The Capability of Sailing Warships
Part 1: Windward Performance

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La capacité militaire d'un navire de guerre à voiles était étroitement liée à sa performance contre le vent, soit sa capacité de naviguer en direction opposée à celle du vent. La stratégie et les tactiques adoptées dépendaient d'elle; en matière de capacité militaire, il est donc essentiel que notre compréhension en soit réaliste. Cet article s'appuie sur des sources contemporaines pour démontrer à quel point notre compréhension actuelle, qui est détachée de cette réalité, doit être revue.

Wind dependence is a defining characteristic of the sailing navy, and it is only right that those who have written of the operations of sailing warships or fleets have acknowledged it and continue to do so.[1] Our existing understanding is somewhat confused, however. The subject of seafaring in the age of sail remains alien to many, a cold and inaccessible subject, rendered the more so by a technical language all its own. The inevitable result is a continuing and peculiar juxtaposition of the acknowledged importance of the subject and the poorly researched status of it. Continually regurgitated but seldom scrutinized by historians, our flawed understanding of sailing capability has exerted a malign influence on the work of those historians whose studies are based upon it.

By far the most frequently discussed aspect of wind dependence is windward performance: the ability of a ship to sail in a windward direction. It was a significant factor, determining both strategy and tactics and it is crucial that our understanding of it should be realistic in terms of practical capability. It has, however, become increasingly apparent that our understanding is in fact based on generalizations and beset with misinformation. It has even been suggested that square rig was the best choice for making good progress when

[1] A.T. Mahan. *The Influence ofSeapower on History. 1660-1783* (Boston, 1890), 2; L.G. Carr Laughton, "'The Way of a Ship," *Mariner's Mirror* XIV, No. 2 (1928), 138-41; W.C.B. Tunstall, *Naval Warfare in the Age of Sail,* edited by N. Tracy (London, 1990), I; M. Depeyre, *Tactiques Et Stratégies Navales De La France Et Du Royaume-Uni De 1690À 1815* (Paris, 1998), 57-63; N.A.M. Rodger, "Image and Reality in liighteenth Century Naval Tactics," *Mariner's Mirror* LXXXIX, 3 (2003), 283-4.

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sailing into the wind.[2]

Figure I: After D. Lever, *The Young Sea Officer's Sheet Anchor* (Ontario, 1998) 75.

The best choice for making good progress when sailing into the wind was, without question, fore and aft rig. Square-rigged ships are particularly restricted in their ability to sail close to the wind by the physical characteristics of their rig. The mariner's compass is divided into thirty-two points: each representing an angle of 11 1/4° ,[3] and a square sail, attached to its yard, can fill with the wind at the very best no closer than an angle of six points to the wind (Fig. I), the traverse of the yard being limited in front by the forestay and abaft by the lee shrouds (Fig. 2). Thus, with a northerly wind, the best course that could be sailed by a sailing warship was ENE, or WNW.

A sail rigged fore and aft, on the other hand, is not subject to such restrictions, and can fill with the wind a mere four points off the bow and sail a course of NE or NW with a northerly wind. Square-rigged ships did carry some fore and aft sails - lateen mizzen or spanker, staysails and headsails - and could effectively create a fore and aft rig by leaving all square sails furled and only hoisting headsails, staysails and spanker. However, any headway gained from such an arrangement would have been minimal and the ship would not have been able to make ground to windward since it could not gain sufficient speed for steerage to be relied upon.[4] Indeed, although jibs were universally acclaimed, some contemporaries had little use for staysails, some (but certainly not all) officers considering them "a useless waste of canvas."[5] In practice it was the square sails that had to be filled to provide the enormous power necessary to drive these ships forward. This is reflected in the contemporary practice of only setting fore and aft sails alone when lying to in a storm (Fig. 3), rolling heavily at anchor, getting underway or

[2] A.D. Lambert, *War at Sea in the Age of Sail* (London, 2000), 30.

000°	North	090°	East	180°	South	270°	West
Oil'//	NbyE	101'//	EbyS	191 '/*'	SbyW	281 •/«*	WbyN
022 *W*	NNE	H2'/2°	ESE	202'/,°	SSW	292 *Vi'*	WNW
033'//	NEbyN	123%°	SEbyE	21374°	SWbyS	303'/4°	NWbyW
045'	NE	135*	SE	225°	SW	315'	NW
056'//	NE by F.	146%°	SEbyS	236'/4°	SWbyW	326'/4°	NWbyN
067/2°	ENE	157'//	SSE	247'/,°	WSW	337'/2°	NNW
078Y4	EbyN	i68y<°	SbyE	25874°	WbyS	348%°	NbyW
090°	East	180°	South	270°	West	000°	North

[4] *Minutes ofthe Proceedings at a Court Martial, Assembled for the Trial of Anthony James Pye Molloy, Esq., Captain of His Majesty's Ship Caesar,* (London, 1795), 95; P. W. Hourigan, *Manual ofSeamanship* (Baltimore, 1903), 90.

[5] *BJ.Toitcn, Naval Text Book* (New York, 1864), 154; A.A. Hurst, "Modern Square-Riggers: Fact and Fallacy." *Maritime South West* VI (1993), 132.

coming to anchor[6] (Fig. 4).

Our misunderstanding is compounded by confused terminology and nomenclature. The evidence of Lieut. J. Dickinson, of the *Formidable* at the Court Martial of Sir Hugh Palliser in 1779 clearly illustrates the problem. Giving evidence of the course of the *Formidable* in relation to the *Victory* and the wind, the minutes run: "Q: Do you remember... in what manner the Formidable was cunned that afternoon? A: We kept the Victory about a point or a point and a half under the lee bow. Q: Did you go from the wind at that time? A: Yes, about a point or a point and a half from the wind."[7] In modern sailing parlance, sailing between a point and a point and a half from the wind would mean being able to point the bows of the ship, and make progress forward, at an angle between 11¼° and 17° from the direction in which the wind was blowing. With the wind northerly, this translates into a course somewhere between NbE and NNE. To the untutored eye, this suggests quite remarkable windward performance.

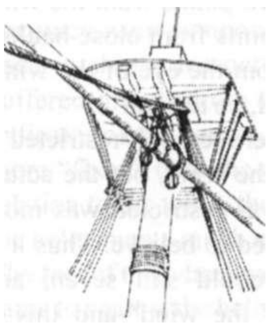


Figure 2: by Mark Meyers in J.H. Harland, *Seamanship in the Age of Sail* (London, 1985)62.

The same problem is illustrated in the minutes of the court martial of Rear-Admiral Knowles in 1750. There was much discussion over the exact positions of the Spanish and English Squadrons in relation to each other, and to the wind. The minutes record the following exchange: "Q: Were the Spanish and English squadrons both close hauPd when you got to the van of the fleet? A: No, - they were about 2 points from the wind, 1 judge: the wind upon the beam."[8] Again, this suggests startling windward performance. Fortunately, however, it also hints at the root of our misunderstanding. Although it is claimed that the course was just two points from the wind, further detail is added that the wind was *abeam,* an apparent contradiction. The solution to this conundrum lies in the contemporary definition of a ship's course in relation to the direction of the wind. Contemporaries did not measure their angle of sail from

Figure 3:Myers in Holland, 89.

' *The Trial of* I *ice-Admiral Griffin,* (London, 1751), 97. Log of the *Téméraire* 30 Oct 1805, T. Sturges Jackson, (ed.). *Logs of the Great Sea Fights, 1794-1805,* (London, 1981). 1:222; D. Lever, *The Young Sea Officer's Sheet Anchor,* 2ed. (London, 1819), 89,108; J.H. Harland, *Seamanship in the Age of Sail (* London, 1985), 84-5: J.H. Harland. "Answers." *Mariner's Mirror* LVI1 (1971).

[7] *Minutes of the Proceedings at a Court Martial Assembled for the Trial of Vice-Admiral Sir Hugh Palliser,* (London, 1779), 74,77. Lor published examples see Evidence of Pender, "The Yarmouth Court Martial" in J.K. Laughton, (ed.). *The Letters and Papers of Charles, Lord Barham,* (London, 1907-8), 1:394.: Howe Signal Book 1794, Jackson. *Logs.* 1:13.

* *Minutes of the Proceedings of the Trial of Rear-Admiral Knowles,* (London, 1750), 92.

the direction of the wind itself, as we do now, but from the point at which they could sail closest to the wind, that is close-hauled at no closer than six points from the wind. In contemporary parlance, therefore, sailing two points from the wind actually meant sailing two points from close-hauled; that is eight or nine points from the eye of the wind, where the wind would, indeed, be abeam.

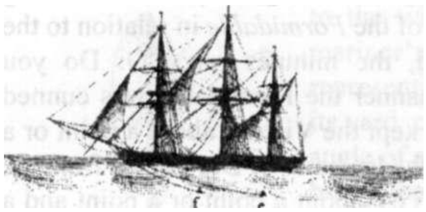


Figure 4: Lever, 569

Square rigged ships were certainly restricted in their ability to sail close to the wind, but the actual extent to which each ship was restricted was more complex than we have been led to believe. Thus it is widely accepted that they could sail seven, and possibly even six points off the wind[9] and this is correct in principle although certain provisos need to be borne in mind. Firstly, a ship had to be able physically to brace her yards around to allow the sails to fill at six points off the wind, and this was only feasible on some ships with certain rigs, where it was made possible by fitting a truss yoke, or by slacking off the truss-ropes. The yard could be also be brought round further by canting down the weather yardarm, or hauling tight the cat-harpins[10] (Fig. 5). There was, however, a good deal of danger in bracing the yards around so far. In 1787, Captain Brown, a restless innovator searching for improvements in windward performance, repeatedly braced the yards of his ship far enough round as to make the sails "as flat as a board." In doing so, however, he sprung more than his share of topsail yards, and Byam Martin quipped "more ... than the little dockyard at Port Royal could well supply."[11]

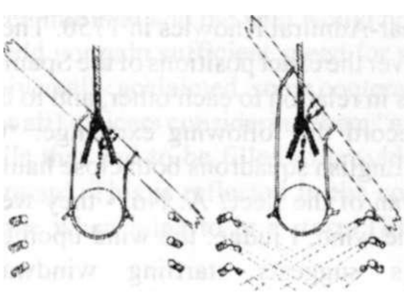


Figure **5:** Myers in Harland. 62.

Once a ship was set up to sail close-hauled, it was up to the helmsman to keep her as close as possible to the wind without the weather leeches collapsing. This was an unforgiving process and there was only a very small margin for error: a ship sailing close-hauled at seven points off the wind is only a mere 11 ¼° away from sailing at right angles to the wind. Helming is not a straightforward process and is entirely different from steering; while the latter requires only sight and reason, the former

[9] Harland. *Seamanship,* 1 I.: Tunstall. *Naval Warfare,* L; N.Tracy. *Nelson's Battles: The Art of Victory in the Age of Sail* (London, 1996). 54; J. Creswell. *British Admirals of the Eighteenth Century: Tactics in Battle* (London, 1972), 22; J. Boudriot. *The Seventy-hour Gun Ship,* (Paris, 1988), 3:8.

[10] Harland. *Seamanship,* 62.69.

[11] R.V. Hamilton, (ed.). *Tetters and Papers ojAdmiral of the Fleet Sir Thomas Byam Martin.* (London, 1903). 1:91.

involves both feeling and intuition, and is a skill that has variously been compared to riding a bike or playing the violin.[12]

The accuracy of a ship's compass was particularly poor in the eighteenth century, the result of weakly magnetized needles and poor craftsmanship,[13] and these problems of accuracy were compounded in the nineteenth century by the increasing quantities of iron used in ship construction that causes deviation in the compass. A ship's compass also suffered greatly from the motion of the vessel and could only be relied on as a rough indicator of the course. The helmsman had to watch the ship's head relative to something more "fixed" than the compass as a more accurate guide. The movement of the bows in relation to the wind, the waves, the clouds, the land, the stars, or other vessels would give the helmsman a much more accurate idea of whether the ship was coming to or falling off. The feel of the wheel would also serve as an accurate indicator, feeling heavier as the vessel came to against the helm, or easing as she fell off.[14] In fact a ship could be accurately steered without the use of the compass at all. Hurst, for example, recalls how the binnacle light went out and he steered with the wind on his neck for five hours.[15]

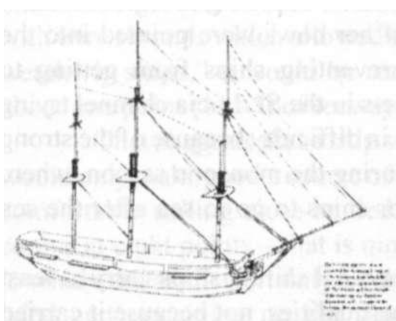


Figure 6: after Myers in Holland, 22.

The ability of a helmsman to keep a ship close to the wind was further affected by the prevailing sea and weather conditions. A ship trying to make ground to windward in rough weather was liable to carry something away if not regularly eased,[16] the all-important bobstay usually being the first casualty when sailing by the wind and in rough weather[17] (Fig. 6). Furthermore, wind does not always blow steadily, nor do waves come at regular intervals or sizes. Even the most experienced helmsman could be pushed ten degrees off course by an unexpected gust or wave and often, through no fault of his own, a helmsman could find himself encroaching on the 11¼° that represented windward progress.

Helmsmanship was so dependent on individual skill, borne of intuition and years of experience, that in windward sailing and particularly in chase, good helmsmanship could make all the difference. In these situations a "good man" would always be sent to the helm irrespective of his position on board.[18] Thus Captain Ambrose of the *Rupert* believed his

[12] E.G. Martin. *Helmsmanship* (London, 1934), 1-2.
[13] A.L. tanning. *Steady as She Goes: A History of the Compass Dépriment of the Admiralty* (London. 1986), xi,xix.
[14] F.L. Liardet, *Professional Recollections on Points of Seamanship* (London, 1849), 239.
[15] Hurst, "Modern Square-Riggers: tact and Fallacy," 146.
[16] *Molloy Trial,* 103.
[17] Liardet. *Professional Recollections,* 29.
[18] *A dialogue between volunteers, containing account of ship's complement, officers, duties of crew, etc,* 1742. National Maritime Museum, Greenwich, (NMM), RLJS1/NM/5/A.

cook to be such a good steersman that he always had him at the helm when in a chase or likely to come to an engagement,[19] and Cochrane recalls how the Doctor of the *Speedy* took the helm in a fight with the Spanish frigate *Gamo* in the spring of 1801.[20]

What needs to be remembered, however, is that that these methods and skills were essential to a ship achieving six points from the wind, rather than added extras to help her sail any closer. In practice, therefore, certain square rigged ships, in certain circumstances, could keep their square sails filled when sailing six points from the wind, and most could keep their sails filled and pulling well between seven and eight points. To do so successfully, however, was to win just one battle in the war to get a square-rigged ship to make ground to windward. In practice sailing even six points off the wind in no way guaranteed windward performance.

The sea itself is not static, but moves according to the current and tide, often at considerable speeds. A current of half a knot was not considered strong,[21] but even this, if in a leewardly direction, would quickly hamper progress to windward. A really strong current could even dictate the course a vessel might steer, as a ship caught broadside to in a strong current losing considerably more ground than if her bows were pointed into the current.[22] Current alone was thus often a factor in preventing ships from getting to windward,[23] and certain places were renowned for it. Fleets in the St. Lucia channel trying to get to windward of Martinique often found themselves in difficulty because of the strong currents,[24] and the coast off Negapatam was notorious during the monsoon season, where Vice Admiral Griffin declared that it was impossible for ships to go to sea after the sea breeze had set in.[25]

An ever-present and significant factor was leeway. All sailing ships carry at least some leeway and a ship would be renowned for its sailing qualities, not because it carried no leeway, but for being less leewardly than others. In fact the windage of the hull, the masts, yards and rigging was sufficient for a square-rigged ship to wear under bare poles alone,[26] and the action of a very leewardly ship was even known as "crabbing," the ship in effect moving sideways.[27] A song of the 1730s gives an impression, albeit exaggerated, of the extent to which windage could affect the speed of a ship. "Without a sail we'll scud

[19] "The Tryal of Captain John Ambrose," in *Copies of All the Minutes and Proceedings Taken at and Upon the Several Trials of Capt. George Burrish, Capt. Edmund Williams, Capt. John Ambrose, Etc. On Board It.M.S London, 23 Sept 1745* (London, 1746), 94.

[20] T. Cochrane, *The Autobiography of a Seaman,* (London, I860), 1:112.

[21] *Griffin Trial, il.*

[22] *Griffin Trial.* 147.

[23] T. Pasley, *Private Sea Journals 1778-1782* (London, 1931), 25.

[24] Rev. J. Ramsey to C. Middleton 23 April 1779, Laughton, (ed.), *Barham Papers,* 47; Anon, "Journal of an Officer in the Naval Army in 1781 and 1782," in *The Operations of the French Fleet under the Comte De Grasse in 1781-2: As Described in Two Contemporary Journals,* J.G. Shea, (ed.), (New York, 1783), I65; D. Spinney. *Rodney* (London, 1969), 389-90.

[25] *Griffin Trial,* **31,85.**

[26] Lever, *Sheet Anchor,* 90.

[27] For an example of this happening in practice, see Hamilton, *Byam Martin Papers,* 186.

beneath our naked poles/ To poop, and heave the log - it blows a tearing gale/ Nine knots she fully runs, without a knot of sail ,.."[28]

The leewardliness (tendency to leeway) of a particular ship was determined by her hull design, rig design and trim, but the amount of leeway she actually made depended on the prevailing wind and sea conditions. Anything more than a good breeze would add to leeway and many ships became exceedingly leewardly as the wind increased.[29] Similarly, any ship close-hauled in light airs, with barely any steerage way, would be affected by considerable leeway, even in smooth water.[30] It is therefore difficult to offer any accurate general conclusions about the amount of leeway any particular ship might have made at any one time. We know that weatherly ships such as the Niger and Lowestoffe classes of 32-gun frigates built in 1757 and 1760 only drew % point (just under 3°) of leeway with all sails drawing,[31] but these were the exception not the rule. As a rough guide, Mossel reckoned that a good ship should make no more than eight degrees of leeway up to six knots,[32] while Dick and Kretchmer thought it would make between six and twelve degrees.[33] Bearing in mind that these figures are based on more modern square rigged vessels with finer hull forms and with wire shrouds which allowed them to brace up sharper, and that not all ships were "good weatherly ships," it would be reasonable to say that most ships, most of the time, made about one point (11 *VA°)* of leeway.

That suggests that a ship sailing even at its theoretical best of six points off the wind would only make good a course of seven points. Consequently, and more realistically, a ship comfortably sailing close-hauled at seven points off the wind would only make good a course at eight points - that is ninety degrees to the wind and would thus make no ground to windward at all. Certainly a good weatherly ship, sailing close-hauled at six points to the wind and remaining on the same tack, would edge her way to windward. In theory, therefore, all she then had to do to make significant ground into the eye of the wind, was to tack or wear repeatedly. In practice however, it did not necessarily follow that a ship could make a particular destination that was dead to windward by repeated tacking or wearing. Confusion has arisen because "tacking" means the same in modern sailing parlance as it was understood by contemporaries, that is to put the bow through the wind. Because of the efficiency of the modern fore and aft rig, however, it is now regarded as being synonymous with making ground to windward.

Although there are examples of exceptional ships, such as the Unicorn class of 28-gun frigates from 1747 which were renowned for being able to tack in their own length,[34]

'* Anon, *The Sailor: Or a Sketch of the Seaman's Art in Working a Ship: in a Dialogue between a Captain and His Two Mates* (London, 1733), 5.

2" M. Maxwell to W. Marsden 7 Nov 1805. Public Record Officer, London (PRO), ADM 1/2149

"' W. Falconer, (ed.). *Universal Dictionary of the Marine* (London, 1771), 220.

31 R. Gardiner, "The First English Frigates," *Mariner's Mirror* LXI (1975), 98-9.

52 O.P..I. Mossel, *Manoeuvres Met Zeil-, En Stoomschepen* (Amsterdam, 1865), 28.

33 C. Dick and O. Kretchmer, *llandbuch Der Seemannschaft* (Berlin, 1902), 169.

14 R. Gardiner, *The First Frigates, Nine and Twelve Pounder Frigates 1748-1815* (London, 1992), 97.

tacking a square-rigged ship was not a reliable process; hence the need for a specific signal for "inability to tack."[35] Lever identifies five separate potential causes of failure in an attempted tack and further concedes that, for a tack to have the most chance of success, the sea must be "tolerably smooth;"[36] if the blunt bow was contending with a strong swell or tidal current from the intended direction of the tack, it would fail to turn through the wind and the ship would hang "in irons."[37] One hardly need add that the luxury of a tolerably smooth sea was rarely present.

To maximise the chances of a successful tack, a ship needed speed for the rudder to have greatest effect,[38] but close-hauled is the slowest possible point of sailing. A ship would therefore have to do her utmost to increase speed prior to initiating an attempted tack. In situations of urgency, anything that might increase speed was acceptable. In the heat of the battle of Minorca in 1756, the *Lancaster,* urgently needed to tack and cut away her longboat and barge to gain more way;[39] normal practice, however, was to increase speed by bearing away before initiating the tack.

Once the bows were through the wind, they would naturally fall off and the ship would have to be brought back under control before once again being brought up and held steady close-hauled. A ship did not recover her way as soon as she was about and, as speed through the water was a factor in weatherliness, it was therefore sensible to sail extra full for a few moments after tacking in order to regain speed and thus be able to sail the ship to her best advantage.[40] It was consequently an inherent paradox of square-rig sailing performance that maximising the likelihood of success in tacking required a ship to be sailed a few points away from close-hauled both before and after the manoeuvre, despite the fact that any time not spent close-hauled meant ground lost to leeward.

The most crucial stage in an attempted tack was the backing of the sails on the mainmast, the timing of which was down to the officer in charge of the manoeuvre. It was his task to judge the conditions, the speed of the ship through the water, its rate of turn, and the angle of the wind in respect to the ship's head. If the order for "mainsail haul" was given too early, the ship would surely hang in irons; too late, or the mast backed too slowly, and

" Creswell, *British Admirals,* 202. For an example of this being used in an action, see *Molloy Trial,* 8.

M' Lever. *Sheet Anchor, 11.*

" "In Irons" meant that no movement was being made to port or starboard, and the ship began to make sternvvay. In such a situation, the ship can drop off onto the original tack and attempt the entire manoeuvre again, or she can drive her stern up into the wind and perform what is known as a "boxhaul." The idea of a boxhaul is that it serves as a "gel out of jail free card." Theoretically, in driving the stern up into the wind, you make back up the ground lost to leeward when in irons, but in practice it is impossible to regain all ground lost. The manoeuvre is then continued as a wear, and is subject to the leeway inevitable in such a manouevre. For an example of this happening in practice due to a high swell, see K. Digby, "Journal of a Voyage into the Mediterranean A.D. 1628," *Camden Society* XCVI (1868). 5.

" J. Bourde de Villehuet, *The Manoeuverer, or Skilful Seaman: Being an Essay on the Theory and Practice of the Various Movements of a Ship at Sea as Well as of Naval Evolutions in General,* trans. J.N.J, de Sauseuil (London, 1788), 75.

" *The Trial of the Honourable John Byng at a Court Martial,* (Dublin, 1757), 137-8.

40 R. Park, *Defensive War by Sea* (London, 1704), 81.

the corresponding time lost would translate into loss of speed and hence of ground to leeward. In the latter case, the ship would no doubt tack, but much of the efficiency of the manoeuvre necessary for windward performance would be lost.

Despite these problems, a crew could greatly improve the chances of tacking successfully by practice and experience. It would not take a captain long to be able to judge time and again the exact moment for the mainmast to be backed. To help drive the bows into the wind the headsails would be dropped and the spanker set amidships, thus adding as much resistance as possible to help force the bows into the wind.[41] Once through the eye of the wind the spanker would be taken in, the headsails set and their windward sheets hauled to offer maximum resistance to the wind and thus to push the bows off the wind to complete the tack as quickly as possible, a process known as "flatting in."[42] Under-manned ships would be rigged with cross-braces for easier working,[43] and on all ships the ropes were laid out on deck to run freely to facilitate tacking.[44]

Wearing ship - putting the stern of the ship through the wind, the equivalent of a jibe in a modern yacht - was less fraught with inherent difficulties than tacking, and less demanding of ropes, sails and spars.[45] The only critical stage in a wear was the feathering of the main and mizen masts as the wind came abaft the beam and the stern passed through the wind. "Feathering" involved bracing the yards of a mast directly into the eye of the wind so that the sails would neither fill nor be backed. Without the requisite skill, the main and mizen masts would fill, preventing the stern from going up into the wind and the bows from falling off and pointing downwind. As with tacking, however, the quality of the ship was critical. Ships with a tendency to gripe (point their bows to wind) were notoriously difficult to wear. The *Nymphe* (36), captured in 1780, was reported as being a ship that "stays well but is long in wearing."[46] The *Cumberland* was so bad at wearing that she was tacked as a rule whenever she put about,[47] an incapacity that was to cause serious trouble for the English line of battle at the Battle of Cuddalore in 1758.[48]

Wearing ship was nevertheless the more reliable method of getting from one tack to the other. The downside was that, in so doing, considerable ground was lost to leeward: a ship wearing would turn through twenty points of the compass, eight points more than if

[41] Bourde de Villehuet. *Manoeuverer,* 73-4.

[42] Lever, *Sheet Anchor,* 78.

[43] When rigged with cross-braces, the braces for the main or mizen mast would lead forward not art. the braces for both masts can then be worked easily from the main deck. Lever. *Sheet Anchor,* 67. Fig.357. This was also done on small ships (usually brigs) as the most efficient angle for the braces ofthe mainmast runs forw'd: the ship being too short for the braces to be rigged aft and worked efficiently. For another trick for shorthandcd ships see Liardet, *Professional Recollections,* 202.

[44] *Molloy Trial,* 22.

[45] Liardet. *Professional Recollections,* 201.

[46] Other captured French ships with similar reports were the *Santa Leocadia* (36) captured 1781, *Heldin* (28) captured 1799. *Oiseau* (36) captured 1793, *Prévoyante* (36) captured 1795. Gardiner, *First Frigates,* 106.

[47] *The Case of William Brereton Esq.,* (London, 1779), Appendix. D, 67.

[48] Kempenfelt to Lord Colvill 23 July 1758. PRO, ADM 1/2010.

she was tacked and in the opposite direction. Even the very best ships, such as the Niger class of 32-gun frigates from 1757, would only wear in four times the ship's length.[49] A captain who was determined to make ground to windward therefore had no choice but to resort repeatedly to the less reliable method of tacking in order to work the ship from one tack to the other.

This heavy reliance on tacking meant that no vessel, except a small fore and aft rigged craft, could gain as much to windward in stays as she would gain in the same time by keeping close to the wind. Making effective ground to windward was best achieved by staying as close-hauled as possible on the same tack. Thus a ship could make good a course of one point to windward if she remained on the same tack but, if the wind were to back she would have to start tacking to make her destination. As the number of tacks required increased, so did the likelihood of losing ground to leeward. Very soon, reaching the destination became all but impossible, and tacking became nothing more than a means of reducing leeway.

Contemporary sailing practices reveal the extent of the problem. If the wind was right out of a river that a ship was to enter up, she would anchor off and wait either for a change of wind, or until the tide was strong enough to take her upriver against the wind.[50] In the latter case the ship would drift up broadside to or astern, the tide acting on the rudder as if she was going ahead and allowing her to be steered.[51] A time consuming and, for the crew, exhausting alternative would be to warp the ship upriver using transport moorings or warping buoys if available,[52] or, the ship could be "kedged:" an equally tedious method involving an anchor being carried forward and dropped by a boat's crew, and then hauling the ship forward on her anchor cable. Although impractical, kedging was nonetheless of great help in an emergency. In the winter of 1809, Cochrane was particularly cautious in coming close under the guns of a battery near Rosas in Cataluôa, Spain, that he laid a kedge out to seaward with a full mile of coir rope attached. With the marines embarked under heavy French fire, Cochrane was thus able to drag the *Impérieuse* out of range of the battery.[53]

In a seaway, a ship had no option but to tack repeatedly, always a considerable struggle with no guarantee of success. In 1789 the Captain of the *Southampton* strove for three weeks in the teeth of strong south-westerly winds to get from the Downs to his sweetheart in Portsmouth,[54] and in 1780, Captain Wallace of the *Nonsuch* tried to work to windward towards a French squadron, but was obliged to bear up, having tacked "eleven or

[49] (jardiner. *First Frigates,* 98.

[50] B. McRanft, (ed.). *The Vernon Papers* (London, 1958), 570.

[51] Lever, *Sheet Anchor,* 98.

[52] The earliest recorded use of warping buoys is at Plymouth, 1747. P. MacDougall. "Hazardous Waters: Naval Dockyard Harbours During the Age of Fighting Sail," *Mariner's Mirror* LXXXVII, I (2001), 25.

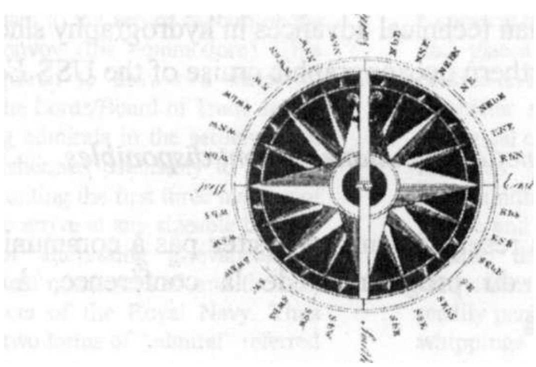
[53] Cochrane. *Autobiography of a Seaman,* 330.

[54] Hamilton, ed.. *liyam Martin Papers.* 134.

twelve times."[55] As late as 1891, HMS *Téméraire,* the last fully rigged battleship in the Mediterranean and hence the culmination of centuries of development of seamanship, rig and ship design, was sailed against a headwind into her anchorage at Suda Bay, Crete by Gerard Noel out of principle. He managed it, but had to tack thirteen times.[56]

Not only must the difficulty of making ground to windward be emphasized, but also the variety in that capability. A fine ship, a fine crew, a fine breeze of wind, no swell, no current (or a current with a windward set) were the ideal, but rare conditions for reliable windward performance. So heavily dependent on such a variety of circumstances the windward performance of sailing warships in any given situation varied a great deal between ships of the same class as much as been between ships of different classes. Generalisations regarding windward performance are, therefore, an unhelpful way of understanding this key aspect of sailing warship capability.

Our accepted understanding of the windward performance of sailing warships is clearly in need of revision. Much of significance is not widely known; much that is widely known is inaccurate. That is symptomatic of a wider problem in maritime history: the history of sailing warfare has for too long been considered in a vacuum, divorced from practical realities when it was those realities which defined the very nature of seafaring. The true nature of seafaring under sail has neither been investigated in sufficient depth nor adequately described, with the direct result that its significance has been greatly undervalued. As a result, much received wisdom on the broader subject of sea fighting is inaccurate by default. An accurate understanding of the peculiar nature of seafaring should not remain peculiar to experts in ship technology, the preserve of a few, but should be the bedrock of any study in maritime history during the age of sail



The compass card graduated in points.
From Lever, 75.

[55] J. Wallace to P. Stevens 11 July 1780, PRO, ADM 1/2675
[56] A. Gordon, *The Rules of the Game: Jutland and British Naval Command* (London, 1996), 206.

The Capability of Sailing Warships: Manoeuvrability

Sam Willis

Dans cet article, S.B.A. Willis continue à faire son enquête sur le potentiel des navires de guerre à voile en réfléchissant à la question de la manière de manœuvrer. En faisant référence à des sources contemporaines, l'auteur considère les aspects significatifs de la performance d'un navire de guerre à voile que jusqu 'à présent les historiens de la navigation de guerre ont négligés ou ont mal compris.

Part 1 of this article warned of the inherent dangers of accepting an easily digestible and simplistic vision of sailing capability and explained in some detail the practicalities of making ground to windward in a sailing warship. An incapacity to make ground to windward was not, however, the only significant characteristic of wind dependence. Unfortunately, very few historians of sailing warfare have considered sailing warship capability beyond the question of windward performance, and there remains much of significance that is not widely known. With our accepted understanding so dominated by the question of windward performance, it has been all too easy to associate negative connotations with the broader question of sailing warship capability.

It is, furthermore, a sad fact that the only characteristics of sailing warship capability that are generally understood are those that are based on a superficial comparison with steamships. A steamship has an engine that provides head or sternway and a rudder that controls lateral movement. Maritime historians have repeatedly used this template to understand the sailing ship, simply regarding the sailing rig as the direct equivalent of the engine. Thus they see the ability of the steamship to go anywhere at any time replacing the restrictions of wind-dependence.

This is the root of a serious misunderstanding which arises from the common methodological flaw of attempting to compare the incomparable: it fails to appreciate the sailing ship for what it was, for how it was built and for how it worked in practice. As a result, the majority of historians have portrayed the performance capabilities of the sailing warship almost exclusively in a negative light. It is a peculiar approach indeed to write the history of sailing warships, indeed the history of sailing warfare, from an understanding of what sailing ships could *not* do, without an appreciation of what they could achieve, and yet that is the consistent pattern of the mainstream of maritime history.[1]

[1] For examples of this approach, see M.A J. Palmer, "The Military Revolution Afloat: The Era of the Anglo-Dutch Wars and the Transition to Modern Warfare at Sea," *War In History* IV, no. 2 (1997), 124; W.C.B. Tunstall, *Naval Warfare in the Age of Sail,* (ed.) N Tracy (London, 1990), 1 ; M. Depeyre, *Tactiques Et Stratégies Navales De La France Et Du Royaume-Uni De 1690 A 1815* (Paris, 1998), 58-60; A.T. Mahan, *Types of Naval Officers* (London, 1902), 7.

***The Northern Mariner/Le marin du nord,* XIV No. 3 (July 2004), 57- 68.**

For all of these reasons, it is crucial that our understanding of sailing warship capability must expand beyond the question of windward performance, and it is the purpose of this article to help close that gap by investigating in greater depth the relationship between wind dependence, performance and capability.

The role of the sails in providing drive is the most obvious characteristic of wind dependence, but one which has not been considered in depth by historians. The visual complexity of the rig and the sheer quantity of canvas gives to the casual observer an impression of a cumbersome tool, an impression which seems to be confirmed by the evidence of contemporaries such as Admiral Latouche-Tréville who recorded with pride how his squadron, in chase of Nelson, made all sail in fourteen minutes.[2] This example, however, refers particularly to *all* sails being hoisted. In practice, a ship could get under way much more easily and quickly, simply by setting her topsails, or even the staysails alone.[3]

Moreover, the sails themselves could be set in a very short time. Once a sail had been freed of its gaskets, it could be set in a flash from the comfort of the deck, simply by casting off the clewlines and buntlines and securing the sheets.[4] If it was known in advance that sails might be needed quickly, the gaskets could be cast off and a temporary spiral of spunyarn used to hold the sail to the yard as if it was furled. At anchor in Basque Roads in 1762, Howe, anticipating a flash attack from the French with fireships, included a specific instruction for his fleet to furl their sails with yarns "in readiness for being set at the shortest warning."[5] Cochrane was also particularly fond of the technique, and used it to great effect aboard the frigate *Pallas* in the spring of 1806. Short handed and isolated in the face of three hostile and inquisitive ships, he set all of his sail in a flash, giving the impression of a numerous and highly disciplined crew. The enemy ships fled.[6]

As a more practical solution, rather than being set or stowed, sails could be left until they were next needed, hanging perfectly comfortably in their gear, secured by their clewlines which gathered the corners of the square sails diagonally up to the centre of the yard, and sometimes by their buntlines which gathered the foot of the sail vertically up to the yard (Fig.1). This sail plan was particularly useful in battle since it allowed captains to minimise the amount of canvas vulnerable to enemy shot, whilst enabling them to set the sails at very short notice and provide bursts of power whenever required.[7] Similarly, the power of the sails could be killed simply by letting the sheets go.[8] They could then be

[2] Report of Latouche-Tréville 16 June 1804, R. Monaque, "Latouche-Tréville: The Admiral Who Defied Nelson," *Mariner's Mirror* LXXXVI, no. 3 (2000), 283.

[3] J.H. Harland, "Answers," *Mariner's Mirror* LVII (1971), 334.

[4] The majority of square sails followed this simple template, but some sails, particularly the topsails of larger ships, might have had further lines such as a leech line or a reef-tackle to be cast off, but this took up little more time in the setting of the sail.

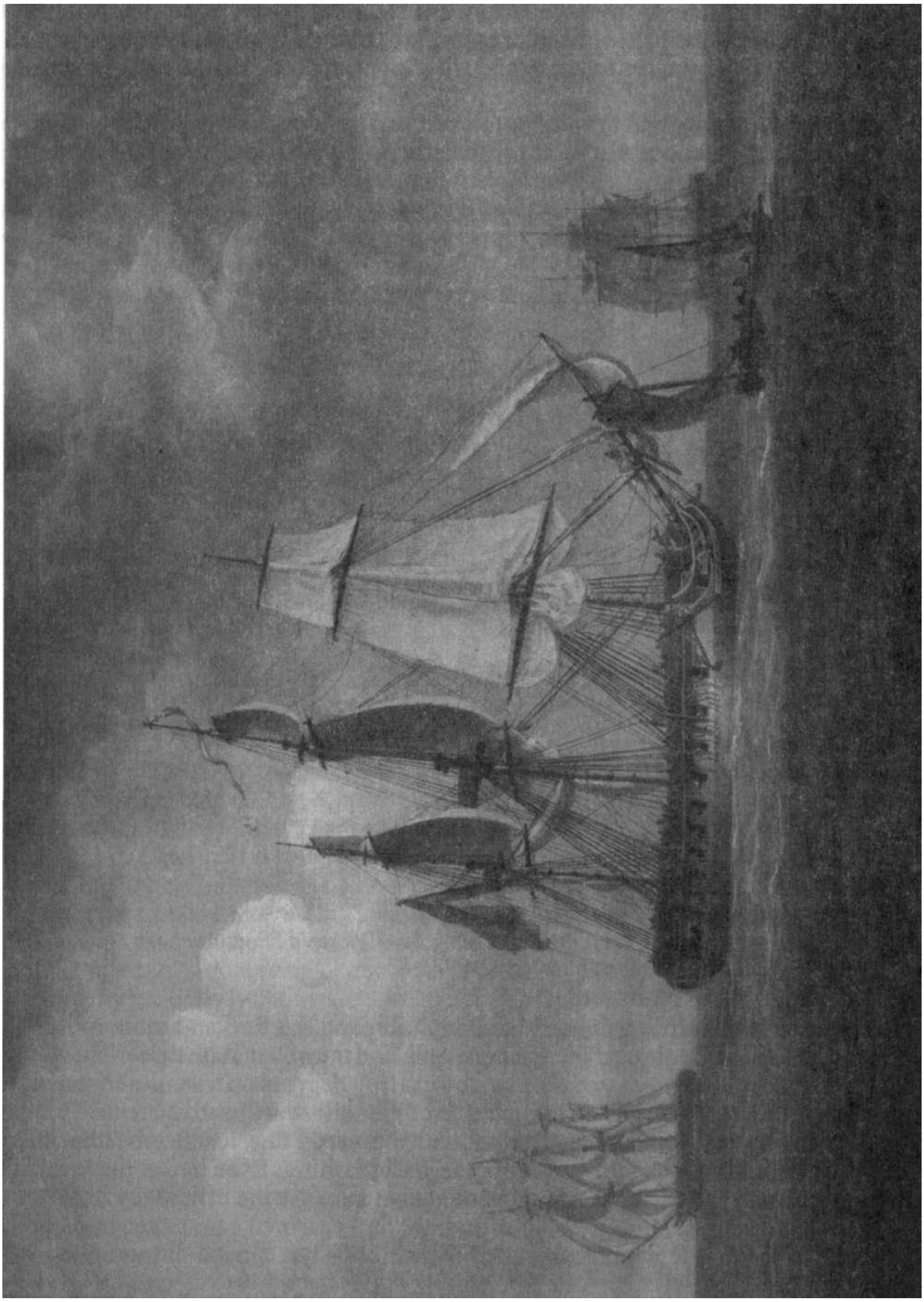
[5] Howe Add. Ins. 15 Apr 1762, D. Bonner-Smith, (ed.), *The Barrington Papers, Selected from the Letters and Papers of Admiral the Hon. S. Barrington,* (London, 1937), I, 369.

[6] Howe Add. Ins. 15 Apr 1762, Bonner-Smith, (ed.), *Barrington Papers,* I, 369; T. Cochrane, *The Autobiography of a Seaman,* (London, 1860), I, 189.

[7] For an examples of this being used in action, see *Minutes of the Proceedings at a Court Martial... For the Trial of Sir Robert Calder, Bart., Vice Admiral of the Blue,* (London, 1806), 14; R.C. Anderson, (ed.), *The Journals of Sir Thomas Allin,* (London, 1939), I, 242.

[8] For the main course or fore course the tacks also would have to be let go, but this would not add to the amount of time taken to kill the sail of its power.

Fig. 1 : The fore-course is hauled up by the clews and bunts. Nicholas Pocock *HMS Triton and other vessels.* 1797. N M M BHC/3675



stowed quickly and efficiently by a well trained crew. At the court martial of Admiral John Byng for his conduct at the battle of Minorca in 1756, Byng's third lieutenant estimated that it would take only five minutes to strike and stow all of the topgallants and the staysails of the 90-gun flagship *Ramillies.*[9]

A captain not only had the ability to exert and remove pressure quickly in different parts of the rig, but he could also control the strength of that pressure by regulating the efficiency of each sail. It is often overlooked that sails did not have to be fully set to be effective nor fully stowed to be ineffective. The effectiveness of a sail was at its maximum when it was set at its full size and was properly trimmed,[10] but the size and trim could be altered in a number of ways.

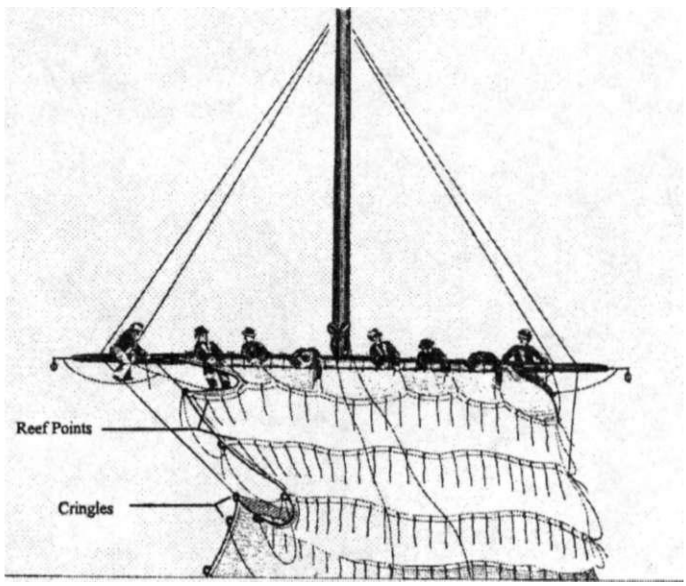


Fig. 2: After Lever, D., *The Young Sea Officer's Sheet Anchor* (Ontario, Dover publications, 1998), 83.

Topsail reefs were introduced in about 1680 and the fore and main topsails were later fitted with four reef points of increasing depth, and the mizen with three. These enabled a captain to reduce the efficiency of each sail by varying degrees on a semi-permanent basis. Reef points - short ropes stitched on to each side of the sail - were used to create a temporary head of the sail by tying them together around the yard. The leeches of the sail were provided with cringles which allowed temporary head lashings to be tied at the level of each reef point (Fig. 2). In light winds a captain could also increase the efficiency of the courses beyond their maximum by adding a bonnet or drabbler - a strip of canvas secured to the foot of the course - a technique which originated in the 1500s but carried through well into the

[9] *The Trial of the Honourable John Byng at a Court Martial,* (Dublin, 1757), 233.
[10] J.H. Harland, *Seamanship in the Age of Sail* (London, 1985), 61-2.

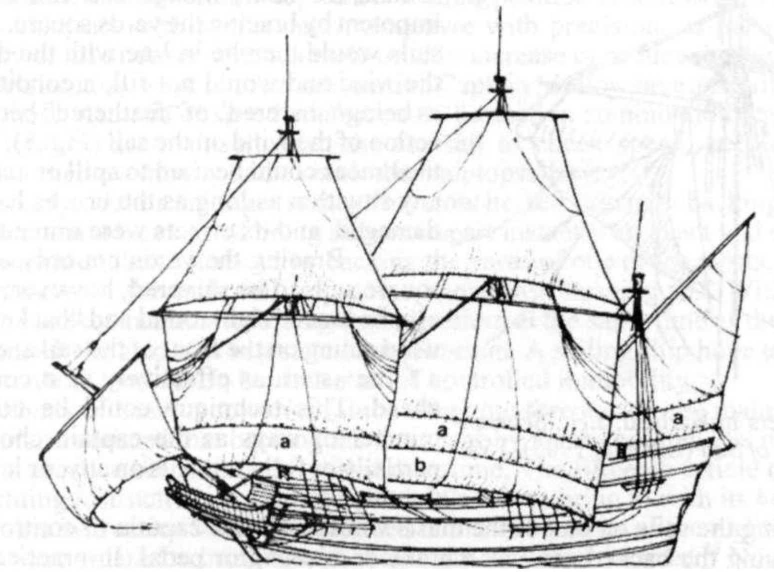


Fig. 3: Bonnets (a) and drabbler (b) bent to the courses of a late sixteenth century ship. M. Myers in Harland, J.H., *Seamanship in the Age of Sail* (London, 1985), 75.

eighteenth century." (Fig. 3).

Other methods of reducing or increasing the relative efficiency of a sail were as effective as reefing and allowed more subtle control of drive. Moreover, these methods could be used quickly, at short notice and in all conditions, as they did not require men to work aloft. For example, a square sail could be partially set with only one clew sheeted home and the other remaining hauled up (Fig. 4, overleaf). There is evidence of this technique being used when cruising and in battle for both the loose-footed courses[12] and the topsails.[13] Sails that were set by hoisting could also be only partially hoisted, a quick and easy way of relatively increasing or decreasing sail efficiency. Most often practiced with the topsails by only partially hoisting the yard to which they were attached, this method of speed control was used most effectively for station-keeping in fleets.[14]

The efficiency of the square sails, and hence the speed of the ship, could also be controlled by the braces, the lines which controlled the movement of the yards in the horizontal plane. At one extreme, with the wind right aft and the yards braced square, the wind hits the sails at ninety degrees. At the other extreme, if the wind is coming from

[11] For examples of this in use, see Barrington to the Bosun of the *Romney* 3 June 1748, Bonner-Smith, (ed.), *Barrington Papers I,* 39; Anderson, (ed.), *Allin Journals*, I, 57-9.

[12] *Minutes of the Proceedings at a Court Martial Assembled for the Trial of Vice-Admiral Sir Hugh Palliser,* (London, 1779), 35; Anderson, (ed.), *Allin Journals,* I, 27,38; R.F. Mackay, *Admiral Hawke* (Oxford, 1965), 82.

[13] *Palliser Trial,* 44.

[14] *An Authentic and Impartial Copy of the Trial of the Hon. Augustus Keppe I, Admiral of the Blue,* (Portsmouth, 1779), 360; Anderson, (ed.), *Allin Journals,* I, 38,40,47,80-1.

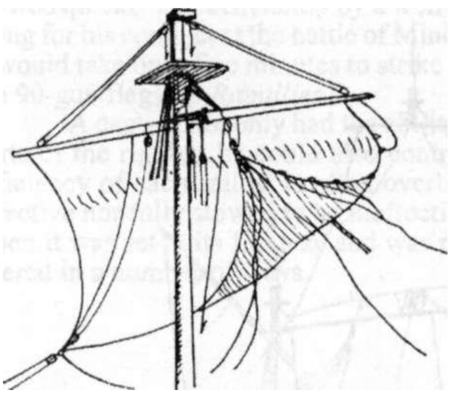


Fig. 4: M. Myers in Harland, J.H., *Seamanship in the Age of Sail* (London, 1985), 150.

abeam, the sails, though set, can be rendered impotent by bracing the yards square. The square sails would then be in line with the direction of the wind and would not fill, a condition known as being "shivered" of "feathered" because of the action of the wind on the sail (Fig. 5). In this way the braces could be used to spill or catch wind in any situation as long as the braces had not been damaged, and its effects were immediate.

Bracing the yards not only allowed the square sails to be shivered, however; they could also be braced right round and "backed" with the wind acting on the front of the sail and imparting a force astern as effectively as it could a force ahead. This technique could be utilised in a number of ways as the captain chose to back partially or fully the sails on any, or indeed all, of the three masts.

Backing the sails on one of the masts would enable a captain to control the speed of his ship, using the backed mast as a brake or accelerator pedal. In practice, the most effective way of achieving control while maintaining good momentum was to back the mizen topsail. Sir Charles Douglas, commander of the *Stirling Castle* at the battle of Ushant in 1778 called this the "usual method"[15] of controlling speed when in formation, and Admiral Gardner testified that he "generally shivered" the mizentopsail when in action. There are numerous further references from throughout the eighteenth century to ships going into action with the mizen topsail aback.[17] With the mizenmast backed, the ship would feel the want of her after sail and would tend to point downwind much more easily than if the more centrally placed maintopsail or indeed the foretopsail was backed.[18] In the latter cases, the ship tended to keep to the wind, and was thus much harder to get back underway and hence under command of her helm, the captain often having to shiver the mainsail to allow the ship to fall off sufficiently to gather way.[19] In backing

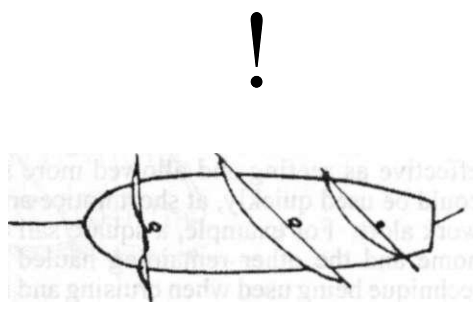


Fig. 5: The foremast is shivered, while the main and mizen fill. After M. Myers in Harland, J.H., *Seamanship in the Age of Sail* (London, 1985), 192

[15] *Keppel Trial,* 399.

[16] Vice-Admiral Sir Alan Gardner, *Minutes of the Proceedings at a Court Martial, Assembled for the Trial of Anthony James Pye Molloy, Esq., Captain of His Majesty's Ship Caesar,* (London, 1795), 38.

[17] F. Maitland to C. Middleton 5 July 1780 & 11 Aug 1780, J.K. Laughton, (ed.), *The Letters and Papers of Charles, Lord Barham,* vol. I (London, 1907-8), 103,07; *Copies of All the Minutes and Proceedings Taken at and Upon the Several Trials of Capt. George Burrish, Capt. Edmund Williams, Capt. John Ambrose Etc. On Board HM.S London, 23 Sept 1745,* (London, 1746), 33; *Palliser Trial,* 42.

[18] F.L. Liardet, *Professional Recollections on Points of Seamanship* (London, 1849), 48.

[19] National Maritime Museum, Greenwich, RUSI/NM/5/A. *A dialogue between volunteers, containing account of ship's complement, officers, duties of crew, etc,* 1742.

the mizen topsail, a ship in effect adopted a crouching position of controlled aggression from which it could react with power, and manoeuvre with precision, as the need arose. In practice, any or all of these methods were used to increase or reduce the speed of the ship according to circumstances. In his court martial, Captain Molloy gave a detailed impression of how all these methods of speed control could be used in combination: "hauling up one clew at a time of the mainsail, then the foresail to check speed, before backing the mizentopsail, then eventually had to back the maintopsail."[20]

Not only could a sailing warship thus slow herself down by backing her sails, but it had the peculiar advantage of being able to impart instantly an exact and opposite force astern to that which drove it ahead by backing the yards of one of the masts, while leaving the other mast with the sails full; a process known as "heaving to." With the rig thus balanced, the backed mainmast forcing the ship astern at the same time as the full foremast drove her ahead, the ship was in a state of equilibrium. A sailing ship hove to was thus not simply in "neutral" and adrift, but in a state of controlled immobility.

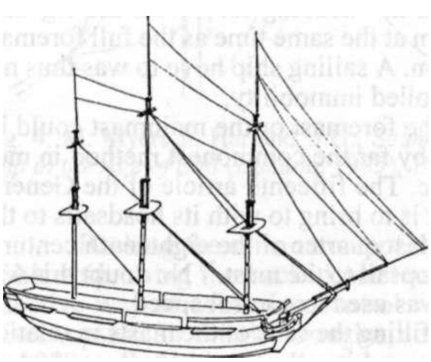
Methods of heaving to varied, since either the foremast or the mainmast could be backed. Harland claimed that backing the main was by far the commonest method in men of war,[21] but practice seems to have varied over time. The fifteenth article of the General Printed Fighting Instructions is explicit that the fleet is to bring to with its headsails to the mast,[22] but this instruction was then amended in the last quarter of the eighteenth century, when ships were ordered to bring to with their main topsail to the mast.[23] No doubt this was preferred for the same reasons that the mizen mast was used to control speed.

This ability to control a ship by backing and filling the sails of the masts in relation to each other was peculiar to the square-rigged ship, and its advantages were not lost on contemporaries. In his *Treatise on Practical Seamanship* (1787), Hutchinson is careful to discuss this as a particular advantage of square-riggers over vessels rigged purely fore and aft.[24] The principal benefit was in tight control of speed. A sailing warship was at a considerable disadvantage if stationary, as it took some time to gain the momentum necessary to respond to the helm or even to hold a course. In the words of Admiral Rodney, the only way for a ship to be on her guard "is to be on easy sail, and ready to make more sail, bear away, or wear as occasion may require."[25] Therein lay the importance of heaving to. In his trial in 1757 Byng and several of his captains acknowledged that a ship even with her maintopsail to the mast would still have steerage way,[26] and some years later, Captain Young was explicit that the *Sandwich* retained steering way even with "her topsails lowered down on the caps and the yards braced contrary ways."[27] By heaving to, headway could be reduced in a controlled fashion without actually losing that all-important momentum: a most effective tool for station keeping in fleets and for combat.[28]

[20] *Molloy Trial,* 48.
[21] Harland, *Seamanship,* 226.
[22] Russell's Instructions, 1691 J.S. Corbett, *Fighting Instructions 1530-1816* (London, 1905), 191.
[23] J.S. Corbett, *Signals and Instructions 1776-1794* (London, 1971), 222.
[24] W. Hutchinson, *A Treatise on Practical Seamanship, 2* (ed.) (Liverpool, 1787), 225.
[25] Rodney's notes in his copy of Clerk's Naval Tactics, quoted in H.B. Douglas, *Naval Evolutions: A Memoir, Containing a Review and Refutation of the Principle Essays and Arguments Advocating Mr. Clerk's Claims in Relation to the Manoeuvre of 12 April 1782* (London, 1832), 2 Appendix I.
[26] *Byng Trial,* 84,169,249.
[27] Capt W. Young 24 June 1780, Laughton, (ed.), *Barham Papers,* 62.
[28] For examples of this being done in practice, see The National Archives, Kew, (TNA), ADM 1/2513 Smyth to W. Marsden 26 Nov 1805; TNA, ADM 50/21 Pocock Journal Wed 2 Aug 1758; Captured French report enc. in Byam Martin to Bridport 22 Oct 1798, R.V. Hamilton, (ed.), *Letters and Papers of Admiral of the Fleet Sir Thomas Byam Martin,* vol. I (London, 1903), 278; W. Falconer, (ed.), *Universal Dictionary of the Marine,*

Backing the sails to impart a force astern could also be used to create sternway. Making sternway has had limited coverage in the mainstream of maritime history and what press it has received has been bad.[29] In fact, sailing astern was not an unexpected trick nor a risky manoeuvre, but an everyday occurrence with its own advantages, used in all aspects of ship manoeuvre and not least during battle.

Sternway was often used when weighing anchor[30] and was fully exploited in the process of tacking and boxhauling, the very advantage of the latter being the result of driving the stern hard into the wind to recover ground lost through a failed tack.[31] A vessel with sternway went round much quicker as the full force of the water acted more directly on the rudder.[32] During fleet battle sternway was particularly useful when fighting in line. At Malaga in 1704, Shovell in the *Barfleur,* accompanied by the *Namur,* sailed astern under backed topsails to support Rooke.[33] At Cuddalore in 1758, the *Cumberland* backed two or three times astern to allow more room to wear nearer to the enemy.[34] In 1782 at St. Kitts, Cornwallis threw back his topsails in order to manoeuvre his ship into a position whereby he could fill the gap that had opened in the British line, thus thwarting the attempt of de Grasse to cut the British line in the three-decker *Ville de Paris?*[35]



Fie. 6: The forestays provide support for the ship to make sternway. After M Myers in Harland, J.H., *Seamanship in the Age of Sail* (London, 1985), 22.

There was certainly some risk in sailing astern as the rig was primarily designed for pressure to be applied in a forward direction and [illegible] were supported down and aft by the shrouds and backstays. Shipwrights and riggers were, however, only too aware of how often sails were backed or a ship might need to make sternway, and the rig was set up accordingly. The forestays which supported the staysails and headsails, and the bobstay which secured the bowsprit provided the masts with adequate forward support for the sails to be backed and the ship sailed astern for limited periods. (Fig. 6)

(London, 1771), 138.

See for example J. Creswell, *British Admirals of the Eighteenth Century: Tactics in Battle* (London, 1972), 58.

30 D. Lever, *The Young Sea Officer's Sheet Anchor, 2* (ed.) (London, 1819), 110; Harland, *Seamanship,* 82.

31 J. Bourdé de Villehuet, *The Manoeuverer, or Skilful Seaman: Being an Essay on the Theory and Practice of the Various Movements of a Ship at Sea as Well as of Naval Evolutions in General,* trans. J.N.J, de Sauseuil (London, 1788), 75; Harland, *Seamanship,* 189-90.

32 Liardet, *Professional Recollections,* 219.

33 Creswell, *British Admirals,* 58.

34 TNA, ADM 1/2010 Kempenfelt to Lord Colvill 23 July 1758.

35 T. White, *Naval Researches: or, a Candid Inquiry into the Conduct of Admirals Byron, Graves, Hood, and Rodney, in the Actions Off Grenada, Chesapeak, St. Christopher's, and ofthe Ninth and Twelfth of April, 1782: Being a Refutation of the Plans and Statements of Mr. Clerk, Rear Admiral Ekins and Others* (London, 1830), 82; A. Lambert, "Sir William Cornwallis, 1744-1815," in *Precursors of Nelson: British Admirals of the Eighteenth Century,* (ed.) P. Le Fevre and R. Harding (London, 2000), 358. For more examples, see TNA, ADM 1/1607 S. Colby to J. Clevland 3 April 1759; Fox Court Martial, R.F. Mackay, (ed.), *The Hawke Papers: A Selection 1743-1771* (Aldershot, 1990), 77-9.; T. Williams to V-A Kingsmill 10 June 1796, Hamilton, (ed.), *Byam Martin Papers,* 260.

In fact contemporary concerns about damage incurred whilst making sternway were directed at the rudder, rather than the rig, and even then only when it was blowing hard.[36] There is also reason to believe that backing sails was not the only way that a ship might make stern board. At his court martial in 1746, Captain Ambrose of the *Rupert* described how, at the battle of Toulon with the wind too large to back his topsails, he repeatedly yawed his ship, putting the helm alternately hard over in each direction in order to make sternway. Unfortunately, he offers no explanation as to how this might be effective.[37]

So far we have seen how the sails could be manipulated to control drive both ahead and astern, but the advantages of sails did not end there. There were many sails on a man of war and each one provided a certain strength and direction of pressure through the rig to the hull of the ship. The headsails, for example, set fore and aft, provided a lifting and a lateral pressure to the bows. The huge topsails were the main agents of drive, while the mizzen gaff or lateen, also set fore and aft, gave lateral control to the stern. This list, incomplete as it is, still gives an indication of how the sails would act on the hull in a variety of different ways. By setting sails in different parts of the rig, pressure would be brought to bear on different parts of the hull and in different directions. The sails thus not only provided drive, also shaped and described the course of the ship. Simply put, a ship could manoeuvre using her sails.

The basic principle of levers and moments ensured that the bows of the ship could be turned as easily by hoisting one or more headsails or the spritsail as by using the rudder. At the 1779 court martial after the battle of Ushant, an officer aboard the *Cumberland* recalled how she edged downwind by setting the foresails and shivering the after sails,[38] and the Master of the *Weymouth,* to the lee of the now descending *Cumberland* avoided her simply by backing the headsails to pay the ship's head off.[39] For some, the largely unpopular spritsail was even favoured for this purpose as it "threw the ship's head off the wind, better than a bowsprit full of jibs,"[40] and was particularly advantageous for wearing.[41]

Indeed the efficiency of sails for manoeuvre should not be underestimated. The efficiency of a sailing ship's rudder was superior to that of an auxiliary steamship as, in the latter case, a proportion of the flow of water that was supposed to pass the rudder was lost in the aperture between the sternpost and the rudder.[42] Yet the power of the sails was in fact sufficient to drive a ship against the helm: the *Cumberland,* notorious for an imbalanced rig, always tended to point to wind despite the rudder being put hard over.[43] Both Kempenfelt and Pocock complained about this to the Admiralty in 1758 because of the disruption she caused in fleet cohesion; *Cumberland* was still causing consternation among naval officers twenty years later at the battle of Ushant.[44]

Use of the sails in conjunction with the rudder would produce a sharp, exaggerated turn ideal for manoeuvring in small areas or for avoiding collision. The ability to do this led

[36] Lever, *Sheet Anchor,* 79.
[37] "The Tryal of Captain John Ambrose," in *Copies of All the Minutes and Proceedings Taken at and Upon the Several Trials of Capt. George Burrish, Capt. Edmund Williams, Capt. John Ambrose, Etc. On Board H.M.S London, 23 Sept 1745* (London, 1746), 31.
[38] *The Case of William Brereton Esq.,* (London, 1779), Appndx. I, 62-4.
[39] *Brereton Trial,* Appndx. D, 57.
[40] A. Villiers, *Give Me a Ship to Sail* (London, 1958), 192.
[41] *Brereton Trial,* 78.
[42] Harland, *Seamanship,* 70.
[43] TNA, ADM 1/2010 Kempenfelt to Lord Colvill 23 July 1758; TNA, ADM 1/161 Pocock to J. Clevland 22 July 1758.
[44] *Brereton Trial,* Appndx. D, 69.

Nathaniel Boteler, a commentator on sea warfare in the late seventeenth century, to describe warships as capable of being "nimble and agile"[45] - two adjectives that would not be traditionally associated with such ships, and a valuable reminder that contemporaries did not necessarily consider themselves "limited" by wind dependence in the way that the modern historian so often believes them to be. This potential for agility was of significant practical value in battle as a ship could fire one broadside, yaw, and then fire the other in short order.[46] It became very difficult, therefore, for an enemy to "hide" on the bow or quarter unmolested.[47]

The ability of a captain to use his sails to steer his ship, or to augment the action of the rudder was an important factor in sailing warfare. It increased the options available. A ship sailing close-hauled that suddenly needed to point her bows down wind could do so by putting the helm hard over, *or* by backing the foremast. Similarly, a ship wanting to point up to wind could do so by putting the helm to lee *or* by using the spanker to drive the head up to wind. Most significantly, a sailing warship was not entirely reliant on its rudder and could be swung around without headway: a rare luxury indeed. Before the introduction of Voith Schneider technology and, most recently, the advent of bow thrusters, this has only been possible in maritime history in two other instances: by oared galleys and paddle steamers.

This discussion has centred so far on the use of sails to control speed and direction, but even canvas was not strictly necessary to retain momentum and manoeuvrability. The windage of the hull and rigging caused substantial leeway, and leeway was not always an enemy. It was a common ruse of war to cruise large or before the wind with no sail set as a means of maintaining some headway, while remaining invisible to eyes scanning the horizon for sails.[48] Even wind-dependence, the one bastion that maritime historians have clung to as the defining characteristic of sailing warships, is not sustainable as an absolute virtue. From Mahan's claim in his introduction to *The Influence of Sea Power on History* (Boston, 1890) that the sailing warship "must remain motionless when the wind fails,"[49] to Tunstall's similar view that, in a calm, the fleet could not be moved[50] and, most recently, in Depeyre's description of the wind as " [la] force motrice qui rend tout movement du navire possible,"[51] historians of sailing warfare have overlooked much of significance in sailing warship capability. It is a paradox, and indeed the principal cause of our misunderstanding, that to appreciate fully all of the nuances and subtleties of sailing warship capability, the historian must look *beyond* the sails.

Thus captains could harness currents and tide to provide drive. "Drifting" was an art form in its own right. The strength of a current was dependent on the contortions of the coast or river bank, the contours of the sea bottom and the lunar cycle, and had to be "read" before it could be taken advantage of.[52] The effects of drift and current were also dependent on a ship's position in relation to that current: a ship broadside to was more susceptible to a current than one that met the current bows or stern on. It is, therefore, quite understandable that Gower pays professional respect to the skill of the Ganges pilots who drifted the largest

45 N. Boteler, *Sea Dialogues* (London, 1688), 310.
46 Boteler, *Dialogues,* 310.
47 W.G. Perrin, (ed.), *Boteler's Dialogues* (London, 1929), 259.
48 Hutchinson, *Treatise on Seamanship,* 218-9.
49 A.T. Mahan, *The Influence ofSeapower on History, 1660-1783* (Boston, 1890), 2.
50 Tunstall, *Naval Warfare,* 1.
51 Depeyre, *Tactiques Et Stratégies,* 57.
52 R. H. Gower, *A Treatise on the Theory and Practice of Seamanship* (London, 1808), 59.

vessels down the river using the bower anchor for control,[53] but it should not be forgotten that manoeuvring a ship in a current, and using the current itself to manipulate and manoeuvre the ship, was part and parcel of seafaring and sailing warfare. One of the most peculiar examples in practice can be found in Cochrane's *Autobiography of a Seaman* (1860) where he described how a large portion of the French fleet, panicked by an albeit clumsy attack of fireships the previous night, had run aground on the Isle d'Oléron. Frustrated by the unwillingness of his commander, Lord Gambier, to bring the vulnerable French fleet to action, Cochrane deliberately drifted the *Impérieuse* toward the grounded enemy. He explains his movements thus: "I did not venture to make sail, lest the movement might be seen from the flagship [his own], and a signal of recall should defeat my purpose of making an attack; the object of this being to compel the commander-in-chief to send vessels to our assistance, in which case I knew their captains would at once attack the ships which had not been allowed to heave off and escape."[54]

A ship could further manoeuvre without headway or wind by running springs out to the anchor cable and using the anchor as a turning point. By hauling or slacking off the springs a ship was able to move towards or away from the anchor and yaw sharply, entirely independent of the wind. This was particularly useful for freeing a ship that had run aground[55] and for casting anchor in a fleet, when sharp turns independent from the wind were necessary to minimise the likelihood of collision.[56] It was also used in battle. In an engagement with a French frigate in the spring of 1746, Captain Noel anchored with a spring on his cable, his foretopsail tyes and most of his braces shot away. Although crippled in the rig, this allowed him to salvage a good degree of control and rake his antagonist "every time he put about."[57] Samuel Hood's action at St. Kitts in January 1782 is perhaps the most masterful example of the technique being used in a fleet action. Outnumbered and outgunned, Hood nevertheless resolved to occupy the anchorage so recently deserted by de Grasse. Once anchored, and with springs run out to their anchor cables, Hood's fleet were able to yaw and present their broadsides at will, and with no hands needed for sail handling, more attention could be paid to the gunnery.[58]

Even without the help of currents and tides, canvas or anchors, a ship could still move. Francis Liardet, a captain with thirty-three years experience in the Royal Navy and the author of the highly detailed *Professional Recollections on Points of Seamanship* (1849), was quite certain that the action of the swell and the "formation of a ships bottom" caused a ship to forge ahead even in a total calm - a fact so common, he claims, that "every seaman knows." He goes on to recommend that ships dismasted in fleet action should keep their heads towards each other, thus preventing separation.[59] White, in his *Naval Researches* (1830) agreed and goes as far as to claim that the only way of actually stopping a ship was to place another directly in its course.[60] It seems, therefore, to have been rare indeed for a ship to be motionless in a seaway, and as it was generally accepted that warships had steerage way from as little as one knot,[61] there was almost always some degree of

[53] Gower, *Treatise on Seamanship,* 62-3.
[54] Cochrane, *Autobiography of a Seaman,* 385-6.
[55] For an example of this being done in practice, see Anderson, (ed.), *Allin Journals,* I, 71,184-5.
[56] Howe to S. Barrington 15 March 1762, Bonner-Smith, (ed.), *Barrington Papers,* I, 364.
[57] TNA, ADM 1/2217 T. Noel to T. Corbett 4 May 1746.
[58] The action can be followed in detail in Mahan, *Influence of Seapower,* 469-78; W. Laird Clowes, *The Royal Navy. A History from the Earliest Times to 1900,* (London, 1997), III, 510-19.
[59] Liardet, *Professional Recollections,* 206.
[60] White, *Naval Researches,* 23.
[61] *Byng Trial,* 226.

manoeuvrability that could be harnessed.

The manoeuvrability of the sailing warship, therefore, has been much maligned, not least because the problems of windward performance are more widely known, and it is easy to cast a negative glow on the separate subject of manoeuvrability. A skilful captain with a well-trained crew could go both ahead and astern, yaw and accelerate and decelerate with precision and subtlety as the occasion demanded. A ship did not necessarily need headway, nor indeed wind, to manoeuvre. These skills were most in evidence, and, indeed, most remarkable, when they were used in conjunction with each other to manipulate a warship in the narrow confines of a tideway. Through careful backing and filling of the sails to make headway or sternway, and using a tremendously complex combination of sails and anchor, rudder, tide, leeway and drift to steer the ship, a skilful master could negotiate the most intricate of river courses.[62] The future Admiral Sir Thomas Byam Martin, as a boy travelling all the way up the Thames from Gravesend, was so deeply impressed by the skill of the pilot and the motion of the vessel that he later lamented in his memoirs: "...alas! Steamers are pushing aside the beautiful movements of a sailing ship."[63] The subtlety, complexity and range of those "beautiful movements," have for too long been overlooked and consigned to academic obscurity, yet they are fundamental to any description of the operational characteristics of the sailing Navy.

For an illustration of how this might work in practice, see Harland, *Seamanship,* 200.
Byam Martin Journal, Hamilton, (ed.), *Byam Martin Papers,* 153.