An Assessment of the Military Revolution

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Introduction

“Goat Gone. Will Navy Send Seals?” was the December 2002 New York Times headline that stemmed from West Point cadets kidnapping or in this case goat-napping the Naval Academy’s famed mascot ‘Bill the goat’ before the annual Army-Navy football game. Another prank involved Naval Academy midshipmen mule-napping the Army mascot, which resulted in an interstate chase by Army helicopters and federal agents. The Army-Navy football game played at the end of the college football regular season embodies the intense rivalry found between the military and naval academy of the United States. The steep old traditions found in the Army-Navy game typify the time-honored rivalry between armies and navies of old. There have always been quarrels between each branch regarding the question of which branch is better. The same can be said in assessing the military revolution. Was it the land based army revolution or the sea based naval revolution that was the moving force behind the military revolution theory?

Over the course of academic history many historians have attempted to explain how Europe was able to control wide expanses of territory around the world. How was this technologically backwards civilization coming out of the Middle Ages into the 14th century Renaissance able to gain a toehold on six continents in less than 300 years? When China was enjoying considerable prosperity and technological advances, it was sending large treasure fleets as far as Africa, Australia and maybe even the Americas by the early 15th century. The flagship of the Chinese treasure fleets were four hundred feet long. Christopher Columbus’s St. Maria was only eighty five feet and Columbus came a hundred years later. What gave Europeans the edge over the older and more advanced civilizations? Historian Geoffrey Parker attempts to answer this question by explaining his addition to Michael Robert’s theory of the military revolution. Michael Roberts explains that the radical change in military strategy and tactics resulting from the advent of portable firearms in 16th and 17th century Sweden led to major changes in government structure. This eventually led to the modern European state. Parker adds to Roberts’ theory by linking the rise of the modern state and the military to Europe being able to conquer massive amounts of territory.

I agree with the theory of military revolution in explaining how the advent of gun powdered weapons and the strategic and tactical changes that resulted from it led to the modern European state, and in turn was the impetus to Europe’s ability to conquer a greater part of the world. However, I also believe the development of naval forces must be discussed equally with the development of land based forces in the military revolution of the European states. Until recently

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many scholars have failed to mention the singular importance of a naval force and how its development have been the stimulant in the creation of the modern European state. I believe a comparison is needed between the developments of armies and navies and how both factors can be viewed equally in the creation of the modern European state. I will assess the land based military revolution and naval revolution separately, and lay out a case for how both revolution led to the military revolution and the modern European state.

**The Land Based Military Revolution**

The military revolution was a theory espoused by the late historian Michael Roberts that “exercised a profound influence upon the future course of European history.” Roberts also claims the military revolution was “like a great divide separating medieval society from the modern world.” With the advent of firearms and subsequent changes in military strategy and tactics, the professional military came into existence. This new professional army was a standing military where the members were conscripted, better disciplined and better trained than previous armies. They were also clothed and fed by the government. To maintain such an army, the state had to adapt to the changing circumstances, and there was a huge growth in bureaucracies, treasuries, and economic methods (new methods of taxation and loan financing). Roberts believed these adaptations led to the fruition of a powerful modern European state.

Roberts singles out four changes in warfare that led to the military revolution: 1) a revolution in tactics, where the old lance and pikes along with their armored cavalry were rendered useless by en masse muskets, 2) tactic changes resulted in larger militaries, 3) the adoption of complex and intricate strategies to effectively implement large armies during a war and 4) these changes impacted society due to the higher burden for conscripts and resources for war. Thus, there was a greater need for bureaucratic and logistical efficiency by the respective state.

Many scholars after Roberts have accepted the main argument found in Roberts’ theory on the military revolution, but have added their own additions to the theory. Many of the additions involve the chronology of Roberts’ time period. Historian Jeremy Black believes the main time period of the military revolution to be from 1660-1710, when the sizes of most Europeans armies were increasing the fastest compared to any other time. Some scholars such as Clifford Rogers state the military revolution was more of a punctuated equilibrium. Punctuated equilibrium is a term used by evolutionary biologists to describe the theory of evolution. Instead of a slow, continuous movement, evolution tends to be characterized by long periods of virtual standstill “equilibrium”, “punctuated” by episodes of very fast development of new forms. Rogers states

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The invention of the cannon and the development of effective artillery warfare brought about significant changes in military strategy and tactics. These revolutions in warfare were accompanied by changes in the size of armies, the development of naval forces, and the evolution of fortification techniques. Geoffrey Parker has been a key figure in expanding the theory of the military revolution, arguing that Europe became the dominant world power due to three factors: the rapid development of cannons and the arms race between cannons and fortresses, the subsequent rise in the size of armies, and the development of European naval forces. Parker's theory has been influential in understanding how European states managed to conquer nearly thirty-five percent of the world's landmass from 1500 to 1800.

One of the most significant developments in fortification was the trace italienne, which was a low thick-walled fortress that was usually built in the shape of a star, with many triangular shaped bastions on the points of the stars. The bastions allowed the defenders to have open access to all fields of fire, preventing the enemy from being able to sneak up on the fort to undermine the structure by planting mines under the walls. The low thick walls of these large fortresses were usually built of brick and earth, allowing the wall to absorb the impact of cannonballs with little adverse effect. Compared to the old, tall stone walls of medieval Europe (the old stone walls chipped when hit with artillery, making it dangerous for the defenders) these walls were almost indestructible. Along with the general evolution of fortifications, engineers expanded the fortress by adding moats and earthen works such as ramparts and trenches further out from the established forts. These earthen works were in essence another layer of fortresses outside the main fortress. The earthen works were cheap to build and easy to defend. Additionally these defensive works added another layer of difficulty for besieging forces to take care of before even laying siege on the fortress proper. Besieging armies had to use their forces on these defensive works before laying siege to the main fortress. The evolution of fortresses made wars costly in terms of manpower and resources since sieges could last up to months at a time.

The cost of constructing these massive fortresses with bastions was extremely high for the time. In 1542, there was a plan to surround Rome with eighteen bastions, but the plan was discarded because each bastion would cost nearly £10,000 (almost £4,000,000 by present standards). In some Italian republics, the cost of building these new fortresses either bankrupted them or made them so destitute that they could not afford relief armies or navies for their fortresses. Other states were careful with their financing of fortresses such as the Dutch, who were able to afford the £100,000 fortress of Antwerp. From 1529-1572, the total cost of fortress construction in the Netherlands exceeded £1 million. Clearly, the Dutch were able to afford such intricate defenses without bankrupting themselves compared to their Italian counterparts. This was probably a result of the development and maintenance of an intricate taxation system and government financial network to construct and maintain these fortresses.

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Parker notes that the evolution of fortress engineering in response to the evolution of cannon warfare led to longer and costlier wars. This created the need for a large besieging army (since sieges could take months at a time) as well as a large covering army to prevent attempts by the enemy to bring relief to the besieged fortress. In addition, the evolution of portable firearms led to the initiation of linear tactics, where the army would line up in a line across the battlefield as to maximize their firepower. Along with these linear tactics, military strategists such as Counts Maurice and William Louis of Nassau realized that they could increase their musketeers' rate of fire by adding lines of men behind the first line. In a battle, the first line of men would fire, then march backwards and reload while the second line would come forward and fire and then march backwards and reload. Then the third line would fire and so on and so on to create a contingent of musketeers that have a continuous rate of fire. The army needed more men to lengthen battle lines to prevent flanking actions and to plug breaches in the line during battles.

Strategies such as these required an exponential increase in military sizes and thus, set off a military size arms race through Europe. States such as Prussia could bring as many as 1 in 13 of their population as soldiers during times of war. By 1692, there were more than 495,000 on the militia rolls of Spain. From 1547 to 1598, the Spanish military expenditure rose from £200,000 a year to nearly £900,000 a year. Military expenditures rose for all Europeans states during this period. Feeding, clothing, and arming thousands of men bankrupted some states such as Spain while other states such as the Dutch formed novel ideas such as securing war-loans on future taxes with an interest rate advantageous for the lender. In addition, the supply nightmare that resulted from maintaining these fortresses and armies required a streamlining of government acquisition and payment to producers. This helped certain industries such as cloth making, metal works, and farming onto the path of industrialization. Governments subsidized the development of military specific industries, allowing them to become proto-industrial and thus, setting the framework of industrialization.

Unique ideas such as these led to an evolution in financial structure of governments, a key aspect of the military revolution. The cost of supplying the fortresses and armies of Europe led to the evolution of government logistics and finances, helping create the modern European state. Parkers' explanation of the need for a larger army was critical in tying Roberts' theory of the military revolution with Parker. However Parker also notes the creation and maintenance of artillery-proof fortresses contributed to the revolution in government structure. Roberts and Parker both agree that the military evolution of strategy, tactics and technology led to the creation of the modern state structure. In Parkers' point of view, this revolution allowed Europe to control nearly thirty-five percent of the world by 1800.

The Sea Based Military Revolution

One of the main criticisms of Roberts’ theory on the military revolution was the insufficient attention paid to naval development during the era. Many scholars of the military

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14 Parker, The Military Revolution, 2.
revolution including Parker have discussed the importance of naval development in the evolution of the European state towards its modern form. Some scholars claim the naval revolution was the most important aspect of the military revolution and was the key factor to Europe’s ability to dominate the world by the 1800s. Some scholars such as Nicholas Kyriazis and Michael Duffy have looked specifically at the rise of naval power in England and the United Republic (Dutch) as the primary movers of the military revolution within these respective states. The naval forces of Britain and the United Republic were built in response to the grave danger they both faced from the seas, primarily from Spain¹⁵.

Up until the 1500s, the standard tactic of warfare at sea was ramming then boarding the enemy ship. Evidence of gun-powdered weapons on ships date back to the 1300s, but it was not until the middle of the 15th century that gun-powdered weapons were a standard for all ships¹⁶. Ships soon evolved to accommodate more guns of a wider variety. Shipbuilders began building castles on the aft and stern of ships to create a downward plain of fire. As gun sizes grew, builders began placing guns lower in the deck to maintain balance. Ships effectively became floating fortresses. With the advent of gun-powdered weapons aboard ships, the naval revolution finally began.

In 1514, at the end of the First French War, King Henry VIII of Britain only had twenty-three Royal Navy ships and thirty-six hire merchant vessels, manned by 4,429 men. By the end of the 18th century, the Royal Navy maintained one thousand warships manned by over 130,000 men. In less than three hundred years, the British were able to increase their naval power forty-four fold and increase their manpower by nearly thirty fold. That’s pretty impressive for a country the size of Kansas in land area putting together one of the greatest and far reaching navies of the world. The early 16th century British crown lacked the financial capacity to build and maintain a navy. Most of the ships of the Royal Navy built at the time were from the proceeds of Henry VIII’s dissolution of the monasteries. It was also cheaper to hire merchant vessels in times of emergency. Such was the case during the Anglo-Spanish war in 1588 when Elizabeth I hired out merchant vessels to defend the British Isles.

The construction of a British navy was more a result of the lucrativeness in raiding Spanish ships laden with booty crossing the Atlantic from the Americas. In essence, British naval strength in the late 16th century to the early 17th century was maintained by the private enterprise and capitalistic mindset of entrepeneuring state-licensed privateers. Private enterprises were developing cutting-edge ships that were able to sail around the Atlantic terrorizing Spanish vessels. Even by 1625, the crown was relying mostly on merchant ships to complement their fleets. Pressure mounted for the development of a better British fleet. Charles I sought funds from Parliament to create a Royal Navy. This created controversy and led to the dissolution of Parliament and then war. It was not until the days of the Republic in the mid 17th century that the construction of a naval force would be a reality.

According to Michael Duffy the development of the Royal Navy could be divided into three stages in the latter half of the 17th century. The first stage was during the days of the

¹⁵ I alternate freely between the words British and English and Dutch, Holland and United Republic
Republic; the government realized the need for purpose built ships, a code of discipline and an official set of fighting instructions. This stage also saw the development of smaller ships. The second stage came under Charles II and James II, during which larger ships with expanded manpower were built. The second stage saw the ascendancy of the British Royal Navy, but during the third stage; the Royal Navy shrunk a little bit but saw the maintenance of smaller vessels to combat privateers instead of large ships of the line. The Royal Navy continued to expand until more than 130,000 sailors served aboard more than a thousand ships. The British developed such an effective system of maintaining its sailors and fleet that during times of peace, a great majority of the sailors would be paid off to return to the merchant marine to practice their trade skills until a time of war. This saved the British government a great amount of money and also allowed their sailors to contribute back into the British economy compared to their standing army, where in peacetime, all the army could do is stay in its barracks.

This pursuit of naval supremacy by the British altered government, finances and foreign policy. To build such a fleet the British had to create facilities and train people to build and maintain a fleet and find the necessary raw materials for ship construction. This required the construction of a merchant marine fleet capable of transporting the necessary supplies for naval ship construction. According to Nicholas Kyriazis of the University of Thessaly, a state that pursues “sea power necessitates a wide alliance of interests, which brings with it more democratic regimes, develops new more efficient and complex forms of organizations, [and] requires the acquisition and diffusion of new knowledge and expertise, which brings with it institutional change and economic growth.” Kyriazis also makes an interesting comment in “Seapower and Socioeconomic Change” that as societies turn to the sea, they are paralleled with the development of more representative political institutions. The naval revolution was not only the main mover of the military revolution in Britain and the United Republics, but it also actually helped each respective state become more democratic (albeit in a lesser form than democracies today).17

The nascent British ship building industry developed trade lines from other areas of the British Isles, Russia, the Baltic states, and the Mediterranean states. The British also exploited the fisheries of Newfoundland and Iceland, and developed a favorable trade system with the Caribbean, North America and India. Complex forms of organization structure developed to maintain such trade and expansion. British shipping tonnage rose from 50,000 tons in 1572 to 752,000 tons by 1786.18 This growth in trade increased the amount of money the British government received from customs and excise taxes, while accord on internal and foreign policy between the Crown and Parliament led to lucrative land taxes and a system of government borrowing.

The rise of the British merchant marine created a system of shipbuilding and docks giving Britain the ability to learn from their merchant marine to build their own Royal Navy shipbuilding docks and become even more entrenched in the economy. The construction and maintenance of the navy became the largest industry and employer in Britain. Some 6,000 to 8,000 civilians were employed in the dockyards by the British naval industry. They were one of the major single

employers. The necessity for resources drew the government more into the economic sphere and influenced its imperial and foreign policy. By the 18th century the naval industry spurred the need for self-sustainment to remain unchallenged by other states. The British government supported development of industry involved in areas of shipbuilding by providing subsidies for industries such as sailcloth production and iron and copper works. The move towards a naval revolution helped the British industry prosper during this time, setting the groundwork for Britain’s ascendancy during the industrial revolution.

The British naval revolution led to an expansion in bureaucracy to maintain such a force. The Navy Board was developed to maintain the navy and new subordinate bodies such as the victualling office, pay office, sick and wounded board and a transport board were established. Later, the Navy Board was formed into the Admiralty Office, where the Admiralty became one of the major forces of the British government. This increased bureaucratization was synonymous with the bureaucratization found in European states that developed large armies. Once the British government was able to overcome antagonisms between the Crown and Parliament, and a taxing and borrowing system was established, the British Royal Navy never looked back. Lord Halifax can best explain the reason the British placed such an importance on the development and maintenance of a naval force:

To the question, what shall we do to be saved in this world? There is no other answer than this, look to your moat. The first article of an Englishman’s creed must, that he believeth in the sea...  

While states such as Holland created maritime forces that matched Britain at times, there was no vital need for a superior naval force. Their survival did not depend on having a fleet. Holland, along with continental Europe, was more worried about land based armies and fortresses than Britain was. This allowed Britain to gain an upper hand over most of the Earth’s waterways by the dawn of the 19th century. These terrestrial worries created a defensive mentality for many European states, while the naval strategy of Britain created an aggressive and offensive mindset, allowing them to control a wide swath of the world by 1800. Naval forces operated thousands of miles from their homeport, setting the mentality of kill or be killed. Retreat was never an option for British fleets, thus, creating the aggressive mindset of British navies and their complement marine forces. Britain’s total and undying commitment to a naval force and merchant fleet expanded the its government and economy by leaps and bounds, allowing Britain to grow into its modern state. The creation of a naval force was Britain’s military revolution.

The Dutch were like the British in that they also had to turn to the sea to defend their nascent republic during the War of Independence against Spain from 1568-1648. When they declared independence from the Spanish, the first thing they did was to create a tax structure to fund their struggle against Spain. The Dutch, during the 17th century with a population of 1.5 million, were able to hold off the Spanish empire, fight the British, successfully repel a French invasion and fight the Swedes to keep Baltic Trade lanes open. In addition, the Dutch expanded...

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19 Ibid., 59.
21 Ibid., 79.
their territory into South America, Africa and Asia. The nascent Dutch fleet was comparable to their British counterparts. The Dutch mainly used armed merchantmen converted into privateers. By 1620, they had twenty-nine warships; by the end of the 17th century the Dutch had more than a 100 warships with 20,000 sailors.\textsuperscript{22} By 1636, the Dutch merchant marine was shipping up to 600,000 to 700,000 tons of trade. The British didn’t even reach these numbers until the mid-late 18th century. Dutch naval success both militarily and commercially can be linked to the development of cost effective ships that were more suited for the surrounding seas and the development of fisheries. Fisheries employed Dutchmen into all sectors of employment that involved ships, ship construction, sailing, timber and sawing mills, food production, sail makers, rope makers, etc. This gave the Dutch an edge when it came to naval warfare, allowing them to militarily convert all these industries.

Overall, the Dutch benefited with such a move to the sea. Their increase in trade with all parts of the world made the United Republic the center of the trading world. Amsterdam built an exchange that became the largest “entrepot” in Europe. The Dutch subsequently developed a banking system to accommodate such increases in trade. This system allowed an exchange between different banks as well as granted credit to merchants. Amsterdam in turn grew in population from some 50,000 in 1600 to 200,000 in 1650. With a modern banking system and increase in population, many Dutch industries ranging from brick manufacturing, textile, soapmaking, to printing developed to accommodate the needs of its populace. This proto-industrialization laid the groundwork for the industrial revolution.\textsuperscript{23}

Naval forces were an expensive investment for both the English and Dutch. While the initial cost for developing an army was relatively small. An army generally required the same things a naval vessel required. This included artillery, guns, clothes, shot and gunpowder, but a field army could easily sustain itself in a field of battle by plundering. In contrast, naval forces had to plan for months in advance since they operated in a range of thousands of miles. The development of a naval force was an expensive and long-term undertaking. Acquiring the necessary supplies to construct such a ship required massive amounts of money and a complex logistical system. This required more innovation in part of the bureaucracies. Naval forces have very high operational costs. Ships required sail changes, painting, and a massive overhauling at the midpoint of a ships lifespan. A ship of the line could be expected to be operational for 50-60 years at a time. A British 100 gun ship of the line cost the British government £63,174 to build in 1765, by 1815, the total bill for ship upkeep was at £371,922.\textsuperscript{24} Such high costs for construction and upkeep required a strong system of logistics and a very wealthy treasury. The naval revolution was the primary mover of the military revolution in both Britain and Holland. The naval revolution laid the groundwork for industrialization, giving both states an advantage over states such as Spain and France in the 19th century.

The French tactician Morogues, most succintly sums up the naval revolution with a quote he wrote over three centuries ago: "Naval tactics are based upon conditions the chief causes of which, namely the arms, may change; which in turn causes necessarily a change in the construction

\textsuperscript{22} Kyriazis, Seapower, 89.
\textsuperscript{23} Ibid., 90-94.
\textsuperscript{24} Duffy, The Military Revolution, 62.
of ships, in the manner of handling them, and so finally in the disposition and handling of fleets.\textsuperscript{25} Tactics may change due to the evolution of arms and ship construction but the most important aspect is “in the disposition and handling of fleets”. A naval force requires a complex organizational structure and a government structure that can fund such a force. This is exactly what the British and Dutch provided for its navy. Allowing the build up of naval forces helped achieve a “military revolution” and the subsequent domination of other areas of the world.

\textbf{Conclusion}

The military revolution itself led to revolutions in medicine, education, and science. The concern for the welfare of the soldiers led to revolutions in medicine. Military hospitals specifically built for injured soldiers came into existence along with the addition of a permanent hospital corps. In turn, this increased education and the standardization of medicine, and doctors were required to attend ‘medical schools’ (in this case, the Prussians created the Anatomical Theatres and College of Medicine and Surgery\textsuperscript{26}). Treatises regarding research on diseases such as scurvy were produced. Some naval doctors began the first mass vaccinations against smallpox in 1798.\textsuperscript{27} The military revolution itself produced many innovations that were beneficial to society and to the military revolution.

The development of naval forces can be considered equivalent to the development of land-based military development in the military revolution. Both revolutions stemmed from a gun-powdered weapons arms race, leading to a revolution in strategies and tactics. This resulted in an evolution in government methods and structure, thus creating the modern European state. It also must be noted that certain European states could not take part in a naval revolution due to geographic constraints. Therefore, one cannot conclude that the development of a land based force was better than a naval force or vice versa, since all states could not follow the same path. The military revolution laid the groundwork for Europe’s ability to conquer wide expanses of the world. The creation of organized military and naval forces backed by a government that could supply and maintain forces stretched around the world allowed Europe to conquer territories from Chile to China.

\textsuperscript{25} Alfred Thayer Mahan, \textit{The Influence of Seapower Upon History: 1660-1783} (Dover Publications, 1987), 10.
\textsuperscript{26} Duffy, \textit{The Military Revolution}, 5.
\textsuperscript{27} ibid., 74.