The ‘Military Revolution’ Afloat: The Era of the Anglo-Dutch Wars and the Transition to Modern Warfare at Sea

M.A.J. Palmer

Beginning in the sixteenth century, myriad interrelated changes in the art of war in the West, first described by Michael Roberts as a ‘military revolution’ (later ‘revisited’ by Geoffrey Parker in a book of that name), enabled the European states to secure global hegemony.¹ At all levels – strategic, operational, tactical, and the administrative – this ‘revolution’, driven to a great extent by technological change, altered the face of conflict. As armed forces grew in size and new weapons replaced the old, commanders struggled to devise original approaches to warfare, most especially in the tactical arena, where generals and admirals risked defeat in pursuit of victory and witnessed at first hand the destructive power of the increasingly lethal tools of their trade.

Nowhere were the pressures of the military revolution greater than at sea.² Advances in military technology, combined with the realities of geography, complicated the task of naval commanders. Nor did history, which extended a rich experiential lode to be mined by the general ashore, offer much, if any, guidance to the admiral afloat. Ashore, the ‘military revolution’ was real enough, as armies struggled to incorporate the new technology. But the traditional arms of infantry and cavalry,


² Notably absent from Roberts’s essay, The Military Revolution, is any substantive discussion of the impact of that ‘revolution’ at sea. Roberts made only a few, passing references to navies. The same is true of Rogers’s The Military Revolution Debate.
albeit equipped with newfangled weapons, remained, and roamed a still familiar countryside in search of the enemy and battle. The Alps were no higher, nor did the Rhine flow any faster with the advent of the ‘military revolution’. Infantrymen still marched, and horses still plodded as had their ancient predecessors.

But at sea, the development of the square-rigged, heavily (cannon-) armed, wooden fighting ship – what would soon become known as the ship of the line – marked a truly revolutionary departure in warfare. The shift from rowed galleys to wind-driven sailing men-of-war altered strategic geography. The scope of naval operations under sail broadened immensely as sea power, heretofore a regional and seasonal factor, became a year-round global element of state power. No admiralty before the ‘military revolution’ had ever had to plan operations on a global scale. Moreover, the sailing men-of-war that constituted these fleets were the most advanced, complex, expensive, and manpower-intensive weapons system of their day. And theirs was no evolutionary design linked to a distant, nor even a not-so-distant, forebear. Galleys had been the premier vessels of war during the preceding two-and-a-half-millennia, but they had relied on their crews’ muscles, not machines, for propulsion and fighting power, both of which were applied along the same longitudinal axis. The new sail-driven machines of war moved along one axis, captive to the wind, but discharged their cannon along another. This fact – that a ship needed to fight at a right angle to its axis of movement – confronted sailing-age commanders with a tactical conundrum, one that they never fully resolved.3

To illustrate this point, imagine a typical late-seventeenth-century engagement fought ashore. To the usual complications of battle, add the following: restrict the movement of units from either army within 35° of the direction of the wind; only allow units, be they infantry, cavalry, or artillery, to discharge their fire weapons to the flanks, but not to their front or rear; forbid the movement of mounted staff officers between the commander-in-chief and his subordinates; and then fight the battle during a prolonged earthquake, forcing soldiers to operate their weapons as the ground heaves to and fro, with hard-pressed artillerymen timing their shots to coincide with the roll of the ground beneath their feet. This was the face of battle at sea!

While military leaders ashore could look back on a fairly rich written

3 William Monson, an early seventeenth-century English commentator, noted that, unlike military formations ashore, formations of ships were restricted in their manoeuvres by the wind, uneven sailing quality, and the problem of collision. Quoted in J.S. Corbett, ed., Fighting Instructions, 1530–1816 (London, Navy Records Society, 1905), p. 76. J. Creswell, British Admirals of the Eighteenth Century: Tactics in Battle (Hamden, CT, Archon, 1972), p. 37, noted that fleets, unlike armies, could not take advantage of naturally strong defensive positions or concealment offered by covering terrain or natural obstacles. Nor were fleets susceptible to having their flanks rolled up as were armies.
western tradition and draw at least some lessons from history, naval commanders of the seventeenth century secured no insights from the study of a nearly barren naval past. Captain John Smith’s *A Sea Grammar*, first published in 1627 but reissued in 1652 as the First Anglo-Dutch War began, proffered some general guidelines for war at sea ‘because I have seene many bookes of the art of warre by land, and never any for the sea; seeing all men so silent in this most difficult service’. Nathaniel Butler, in his ‘Dialogues’ written about 1634, noted that ‘neither the whole of this age nor that which is past can afford any help or precedent; for we have none but those at Lepanto, and this was for the generality with galleys, which kind of fight hath a vast difference from that of ships’.

As the best, though by no means perfect, solution to the tactical problems related to the ‘military revolution’ at sea, late-seventeenth-century naval commanders ultimately adopted the close-hauled, single line-ahead (and associated doctrine or fighting instructions). Despite the fact that the use of the line-ahead made far more difficult the direction of a fleet in battle, what in the late twentieth century we term command and control, the formation brought greater order and discipline to the fleet, maximized firepower by giving more ships a clear line of sight, and, most importantly, enhanced fighting capacity.

Many historians have been reluctant to accept the proposition that late-seventeenth-century navies adopted the line-ahead for such a simple reason – that it worked. Probably no axiom in the history of warfare has been so widely accepted and applied for such a long time, and yet been held in such disrepute by so many historians. In 1911 the French naval writer and strategist Raoul Castex was among the first to link the indecisiveness of eighteenth-century naval warfare to developments that occurred in the final decades of the preceding century. In the late 1940s Michael Lewis, one of Great Britain’s premier naval historians, wrote disparagingly of ‘the Law – the parallel, conterminous, inviolable Line’, that caused ‘the spell of failure or, at least, strictly limited success’ and

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4 Parker, while he notes that there were generals who rejected the notion that there was anything to be learned from the military history of the ancients, stresses the continuity in land warfare; *The Military Revolution*, pp. 6–7.


7 Ships deployed in a close-hauled, single line-ahead formation would be arranged in a single file, with about 300 ft between ships, sailing as close as possible to the wind. Against ships so arranged, an opposing fleet could not gain an upwind position, although it might have begun the battle with one.

which handicapped England’s Royal Navy for a century. Most recently, the eminent American military historian Russell F. Weigley, in *The Age of Battles*, wrote of the ‘stultifying sanctity of the line-ahead’.

If the line-ahead was such a poor fighting formation, why did the naval commanders of the late seventeenth century so wholeheartedly embrace it? In an effort to answer this question, historians have offered reasons for the adoption of the line that fall into two general categories: those which focus on technology, and those which emphasize the development of military professionalism at sea.

Alfred Thayer Mahan argued that, given the technology of sailing men-of-war, the line-ahead formation was ‘best adapted to develop the full power of the fleet for mutual support’. To Mahan, the reasons for the adoption of the line were ‘clear and logical’, the result of an intellectual exercise. In fact, he believed that the virtues of the formation were so obvious that it should have been adopted much earlier, and would have been had it not been for the persistence of ‘old traditions’. William Maltby, in an effort to explain why navies adopted the line-ahead, although slowly, argued against a technological imperative, writing: ‘The adoption of the line-ahead as tactical doctrine cannot . . . be regarded as a foreordained response to technological change. It was instead a deliberate step toward a new concept of naval organization based upon the extension of military values to warfare at sea.’ To Maltby, the adoption of the line marked the beginning of professionalism for a naval officer corps attempting to meet the new, complex challenges of the ‘military revolution’. Maltby’s focus on professional control, in lieu of technological change, also enabled him to explain not only why navies adopted the line-ahead but also why they chose a formation he believed diminished the fighting power of their fleets. ‘The pursuit of total victory, with all its attendant glory and risk’, he wrote, ‘was subordinated to the need for discipline and operational control. It was a price that captains, naval administrators, and kings were prepared, however reluctantly, to pay.’

Russell F. Weigley, in *The Age of Battles*, took a somewhat similar tack, but went further than Maltby, arguing that the line-ahead was not only an ineffective tactical formation but also one that proved to be professionally counterproductive. ‘The Fighting Instructions’, Weigley wrote, ‘regarded the difficulties of command and control in naval battles as so formidable that their proposed remedy limited officers’ initiative so rig-

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idly as to impose a nearly insurmountable obstacle to the development of a profession of naval officership – or for that matter, to decisiveness in battle and naval war.'\textsuperscript{14} Weigley further argued that since ‘tactical expertise has tended to emerge first, with larger operational and strategic expertise built upon it’, the adoption of the Royal Navy’s Fighting Instructions, the body of doctrine that embraced the close-hauled line-ahead, ‘stultified the growth of naval tactical skills as distinguished from seamanship, they also stultified professional growth in the higher levels founded upon tactics, in operations and strategy’.

It is all too tempting, and easy, for the historian writing three centuries after the fact, armed with a naval history seemingly replete with the record of ‘indecisive’ eighteenth-century battles, to portray the adoption of the line by European navies at the end of the seventeenth century as something other than a decision based upon lessons drawn from wartime tactical experience. But keep in mind that English, Dutch, and French naval commanders were neither clairvoyants gathered around crystal balls nor defence intellectuals assembled about a table brainstorming new tactical formations. They were warriors, veteran warriors. As Michael Lewis noted of the English commanders of the era: ‘These Cromwellian Generals-at-Sea were hard-bitten practical men, who would be most unlikely to risk all, in an all-important action, for the sake of an untried innovation based exclusively upon theory. Such conduct is really unthinkable.’\textsuperscript{15} Any attempt to understand tactical developments at the end of the seventeenth century must confine itself to the history, and especially the battles, of the Anglo-Dutch Wars.

Mahan could portray the adoption of the line as a logical step, one obvious on an intellectual level, because his study opened in 1660. Mahan began his history with the Second Anglo-Dutch War, by which time the English navy had already adopted the line-ahead as its standard fighting formation. \textit{The Influence of Sea Power upon History} did not cover the chaotic and frustrating engagements of the First Anglo-Dutch War that led pragmatic English commanders to search for new tactics, a search that led to the line-ahead.

William Maltby rejected the suggestion that English experiences in the Anglo-Dutch Wars had any impact on the decision to adopt the line.\textsuperscript{16} ‘It has been shown’, he wrote, ‘that the diffusion of such ideas among naval officers during the Dutch Wars was not prompted by their demonstrable success in action.’\textsuperscript{17} But he reached these conclusions after completing what he admitted was ‘a much abbreviated account’ of the engagements of the era. Michael Howard, in an afterword to the anthology in which William Maltby’s chapter appeared, eagerly embraced the concept of an ‘imposition of order on the conduct of war,

\textsuperscript{14} Weigley, \textit{The Age of Battles}, 145–7.
\textsuperscript{15} Lewis, \textit{The Navy of Britain}, p. 450.
\textsuperscript{17} \textit{Op. cit.}, 68. Maltby also wrote: ‘the Dutch Wars offered no incontrovertible support to any tactical doctrine’; \textit{op. cit.}, p. 59.
both by land and by sea’. Howard noted: ‘the simultaneous evolution of the firing line on the battlefield and of line-ahead formations at sea, the attempt to constrain the violence of war within the limits of orderly, calculated, rational control, was of a piece with other contemporary forms of social behavior.’ Russell F. Weigley, too, is guilty of failing to discuss the adoption of the line within its contemporary context. He states that the adoption of the line-ahead eased the problems of command but decreased the fighting power of the fleet. While this may have been true in the eighteenth century, the English experience in the Anglo-Dutch Wars does not support that conclusion.

Reading the work of Maltby, Weigley, and Howard, one might expect to discover that before the adoption of line-ahead, a haphazard process that began in the English navy in March 1653, sailing-age battles were decisive encounters, but that afterwards indecisiveness began to surface, concurrent with the appearance of linear formations. But the battles of the First Anglo-Dutch War fought after March 1653 were more, not less, decisive; more, not less, violent. The English navy’s experiences during the First and Second Anglo-Dutch Wars demonstrated that the adoption of the line-ahead enhanced, rather than decreased, fighting power; and exacerbated, rather than eased, the problems of command and control.20

The four major battles of the First Anglo-Dutch War fought before March 1653 – the Downs, Kentish Knock, Dungeness, and the Three Days’ Battle (Portland) – were chaotic affairs. Reports and letters written by participants at the last-named, for example, included descriptions of ships and squadrons ‘charging’ their enemies like cavalrymen, and firing guns at opposing ships arrayed to both port and starboard. Ships boarded their opponents, and were boarded in return; some were captured, but then recaptured. The contemporary reports and letters are so confusing that their nature, as much as the dearth of first-hand accounts, explains the inability of historians to reconstruct the engagements. The participants, even the commanding admirals, evidently had little sense of how their battles developed once the action began.21

Nevertheless, some tactical details are evident, and others can be inferred from the record. Given the size of the fleets, both Dutch and English commanders subdivided their forces into squadrons, each led by an officer who flew his personal flag from his ‘flagship’. A fleet’s senior subordinate commander, generally a vice-admiral, commanded the lead, or van, division. The commander himself brought up the main or centre portion of the fleet. A third subordinate, the rear-admiral, commanded the rear division. Extremely large fleets sometimes included a fourth, or

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20 This was not so evident in the Third Anglo-Dutch War. See below.
21 Corbett, Fighting Instructions, pp. 96–7, notes: ‘In both official and unofficial reports of the actions of this time an almost superstitious reverence is shown in avoiding tactical details.’ I would suggest that the problem may have been more an inability, rather than an unwillingness, to recount details.
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even fifth squadron.22 Usually, these divisions were themselves further subdivided into smaller, more manageable formations. As in land warfare, subdivision facilitated manoeuvre and eased problems of command and control.23

The principal duty of the subordinate ‘flag’ officers, as well as the captains of individual ships, was to support each other, and especially their respective superiors. English instructions issued in 1650 called for the ‘relief and assistance’ of any ship ‘over-charged and distressed’.24 Dutch Lieutenant-Admiral Maarten Harpertszoon Tromp’s instructions issued on 20 June 1652 stated: ‘Each captain is expressly ordered, on penalty of 300 gilders, to keep near the flag officer under whom he serves . . . The said superior officers and captains are to stand by one another with all fidelity; and each squadron when another is vigorously attacked shall second and free the other, using therein all the qualities of a soldier and seaman.’25

Without a doubt, manoeuvring as part of a squadron of from ten to thirty ships, each of which sought to maintain its position relative to a commander who might change course in the midst of a confused battle and ‘charge’ the enemy, was a true test of seamanship. After the battle off Gabbard Shoals in June 1653, Tromp reported: ‘Through carelessness or lack of experience in naval warfare of several of the captains and their officers, several of us ran one into another and were thrown into confusion.’26 The fact that relatively few ships were captured by boarding, the tactic preferred by the Dutch, or sunk by cannon fire, the tactic preferred by the English, suggests that the demands of manoeuvre and formation-keeping were so great that individual ships were often unable to get close enough to an enemy vessel to grapple and board, or to fire their guns with effect.27 As one seventeenth-century naval commentator wrote: ‘when [ships] strictly keep their order, commonly they fall foul one of another, and in such cases they are more careful to observe their directions than to offend the enemy’.28


23 The English fleet was, of course, commanded by army officers who are often referred to by their army ranks, e.g. General Monck. They are also sometimes listed as generals-at-sea, or by equivalent naval rank, e.g. admiral. The rank associated with the squadron organization above is thus idealized.

24 Corbett, Fighting Instructions, p. 89.


28 William Monson, quoted in Corbett, Fighting Instructions, 76.
The inability to bring the strength of a powerful fleet to bear on an enemy formation, evident in the disappointing results of the first four battles of the war (see Table 1), frustrated both English and Dutch commanders. The two fundamental problems limiting the effectiveness of fleets were fairly obvious. First, as already discussed, warships moved along one axis and discharged their cannon along another. Second, with men-of-war ranged around a commander’s flagship, only those on the periphery facing the enemy could fire their guns or hope to board. Unfortunately, the solutions to these dilemmas were not, as Mahan argued, self-evident. The answer to the first had to wait until the Industrial Revolution and the development of steam-driven ships with turreted guns. A possible solution to the second involved placing all the ships of a squadron in a line. In a linear formation each ship would have a clear line of fire. But a fleet so deployed lacked depth, and the idea that a thin line of men-of-war could repel the massed attacks of the Dutch was counterintuitive. Nor could a long line of 60–100 ships execute any but the most basic manoeuvres. To the Dutch, the answer was simple enough: to press their mêlée attacks with even greater vigour.

Not so the English, who instead adopted the single line-ahead. But why? Did they copy it from the Dutch, as Geoffrey Parker implies? Was it common sense, as Mahan claimed? Was it a desire to control the fleet better, as Maltby and Weigley have asserted? Or was it the result of lessons learned during earlier battles?

The line-ahead was not an entirely novel battle formation. One of the earliest and best-documented combat uses of the line occurred at the battle of Dunkirk on 16 September 1639. A small force of 17 Dutch ships, 12 of which were commanded by Tromp, deployed and fought in a close-hauled line-ahead against a much larger Spanish fleet of 67 ships. Tromp reputedly told his commanders before the battle: ‘work in such a manner

<table>
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<th>Name</th>
<th>Date</th>
<th>English ships engaged/lost</th>
<th>Dutch ships engaged/lost</th>
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<tbody>
<tr>
<td>Dover</td>
<td>19 May 1652</td>
<td>22/0</td>
<td>40/2</td>
</tr>
<tr>
<td>Kentish Knock</td>
<td>28 Sept. 1652</td>
<td>68/0</td>
<td>60/2</td>
</tr>
<tr>
<td>Dungeness</td>
<td>30 Nov. 1652</td>
<td>37/3</td>
<td>78/1</td>
</tr>
<tr>
<td>Portland</td>
<td>18–20 Feb. 1653</td>
<td>80/2</td>
<td>81/9</td>
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These four battles involved a total of 466 ships, of which 19, or 4 per cent, were sunk or captured. The average loss for the defeated fleet was 7 per cent.

Even dreadnoughts, in fact, had to fire their guns broadside to maximize their firepower. Only the development of effective surface-to-surface missiles beginning in the 1960s solved the problem of movement and combat in naval warfare.

that these our ships unite so closely, that by no chance will they allow any contrary force to penetrate between them’. 31

Tromp’s use of the line at Dunkirk was a tactical aberration, a desperate defensive measure to hold off a much larger enemy force. At the Downs on 21 October 1639, where Tromp commanded a heavily reinforced Dutch fleet of over 100 ships, he reverted to group tactics and the mêlée to destroy the Spanish armada. 32 The Dutch were still using such tactics when the First Anglo-Dutch War began, and there is no evidence to suggest that the English ‘stole’ the idea for the line-ahead from their enemy. 33 As Michael Lewis wrote nearly a half-century ago: ‘The First Dutch War produced one tactical innovation of the first importance – a real line-ahead. And there can be no doubt that it was the English, and not the Dutch, who produced it.’ 34

Those British naval historians who examined the tactics of the era, Corbett and Tunstall among them, suggested that the English adopted the line in March 1653 because of their own experience with the formation, perhaps the result of some inadvertent battle development. 35 Michael Lewis wrote: ‘They must have known more exactly what they were doing. It must have been tried before – and tried with some success.’ 36 C.T. Atkinson, editor of the later volumes of the Navy Records Society’s collection of documents related to the First Anglo-Dutch War,
agreed, suggesting that the now forgotten episode probably occurred during the Three Days’ (or Portland) Battle of February 1653. Atkinson noted that the last set of instructions issued in early February before Portland contained no reference to the use of the line-ahead, whereas the first set issued after the engagement introduced the new formation to the fleet.\(^{37}\) ‘It is clear’, Atkinson wrote, ‘that the experience of the Three Days’ Battle had had something to do with the innovation.’\(^{38}\) But at what point in the battle might the English have fallen into the line-ahead?\(^{2}\)

The most tactically notable phase of the rather complex three-day Battle of Portland occurred on the first day (Figure 1). Tromp, with about 80 ships, was shepherding a convoy eastward through the channel when he spied a somewhat disordered English fleet of about the same size to leeward. The Dutch, holding the preferred upwind or windward position, could have avoided a fight, but about 0900 Tromp led his whole force against an English division of about 20–24 men-of-war.

Tromp’s sudden attack threatened to overpower the English rear before their other squadrons, all downwind, could beat their way upwind to assist their comrades, a process that would take hours. An account written by one participant in the Triumph, the flagship of the attacked squadron, noted: ‘the fleets engaged suddenly, and with some disadvantage to ours, because the enemy having the wind, our sternmost ships could not get up to do any considerable service, which laid the brunt of this day’s fight much upon the flag-ship the Triumph, and had much endangered the whole. But God helped us exceedingly.’\(^{39}\) In their official report, Generals-at-Sea Robert Blake, Richard Deane, and George Monck admitted that one of their squadrons of about two dozen ships ‘had a

Figure 1 The Battle of Portland, 18 February 1653: the morning of the first day.

\(^{37}\) Gardiner and Atkinson, First Dutch War, iv, pp. 18, 34–8, 262–6.
\(^{39}\) Op. cit., p. 94.
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very sharp conflict of it that whole day till about four o’clock in the afternoon’ before help arrived.40

Tromp, despite his overwhelming initial advantage, failed to crush the ships ranged against him before the other English squadrons joined the battle. The Dutch were clearly frustrated by their inability to destroy the much smaller English squadron. Tromp’s ships, despite the fact that they held the wind gauge, were unable to close with their enemy and to employ the boarding tactics the Dutch preferred. Instead, they found themselves locked in a gunnery duel. Vice-Admiral Jan Evertsen, one of the senior Dutch commanders, wrote in his journal: ‘The two squadrons reduced one another to a condition of harmlessness.’41

Why were the Dutch unable to close with the English? Had the latter accidentally imitated the example of Tromp at Dunkirk and used the line-ahead that first day south of Portland to beat off a larger enemy force? An account written by one Dutch participant noted: ‘We were the first of the fleet. We ran across in front of our Admiral, at the English Vice-Admiral, so as to separate the English ships one from another. When we came up with them, several English frigates that were close together opened a fearful fire on me from their five or six ships all at once. . . . I suffered heavy damage.’42 Tromp himself later reported: ‘we have seen in this engagement that divers of our captains are not as staunch as they ought to be; they did not second myself and their other honest comrades as the English did, for I observed in attacking Blake that, before I could get at him, I had had such a welcome from three or four of his ships that everything on board us was on fire, and Blake was still unhurt.’43

The effective English cannonade clearly made an impression on the Dutch. The fact that these reports mention being fired on simultaneously by multiple ships suggests that the English vessels in the immediate path of the Dutch attack were not deployed in groups and had clear lines of fire. These documents may indicate that the English men-of-war were arranged in something approaching a line-ahead.

Whatever the catalyst, on 29 March 1653 the Generals-at-Sea Blake, Deane, and Monck issued two sets of instructions: ‘For the Better Ordering of the Fleet in Sailing’ and ‘For the Better Ordering of the Fleet in Fighting’.44 Corbett and Tunstall, both eminent historians of the development of naval tactics under sail, term these instructions ‘revolutionary’.45 The new orders marked, of course, not an end of a process of tactical and doctrinal development, but a beginning, and as such were far from perfect. The signals by which a commander was expected to make his plans known to subordinates were primitive. The discharge of two guns ‘and putting out a red flag on the fore-topmast head’ indicated

41 Op. cit., p. 188.
44 The instructions are reproduced in op. cit., pp. 262–73.
45 Corbett, Fighting Instructions, p. 95; Tunstall, Naval Warfare in the Age of Sail, p. 19.
The instructions offered no guidance as to how commanders were expected to convey their intentions to the fleet once the battle began. Speaking-trumpets, the dispatch of messengers in small boats, and sending up a general signal for a parley remained the chief means of communication in action. Nevertheless, the instructions were the most detailed and comprehensive yet issued for use by the English navy. They also marked the beginning of a new tactical system: the third article of the instructions for fighting directed that once an engagement began, ‘each squadron shall take the best advantage they can to engage with the enemy next unto them, and in order hereunto all ships of every squadron shall endeavour to keep in a line with their chief’.

The first engagement fought by the English navy in a line-ahead was its marked success against the Dutch off Gabbard Shoal in June 1653. While the accounts of the battle are sketchy, the extant documents indicate that the English fleet was well handled, maintained the windward position throughout most of the action during the first and second days of the battle, fought, at least at times, in something approaching a line-ahead formation, and forced the Dutch to fight a gunnery duel that they were unlikely to win.46 An English participant reported, ‘our fleet did work in better order than heretofore, and seconded one another’.47 An anonymous account noted that the English ‘having the wind . . . put themselves in their order they intended to fight in, which was in file at half cannon shot, from whence they battered the Hollanders furiously all that day’.48 Compared to the earlier battles of the war, Gabbard Shoal was a crushing defeat for the loser. The English lost not a single ship and sustained only 400 casualties. The Dutch fleet returned to Holland less nine ships sunk and eleven captured. They suffered about 800 casualties and left behind in the prizes another 1000 men as prisoners.

Worse yet for the Dutch, for the first time in the war the victorious fleet survived an engagement in fair enough shape to continue operations. Within a week the English were blockading the Dutch coast. Earlier battles of the war had left both fleets so shot up that victor and vanquished had to return to port to refit. But as Captain Richard Lyons of the Resolution wrote after the battle: ‘We are now in a good posture to follow the enemy and keep the sea, which we were never afore’.49 The victory off Gabbard Shoals, combined with another triumph the following month off Scheveningen (see Table 2), strengthened the drift toward the adoption of the line-ahead as the service’s preferred fighting formation.

If the line-ahead enhanced, rather than diminished, the fighting power of the English navy, what of the question of command and control? Did the adoption of the line improve the ability of commanders to direct
Table 2 Major battles fought in European waters, First Anglo-Dutch War, after March 1653

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<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>English ships engaged/lost</th>
<th>Dutch ships engaged/lost</th>
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<tbody>
<tr>
<td>The Gabbard</td>
<td>2–3 June 1653</td>
<td>100/0</td>
<td>98/20</td>
</tr>
<tr>
<td>Scheveningen</td>
<td>31 July 1653</td>
<td>130/2</td>
<td>125/30</td>
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These two battles involved a total of 453 ships, of which 50, or 11 per cent, were sunk or captured. The average loss for the defeated fleet was 22 per cent.

their fleets in combat? English naval commanders who embraced the line discovered that the use of the formation, while it enhanced order and ensured effective firepower, vastly complicated the control of the fleet in battle.

Controlling the movements of a fleet under the old tactical system had been relatively simple. When a fleet commander changed course, the ships of his squadron did likewise, and the subordinate commanders of the other squadrons followed suit, to be mimicked, in turn, by their subordinates. For example, at Kentish Knock, Dutch Vice-Admiral Witte Corneliszoon de With, after assaulting the English van, abruptly changed course and led his fleet to the south without difficulty to engage the English centre and rear divisions.

Such a manoeuvre was impossible for a fleet deployed in a line-ahead formation. Controlling the movements of a large body of ships arrayed in a line was an extremely difficult problem. How could the fleet commander communicate his intentions to his subordinates commanding the van and rear divisions? And how could the commanders of the van and rear control their own formations? The prospect of having admirals lead their lines into battle involved enormous risk: note Horatio Nelson’s fate at Trafalgar. In an engagement, flagships attracted enemy attention the way lights attracted moths in the dark. Despite these risks, Admiral Sir Edward Spragge, commander of the English rear at the second battle of Schooneveldt in the Third Anglo-Dutch War, believed that division commanders had to lead their lines because inexperienced captains could not be expected to make the proper tactical decision when manoeuvre became necessary. How could a commander whose flagship was located in the centre of the line direct the movements of his lead ship?

The physical extent of the battlefield at sea also posed peculiar problems. A fleet of 100 ships, even if arrayed in the old group formation, covered a good deal of ocean. Those same ships arranged in a line could easily extend beyond the visible horizon. In good weather, English captains were expected to keep at least a half-cable’s length – 304 ft – behind the ship they followed. This distance combined with the length of the typical ship – another 100 ft or more – meant that battle-lines could easily

50 Quoted in Tunstall, *Naval Warfare in the Age of Sail*, p. 36.
extend for between seven and eight miles, assuming, of course, both good weather and good order.\textsuperscript{51} Unless visibility was good (and in the English Channel and North Sea visibility was rarely good), an admiral in the centre of such an extended line would not be able to see either end. As Spragge noted in his journal after second Schooneveldt: ‘the line-of-battle . . . is so very long that I cannot see any sign the General Admiral makes’.\textsuperscript{52}

As if the problems of controlling one’s own fleet were not daunting enough, there remained the question of an opponent’s behaviour. What if an opposing commander was less cooperative than Tromp and did not insist on sailing into the guns of an English line in an effort to bring on a mêlée? What if an enemy fleet accepted a gunnery duel and tried to manoeuvre to advantage? What if an opposing fleet, downwind from an English line, chose to disengage? In such cases, would a linear formation allow a commander to achieve results comparable to those attained by Monck, Deane, and Blake off Gabbard Shoals?

The answer to these problems, of course, lay with the development of means to control a fleet in combat. There were two possibilities. Commanders could use visual signals to communicate their intentions to their subordinates. The alternative involved the use of prearranged instructions – doctrine. Experienced commanders could draw up rules explaining how subordinates should act in given situations. For example, if a friendly fleet held the windward position A, and the enemy fleet held the leeward position B, then the commander of the van should respond with manoeuvre C. The fighting instructions issued on the eve of the Second Anglo-Dutch War by the Restoration navy relied on this latter approach. The new instructions included some additional signals, but doctrine became the principal means by which a commander could expect to control a large fleet arrayed in a line.

While the third article of the new instructions made no mention of the line, as it had under the Commonwealth, the line-ahead remained the prescribed order of battle. According to the new article, once the admiral made the signal to engage, ‘then each squadron shall take the best advantage they can to engage the enemy according to the order prescribed’.\textsuperscript{53} Commanders were expected to lay out, before a battle, a specific order for each of the ships of the fleet. And that order, the additional instructions made clear, would be linear: ‘In all cases of fight with the enemy the commanders of his majesty’s ships are to endeavour to keep the fleet in one line, and as much as may be to preserve the order of battle which shall have been directed before the time of the fight.’\textsuperscript{54}

The new instructions also attempted to take into account the different

\textsuperscript{51} According to an eyewitness account, the English and Dutch lines at the battle of Lowestoft (June 1665) extended for 5 leagues, about 15 nautical miles. See Penn, Sir William Penn, ii, p. 350.

\textsuperscript{52} Tunstall, Naval Warfare in the Age of Sail, p. 36.

\textsuperscript{53} Corbett, Fighting Instructions, pp. 122–6.

ways a battle might begin and to provide doctrine to guide subordinates’ decisions. Assuming the enemy chose to fight (and there were no instructions to address the possibility that he might not), if the English fleet had the wind, the van would steer a course for the ‘headmost’ of the enemy’s ships. If the opposing fleet held the wind, the English ships would place themselves ‘in one line close upon the wind’.

Once engaged, English ships were to fight in line. Captains were warned not to leave the line to render assistance to battered comrades that fell out of formation, being admonished that ‘nothing but beating the body of the enemy’s fleet can effectually secure the lame ships’. Another article directed that no ships were to ‘pursue any small number of the ships of the enemy before the main [body] of the enemy’s fleet shall be disabled or run’. And in the event of a chase, none of the chasing ships was to advance beyond sight of the flagship, and they were directed to break off pursuit once darkness fell.

While some historians have maintained that linear formations were destined to rob naval battles of their ability to produce decision, others have portrayed the line as a reasonable response to the tactical dilemmas facing commanders. In his 1895 study of naval warfare, P.H. Colomb wrote that, once adopted, the ‘advantages of the line were . . . certain to give it permanence’. Sir Julian Corbett argued that overly restrictive articles, such as those discussed above, and not the line per se, caused the inconclusiveness of fleet tactics as they developed in the eighteenth century. While eighteenth-century indecisiveness may have been the ultimate result of the adoption of linear tactics, Brian Tunstall pointed out that the seventeenth-century motivation that led to the issuance of the restrictive articles was nevertheless sound. English fleets of the mid-seventeenth century, comprising 100 or more ships of myriad types commanded by captains of grossly uneven capabilities and temperament, cannot be compared to the smaller, well-ordered, well-disciplined, and well-led fleets of the next century. It had been common in the First Anglo-Dutch War for individual captains, some of whom were not naval officers but commanders of hired merchant ships, to break formation to go after

55 These same additional instructions directed, as was mentioned above, that in good weather the proper distance between ships in line was a half-cable’s length. In the Royal Navy, a cable’s length measured 608 ft; in the US Navy 720 ft.
57 P.H. Colomb, *Naval Warfare: Its Ruling Principles and Practice Historically Treated*, 2nd edn (London, W.H. Allen, 1895), p. 91. One of the line-ahead’s attributes important to Colomb, but not mentioned by other naval historians, was the ability of fleets so deployed to avoid fireships, vessels filled with incendiaries that the upwind fleet could set loose and allow to drift down on an opposing fleet. Ships deployed in a line could easily avoid these infernos. Colomb, *op. cit.*, pp. 91–2, tracked the decline in the number of Royal Navy fireships into the eighteenth century and contrasts these figures with the rise in heavy line-of-battleships as the line-ahead became the formation of choice. Theodore Ropp, *War in the Modern World*, rev. edn (New York, Collier, 1962), p. 70, termed the line-ahead ‘the most effective formation for delivering broadsides’.
a crippled enemy in a quest for prize money. The authors of the revised articles were not seeking to stay an effective pursuit of a beaten foe; they were simply trying to prevent the seaborne equivalent of looting in the midst of battle.

While the newly issued instructions relied principally on doctrine to ensure the effective command and control of a fleet, they also marked the beginning of an increased use of signals. Because of the still primitive nature of visual systems, their use was mostly confined to the approach to battle. The new instructions included signals for forming line-ahead on a starboard or larboard tack, a manoeuvre that marked an advance in line-ahead tactics. Other specified signals, for example the union flag at the mizen peak of the flagship, indicated that ‘the admiral would have all the ships to fall into the order of “Battailia” prescribed’, that the admiral wished the van to tack first, the rear to tack first, the fleet to add more sail, or for the squadrons to chase.

The instructions circulated on the eve of the Second Anglo-Dutch War were a marked advance over those issued during the previous conflict, but were still far from adequate. The doctrine and signalling systems with which admirals were to command their fleets remained rudimentary, despite significant improvements. There was a prescribed order of battle, with each ship given a designated place in the line, but the presence of small, slow, undergunned hired merchantmen weakened the formation. At least one commander, Edward Montagu, the Earl of Sandwich, argued that the removal of the ships would shorten the line (he calculated by nearly three miles) and better concentrate the firepower of the fleet. But the merchantmen remained, placed for their protection near the more powerful flagships, whose own safety should have been of primary concern.

Notwithstanding these shortcomings, in the spring of 1665 English commanders went to war with confidence, in themselves, their ships, their subordinates, and their new fighting instructions. Tactically, the English performed well during the war, winning two of the three major battles (see Table 3). And in the only fleet engagement the English lost,

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>English ships engaged/lost</th>
<th>Dutch ships engaged/lost</th>
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</thead>
<tbody>
<tr>
<td>Lowestoft</td>
<td>3 June 1665</td>
<td>c. 100/1</td>
<td>c. 100/32</td>
</tr>
<tr>
<td>Four Days’</td>
<td>1–4 June 1666</td>
<td>54/17</td>
<td>84/4</td>
</tr>
<tr>
<td>St James’s Day</td>
<td>25–6 July 1666</td>
<td>81/1</td>
<td>88/20</td>
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These three battles involved a total of about 507 ships, of which 75, or 14.7 per cent, were sunk or captured. The average loss for the defeated fleet was 24 per cent.

50 Tunstall, Naval Warfare in the Age of Sail, pp. 23–4.
the Four Days’ Battle of June 1666, they departed from the line, while the Dutch for the first time fought in one. After the battle, Admiral Sir William Penn remarked to Samuel Pepys: ‘That we must fight in a line, whereas we fight promiscuously, to our utter and demonstrable ruine – the Duch [sic] fighting otherwise – and we, whenever we beat them.’

The English fought their next engagement – the St James’s Day Battle of July 1666 – in the line and won another major victory. Unfortunately, through his parsimonious and short-sighted policy, the restored Stuart king, Charles II, threw away the fruits of the English triumphs and handed victory to the Dutch in the Medway in June 1667.

While the English made the transition to the line, the Dutch also refined their tactics and struggled with the related problems of command and control. During the First Anglo-Dutch War, Dutch tactics had become increasingly linear, although not to the extent that the Hollanders adopted an actual line-ahead formation. According to Jaap R. Bruijn, historian of the Dutch navy, Tromp, hoping to gain the wind gauge, would lead his fleet into battle in a line, but would then use group tactics to swoop down on the English in an effort to grapple, board, and overwhelm the defenders. ‘The lack of any uniformity among the types of ships in the Dutch fleet’, Bruijn noted, ‘would indeed have caused great problems with regard to a more strict and continuous order of battle.’

At Lowestoft, the first engagement of the Second Anglo-Dutch War, the Hollanders’ tactics were somewhat more linear, but they still did not use the line-ahead. In combat, most ships remained grouped in twos and threes. A contemporary observer, D’Armand de Gramont, comte de Guiche, noted that such tactics allowed the Dutch to repulse individual English ships that attempted to penetrate the line, what later military analysts would call defence in depth. Despite these advantages, de Guiche considered the English line-ahead, which maximized firepower, to be the superior order of battle, and one worthy of imitation by the French.

The Dutch, after their disastrous repulse at Lowestoft, reassessed their command structure and tactical approach to warfare. Johan De Witt, then the republic’s councillor pensionary, personally visited the fleet and oversaw its refitting, reinforcement, and a series of courts martial that sentenced three captains to death, exiled two more, and dismissed three others. De Witt also reviewed the tactics employed by the navy. He met personally with the fleet’s senior flag officers and discovered that they

62 Samuel Pepys diary entry, 4 July 1666, in R. Latham and W. Matthews, eds, The Diary of Samuel Pepys (9 vols, Berkeley and Los Angeles, Univ. of California Press, 1970–6) vii, pp. 193–5. Latham and Matthews comment in a note that the English did in fact fight in a line at the Four Days Battle and that the Dutch did not. But the Dutch, as will be discussed below, did fight in the line while the English fleet was extremely disordered, so much so that perhaps it seemed to Penn that the fleet had not fought in its usual order.

63 For a discussion of Tromp’s use of linear tactics, see Gardiner and Atkinson, First Dutch War, p. 20, and Bruijn, The Dutch Navy, pp. 71–2.

64 De Guiche’s account is quoted in Corbett, Fighting Instructions, pp. 118–19.

had concluded that the English squadronal system was superior and that the Dutch fleet should henceforth fight in a single line of battle.66

On 15 August 1665 De Witt issued the appropriate instructions while on board the flagship of the fleet.67 The new tactics embraced the line-ahead and the three-squadron order of the English. But the Dutch modified the system to protect flag officers and to maintain a reserve. The instructions of 1665 retained an option for the formation of a fourth, reserve squadron that could be thrown into a battle at a critical moment. To keep the fleet’s senior commanders out of harm’s way early in an engagement, the Dutch centre squadron was to remain a greater distance from the English line than the van and rear squadrons, while individual flagships, deployed in the centre of their respective squadrons, were to do the same. The result was the Dutch snake-shaped line.68

Responsibility for employing the new tactics fell to Michiel Adriaanzen de Ruyter who, after Tromp’s death at the Battle of Scheveningen on 31 July 1653, had become the foremost of the Dutch admirals. De Ruyter had no quarrel with the line-ahead, but still sought to find some tactical method that would allow his usually outnumbered ships to concentrate their efforts against a portion of an enemy fleet. He was among the first naval commanders to consider breaking an enemy’s line in an effort to attain such a concentration.69

As the English and Dutch duelled for maritime superiority in the Channel and the North Sea, the French quietly built up their own naval and maritime establishments. While Jean-Baptiste Colbert, the central figure behind France’s maritime buildup,70 directed French naval policy, responsibility for the honing of the fleet as a fighting instrument on the eve of the War of the League of Augsburg rested in the hands of Anne Hilarion de Cotentin, comte de Tourville.71 Brian Tunstall wrote that Tourville, who had served as an officer in France’s star-crossed naval squadron attached to the English fleet during the Third Anglo-Dutch War, ‘did for the French navy, and ultimately for all navies, what maréchal Jean Martinet did for the army’.72 In a matter of a few years, Tourville singlehandedly advanced the state of French naval doctrine well beyond that of England’s Royal Navy.73

In May 1689 Tourville issued printed sailing and fighting instructions

69 Bruijn, The Dutch Navy, pp. 88–9; Castex, De Ruyter à Suffren, p. 16.
72 Tunstall, Naval Warfare in the Age of Sail, p. 48.
to the commanders of his fleet. His instructions were the most comprehensive yet issued, although they broke little new tactical ground. Tourville completely embraced the English concept of the line-ahead and the subdivision of the fleet into van, centre, and rear. Doctrine, and a handful of still primitive signals, remained the principal means to control the fleet in battle. The most significant advance involved detailed sailing formations designed to enable a large fleet to change course, as a result of wind shifts or the sudden appearance of an enemy in an unexpected quarter, while retaining the capability to redeploy quickly from the order of sailing into a linear order of battle. English sailing instructions would not rival Tourville’s for comprehensiveness for another 90 years.74

Throughout 1689 and 1690, Tourville continued to issue revised and more elaborate instructions. Tunstall describes one of the 1690 editions as a physically handy, ‘pocket size, thumb-indexed’ manual.75 These instructions included even more detailed sailing directions for fleets of over 100 ships organized in three or six columns, illustrated diagrams of sailing formations, and additional visual signals.76

The efforts of Colbert and Tourville made the French navy of the late seventeenth century a potent force. As William Laird Clowes, historian of the Royal Navy, wrote:

[By 1689] the young French navy had reached a pitch of development to which it had never previously attained, and to which it did not for many years attain again. The intelligence and energy of Colbert had created a splendid fleet, which was numerically equal, if not superior, to the combined fleets of England and Holland; and the officers and men of the service had learnt experience in the best schools of the day, fighting at one moment with the Dutch against the English, and at another, with the English against the Dutch.77

Tourville was also responsible for the attempt to apply rationalist concepts to the problems facing navies. He directed the Jesuit priest Paul Hoste to write a treatise on naval warfare. Hoste, in his capacity as sometime chaplain, had served in French flagships during the Anglo-Dutch Wars. He had witnessed at first hand many of the greatest naval clashes of the day, including those of the Second and Third Anglo-Dutch War and the War of the League of Augsburg.

Hoste published his L’Art des armées navales ou Traité des évolutions navales in 1697.78 He drew his lessons from the history and experiences of the last half-century, often from his own observations and the experiences of senior French commanders such as Tourville, to develop a com-

74 Tunstall, Naval Warfare in the Age of Sail, p. 48.
78 The full title was, in the fashion of the time, L’Art des armées navales ou Traité des évolutions navales, qui contient des règles utiles aux officiers généraux, et particuliers d’une armée navale; avec des exemples itez de ce qui s’est passé de considérable sur la mer depuis cinquante ans.
Hoste's work addressed the tactical advances of the English, Dutch, Spanish, and French fleets. He provided definitions of naval terms and discussed what he viewed as the principles of naval warfare. His illustrated treatise covered different formations for sailing and fighting, orders of battle, fleet organization, movement, anchoring, and a variety of combat tactics including doubling and breaking an enemy's line. Hoste advocated not only line-ahead tactics but also the idea of restricting the line to powerful men-of-war, or what were becoming known as ships of the line. The presence of smaller ships, he argued, weakened rather than strengthened formations. Hoste also reviewed the advantages and disadvantages of the windward and leeward positions. Unlike most French commanders of the next century, Hoste, like the English, considered the windward position the superior in battle. He also noted the shortcomings of current visual systems, and toward the end of the book included his own scheme for signalling. Hoste's design, while far more elaborate than contemporary French and English systems, was nonetheless impractical.

While there was little that was revolutionary about Hoste's work, it was nevertheless important. His was the first treatise on then-modern naval warfare, written at a time when other academics, including military specialists, were beginning to apply scientific principles and rationalist concepts to the world's complex problems. Hoste personifies the rationalist ideal: Jesuit training, use of history, personal experiences, and observations combined with the application of a scientific method. Hoste was French, and, as Carl L. Becker noted in *The Heavenly City of the Eighteenth-Century Philosophers*, while rationalism and the Enlightenment were international movements, France was 'the mother country and Paris the capital'. Hoste was not only a chaplain, but also a professor of mathematics at the naval college in Toulon. In fact, at about the same time he published his treatise on naval warfare he also published his *Théorie de la construction des vaisseaux*, one of the first scientific efforts to develop a theory for ship construction. And as Becker wrote of the eighteenth-century world as one that had 'emerged from barbarism into a civilized

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79 Hoste's work is often cited, e.g. by Mahan and Clowes, as a primary source for accounts of the battles of the Anglo-Dutch Wars.

80 For discussion of Hoste's work, see Corbett, *The Fighting Instructions*, pp. 179–85; Tunstall, *Naval Warfare in the Age of Sail*, pp. 59–64; and the Robisons, *A History of Naval Tactics*, pp. 215–24. The Robisons provide fairly extensive excerpts from Hoste's book, but Tunstall's discussion is the more pertinent. Castex, *De Ruyter à Suffren*, 23–8, is exceedingly critical of Hoste's work and views the naval chaplain as a principal villain in the chain of events that crippled the development of effective naval tactics. From a French perspective, Castex may be right. For there is irony in the fact that the French, who were so much more scientific and thoughtful in their approach to things naval – ship construction, tactics, professional study for their officers – nevertheless lost a disproportionate share of their battles fought against the seemingly amateurish British.


and ordered state’,83 Hoste declared that ‘without the art of naval evolutions, a fleet resembles an army of barbarians’.84

Hoste was one of many late seventeenth-century writers wrestling with the problems of ‘the military revolution’.85 Azar Gat, in his study The Origins of Military Thought from the Enlightenment to Clausewitz, notes that these authors based their work on ‘the accumulated strata of the doctrine of natural law, the neo-classical search for rules and principles in the arts, and Cartesianism, which together had dominated Louis XIV’s France, stressing that reality was subject to universal order and to the mastery of reason.’86

But the French naval commanders, and the West’s first modern naval philosopher, were all schooled in the crucible of the Anglo-Dutch Wars. They understood what many historians have failed, or refused, to recognize: that the English embraced the line because it enhanced combat effectiveness. There is no evidence to support Mahan’s view that English, Dutch, or French commanders reasoned their way to the line-ahead through some sort of intellectual exercise. English fleets simply performed better and captured and destroyed more ships in their victories won after March 1653 than they had earlier in the First Anglo-Dutch War. And while it would be incorrect to portray these English triumphs won with the line as ‘decisive’, they were less indecisive than those battles fought earlier in the First Anglo-Dutch War.

English, French, and Dutch admirals also understood that, far from enhancing a commander’s control, reliance on the line-ahead exacerbated the difficulties inherent in direct a fleet in combat. Linear formations brought greater order to the fleet, but they were extremely unwieldy and incapable of the responsive manoeuvring made possible by the ‘mimic the leader’ group tactics used by the Dutch and the English early in the struggle. The development of, and increasing reliance on, signalling systems and fighting instructions by the English and other navies reflected an appreciation of the command and control difficulties inherent in the use of the line-ahead. Commanders, be they of fleets or squadrons, could no longer lead, they now had to direct.

The adoption of the line-ahead also led to the elimination of converted

83 Becker, The Heavenly City, p. 135.
84 Quoted in Castex, De Ruyter à Suffren, p. 23. See also Tunstall, Naval Warfare in the Age of Sail, p. 59.
86 Azar Gat, The Origins of Military Thought from the Enlightenment to Clausewitz (Oxford, Clarendon Press, 1989), p. 26. While it is true that Hoste’s was the only such work to deal with naval matters, historians of this era, as well as of the eighteenth century, when there were many more works published on naval subjects, routinely ignore naval authors and, unintentionally to be sure, give the impression that no such treatises existed. For example, Gat’s excellent work makes no mention of naval writers. Likewise, R.F. Weigley, in his The Age of Battles, commits a generous amount of space to the discussion of naval matters, but fails to mention the work of Hoste or later naval theoreticians, whereas writers on land warfare figure prominently.

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merchant ships from the battle fleet, and along with them their merchant masters. Fleets were thus purged of their non-professional elements, and the remaining officers were left to study the signal book, digest the meaning of the fighting instructions, and, if they so chose, develop better doctrine and improved signalling systems. Professionalism did not lead to the adoption of the line, as William Maltby suggested, rather the adoption of the line accelerated the trend toward professionalism.

Nevertheless, an important question remains unanswered. If the adoption of the line-ahead by European navies at the end of the seventeenth century was, in fact, a sensible choice given the empirical evidence available to commanders at the time, was the embrace of the line nonetheless a decision that would ultimately hamstring European navies for the next century? Was the line-ahead formation, in its eighteenth-century guise, actually as ‘stultifying’ as it is often made out to be?

Despite the fact that it has been maligned by innumerable historians for the past century, I would argue that the adoption and continued use of the line was a rational response to the tactical problems faced by naval commanders in the age of sail, in both the seventeenth and eighteenth centuries. My ongoing study of naval command and control methods leads me to agree with the overall conclusions of John Creswell’s 1972 revisionist work, *British Admirals of the Eighteenth Century*.87

There is, however, nothing strange in the absence of change in tactical theory during the period covered here [the eighteenth century]. Unless the doctrines generally accepted at the beginning of the century were unsound, which they were not, how could there be any progress in theory when there were not, and could not be in those days, any substantial changes in the materials of the tactician’s trade – his ships and his guns?88

The indecisiveness of eighteenth-century naval warfare was not solely, nor even primarily, the result of reliance on the line-ahead and the fighting instructions. The absence of military decision at sea in the eighteenth century was rooted in the nature of warfare in general, and of warfare at sea in particular.

To say that warfare at sea was *indecisive*, implies, after all, that warfare ashore was decisive. But how often did the great captains of the age – Gustavus Adolphus, the Duke of Marlborough, Frederick the Great, Napoleon I – or the not-so-great bring their campaigns to decisive and successful conclusions in a single climactic engagement? The answer, of course, is not very often. Had battles fought on land been regularly decisive, there would not have been so many of them as to justify calling the era an ‘Age of Battles’. The technological advances that made the ‘military revolution’ possible simultaneously fuelled the power of the state, and virtually ensured that wars would usually be decided by a long, costly

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process of attrition, and not by a single engagement, either on land or sea.

Note also that at the tactical level, as the English generals-at sea embraced the line-ahead as a result of experimentation in battle, their fellow generals ashore also adopted linear tactics. And as Richard A. Preston and Sydney F. Wise wrote of land warfare in the late seventeenth and early eighteenth centuries: ‘There was no room in linear tactics for the exercise of individual initiative. Linear tactics were designed to exploit the new fire power to the fullest extent.’

For both armies and navies, the era was one of tactical experimentation and frustration. Infantry battalions arrayed in straight lines could lay down deadly volleys, but were vulnerable to shock attacks, either by cavalry or, as was the case later in the eighteenth century, columns of infantry. The search for the proper balance between the line and the column remained a subject of doctrinal debate and experimentation until the end of the Napoleonic Wars. Practical combat experience, akin to the difficult school of war at sea, was central to this process. John A. Lynn, in his study of the evolution of French infantry tactics in 1794, wrote: ‘The column advocates of the Military Enlightenment clearly prepared the French to experiment with columns, but their final form was not one prescribed by the soldier-philosophers. Rather it was one that evolved under the pressure of circumstances.’

Moreover, naval war, by its very nature, could not be as decisive as land warfare, except in special cases, such as the Anglo-Dutch Wars, involving two maritime powers. The string of English victories at Portland, Gabbard Shoals, and Scheveningen did lead the Dutch to agree to terms in 1654. The Dutch assault into the Thames estuary in the Second Anglo-Dutch War did force the English to sue for peace. But (at least


90 For a discussion of the evolution of European military tactics, see Hans Delbrück, *History of the Art of Warfare iii: The Dawn of Modern Warfare*, trans. W.J. Renfroe, Jr (Lincoln and London, Univ. of Nebraska Press, 1990), pp. 269–85. See also D. Chandler, *Marlborough as Military Commander*, pp. 91–3; the same author’s *The Campaigns of Napoleon* (New York: Macmillan, 1966), pp. 344–50; and G.E. Rothenberg, *The Art of Warfare in the Age of Napoleon* (London, Batsford, 1977), pp. 67–70. Late in the eighteenth century the French adopted mixed formations that used both column and lines, and enjoyed tactical dominance over most of the other European armies for almost twenty years. The English clung to their linear tactics and, when these were properly handled, demonstrated that they could beat the French. Without a doubt, late-eighteenth-century French tactics gave their field commanders an excellent mix of firepower and mobility. But the manoeuvres of French field commanders were not dependent on the direction of the wind, and well-trained troops could be deployed quickly from column into line and from line into column, or into a square. Until the advent of steam power, men-of-war could not, whatever the state of training or the tactical skill and professionalism of naval officers, achieve similar battlefield dexterity.

until the nuclear age) in a conflict pitting a maritime against a continental power, for example Great Britain against France, the concept of a decisive victory at sea by the former over the latter was an oxymoron.\textsuperscript{92} Note that Nelson’s great victory at Trafalgar in October 1805, one of the most absolute triumphs in annals of naval history, was followed by another nine years of war!

Another problem that plagued naval warfare was one of tactical symmetry. The line-ahead was a system developed during the Anglo-Dutch Wars as a defensive measure to fend off aggressively led Dutch fleets using group tactics. As early as the Third Anglo-Dutch War (see Table 4) it became apparent that a fleet deployed in a line-ahead could not easily be wielded in an aggressive manner.\textsuperscript{93} The English, after successfully beating off a surprise Dutch attack on the combined Anglo–French fleet at Solebay, had little success bringing their enemy, who was himself now using the line-ahead, to battle along his own coast. At the time, the English associated their problems not with their formation or doctrine, but with geography and their incompetent French allies. The Royal Navy, with its deep-draft vessels, was at a distinct disadvantage pressing an offensive in Dutch home waters against a fleet designed to operate in shallows. The English, not without justification, also attributed their lack of success to the poor combat effectiveness of the French. The French squadron attached to the English fleet was inexperienced, compared to the battle-tested English and Dutch contingents, and its commanders, strangers to the Royal Navy’s tactical doctrine, were incapable of reacting promptly and effectively once battle began.

In the naval conflicts that followed the Anglo-Dutch Wars, principally those waged between England and France from the late seventeenth into the early nineteenth centuries, both opposing fleets likewise fought in a

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>English/French ships engaged/lost</th>
<th>Dutch ships engaged/lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solebay</td>
<td>28 May 1672</td>
<td>98/4</td>
<td>75/2</td>
</tr>
<tr>
<td>Schooneveld I</td>
<td>28 May 1673</td>
<td>80/2</td>
<td>52/0</td>
</tr>
<tr>
<td>Schooneveld II</td>
<td>4 June 1673</td>
<td>78/0</td>
<td>51/0</td>
</tr>
<tr>
<td>Texel</td>
<td>11 Aug. 1673</td>
<td>90/0</td>
<td>60/0</td>
</tr>
</tbody>
</table>

These four battles involved a total of 684 ships, of which 8, or 1 per cent, were sunk or captured. All four battles were drawn.

\textsuperscript{92} See e.g. P.M. Kennedy, \textit{The Rise and Fall of British Naval Mastery} (New York: Scribner’s, 1976), pp. 78–9.

\textsuperscript{93} Even after the impressive English victory at the Gabbard in the First Anglo-Dutch War, there had been at least some observers who noted that the scale of victory ought to have been greater. An anonymous writer noted: ‘If the English fleet had borne up close after the Dutch when they first retired, it’s thought they might have endangered to have totally ruined them’; see Gardiner and Atkinson, \textit{First Anglo-Dutch War} v, p. 101.
The ‘Military Revolution’ Afloat

line-ahead formation. Nor were the French as aggressive as the Dutch. As a result, English commanders faced an obvious dilemma. If they adhered to the line-ahead and the French did the same, the most likely outcome would be a drawn battle. But what was the alternative? The Dutch had relied on aggressive group tactics to attack the English line and had been beaten time and time again.

Historians, as they have assessed the work of late seventeenth- and eighteenth-century admirals, have attributed their battle success, or lack thereof, to their degree of adherence to the line and the associated fighting instructions. Successful admirals were those who somehow found a way to escape the straitjacket of the formation and to avoid the ‘dead hand’ of the fighting instructions. Those admirals who failed to win the big battles were those who lacked the imagination to depart from the line and the instructions. The latter are generally labelled the ‘formalists’, while the more successful naval commanders are termed ‘mêléeists’, or adherents to the ‘pell-mell’ or ‘promiscuous’ battle.94

But why is it that a naval commander’s success or failure must somehow be linked to the line-ahead and the fighting instructions? Are we to assume that had all English commanders thrown their instructions overboard and abandoned the line that they would have won Trafalgar-like victories? Did generals ever lose battles ashore? Do historians always attribute success or failure in land battles to adherence to, or the willingness to ignore, some tactical arrangement or doctrinal creed? Historians, when they examine land battles, generally, and correctly, associate victory and defeat with myriad causes, the foremost being the relative skill and imagination of an individual commander and the size and training of his army. The fact is that some generals, and armies, are just better than others and win more battles; and the same is true of admirals and navies. Is it conceivable that off Minorca in 1756, Admiral Sir John Byng, a tragic but mediocre commander, failed the fighting instructions more than the Royal Navy’s doctrine failed him?

Rather than castigate naval commanders for caution and lack of imagination, one might well praise them for having the insight to recognise the true nature of modern warfare. To be sure, English (and after 1707 and the Act of Union, British) admirals were more aggressive than their French and Spanish counterparts, and a few of the first-named, such as Nelson, sailed about searching for that decisive, if elusive, engagement. But most, even the astute Sir John Jervis, later Lord St Vincent, viewed such a quest as all but chimeric: ‘two fleets of equal force can never produce decisive results, unless they are equally determined to fight it out, or the commander-in-chief of one of them bitches it so as to

94 See e.g. Michael Lewis’s discussion of ‘the rival schools’ in The Navy of Britain, pp. 455–533.
misconduct his line.'95 St Vincent was not a cautious mediocrity wearing a naval uniform; he was a realist. And unlike that imaginative, glory-seeking emperor of the French, Napoleon Bonaparte, who epitomized the quest for decisive victory, Sir John died without the blood of hundreds of thousands of his countrymen on his hands.

What, after all, were the alternatives to reliance on the line-ahead? No tactical system could resolve the fundamental problem related to the fact that sailing men-of-war moved and fought along axes that lay at right angles to each other. Naval commanders had but two options. They could maximize firepower by arranging their ships in a line, accepting the command and control difficulties inherent in using such a formation. Conversely, if they were willing to accept a dramatic reduction in the firepower of their force, they could ease their command and control burden and adopt group mêlée tactics, embracing the pell-mell or promiscuous battle. They chose the first option because the lessons of the First and Second Anglo-Dutch Wars indicated that the trade-off was favourable and that the command and control problems appeared to be subject to solution, through the development either of better doctrine or of improved visual signalling systems.

While adequate doctrine and workable signalling systems never did in fact materialize, that does not mean that the second option ought to have been chosen. The only commander in the entire history of naval warfare who managed to fight and to win pell-mell battles, repeatedly and by design, was Horatio Nelson. His genius for command was unique, and his trusted subordinates were long-term professionals with twenty years of service and a decade of wartime experience.96 Nor did Nelson have to tangle with admirals of Tromp’s or De Ruyter’s mettle, commanding ships manned by seamen of the calibre of the late-seventeenth-century Dutch navy.97 As the Dutch learned during the course of their three wars with the English, a well-led and drilled fleet arrayed in a line-ahead could defeat aggressive mêlée attacks.

For these reasons, the line-ahead became, and remained, a central element of European navies’ efforts to meet the tactical challenges of the era. The men who adopted and retained the line were neither naval philosophers nor unimaginative fools willing to trade combat effectiveness for a well-dressed and ordered line of ships. They were commanders who, facing an intractable, well-nigh insoluble tactical problem,
embraced ‘a system approved by successive generations of naval officers over a period of nearly 150 years, in the later decades of which every admiral had experience of at least two previous wars’.98 If admirals achieved fewer marked successes in battle than did generals ashore (a debatable proposition), the cause lay not with naval tactics or doctrine, but with the immanently more difficult problems associated with the ‘military revolution’ at sea.

*Greenville, NC*

98 Creswell, *British Admirals of the Eighteenth Century*, p. 34.