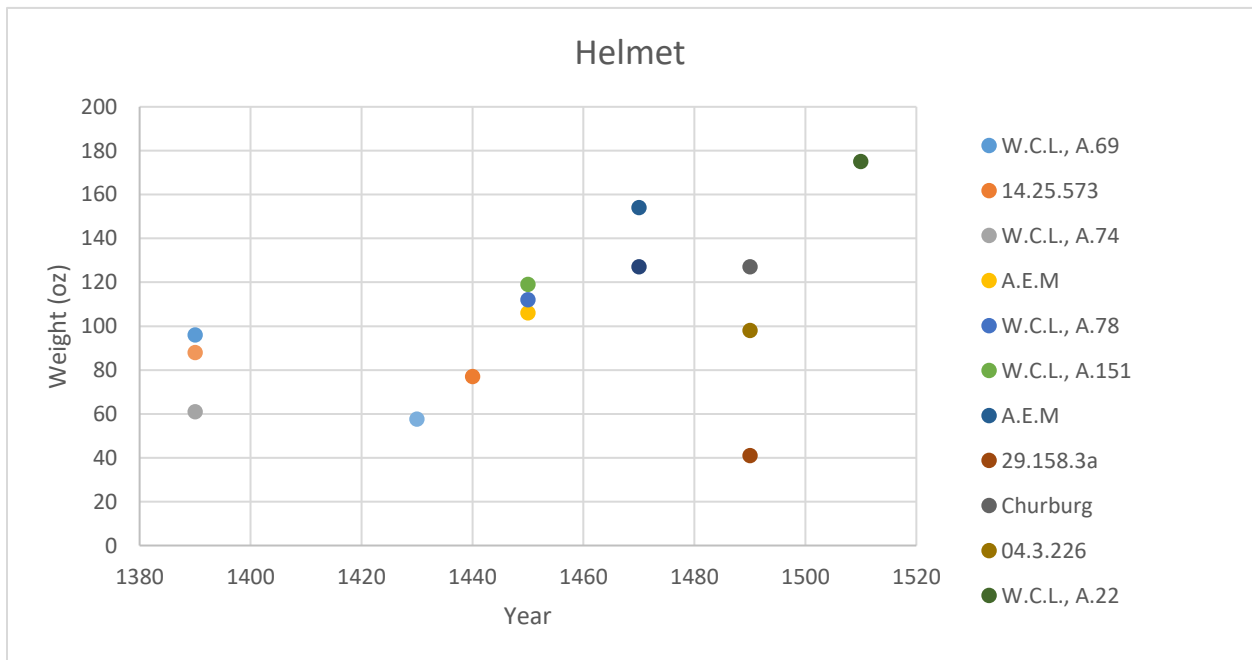
The thickness at the bottom right of armor has a similar pattern, as over the heart, a general

⁴⁵ Ibid., 935.

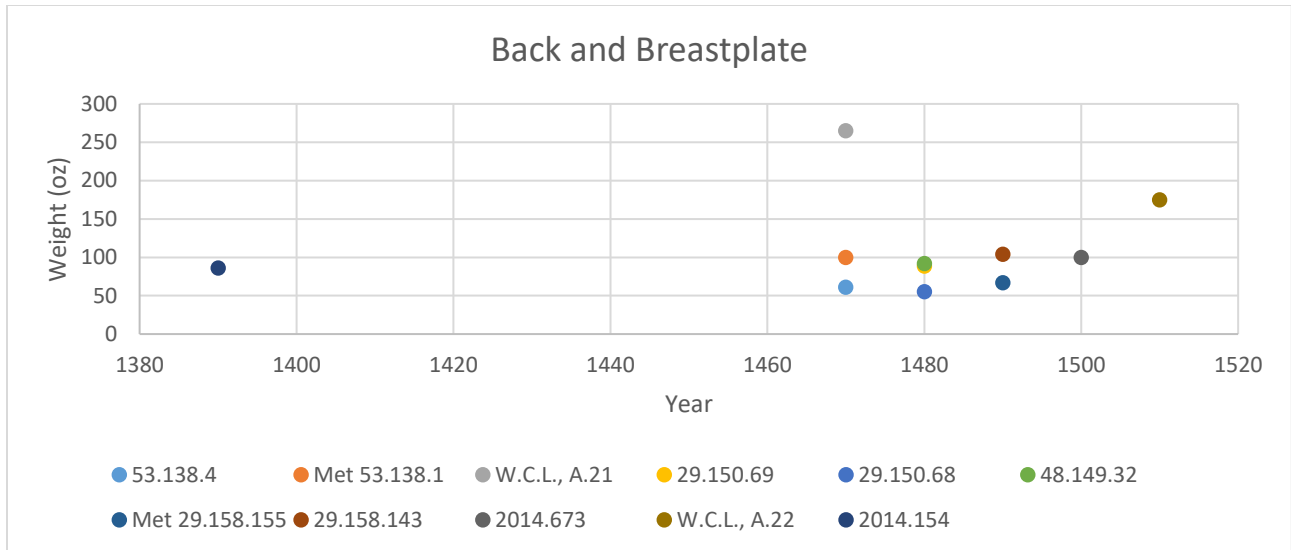
increase up to 1490 then there is a decrease in thickness.



The weight of armor is the next portion of armor design that needs to be discussed. The weight of helmets from 1390-1510 had a general pattern of increase in weight:



starting in 1390 at a weight of 61 ounces and ending in 1510 at 175 ounces. In 1490, there is a significant drop in weight only to rise again in 1510. This pattern of weight generally aligns with the thickness pattern discussed earlier.



The breast and backplate weights remain fairly constant throughout the decades. In 1510, there is an increase of about 70 ounces. This pattern does not perfectly align with the thickness.

ANALYSIS OF TACTICS:

The weapons used at Agincourt, October 25, 1415, by the English are longbows, axes, maces, swords, spears, falcon beaks, mallets, and stakes.⁴⁶ The French at Agincourt did not use longbows; instead, their archers used crossbows as well as more conventional bows that were not as powerful as the longbow.⁴⁷ The longbow enabled the English to disrupt and stall all of the French actions.⁴⁸ The English men-at-arms primarily fought with long spears.⁴⁹ The French dismounted men-at-arms also primarily fought with spears.⁵⁰

⁴⁶ Anne Curry, *Agincourt: A New History* (Gloucestershire: Tempus Publishing Limited, 2006), 255.

⁴⁷ Peter Reid, *Medieval Warfare: Triumph and Domination in the Wars of the Middle Ages* (New York: Carroll & Graf Publishers, 2007), 273.

⁴⁸ *Ibid.*, 334.

⁴⁹ *Ibid.*, 859-860.

⁵⁰ Strickland, *The Great Warbow*, 860.

At Towton, March 29, 1461, both sides used a combination of swords, poleaxes, halberds, axes, and longbows.⁵¹ The poleaxe was the preferred staff weapon at Towton.⁵² At Agincourt, the preferred weapon for the dismounted English men-at-arms was a spear. The poleaxe is both swung and thrust, thus exposing more areas of the body in its use. The longbow as at Agincourt was the initial weapon used. Unlike at Agincourt, the longbow was being used against fellow Englishmen rather than the French. Also at Agincourt, the fact that the English had longbows and the French did not played a significant role. Now that both sides have the longbow, the deciding factor was who utilized the weapon better along with utilizing other factors at the battle.

The battle at Flodden, September 9, 1513, had the major shift in weaponry of the cannon.⁵³ The cannon was able to reach farther than the longbow, so for the first time in this examination, the cannon is the first weapon armies had to worry about. The English had smaller field cannons than the Scots allowing the English to maneuver the guns more effectively than the Scots.⁵⁴ The English also used the eight-foot bill instead of the longer pike of the Scots.⁵⁵ The English archers had a short sword and buckler to supplement their longbows.

In all three battles the longbow played a critical role for the English; it helps them to attrit and disrupt their enemies to the point that their melee weapons could dispatch the rest of the enemy. The biggest differences in weapons used in battle are that at Agincourt when the archers joined in, they used any weapon they could get ahold of and the men-at-arms used lances. The

⁵¹Philip A Haigh, *The Military Campaigns of the Wars of the Roses* (Gloucestershire: Alan Sutton Publishing Limited, 1995), 62.

⁵² Veronica Fiorato, Anthea Boylston, and Christopher Knusel ed., *Blood Red Roses: The archaeology of a mass grave from the Battle of Towton AD 1461* (Oxford: Oxbow Books, 2000), 150.

⁵³George Goodwin, *Fatal Rivalry: Flodden 1513 Henry VIII, James IV and the Battle for Renaissance Britain* (New York: W.W. Norton & Company, 2013) , 197.

⁵⁴ *Ibid.*, 198-199.

⁵⁵ *Ibid.*, 204.

English men-at-arms evolve their staff weapons from the lance at Agincourt to the poleaxe at Towton, and finally to the bill at Flodden. Towton has the biggest change in weaponry; for melee weapons, they primarily used poleaxes instead of lances.

The composition of the English army at Agincourt was around 5,000 archers and 900 men-at-arms.⁵⁶ The archers were arrayed on the flanks of the men-at-arms.⁵⁷ There was also a contingent of archers that either started in front of the men-at-arms and pulled back as the French approached, or that took up position in the middle of the English men-at-arms.⁵⁸ The men-at-arms were arrayed into a single line for battle.⁵⁹ The archers had stakes that they placed in a checkerboard fashion in front of their position to protect themselves from advancing French troops.⁶⁰ Also, when the archers started to join the melee they did not do so on an individual initiative, but rather as a cohesive unit.⁶¹

⁵⁶ Strickland, *The Great Warbow*, 325.

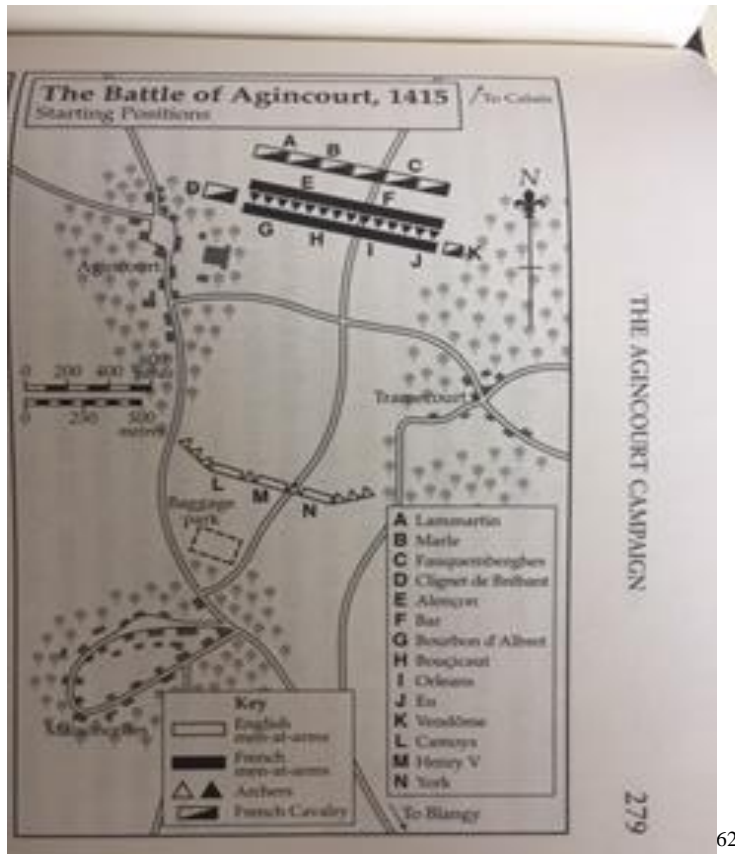
⁵⁷ Curry, *Agincourt*, 235.

⁵⁸ Curry, *Agincourt*, 252. and Strickland, *The Great Warbow*, 327.

⁵⁹ Strickland, *The Great Warbow*, 327.

⁶⁰ *Ibid.*, 326.

⁶¹ *Ibid.*, 336.



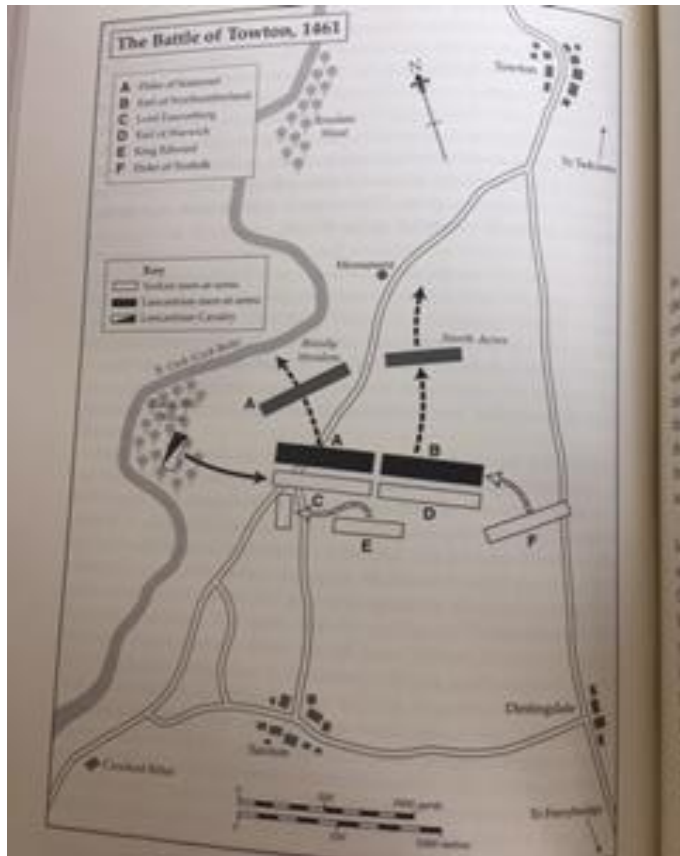
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At the battle of Towton, both the Lancastrian and Yorkist forces were arrayed similarly to each other. They each had their men-at-arms in three lines, the third being the rearguard and reserve commanded by the leader of each army.⁶³ The Yorkists had their archers in front of their men-at-arms until the Lancastrian forces got too close, then the archers fell behind the men-at-arms.⁶⁴ Neither side had a cavalry force.

⁶² Reid, *Medieval Warfare*, 279.

⁶³ Haigh, *The Military Campaigns*, 60.

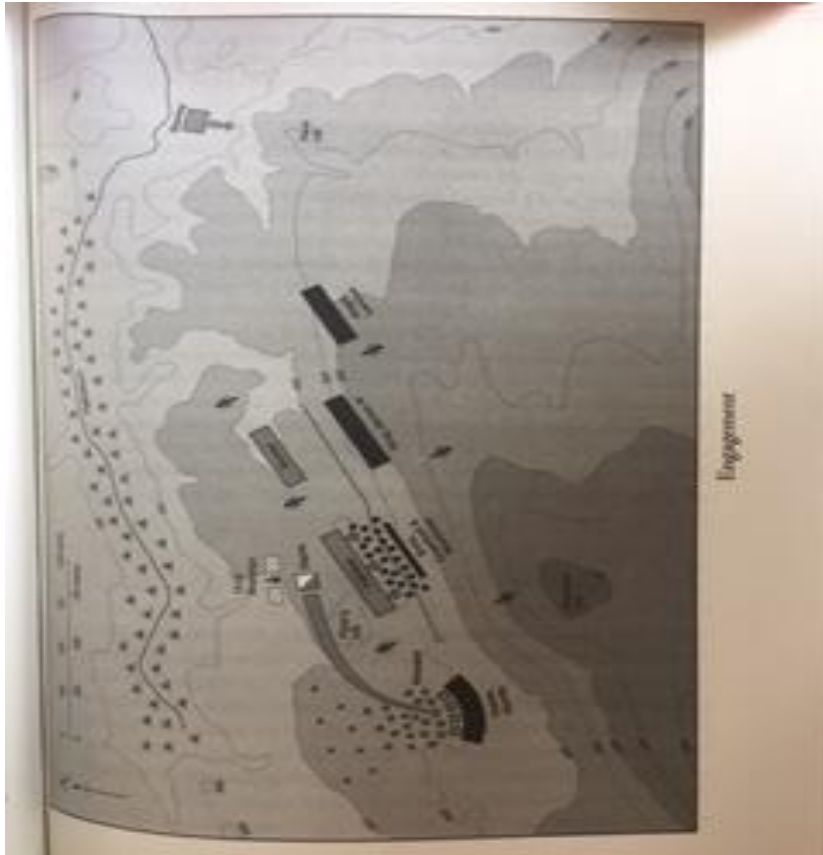
⁶⁴ *Ibid.*, 61.



The English army at Flodden was made up of 26,000 men. These 26,000 men were split between Surrey and his son the Admiral. Surrey controlled the rearguard, his center had 5,000 men, his right wing was composed of 1,500 mounted troops and 1,500 men on foot, and on the left wing was 3,000 men. The Admiral was with the vanguard; his center had 9,000 men, his left and right wing had 3,000 men each.⁶⁶ This is the first battle in this analysis where the English have a mounted reserve component. This mounted reserve component was used to reinforce the English from the initial pike advance of the Scots by joining the breaking English formation, thus allowing the English to continue to fight.

⁶⁵ Reid, *Medieval Warfare*, 428.

⁶⁶ Goodwin, *Fatal Rivalry*, 193-194.



The biggest change in the composition of the armies of the English during the fifteenth century is the percentage of archers used in the battles. At Agincourt, the overwhelming percentage of men were archers; out of about 6,000 men, only 900 were men-at-arms, making the archers about 85 percent of the army. At the battle of Towton, the number of archers is not given, but Philip A. Haigh claims that the Lancastrians had 40,000 men-at-arms and the Yorkists had 36,000 men-at-arms.⁶⁸ Peter Reid claims that these numbers are too large and calculates the number of men on both sides by counting the number of nobles and averaging the number of men each would have and the number of additional forces that could be brought in from the surrounding areas.⁶⁹ Reid calculates that the Lancastrians would have 27,000 men total and the

⁶⁷ Ibid., 205.

⁶⁸ Haigh, *The Military Campaigns*, 60.

⁶⁹ Reid, *Medieval Warfare*, 411.

Yorkists would have 22,000.⁷⁰ Reid believes the breakdown of the Lancastrian army to be “about 2,500 men-at-arms, some 12,500 archers and around 12,000 bill-men, while the Yorkists would have had about 2,000 men-at-arms, 11,000 archers and 9,000 bill-men.”⁷¹ Haig's numbers seem to be high, especially since he says his numbers are for men-at-arms only. Using Reid's breakdown of the army it can be determined that the archers make up 46 percent of the Lancastrian army and 50 percent of the Yorkist army. By the time of Flodden the artillery piece had taken over the primary role of the longbow so it would seem likely that there would be even fewer archers at that battle than at Towton. The primary role of the longbow, as seen at Agincourt and Towton, was to strike the enemy at far distance and force the enemy to fight or flee as well as disrupt the enemy during their advance. A constant similarity is that the English fought on foot on all of these battles; Flodden was the only battle with mounted troops and they were only about 6 percent of the army and the majority of the fighting was done by men on foot.

Topography at Agincourt from the English perspective was highly useful. The English were positioned at the bottom of a long gentle incline, which is usually a disadvantage, but the English were able to turn it into an advantage.⁷² The ground at Agincourt was extremely soft and slippery since it was a newly sown wheat field.⁷³ The soft ground also made it easier for the archers to put in the stakes to defend their position.⁷⁴ The English flanks, where the archers were positioned, was against a thick tree line.⁷⁵ This prevented the French from attacking the archers from the archers' flanks. The more French troops and cavalry that attack, the more of a quagmire the ground become for the advancing French, making it almost impossible for them to advance

⁷⁰ Ibid., 412.

⁷¹ Reid, *Medieval Warfare*, 412,

⁷² Curry, Agincourt, 254.

⁷³ Ibid., 241.

⁷⁴ Ibid.

⁷⁵ Ibid., 254.

even reasonably quickly.⁷⁶ The English would have also been fighting on the rather muddy ground. However, it would not be as large of a drawback for them since the English were holding their ground instead of trying to take it. This experience could lead to the English accepting armor that weighed more so that it could provide more protection while fighting in place. Alternatively, they might recognize that they may need to advance through the mud in the future and need to make sure that their legs are not restricted as much as possible.

Lancastrian and Yorkist forces were separated by a shallow valley at the beginning of the battle at Towton.⁷⁷ One of the armies was going to have to go downhill and then back uphill to fight their enemy. There was also extremely high winds that were blowing snow into the face of the Yorkist forces.⁷⁸ When the wind flipped directions the Yorkists opened with longbow fire; the wind carried the arrows farther than they would have gone otherwise and when the Lancastrians shot back, their arrows fell short of the Yorkist lines.⁷⁹ When the Yorkists eventually pushed the Lancastrians back, the Lancastrians slipped and got trampled trying to go up the snow-covered hill they originally came down.⁸⁰ Many Lancastrians as they fled tried to cross the River Cock and drowned because their armor weighed too much for them.⁸¹

Seizing Branxton Hill was the decisive objective for the English at Flodden that would enable the English to defeat the Scots. In order to do that the English had to cross the River Till.⁸² The river was swollen from heavy rains previously.⁸³ The English also crossed the river at two points that were a mile and half apart, because they needed to get the army across as much at

⁷⁶ Strickland, *The Great Warbow*, 334.

⁷⁷ Haigh, *The Military Campaigns*, 60.

⁷⁸ *Ibid.*, 60-61.

⁷⁹ *Ibid.*

⁸⁰ *Ibid.*, 63.

⁸¹ *Ibid.*

⁸² Goodwin, *Fatal Rivalry*, 191.

⁸³ *Ibid.*, 192.

the same time as possible and they had to use a specific bridge in order to move the heavy cannons across.⁸⁴ There was a large amount of smoke cover both the English and Scottish movements; the smoke came from the burning of the Scots trash as they changed positions to react to the English attack on Branxton Hill.⁸⁵ Also after the first Scottish pike attack, the already muddy ground become so bad that men's legs were sinking into it.⁸⁶

In all three battles, the English utilized the elevation of the ground to their advantage. At both Agincourt and Flodden, the English set up at the bottom of a hill. At Towton both sides were on the top of hills separated by a shallow valley. All three battles were also fought on ground that was extremely muddy or slippery. Agincourt and Flodden were both fought in the fall, bringing rain, and Towton was fought in late winter, bringing snow.

Henry at Agincourt wanted to fight a defensive battle. He built a defensive position and was then forced to move out it because he knew that the French would only gain in their number of troops and would be able to resupply.⁸⁷ Henry was not able to resupply unless he was able to get past the French. When he did advance, he made sure that his archers brought their stakes with them and he only advanced to bowshot range.⁸⁸ Once he gets his archer into bowshot range, he has them fire onto the French until the French are forced to fight or be cut down by arrows. Instead of going to meet the French advance he waits for them to come to his men-at-arms and uses his archers to thin out and disrupt the French ranks.⁸⁹

⁸⁴ Ibid., 194.

⁸⁵ Ibid., 195.

⁸⁶ Ibid., 201-202.

⁸⁷ Curry, *Agincourt*, 241.

⁸⁸ Ibid., 254.

⁸⁹ Ibid., 235.

Both sides at the battle at Towton choose to take up positions on a hill, which is the classic defensive position.⁹⁰ The Yorkists fired first only because when the wind shifted, it gave them the distinct advantage of being able to hit their enemy without being able to be attacked in return.⁹¹ The barrage of arrows forced the Lancastrians to either attack or to withdraw from the field; they choose to attack.⁹² The Yorkists, by striking first, forced their enemy to come to them where they were already set up in a defensive position. This is very similar to what Henry did to the French at Agincourt. The Yorkists were able to hold the Lancastrians off long enough for their reinforcements to arrive and then with that advantage of fresh troops were able to drive the Lancastrians back and ultimately defeated them.⁹³

The English at Flodden were fighting an enemy who was in a better defensive position than they were in. The English artillery pieces were more maneuverable and could fire more accurately and faster than the Scots could counter, so the Scots were forced to attack the English or be torn apart by the English artillery.⁹⁴ This is continuing the English tactic used at both Agincourt and Towton; attack the enemy in order to make them come out of their defensive position. The Scots attacked with their pike-men and their first assault was rather successful; they almost broke the English entirely and would have done so if it were not for the reinforcement by the English mounted troops who were able to prevent English forces from being overwhelmed.⁹⁵ After the first assault was repelled, the Scots sent in their second wave of pike-men and this assault would have had similar effects and could have destroyed the English army if it was not for the mud that was created by the first wave of pike-men. The mud slowed

⁹⁰ Haigh, *The Military Campaigns*, 60.

⁹¹ *Ibid.*, 61.

⁹² *Ibid.*

⁹³ *Ibid.*, 62-63.

⁹⁴ Goodwin, *Fatal Rivalry*, 191.

⁹⁵ *Ibid.*, 200-201.

and disrupted their assault and allowed the English longbow-men to start picking them off and now that the pike formation had been disrupted, their reach advantage was negated; for pikes to be effective they need to be part of a solid formation making it impossible for the enemy to get around their blades.⁹⁶ The Scots now had to get in close and fight in a more individualistic style. The English bills were just short enough to be more nimble than the Scottish pikes, but they were long enough to outreach the Scots' side-arms.⁹⁷ This method ultimately defeated the Scots and the English routed them.

In all three battles, the English did their best to fight a defensive battle. In all three in order to get the enemy to go on the offensive, the English struck with long-range weapons that the enemy could not counter except by advancing forward for a melee fight. At both Agincourt and Flodden, the English were motivated to get the fight started sooner than they may have liked because they were running low on supplies and had to fight through the enemy to get resupplied.⁹⁸

After examining all four categories of tactics for the fifteenth century English a strong theme starts to emerge. There is little change in both the topography and the preference for offense or defense. For weapons, the English men-at-arms evolve from wielding the spear primarily to the poleaxe to the bill. The enemies of the English for melee evolve from using the spear to the poleaxe to the pike. For ranged weapons, the English had to deal with crossbows then longbows and finally cannon. As for composition, Agincourt seems to be the outlier with such a huge number of archers; in the other two battles, the armies are dominated by men-at-arms on foot. The changes in the weapons the English used caused an increase in demand for the

⁹⁶ Ibid., 206.

⁹⁷ Ibid.

⁹⁸ Goodwin, *Fatal Rivalry*, 191. Curry, *Agincourt*, 241.

ability to swing and deliver more powerful strokes as opposed to thrusts. The English armor also had to be able to deflect or stop similar blows from harming the English. Changes in armor would most likely be in response to these concerns.

When examining the four components of armor design, weight, thickness, hardness, and design of the armor, there is a consistent manner to the progress. The weight of the helmet steadily increases over time, while the weight of the breastplate remains relatively the same. This could be from the increase in the use of more dangerous staff weapons. The way to deliver a more powerful blow with staff weapon with an axe or hammer on it would be to raise the weapon above the head and to bring it down with as much force possible. This would mean the first thing to be threatened is the head rather than the chest. The chest would need to primarily prevent thrusts from enemies trying to quickly attack while a powerful blow is being prepared. The thickness of helmets start and end at the same level (more research should be done here), and the thickness in breastplates over the heart region generally rose for the majority of last quarter of the century. The hardness of armor also generally increased in the last quarter of the century. The design of armor was modified slowly and usually in the same areas, protecting the joints better, better protection for the neck, and protection for the upper thigh region increased. This would provide the individual soldier with the ability to make more powerful attacks without the concern of being wounded in sensitive areas.

In addition to the change in weapons in English battles another explanation as to why English armor continued to change is that the English were constantly trying to find the best armor to suit their tactical needs. This makes sense, instead of drastically altering your equipment or your preferred fighting style; it would be easier instead to slowly change the armor in specific areas. The English over the century had plenty of battles in which to discover what

their needs are on the battlefield for their armor. By not changing tactically, they are able to predict what problems they will encounter in battle and so they can adjust accordingly.

English armor and English tactics during 1415-1515 adds to the discussion on whether it is technology that drives tactics or if it is tactics that drives technology. When focusing on armor, I believe that it is the tactics used that drive the technology. The shape of English armor steadily adds more protection to areas that are found to have weak spots, such as joints and the neck. The weight of English helmets reveal an increase in weight, which corresponds to the prevalence of poleaxes and bills. The thickness of the front breastplates increases as the side lessens, most likely to maintain the same weight, shows that a certain importance was given to one area over another. If it were the technology driving the tactics there would probably be more variation in armor design and more visible experimentation on how to design armor. The battles themselves would most likely not be consistent in three out of the four categories examined.

Armor being a technology that is driven by tactics makes sense. Armor is a defensive piece of technology so it is reasonable to be reactive to the situation that it is placed. For a technology to drive tactics, it has to make the army attack or defend differently. Armor, in 1415-1515 England, supplemented the tactics already in use. Armor was changed to meet threats of more deadly weapons, to make it easier wield new weapons, or to prolong the wearer's ability to fight. English armor from 1415-1515 responded to tactical requirements found in battle.

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