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Claire Jowitt, Craig Lambert, Steve Mentz

Navies and naval operations

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Typically, historians have described navies and naval operations as a nation-state’s actions that involve a specific range of activities within the spectrum of armed conflict and violence at sea. The traditional historiographical focus has been on the scope of naval activities at sea that a state directly controls and directs with state-owned, state-hired, or purpose-built warships. In these interpretations of naval operations, the primary historical focus was on battles at sea between fleets, squadrons, or individual ships of similar types. In this approach, naval operations were distinct from the maritime activities that private business enterprises, chartered companies, political groups, individual leaders, or warlords might have carried out. Such other forms of violence at sea also included piracy, buccaneering, filibustering, and ship hijacking, although navies have, from time to time, worked to combat and control such activities.1 Throughout the early modern period, states deliberately encouraged privateering and corsairing as complementary to naval operations in carrying out economic warfare. Scholarship on such related subjects has been marred by a common failure to define the terms, to look with care at the translation of foreign words, and to understand the legal systems behind these activities.2

The traditional historiographical understanding of naval power and naval operations derives from several practices and influences. Until the late twentieth century, writers have tended to examine navies and naval operations from the limited viewpoint of a specific nation’s history or through the biography of a particular national naval hero.3 For example, in Dutch naval literature, Gerard Brandt’s 1687 biography of Admiral Michiel de Ruyter was an early model for heroic naval biographies.4 In the English-language literature of the field, the Secretary of the Admiralty, Josiah Burchett, published the first British national naval history in 1720.5 Similar to the biographies, Burchett’s work exemplified the early approach to naval history that focused on descriptions of heroes, battles, and tactics. This approach dominated through the late nineteenth century with writers such as William James,6 Johannes Cornelis de Jonge,7 William Hepworth Dixon,8 Charles de la Roncière,9 George Lacour-Gayet,10 and the many British authors who wrote biographical studies of Admiral Lord Nelson and his battles beginning as early as 1802.11 Even today, biographical studies of naval heroes continue to be a significant approach to naval history.
In an early attempt to change the emphasis on heroes and battles, Sir Nicholas Harris Nicolas, in his 1847 history of the Royal Navy, divided naval history into two categories, civil and military, while making pioneering use of original manuscripts for the medieval and early modern period. Half a century later, Michael Oppenheim devoted an entire volume to English naval administration between 1509 and 1660, connecting it to merchant shipping. Another major effort to change the approach began in late nineteenth-century Britain and the United States, starting with the writings of Sir John Knox Laughton, Rear Admiral Stephen B. Luce, Captain Alfred Thayer Mahan, and Sir Julian Corbett. These four highly influential figures were either naval officers or civilian scholars closely associated with navies. They studied early modern naval history as the period in which they found the most recent major naval wars before their own time. All were involved in using naval history to create a scientific approach with principles of naval strategy and operations for modern and future naval application. In the twentieth century, many naval historians still reflected the general lines of the approach that these Anglo-American historians used as they focused on national history, the role of the navy in the rise of their nation-state, the characteristics of decisive naval battles, and exemplary heroic national naval leaders. The writers of such works were also typically professional naval men, whose writing demonstrated a mixture of nationalistic impulses as well as a desire to prove the historical importance of naval power in a way that contributed to support their national naval development in the authors’ own time. Others, in a more antiquarian vein, continued the tradition of writing about naval heroes and detailed technical descriptions of battles with lists of warships with their measurements and armament.

Two major historiographical issues arose out of these earlier approaches to understanding naval history in the early modern period. First, naval historians in the nineteenth and early twentieth centuries focused on the latter part of the early modern period, drawing their conclusions and understanding of navies and naval operations from the period of the mid- and late seventeenth-century Anglo-Dutch and the Anglo-French naval wars between 1689 and 1815. They saw these years as the origin of modern navies and gave little attention to the earlier, formative period for navies in the two and a half centuries between c.1400 and c.1650. Second, writers such as the American naval historian Alfred Thayer Mahan and the German political economist Max Weber emphasized the role of individual nation states in exercising a monopoly on the legitimate use of violence. Building on concepts of public law found in Jean Bodin’s 1576 "Les Six Livres de la République" and Thomas Hobbes’s "Leviathan" from 1651, Mahan and other naval writers contributed to this general understanding. They argued that by the end of the early modern period, states were developing a permanent monopoly over violence at sea, which involved the eradication of buccaneering and piracy. The 1856 Paris Declaration on Maritime Law, the first multinational attempt to codify in peacetime a set of rules for maritime warfare, underscored the role of the state. The signatories rejected privateering and contributed to the further growth of late nineteenth-century liberal thinking on international and maritime affairs that led to The Hague Conventions of 1899 and 1907. Such contemporary developments influenced naval historians of the time who were looking for practical lessons in history for naval practitioners. Similarly, the events in naval affairs during
the early twenty-first century have begun to suggest to historians that the idea that national navies developed an effective monopoly over violence at sea was not a permanent one. Moreover, scholars have begun to argue that this understanding is overstated for the early modern period.18

In the mid-twentieth century, an additional and new interpretative factor entered the scene. Michael Roberts’ 1956 inaugural lecture on ‘The Military Revolution, 1560–1660’19 set off a widespread debate among military historians and naval professionals, some of whom sought to find a similar naval revolution. The historiographical discussion first moved toward changing technology as a reflection of a revolution in naval affairs. The pacifist scholar Carlo Cipolla, who thought revolutions an impolite and irrational way of settling issues, led the way with his study of technological innovation and the early phases of European imperial expansion.20 In another influential study, John Guilmartin pointed out how changing technology brought about a fundamental change in sixteenth-century naval warfare in the Mediterranean.21 Historians such as Guilmartin, Richard Barker, Geoffrey Parker, and Andrew Thrush all pointed to technological innovations that marked vital turning points in early modern naval history.22 Parker went much further to argue that

a revolution in naval warfare occurred in early modern Europe which was no less important than that by land, for it opened the way to the exercise of European hegemony over most of the world’s oceans for much of the modern period.23

N.A.M. Rodger urged scholars to make a more careful evaluation. He suggested the need for a better understanding of the links between naval developments and the nature of the national societies that supported navies, the character of those governments, and the types of naval operations involved.24 More recently, Louis Sicking has argued that none of this made a revolution in naval affairs. While there were fundamental technological, organizational, operational, and tactical changes for navies, these changes took place over three centuries and constituted an evolution, not a revolution.25

By the middle of the second decade of the twenty-first century, scholars have come to see the naval history of the period between the beginning of the fifteenth century and the early nineteenth century in two separate segments. The two centuries from 1450 to 1650 were the formative period when navies developed from their medieval character, evolving into a protomodern form in the 165-year span between 1650 and 1815. In contrast to the nineteenth-century historians, who focused singularly on battles and tactics, the latest scholarship has explored a much more comprehensive range of categories in understanding them as complex organizations.

Modern historians are careful to point out variations in these matters for navies operating in different parts of the world. Up to the end of the second decade of the twenty-first century, only one scholar has been successful in analysing this period in a national naval history in terms that bring the numerous strands together in a single work. N.A.M. Rodger’s multivolume Naval History of Britain does this by grouping themes in alternating chapters or parts of chapters to interweave a descriptive analysis of four different layers of national activity that he identifies as the fundamental elements of the navy’s role in broader national history: (1) policy, strategy, and operations;
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(2) finance, administration, and logistics, including technical and industrial support; (3) social history; and (4) the material elements of navies: ships and weapons. At the time of writing this chapter, no other scholar has used this approach to deal with the multidimensional and complex character of another navy or in a comparison of navies.

The historical monographs that deal with the newer approaches to naval history have tended to focus in seven broad areas: (a) the relationship of navies to state formation and the rise of the fiscal bureaucratic state for the support and administration of fleets; (b) the development of maritime strategic thinking; (c) technology and the developments of naval architecture for warships; (d) the development of naval tactics in battle; (e) the range of naval operations including trade warfare, and privateering; (f) the beginning of the development of international law touching on war at sea; and (g) culture, society, and the development of sea officers and sailors who specialized in naval affairs. Each area will be discussed, in turn.

The relationship of navies to state formation and the rise of the fiscal bureaucratic state for the support and administration of fleets

In the fifteenth century, the medieval concept still operated in which navies were not entirely controlled by princes. A sovereign typically owned only a few vessels, if any. When the king needed to arm a fleet for some specific purpose, such as an expedition to France, officials had to impress or hire vessels for particular periods. By the fifteenth century, this system was extremely sophisticated. Edward III regularly assembled fleets of more than 400 vessels. Between 1345 and 1347, he probably managed to assemble over 1,000 merchant ships for a variety of war fleets. Edward IV of England owned ships in the 1470s, but, probably due to political instability, there was no officer, such as the Keeper of the King's Ships, who had responsibility for managing the fleet. King Henry V of England owned only 18 vessels in the period around the time of his expedition to Agincourt in 1415. The chroniclers of the day reported that the expedition had between 1,500 and 1,600 ships of various sizes, but modern historians estimate that there were between 700 and 750; 36 per cent of them hired abroad. The size of Henry V's royal warships ranged from Grace Dieu of 1,400 to 1,500 tons completed in 1420 and two other 'great ships' of 500 to 700 tons displacement, to five oared balingers of 24 to 40 tons. By contrast in the eighteenth century, the largest warships in Europe reached 3,000 tons. In the 1650s and 1660s, observers had regarded warships of 1,000 to 1,500 tons as massive giants, but by the mid-eighteenth century this same size of a ship had become too small to be in the fleet line of battle.

There was not yet a standing navy in England as there was in some other countries, and as England and some other countries would have by the seventeenth century. English kings in this period did not need a standing navy since they could very effectively requisition large fleets of 400 to 750 merchant vessels manned by over 16,000 men. For example, the English Crown could still ship armies of 10,000 men and twice that number of horses to France for military expeditions during the Hundred Years' War. While there were few English ships specially designed or built specifically as warships, ordinary merchant vessels used for trade sufficed. There was one notable
exception, Henry V’s *Grace Dieu* was built in 1418 as a warship and was never used in a commercial capacity. At 1,500 tons, she was the largest English warship built until the 1600s.\(^{31}\) To maintain vessels of increasing size, England under Henry VII built the first recorded dry dock at Portsmouth in 1495, where the carrack *Mary Rose* was constructed in 1509. Elsewhere in northern Europe, France had active royal shipyards and purpose-built bases dating from the reign of Philip IV in 1293–5 at the *clois des galées* at both Rouen and its offshoot, Harfleur. Such developments provided the initial infrastructure for further development through the fiscal–military state.

The example of the Habsburg Netherlands between 1488 and 1558 illustrates an intermediate situation. The issuance of a series of Ordinances on the Admiralty, the development of the office of Admiral General of the Netherlands, and the establishment of a small royal fleet at Veere demonstrated Habsburg objectives to gain control over armed violence at sea. Conflicts of interest among seafarers, merchants, the admiral, and the central government led to a failure to achieve centralized management, but these initiatives did foreshadow later developments in the Spanish Netherlands and the province of Holland.\(^{32}\)

In southern Europe, Genoa, like England, did not maintain a state naval fleet, but relied on privately armed vessels until 1559, when it began to create a state fleet.\(^{33}\) In contrast, Venice had long maintained state shipbuilding facilities and expanded them further with the development of the *Arsenale Nuovissimo* in the late fifteenth century.\(^{34}\) Until the sixteenth century, practice varied widely in both northern and southern Europe as to the degree of central control and maintenance of naval forces. The change seems to have begun with the more widespread use of heavy guns in warships. The heavy guns could not be easily used in ordinary merchantmen, so they became less useful. In England, during Henry VIII’s campaigns in 1512–14, the king used most of the merchant ships that had been arrested for war service only for supplies, while only the largest, well-armed merchant ships were useful in combat and offensive operations. The balance between armament and manning changed as the number of seamen needed to man the large guns increased.\(^{35}\)

The rise of the fiscal bureaucratic state created a significant change in European history, bringing with it a new and sophisticated form of organization that transformed the nation and the control of armed forces through innovation and entrepreneurship. It first appeared in early modern Europe. As Jan Glete described it, the fiscal bureaucratic state was a double contractual relationship between rulers and society and between rulers and the armed forces. The rulers raised their financial resources through taxes from their subjects in exchange for societal stability and security for their interests, both at home and abroad. In turn, the rulers used the funds they raised to pay the armed forces to provide the security and stability that their subjects required.

The rise of this new type of state organization took place in three stages: the years 1480–1560 saw a significant change, with an increase in domestic peace within states and a parallel rise in cooperation within countries, along with the formation of improved organizations for tax and fiscal matters. Gunpowder weapons also came into use in this period, bringing with them the obsolescence of older forms of static defence through fortifications and a rise in mobile armed forces, including the beginnings of
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permanent naval forces. Only wealthy states could afford to keep up with such technological innovations and this, also, enhanced the process of centralization.

The second phase in the transition period, from the 1560s to 1660s, is marked by domestic political crises that were resolved with outcomes that transformed the state through an aggregation of power into large and complex governmental administrative organizations. The third phase, during the latter half of the seventeenth century, saw a rapid rise of permanent naval forces. In the period up to 1570, the total displacement tonnage of all European state navies was about 200,000 tons. Growth was moderate up to 1650 when there was a naval tonnage of slightly less than 300,000 tons. In 1675, 25 years later, the total was suddenly 500,000 tons. By 1700, it reached 800,000 tons.36

The Mediterranean states used the traditional galley as a warship. At the centre of European trade, commerce, and culture, Mediterranean navies multiplied in size until the 1570s and were the largest in Europe, with the Ottoman, Spanish, and Venetian naval forces as the principals alongside such smaller and specialized forces as those of the Order of St John at Malta37 and the Sacred Military Order of St Stephen at Florence.38

The first sailing ship navies were small forces and grew along the periphery of the continent – in Portugal, England, Denmark-Norway, and Sweden. These navies grew out of the dynastic ambitions and protection-selling interests of their sovereigns. Portugal was the first to develop a long-distance capability for its growing overseas trading empire.39 States that controlled the most significant amount of shipping – Spain, Venice, Genoa, the Netherlands, and the northern German states – only slowly came to sail.40 Spain, the Dutch Republic, and Sweden provide three quite differing models for the development of a fiscal-military state.

In contradiction to some scholarly interpretation, Glete argued that Spain was the first fiscal-military state because of its initial successful combination of aggregating internal interests and building government organizations. Yet, in contrast to others, Spanish innovation in this area failed in the mid-seventeenth century. Although Spain had the resources and was not inextricably exhausted, Glete argued that its attempt failed because it was based, not on central governmental organization, but on a network of private entrepreneurs, aristocrats, and city elites that came to control the nation’s military and naval structure.41

The Dutch Republic provides an example of a Bourgeois military-fiscal state. The Dutch political and economic systems were advantageous for the development of complex organizations. The two government-chartered East India and West India companies provided trade and protection in both Asian and American waters. Dutch society had relatively little internal strife and encouraged cooperative entrepreneurial activity. In observing the English, Voltaire later commented on a comparable situation when commenting ‘On Trade’ in his Lettres philosophiques sur les Anglais (1778). The several Dutch admiralties’ ability to tax trade provided funding for a core of standing Dutch naval forces.42

In contrast to the Dutch Republic, Sweden provided the example of a dynastic fiscal-military state. The development of robust state organizational structure gave Sweden an advantage over others. Its ability to mobilize resources, aggregate political interests, and maintain armed units with long-term coherence, was supported by
officers and bureaucrats who developed professional skills and who, along with aristocrats, identified their interests with the state and were, therefore, loyal to it. As long as these factors held, they radically transformed northern Europe and contributed to the maintenance of a naval force that was able to dominate the Baltic. The development of fiscal-military states resulted in the ability of those states to add to the formation of a state monopoly that attempted to control the use of armed forces.43

In 1918, Joseph Schumpeter argued – in a precursor to Roberts’ 1956 military revolution argument – that the power of the state to tax stemmed from the need in early modern Europe to support standing armies. Looking back to this argument in 2004, Jürgen Backhaus, Rodger, and others joined in a conference to examine the applicability of Schumpeter’s thesis to navies, which were vastly more expensive.44 This group of scholars found no evidence of a tax-financed navy. In contrast, their examination suggested that various influences in different states gave rise to navies. These factors included the interrelationship of sea power with overseas trade, indirect taxation, royal patronage, and more efficient and adaptable bureaucracies.45 These examples demonstrate that navies and naval power played a role in the development of European states from a collection of separate autonomous cities and groups, into a continent of territorial states. The process, however, might have been more complicated for northern European states than Glete suggested. British historians of the fourteenth and fifteenth centuries argue that France and England developed national identities and a ‘state’ in the period before either had a true navy, and such developments were shaped by the Hundred Years’ War.46

As part of the emerging modern state, the development of a naval bureaucracy, as well as the creation of government-owned dockyards and a burgeoning support enterprise for navies, became distinctive features of this era.47 Further studies have begun to examine the interrelationship between the state and commercial entrepreneurs through non-state networks of suppliers, human resources, construction, manufacturing, and food supplies.48

The concepts behind the idea of the fiscal-military state have broader applications and are not limited to the transitional period, but also have application to the proto-modern and modern navies. For example, the early eighteenth century saw the successful rise of two significant navies, both backed by significant fiscal-military bureaucracies and infrastructure that supported a navy. These are the Russian Navy from 169649 and the revived Spanish Navy after 1714.50 At the same time, the study of the fiscal-military state is not necessarily a study of success, as shown by the deterioration of the Spanish Navy after its defeat in 1588,51 or the failure of the infant United States to develop the infrastructure and bureaucracy to maintain its Continental Navy after winning its independence in the early 1780s.52 Fiscal matters are also reflected in conscious downsizing and change in strategy, as France did during the Nine Years’ War of the 1690s.53

The development of maritime strategic thinking

The classical Greek word for a general in the army – strategos, and its cognate stratégia, the art of a general – did not begin to acquire the modern meaning of ‘strategy’ in European languages until the period between the 1770s and the 1830s. By that time,
writers such as Henri Jomini and Carl von Clausewitz had refined the meaning of the word to designate the higher direction of military forces in a war to achieve particular ends. Despite the fact that there was no explicit theoretical concept of strategy during the period, some historians have found elements of strategic thinking in the early modern documents. Writings on naval affairs in the early modern period initially tended to follow the model set by the fourth-century CE Roman writer Publius Flavius Vegetius Renatus in his *Epitoma institutorum rei militaris*, commonly referred to as *De re militari*. Although largely devoted to land warfare, the work contained a short section on galley warfare and tactics. Vegetius’ work had been influential in western European warfare during the medieval period when it had circulated in manuscript form and then was first printed in several editions in the 1470s and 1480s. It continued to be influential as the basic practical manual on the art of war through the mid-eighteenth century. The early writers on naval matters in the early modern period— for example, Christine de Pizan (c.1364–1430) and Jean V. de Bueil (c.1404–77), who served in the post of Admiral of France from 1450 to 1453—placed their thoughts in the context of the practical issues of shipbuilding, navigation, and followed closely the naval tactics that Vegetius described.

Of the classical texts, Thucydides’ *History of the Peloponnesian War* had the most to say about naval strategy with the book’s discussion of the limitations of the Athenian navy’s power during the Sicilian expedition, along with ideas of command of the sea and *thalassokratia*. In the early modern period, Thucydides was available to influence English thinking after 1550 when an English translation from the French version was published. Thucydides had a major impact on strategic thinking after his work came to influence Thomas Hobbes, who first translated the work from Greek in 1628, and Carl Andreas Duker, a German-born philologist at the University of Leiden, who published his translation at Amsterdam in 1731.

The earlier English views on the ‘sovereignty of the seas’ came from medieval feudal concepts that had nothing to do with strategy, but rather were based on a medieval legal fiction that asserted the king’s symbolic authority and right to maritime revenues. Early English mariners typically spoke of safeguarding their ships and shipping. In contrast, by the mid-1560s, a Spanish naval commander wrote that battles at sea vindicated Philip II’s claims for Spanish dominion over the oceans.

Scholars make a distinction between the actual practice of strategy in maritime wars and the early traces of maritime and naval strategic theory in the early modern period. There is clear, but highly scattered, documentary evidence that rulers, governments, and naval leaders thought strategically in sending out their naval forces to achieve broad objectives in international relations. It was neither a consistent nor necessarily a conscious activity, and the evidence is found in dispersed documents that require deductive analysis. Only in modern times have theorists fully developed the ideas of grand strategy, maritime, and naval strategy, but historians have convincingly found evidence of it in practice before the development of theory.

While central governments had the means to develop broad strategic activity, the question arises as to what degree those who commanded at sea understood or were informed of such matters. This observation raised the natural linkage between
strategy and tactics. Before one can grasp fully the linkages between strategic concepts and tactics, one must understand the character of the ships and weapons available to translate concepts into actions.

**Technology and the development of naval architecture for warships**

Navies in the first phase of the early modern period used a range of new technical innovations to move beyond the galley warfare that had characterized navies and naval actions in Antiquity. One of these innovations was a fundamental change in naval architecture. Up until about 1450, shipbuilders constructed ships by unwritten rules of thumb and empirical methods passed on through apprentices. In southern Europe, there were two types of vessels, long-ships or galleys, with oars, and round ships, with sails. In northwestern Europe, there were a greater variety of ship types with specialized uses. In the north, building techniques were more varied but less mature than those used in the Mediterranean. Shipbuilders in Scandinavia used the shell-first, clinker building technique with strakes that overlap at the edges in Viking longboats. Shipbuilders on the coast of northwestern Europe later adopted this approach for the cog and hulk designs used up until the late sixteenth century. Mediterranean shipwrights traditionally built vessels with their frame first and a smooth caravel-built hull in which the edges of the strakes butt ed up against one another. Between the twelfth and fourteenth centuries, the northern cog design began to influence Mediterranean ship design. The builders of the Mediterranean round vessel, although caravel-built, shaped their hulls first. The design innovation of a nearly vertical stern-post with attached deadwood at the lower part of the vessel’s stern provided the position to introduce the northern-style pintle and gudgeon rudder. These innovations jointly increased manoeuvrability. Also, the number of masts increased, improving the sailing qualities of ships.59

In the early fifteenth century, designers at the Arsenale in Venice were the first to separate the design process from the building process, with the introduction of geometric design methods on paper. This approach involved the use of the mezzaluna (half-moon) to determine the narrowing of the frames. At first, its purpose was only a means to translate rule-of-thumb construction methods to paper, but eventually, it allowed for standardization, quality control, and improvements in design through developing an archive of plans. As the process evolved to design the shape of the hull in advance of construction, the frames could be built separately in a moulding loft. The use of drawings gave ship-owners and government officials a means to evaluate design before construction.

Venice also was the first to employ ship models as a design tool as a means to pass on the classic galley designs of Theodoro Bazon (d.1407). In France, Jean-Baptiste Colbert required floating models in his 1673 regulation, although his innovation failed to take hold. Spanish shipwrights were using models by about the mid-eighteenth century. In contrast, the seventeenth- and eighteenth-century British Admiralty models were probably built for royal approval of a design rather than as a design tool.60 By the end of the eighteenth century, builders had begun to use solid
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half models of the hull. These became important in private shipyards where shipwrights shaped the underwater body by eye. The Royal Navy occasionally used this method from 1716 onwards. By 1750, the scientific understanding of shipbuilding increased. This involved knowledge of the principles of vessel displacement in water, buoyancy, metacentric height, and stability as well as the relationships of hull shape to speed.

Shipbuilders in the early modern period did not widely employ Archimedes’ principles of displacement and buoyancy, although some knew of it, before about 1600 when gun ports began to pierce hulls and thereby lower freeboard. In 1608, the Flemish mathematician Simon Stevin was the first to differentiate the centre of gravity from the centre of buoyancy, and to develop a theory of hydrostatics. In this period, naval constructors such as Anthony Deane in England and Olaus Judichær in Denmark calculated displacement by complicated geometric methods. In 1687, Isaac Newton’s *Principia* replaced all earlier theories of hydrodynamics by using calculus to define a solid of least resistance. Père Paul Hoste was the first to create a synthesis of the theory of naval architecture with his 1697 work, *Théorie de la construction des vaisseaux*. Pierre Bouguer’s 1746 *Traité du Navire* and Henri-Louis Duhamel du Monceau’s 1752 treatise, *Elémens de architecture navale*, signalled the beginning of the practice whereby mathematics predicted a ship’s performance and characteristics.

Based on these early works, the French Minister of the Navy, Choiseul, created in 1765 a corps of naval engineer-constructors steeped in scientific theory. In Sweden, Frederik af Chapman introduced scientific method to calculate waterplane areas and displacement in his 1775 work, *Tractat om Skeppsbyggeriet*. In the last half of the eighteenth century, state-sponsored scientific academies, at the direction of naval ministries, supported this line of development. The Napoleonic Wars brought an end to such academies, and with it the theoretical scientific approach. The development of measuring instruments that quantified resistance, power, and energy eventually replaced the abstract theories with engineering standards and criteria.

There were some fundamental characteristics of warships that carried across the centuries from the late fourteenth up to the mid-nineteenth century. Ships designed as warships were usually built of oak, mahogany, or teak with additional wood built into the hull for buoyancy and protection of the crew in battle. A warship’s framework was robust with well-supported decks and sturdy internal fittings necessary to carry guns high up within the hull. As ships became larger and took on more guns, the placement of the decks, the distribution of weight, and the hull-lines became increasingly important. The stability of the ship, with a small metacentric height and a short rolling period, became essential characteristics. In a seaman’s words, a ‘stiff ship’ was preferable to a ‘tender’ one, so that the gun ports on the lowest deck could open. To increase gun power, the number of guns needed to be raised, with the heaviest guns on the lowest tier for stability and the relatively lighter guns on the higher decks. With space limitations in the bow and stern, most guns lined the sides of the ship. A complicated system of masts, sails, and rigging controlled propulsion and a single rudder at the stern provided manoeuvrability. As such, the wooden sailing warship
of the early modern era was a weapons system that was tactically defensive, but was capable of being strategically offensive due to its capability for travelling long distances on the open sea. In an innovative study, Carla Rahn Phillips followed six Spanish galleons of the early seventeenth century from their initial contracts, through construction, fitting out, manning, and later employment to encapsulate the entire range of issues involved in the full process.\textsuperscript{65}

Over the early modern period, warship design was not static but continuously improved. Joining many other factors, hull design, and sail plans incrementally improved, making ships more seaworthy and manoeuvrable, with better endurance, speed, and weatherliness. As warships became larger and more complicated, naval architects could no longer optimize a single warship design to meet all naval missions. As a result, specialized types of naval vessels with increasingly standardized equipment developed to carry out different and complementary tasks. The largest ships, ships-of-the-line, were built to be part of battle fleets and have a long endurance, while smaller vessels could control sea lanes. Medium-sized ships, such as frigates, could attack merchant shipping, provide surveillance, and carry communications. Others, such as the bomb vessel and fireship had special missions. From the mid-eighteenth century, single-deck ships became numerous for patrol, escort, coast guard, and reconnaissance work.\textsuperscript{66}

The development of naval tactics in battle

The appearance of gunpowder weapons brought a major change in naval warfare, but their use and application developed incrementally over several centuries. Known in China by about 1128, references to guns and projectiles launched by gunpowder became common in Europe by the beginning of the fourteenth century, when the Catalan forge began to produce high-quality wrought iron. A century later, they were starting to have serious potential for military and naval use. Early shipboard use coincided with developments ashore as cannon balls were able to breach the walls of fortifications and gunpowder mills developed. By the last quarter of the fifteenth century, cast bronze cannon began to replace wrought iron guns.\textsuperscript{67}

The presence of gunpowder weapons on board ships did not immediately change naval tactics. In the 1460s and 1470s, small bombard type guns were mounted to fire on the broadside or over the bulwarks. The traditional tactics continued. For the attacking ship, these involved taking the weather gauge to be upwind of the opponent and better able to select timing and angle of attack. When the moment came, the attacking ship bore down upon her enemy. As the distance between the two closed, every type of available missile – arrows and other projectiles, holding the bombard to the last moment in close range – was launched in order to kill or injure the opposing crew to facilitate grappling the enemy ship. In this manoeuvre, the approaching ship often rammed the enemy ship. Although ships at this time were no longer fitted with a ram, as ancient galleys once were, the concussion of hitting the other ship could knock the enemy seamen off their feet, and damage the hull and rigging. When a ship’s crew boarded an enemy vessel, hand-to-hand fighting ensued with the object
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of capturing, rather than destroying, the enemy ship. The tactic of raining arrows and deadly missiles on an enemy led to the construction of galleons with higher defensive superstructures, fore and aft, to provide for counterattacks. This change made the galleon a far superior vessel in combat against the low Mediterranean galley. As a result of the need to counter galleys in combat, northern European navies had developed, by the sixteenth and early seventeenth centuries, a new and distinctive type of warship with guns concentrated along the broadsides. This development suggested the opportunity for a new approach to naval tactics, but this did not take place for some time. The Spanish Armada of 1588, with its distinctive semi-circular battle formation provides a prominent example of Spanish naval tactics in use against Elizabethan English naval tactics.

Naval warfare continued to have a variety of types of operations for different purposes that ranged from transporting soldiers and landing them on distant shores to blockade, patrolling for defensive purposes, and attacks on merchant shipping in forms of economic warfare. The increasing use of large guns presented a particular problem to be solved in fighting similarly armed warships with broadside guns.

The first significant change came on 29 March/8 April 1653, following the battle of Portland during the First Anglo-Dutch War. The three English Generals at Sea – Robert Blake, Richard Deane, and George Monck – jointly issued two documents: ‘Instructions for the better ordering of the Fleet in Fighting’ and ‘Instructions for the better ordering of the Fleet in Sailing’. While these instructions incorporated existing procedures, they also established a connection between cruising formations and battle formations as well as implying the need for exercising and training a permanent fleet in standardized practices. As preparation for battle, the instructions gave the flag officers in command an improved ability to discipline and command over a fleet at sea. At the battle of the Gabbard, a year later, both the Dutch and English commented on the fact that the English fleet was under better control and that its broadside gunnery, when in a line, was effective in preventing the Dutch from approaching to grapple and board the English ships. Thus the experiences of naval warfare between 1652 and 1654 led naval leaders in England and the Dutch Republic to begin to think differently about naval tactics. During the years of peace that followed, the Dutch Navy, then the largest in Europe, was the first to adopt what quickly became the new standard for European navies: a large, permanent, national navy with purpose-built warships.

During the Second Anglo-Dutch War additional tactical ideas developed. The Dutch institutionalized and expanded their thinking. The Dutch admirals acknowledged the long-observed need for discipline and a well-ordered fleet in battle. They agreed that the fleet should be a fighting unit in a single line of battle. Ideally, the ships in the line of battle should be close-hauled to the wind with all three squadrons within the line positioned to windward of an enemy. In addition, the flag officers should be less exposed at the opening of an engagement and it was necessary to have a reserve corps of ships available. Naval officers debated and refined these issues for decades.
In June 1666, the Four Days Battle off the Thames Estuary, often denoted as the longest and bloodiest battle of the age of sail, gave rise to further contemplation on naval tactics. As a result, in July 1666, James, Duke of York, issued new instructions to the English fleet that were designed to ensure that it maintained the advantageous weather gauge during a battle. He made additional points on the importance of keeping in the line formation and dividing an enemy’s fleet by tacking through the enemy’s battle line to gain the windward position. These points established tactical practices that continued until the end of the eighteenth century.71

In the years between 1666 and 1815, fleet naval tactics developed further. From the 1690s onward, French tacticians approached the subject with a more intellectual, geometrical, and abstract approach to that of the British and Dutch who remained more pragmatic. In France, Hoste’s l’Art des armées navales (1697) set the tone, followed by Sébastian-François Bigot de Morouges’ Tactique navale in 1763, Jacques Bourdé de Villehuet’s Le Manœuvrier of 1765, and le Viscomte Grenier’s 1787 l’Art de la guerre sur mer. These works provided theoretical treatises on naval tactics that also had extensive influence in English translation. From a British perspective, a Scot, John Clerk of Eldin, provided a counterpart in 1790 with An Essay on Naval Tactics, Systematic and Historical, with Explanatory Plates. His work reached a wider audience, with translations into Dutch, Portuguese, and Russian.72

Emphasis on studying the theoretical literature of naval tactics and the various instructions led to overstressing rigidity of naval tactics and stagnation of thought among naval officers. One of the problems was the late nineteenth-century idea of correlating principles of military theory to attempt to create laws of sea power similar to the laws of natural science.73 Taken blindly and to its extreme, this approach created inflexibility of thought rather than stimulating new ideas. More recent approaches to the history of naval tactics of the period stress the need to think about the abstract concepts of tactical thought in the light of their limitations in practical application and experience at sea.74 As one historian has stated, ‘In the absence of a consideration of such questions, the intricate three-dimensional business of fighting at sea has been reduced to a sterile one-dimensional narrative cleansed of its complexity’.75

Naval practitioners and historians often cite the battle of Toulon in 1744 as an example of stagnation in naval tactics, while they see Admiral Lord Nelson’s leadership and tactics at the battle of Trafalgar in 1805 as the apogee of tactical thinking in the age of sail. When current and future historians come to think about naval tactics in the age of sail they need to take into account a number of complex factors beyond the orders, instructions, and theoretical studies. Operating a sailing warship in combat presented a rapidly changing environment that involved a wide range of relative conditions and capabilities: relative ship or weapon design advantages or weaknesses, relative leadership and tactical skills in commanders, the weather, wind, speed, sea state, physical condition of the ships and guns, as well as the morale, health, training, group mentality, emotional state, and discipline of the officers and men. To understand the employment of naval tactics it is necessary to consider the interaction of the human and physical elements in terms of the wide range of unpredictable, chaotic, and lethal conditions involved in naval battle.76
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The range of naval operations including trade warfare, and privateering

In general and in retrospect, one can see that nations used their sea power for a number of different strategic and functional purposes. Although the following terminology is cast in modern definitions, the anachronism, in this case, assists understanding when used with care:

1. To destroy or blockade an enemy fleet to prevent it from interfering with its own trade or other uses of the sea. In this an inferior force used its lesser resources to challenge by keeping a fleet in operation and to threaten it, thereby diverting its enemy’s resources.77
2. To control the sea by protecting one’s own trade and trade routes. This was done typically by patrolling key geographic areas where shipping routes converged and accompanying convoys of merchant ships with armed escorts.78
3. To protect the coast of the nation or its overseas possessions, at the same time making it difficult for an enemy to operate in those waters.79
4. To deny the use of the sea to an enemy by using the navy or privateers to attack an enemy’s merchant shipping and to damage the enemy’s economy.80
5. To support military operations through amphibious landings.81
6. To represent or serve as a symbol of state or princely power. Associated with this is the ability to demonstrate latent power and political interest through naval presence.82
7. To carry out policing duties, such as curbing piracy, maintaining order, regulating trade, or collecting customs duties.83
8. To carry out diplomatic functions; carry important officials, diplomatic correspondence, specie, or other important cargoes.84

All of these approaches and functions were in use during the early modern period. In the transitional period from 1400 to 1650, these strategies were much more limited in scope and local in nature than became the case in the protomodern period from 1650 to 1815, when navies developed global strategic reach.85

A notable development from the Hundred Years’ War through the Napoleonic Wars was the increased ability, mainly by the British Army and Royal Navy, to work together to undertake and to control amphibious landings of military forces from troop transports. This involved three essential elements: naval predominance to prevent disturbance of the operation from the sea; the availability of a commercial fleet hired to carry troops; and the development over time and extensive experience of the ability to reconcile the differing opinions and approaches of military and naval commanders during such operations.86

The beginning of the development of international law touching on war at sea

Maritime law derives from the laws of merchant trading that extend back to ancient times and by the medieval period were known as lex maritima et mercatoria. In the ancient and medieval periods, various codes of law developed in specific maritime
regions. These regional legal codes provided the basis for maritime law as it grew during the early modern period. One of the oldest is the Rhodian Sea Law. Roman Maritime Law incorporated aspects of this law and applied them in all parts of the Roman world. When the Roman Empire receded, many legal practices from that period remained in the local tradition. The most famous of the regional legal codes is the ‘Roll of Oléron’, originating from the island at the mouth of the Charente River in the Bay of Biscay. It came to form the basis of English maritime law through Eleanor, Duchess of Aquitaine, whose personal property included Oléron. About 1346, King Edward III of England declared it the basis for all legal decisions that the Admiral of England would make, leading it to become the basis for maritime law in the English-speaking world. The inquisition of Queenborough of 1375–1403 expanded upon it. As a compilation of legal judgments in French ports, the Laws of Oléron also became the basis of all subsequent Atlantic and Baltic maritime law. Louis XIV’s 1681 *Ordonnance de la Marine* incorporated it. In the Mediterranean, the *Consolato del Mare*, printed as early as 1494, supplanted various local legal codes. While much of maritime law pertains to trade and merchant shipping, essential portions of it directly affect navies and naval operations. In England, the Admiralty Court was a function controlled by the Lord High Admiral, but through a vacancy in the post in 1575, the Judges of the High Court of Admiralty became independent in judgment and jurisdiction. The High Court of Admiralty and its subsidiaries, the Vice Admiralty Courts in various colonies, became highly relevant to the navy and privateers through those courts’ jurisdiction over prize cases.

In a broader strategic sense, the legal debates of the seventeenth century over rival national claims to the sovereignty over the seas established national objectives for naval operations. Several European states claimed control over portions of the open sea. In addition to England’s claim over the ‘British Seas’, Spain and Portugal maintained the legal settlement that divided the East and West Indies between them in the 1494 Treaty of Tordesillas. Denmark claimed the seas around Iceland, Greenland, and the Færøe Islands. Gustavus Adolphus of Sweden declared his power to tax merchant ships coming from outside the Baltic. Genoa claimed sovereignty over the Ligurian Sea, while Venice claimed the Adriatic. Several states began to object to these claims and argue for freedom of the seas. In 1580, while Elizabeth I rejected Spanish legal objections to Sir Francis Drake’s circumnavigation of the world, Spain sent an armada to the Magellan Strait to prevent a repetition. France objected to Danish claims and the Dutch Republic rejected Portuguese claims. It was in support of the Dutch position that Hugo Grotius published his *Mare Liberum* in 1609, though he modified his viewpoint in his 1625 work, *De Jure Belli ac Pacis* to accept a state’s control and defence of its immediate coastal waters. John Selden’s 1636 *Mare Clausum* was part of a widespread doctrinal debate over the freedom of the seas. Many naval powers initially opposed this concept, but the idea gradually gained broad support after David Hume in 1752, and Adam Smith in 1776, helped revive the idea through their thinking on free trade and free markets.

In 1702, the Dutch jurist Cornelis van Bynkershoek laid the groundwork for the solution by arguing that the decisive factor was the control of coastal waters from the shore, not by ships which might or might not be present. Thus, the measure of control
was the distance that a shore-based cannon could shoot. The Swiss philosopher Emer de Vattel accepted this in an influential book in 1758 and soon treaties and national regulations reflected this thought. In 1782, the Neapolitan author Ferdinando Galiani defined the distance of a cannon shot as one league or three miles. These issues in maritime law from this period provided the basis for what developed in the early twentieth century as the law of naval warfare and in the later twentieth century as the international law of the sea.\textsuperscript{95}

**Culture, society, and the development of sea officers and sailors who specialized in naval affairs**

For much of the early modern period, there was a high volume of interchange between seamen in the various sectors of the seafaring world – fishing, whaling, coastal and regional merchant shipping, privateering, long-distance and colonial trade, the chartered trading companies, and the navy. A sense of nationality or religious identity arose only slowly among seamen and this allowed navies to recruit a variety of men of different nationalities from these various sectors for naval service during this period.\textsuperscript{96} This situation continued up through the end of the age of the fighting sailing warship for lower deck seamen.

Traditionally, in England, the fishing industry was ‘the nursery of the Navy’. In Elizabethan England, the Crown depended on being able to draw from a pool of mariners both for volunteers and impressed men. The lack of a permanent standing navy prevented seamen from specializing in naval affairs, although they might have alternated service in the navy with other maritime activities.\textsuperscript{97} The situation was not too different at the end of the eighteenth century for the ordinary seamen during the period when the Royal Navy was in desperate need of manpower during the Napoleonic Wars.\textsuperscript{98} When navies in Western Europe became permanent standing forces after the middle of the seventeenth century, it became possible for seamen to specialize in naval service. This specialization became common among the three classes of officers: petty officer, warrant officer, and commissioned sea officer. But, even the commissioned sea officers – the highest of the hierarchy – were known to serve in merchant ships in the late eighteenth century when they were on half pay. There is clear evidence that there is a link between the nature of societies, governments, and their military activities. Sea power became most successful in countries with open social systems, notably in Britain and the Dutch Republic, where the complex, highly technical, industrial nature of navies reflected modern society as opposed to the rigid agrarian societies of the aristocratic military powers.\textsuperscript{99} As a result of the growing internal social differences within navies, scholars have begun to look at specific groups of seamen.\textsuperscript{100}

In many European navies, the professional development of both officers and men was initially a process of on-the-job training. The historically minded sociologist, Norbert Elias was among the first to compare major western European navies in terms of their professional genesis in the seventeenth century. Writing in the 1950s, few noticed his work on this subject until his studies appeared posthumously in 2007.\textsuperscript{101} Among British naval historians, social history was in its infancy with the
works of Michael Lewis and Christopher Lloyd. Rodger’s *Wooden World* was a pioneer archival based study in eighteenth-century naval social history, followed by David Davies’ *Gentlemen and Tar-paulins* on the seventeenth century. A widening range of recent scholarship has explored specific social issues, such as naval families, wives and mistresses, manpower, gender, order, discipline, crime, punishment, religion, shipboard life, naval medicine, and the health of seamen.

The Royal Navy was distinctive in establishing a practical qualification examination in seamanship for promotion to lieutenant in 1677. By the end of the eighteenth century, the prerequisite for taking the test was a minimum of six years of sea service with one of those years as a warranted, working midshipman. Such a requirement placed young aristocrats on the same level of competition as middle- and even lower-class applicants for commissions.

In 1702, the Royal Navy created the seagoing position of schoolmaster with the primary purpose of teaching navigation. The Royal Navy established a Naval Academy at Portsmouth in 1729, but it was neither widely attended nor highly regarded. The Admiralty eventually created another alternative by allowing potential officers to attend grammar or navigation schools ashore to reach the required standard in mathematics for navigational work.

The French Navy’s method of officer education was different. From the time of Cardinal Richelieu, Colbert, and his son the Marquis de Seignelay, prospective naval officers had to be of noble birth and heritage, and have attended one of the three schools for the *gardes de la Marine* at Toulon, Brest, or Rochefort. The initial focus was the creation of learned men, reflecting the French Navy’s approach to the navy, in general, as seen in its naval architecture and extensive use of mathematics. French naval misfortunes during the Seven Years’ War led to controversial reforms in the educational system that divided the focus between mathematics and developing a zeal for combat. Current scholars are just beginning to make comparative examinations of naval officer education and leadership styles in different navies.

The academic investigation of navies and naval operations in the early modern period has an expanding research agenda that has moved far beyond the model of battle narratives typical of earlier periods. No longer confined to the traditional and narrow nationalistic institutional approach of the past, the modern understanding of naval history as a sub-discipline of the broader field of maritime history has widened and enriched its scope to cross standard academic disciplinary lines and benefit from wider perspectives and insights. While the study of ships and seamen in battle continues to have its place, scholars are now moving to see this aspect of naval activity in much broader terms and in relation to other functions and activities of navies as complex governmental organizations. The widening modern research agenda has multiple dimensions that range from the relationships of navies to the nation and the state, comparative organizations, management, economics, industry, science, technology, international relations, and social relations as well as in terms of comparing differing regions and cultures over wide periods of time. Most importantly, whole new areas of research are opening up that involve understanding navies and naval affairs in social and cultural terms of nationhood, community, society, race, empire, gender, ideology, memory, commemoration, and other social and cultural themes and issues. As the
situation stood in 2019, scholars have not yet applied investigation of these themes evenly across the early modern period. Many have tended to examine issues in the late protomodern years, 1793–1815, rather than in earlier phases or in the transitional between 1400 and 1650. At the same time, the largest body of recent work has been on British naval history, not on other European navies nor on comparative aspects across different navies. This pattern suggests lacunae that future scholarship has the opportunity to fill.108

Notes


15 See, for example, C. F. von Maltzahn, Der Seekrieg, Leipzig: Teubner, 1906; A. Munthe, Sjömaktens Inflytande på Sveriges Historia [to 1699], 2 vols, Stockholm: Marinlitteraturföreningen, 1921–2; E. Wolgast, Seemacht und Seegeltung: Entwickelt an Athen und England, Berlin: Carl Heymanns Verlag, 1944.


54 S. Rose, ‘Vegetius and Taccola: Was Medieval Writing on War at Sea of any Practical Use?’, The Mariner’s Mirror, 104/1, 2018, pp. 4–17.


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60 For example, see Walker, Rogers Collection.
62 For an evaluation of the role of the Enlightenment in this, see Rodger, Essays in Naval History, ch. 14.
76 Willis, Fighting at Sea, p. 171.


For example, see Glete, Swedish Naval Administration, p. 659.


For example, Friel, Henry V's Navy, pp. 152–4.

For example, R. Ritchie, Captain Kidd and the War against the Pirates, Cambridge, MA: Harvard University Press, 1989; Chet, Ocean Is a Wilderness.


See, for example, J. R. Hill, The Prizes of War: The Naval Prize System in the Napoleonic Wars, 1793–1815, Gloucestershire: Sutton Publishing with the Royal Naval Museum, 1998, on the legal constraints on navies and privateers in prize cases at the end of the early modern period.

See Fulton, Sovereignty.


Fulton, Sovereignty; P. Emmer, ‘Mare Liberum, Mare Clausum: Oceanic Shipping and Trade in the History of Economic Thought’, in C. Buchet and G. le Bouëdec (eds), The Sea in
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101 Elias, Genesis.


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