

Revisiting the Lessons of the Early Steering and Sailing Rules for an e-Navigation Age

John Wilde Crosbie

(Email: crossbee@eircom.net)

Armed with the axiom that the best way to avoid collision at sea is for one ship to pass under the stern of the other, this paper revisits the early steering and sailing rules. It conjectures that the port tack rule was an antidote to the sailing ship's imperative to gain ground to windward even at the cost of risk of collision. It draws attention to evidence that with early steamships, free of the port tack rule, one altered course to pass astern of the other and that, in fact, the one to alter was invariably the faster of the two. It traces, to the want of prescribed navigation lights, the introduction of the port helm/right rudder rule for all ships by day and by night. It records how with the introduction of prescribed lights the port tack rule, though in a form proposed by France, was re-introduced for sailing ships together with an analogous crossing rule for streamers. The paper concludes that the port tack rule is redundant in this collision conscious age and that its objective of motivating one ship to alter course can be achieved by making both ships to blame in the event of a collision. It is submitted that these lessons offer the e-navigator a method of avoiding collision at sea applicable in all situations; the only technical requirement for its safe conduct is for each ship to be able to tell instantly and accurately at any moment how the other ship is heading.

KEY WORDS

1. Seamanship.
2. Collision avoidance.
3. History.

1. INTRODUCTION. It is a self-evident truth that when two ships are on a collision course, the simplest and quickest way to resolve the threat is for either one of them to alter course so as to shape up to pass under the stern of the other. This is a universal truth and it is true no matter what the angle of encounter at which the two ships are converging towards the point of collision. To rely safely upon this simple truth as a means of avoiding collision, each ship must be able to discriminate accurately between the port and starboard bow of the other ship. In broad daylight, this information has always been accurately known to each ship by reference to the masts or visual aspect of the other; by night, the same information has been available to each ship since the introduction of red and green sidelights in the mid-nineteenth century; and, in fog, this information is now available to each ship from the heading vector of the other as shown by the automatic radar plotting aid (ARPA) on the observing ship's radar screen.

Reliance on this simple truth as the means of avoiding collision has the following advantages over rule based schemes of collision avoidance:

- The menacing situation can be resolved in as short a time as it takes to swing so as to bring the other ship on to the opposite bow, at which point in time the change in visual aspect by day, the change in colour of sidelights at night, or the swing of the heading vector in fog, will signal to the other ship that the situation has been made safe.
- The alteration made in obedience to this truth is safe whether there is risk of collision or not. In short, it is fool proof against a mistaken assessment of risk.
- The alteration is equally effective in avoiding both collisions and close quarter situations. In short, it can be used to avoid risk of collision as well as collision.
- Once one ship has altered the other is relieved of the need to alter and will almost instantly have been assured of this by the body language of the altering ship in swinging to show her opposite bow. However, if the other ship is unhappy with the safe passing distance chosen by the altering ship, the other ship may veer away to increase the safe passing distance.
- The effectiveness of the alteration in heading is independent of speed; it is impervious to loss of speed in turn; and, the altering ship may slow down or stop without cancelling out the effect of the alteration in heading.
- Either ship may alter so that no ship is burdened with the obligation to maintain her course and speed in an encounter with a rogue ship keeping a poor look-out. However, in practice it is likely that the ship which has the other one bearing closest on the bow will be the one to alter. The phenomenon of behaviour whereby the ship, which has the other closest on the bow, is motivated to alter first has been observed by Colomb (1872) as an axiom and is discussed further in paragraph 7 below. In a collision situation the ship which has the other bearing closest on her bow is always the faster ship, so that the natural operation of Colomb's axiom means that the faster ship in an encounter is usually the one to alter. In particular situations a small ship may choose to alter so as not to impede a larger ship, or a ship outside a traffic separation scheme may choose to alter so as not to impede a ship in the scheme.
- This means of avoiding collision results in the greatest economy of sea-room especially where the faster ship is the one to alter in accordance with Colomb's axiom.

Given that this one simple truth provides us with a straight forward and elegant means of avoiding collision in all situations one wonders why we have collision regulations comprising some 38 articles and containing a plethora of regulations between them. What can have gone wrong, if anything, in the evolution of the collision avoidance rules?

2. THE INFLUENCE ON THE RULES OF GAINING GROUND TO WINDWARD. Kemp¹ (1976) has traced the earliest written rule on collision avoidance to the Signal Book of Admiral Howe of 1776:

“[S]hips of war are to bear up for each other, shorten sail, &c., without regard to the seniority of Commanders, or other claims of distinction, in such manner as shall be found most convenient on either part, and may best guard against the hazard of falling on board each other.



Figure 1. The Sailors Defence.

But when ships are upon different tacks, and must cross near each other, the ship on the starboard tack is to keep her wind, while that on the larboard tack is always to keep to leeward."

It is reasonable to suppose that Admiral Howe, in abolishing old rules of precedence based on seniority, was enjoining his commanders to follow the ordinary practice of seamen in avoiding collision, so his instructions must be a reliable guide as to what that practice was. Certainly, as evidenced by a caricature² made by George Moutard Woodward in 1807 entitled "The Sailors Defence", reproduced here as Figure 1 because of its historical interest in this regard, we know that the port tack rule was well established in the popular culture of the time. However, it is a mistake to allow the clarity of the port tack rule to lead one to the conclusion that it was the principal rule at that time. In fact, as written down by Admiral Howe, it was an exception to the general rule that ships should avoid collision "*in such manner as shall be found most convenient on either part*" and this, then as now, can be achieved most conveniently by one passing under the stern of the other. It is important to notice that Admiral Howe wrote the port tack rule in such a way that it could only have application to ships tacking into the wind; it did not apply to ships generally with the wind on the port side. However, the practice of good seamanship with one ship, generally the faster of the two, passing under the stern of the other, ought to have operated as successfully in a tacking situation as in any other. Why then the exception of the port tack rule? The answer, it is submitted, lies in the importance which sailing ships placed upon the making of ground to windward. Since square-rigged ships could only sail some 6 points to the wind and those with fore-n-aft rig only some 4 points,

progress to windward was like gold-dust. In this situation the discretion as to which ship should most conveniently alter for the other could not be left to the commanders involved as each might tenaciously stand his ground without any regard to the niceties of collision avoidance. On this hypothesis, the practice of placing the burden of altering course on one ship alone has its roots, not in a fear that both ships will alter towards one another at the same time, but in the fear that neither ship will alter at all.

3. THE EARLY EMERGING PRACTICE OF STEAMSHIPS. When paddle-steamers first appeared in the rivers, estuaries, coasts and cross-channels of the United Kingdom, the practice which was naturally adopted for passing each other is described by Captain K. B. Martin in his evidence³ to the Parliamentary Select Committee on Steam Navigation in 1831 as follows:-

“What are you? – I am in the command of the City of London steam packet, and deputy harbour master at Ramsgate, during the winter months.

“In passing vessels have you any regulation at all as to keeping sides? – We have no decided regulation of that kind. It is so easy for vessels to avoid if they see each other; you see which side of the vessel is open, and you go to that side of her because it is easy to go that side. We have this rule in the river; the steam-boat that is going against the tide keeps that side of the river where the tide is weakest; the other vessel keeps with the tide.

“And therefore they cross from side to side as they find it convenient? – Yes.

“In a dark night as you can have no particular rule similar to what you have stated occurs in the day, what do you do? – We had no established regulation, I do think that it would be a good thing to have a regulation of that kind.”

It appears from this evidence that steamships, free of the need to gain ground to windward, were adopting the general rule enunciated by Admiral Howe without the baggage of the port tack exception. Each commander could alter course as convenient to pass under the stern of the other ship. The Select Committee made the following recommendation in its report to Parliament:-

“That it should be generally understood that when two steam vessels find themselves unexpectedly near each other, “stem on”, both vessels are to put their helms a-starboard⁴, unless there be some evident cause to prevent it; and if the vessels not be directly “stem-on” to each other, their helms should only be altered so as to make them sheer from each other.”

The reference to “stem on” in this recommendation was to provide for an exceptional case and the purpose of the Select Committee was to promote the practice in the general case that ships meeting should alter their helms so as to sheer from each other. In practice only one would alter as described by Captain Martin and she would go to the side of the other which was open and pass under her stern. This practice continued by day, as before, after the Select Committee reported but at night, with no recognised system of navigation lights, a ship was not able to pass under the stern of the other as she could not tell how she was heading. Accordingly, ships treated a night time encounter as the exceptional case and reacted to a non-descript light anywhere ahead as a “stem-on” ship. At night, ships on the Irish Sea adopted the practice of altering course to port when meeting each other as recommended by the Select Committee. Similarly, ships in the English Channel applied the “stem-on” rule at

night when meeting generally, though in their case they adopted the practice of altering course to starboard.

4. THE EARLY PRACTICE OF STEAMSHIPS MEETING AND CROSSING. On the 8th March, 1838, the Chamber of Commerce of the City of Waterford petitioned⁵ Parliament “*to pass a law for the general adoption of the system of Coloured Lights now and for many months past used on Her Majesty’s Packets employed in conveying the mails between Milford and this City.*” The system of lights in use on the Milford Haven packets was similar to that developed independently at Liverpool by the Dublin Steam Navigation Company, though the Milford system had the red light on the starboard side. Otherwise the Milford rule was closer to our present system in that it made use of a green light on the opposite bow, at that time white at Liverpool. The inventor of this system of tri-coloured lights was Captain W. D. Evans, a commander of the steam packets crossing the Saint George’s Channel to Dunmore and later Waterford City. In petitioning that this system of lights be made law the Chamber of Commerce said:

“*This intimation is all that is required to enable vessels to pass each other in the darkest night, with almost equal safety as in broad day.*”

Captain Evans prepared a description of how the lights would enable ships to behave at night in the same manner as by day and he outlined six situations involving two ships. These six situations are of considerable historical interest as they provide a unique record of how ships behaved in avoiding collision in broad day between the years 1831 and 1840. The first four situations described by Evans, and the actions taken in them, are unremarkable. The first two described another ship passing in relative safety ahead, in which own ship could increase the safe passing distance by veering away from the stern of the other ship by day or similarly, by reference to the proposed lights, by night. The third and four situations described ships on parallel courses where the lights at night would assist passing safely green-to-green or red-to-red, respectively, as in day.

[Evans’] 5th Situation [Vessels Crossing]

“This is a situation requiring caution: — the *red* light in view to B, and *green* to A, will inform both that they are approaching each other in an oblique direction. Circumstances only must determine on which side to pass — for instance, the vessel *least* advanced will pass under the stern of the other; or, if both be equally advanced, A should put his helm to starboard, according to the standing rule mentioned in the next situation.”

[Evans’] 6th Situation [Vessels Stem-on]

“Here two coloured lights, visible to each, will indicate their *direct* approach towards each other. In this situation it ought to be a *Standing Rule* that both should put their helms to *starboard*. This rule is already pretty generally adopted; but it would add to safety if it were made *imperative*: for it is evident, that without some rule of this kind, well understood and practised, it will be impossible to guard at all times against accidents in the situation of the two vessels here given.”

Leaving aside the anomaly created by the choice of side in the adoption during that period of the Select Committee’s “stem-on” recommendation, here we have the

operation of the fundamental truth that collision should be avoided by the vessel *least* advanced towards the point of collision altering to pass under the stern of the other. We will see in paragraph 7 below that in a collision situation, the vessel least advanced towards the point of collision is the vessel which has the other bearing closest on the bow and also will be the faster of the two ships involved in the encounter.

5. THE ERA OF THE PORT HELM (STARBOARD RUDDER) RULE. It would be another 10 years before Parliament would enact a law regulating the use of sidelights on steam ships and as late as 1843 Captain Chappell reported to the Select Committee on Shipwrecks that in the port of Liverpool alone there were 11 different modes of lighting steam-boats, some of which were intended to give an idea of the course of the vessel but always with the difficulty that any vessel meeting another did not know exactly what her arrangement was. In the absence of proper lights it was impossible to apply, to the night time situation, the day time practice at sea of passing safely under the stern of the other ship. Meanwhile, the anomaly whereby ships from some ports were altering course to port while those from others were altering to starboard was causing concern⁶. This anomaly was blamed for the night time collisions between the *Royal William* and the *Tagus* off the Isle of Wight in 1837 and between the *Thames* and the *Shannon* off Brighton in 1838, though it is evident from the description of the lights involved that the underlying cause was the want of proper lights and that neither ship in each case could tell what course the other was on nor what action she was taking. In any event, to correct the anomaly complained of, Trinity House, appealing to the port tack rule for sailing ships, promulgated the following rule for steamers:

“RULE

When STEAM VESSELS on different courses must unavoidably or necessarily cross so near that, by continuing their respective courses, there would be risk of coming into collision, each vessel shall put her HELM TO PORT, so as always to pass *on the LARBOARD side of each other*.

A STEAM VESSEL passing another in a narrow channel must always leave the vessel she is passing *on the LARBOARD hand*.

By order, J. HERBERT, *Secretary*.”

Rather than importing the daylight practice of passing safely under the stern of the other ship into the night time, this rule had the effect of importing the unsafe night time practice into the day. A ship was no longer free to shape up to pass safely under the stern of the other. The rule would have worked perfectly if ships were in the business of altering course to avoid a collision *point*, but in reality the purpose of altering course is to avoid the *risk* of collision, that is to say, close quarter situations. In 50% of cases the rule did work perfectly, allowing one ship to sheer away from the other so as to increase the safe passing distance. But in the other 50% of cases, the rule induced one ship to cross the bow of the other and, for this action to succeed, it required a corresponding action on the part of the other ship for the two to pass, safely, port hand to port hand. The new rule simply worsened the situation by day and did nothing to improve the night time danger, since the latter, all along, was

caused by the want of proper lights. The Merchant Shipping Act, 1854, extended the port helm rule to sailing vessels.

6. THE MODERN STEERING AND SAILING RULES FOR VESSELS IN SIGHT OF EACH OTHER. Proper lights for steamships were introduced in Admiralty regulations of 1848 authorised by Act of Parliament. However, as ships were now saddled with the port helm rule of both altering course to starboard in all collision situations, knowledge of how the other was heading was not particularly useful and collisions continued to happen unabated. New rules were introduced in 1863 to distinguish between vessels meeting, when both would alter to starboard, and vessels crossing, when, by analogy with the port tack rule, only⁷ the vessel which had the other on her own starboard side would give way and the other would have to keep her course (but not at that time her speed). Unfortunately, the words “*meeting end on or nearly end on*” in the meeting rule were interpreted to mean ships approaching from anywhere ahead up to four points on each bow so that the port helm (starboard rudder) rule continued to operate for crossing vessels in this sector. In 1866 Commanders P. H. Colomb and H. W. Brent published their “*Law of Port Helm – An Examination of its History and Dangerous Action with Suggestions for its Abolition – and an Appendix with Abstract of Cases, &c.*” This book contained a brilliant analysis of all the collisions caused by the port helm rule. The dangers identified in the book resulted in the Order in Council of 1868 which carefully defined the words “*end on or nearly end on*” to mean only the situation where each ship could see the masts of the other in a line or nearly in a line with her own and where, by night, each ship could see both the coloured side lights of the other. Henceforth, the crossing rule applied to all crossing courses, however fine or broad the angle, with the exception⁸ of a very narrowly defined sector dead ahead. Thus the steering and sailing rules for vessels in sight of one another took their modern form. A further gloss was put on the crossing rule at the International Marine Conference held in Washington in 1889 which provided that “*every vessel which is directed by these rules to keep out of the way of another shall, if the circumstances of the case admit, avoid crossing ahead of the other*”.

7. COLOMB’S RULE AND AXIOM. The rule that a vessel, taking action to avoid collision, should not pass ahead of the other may fairly be dubbed Colomb’s Rule. He, more than any other seaman, brought the danger of one ship being induced to cross the path of another to the attention of the public. Indeed, Colomb was of the view that this should be the only rule. Writing in the quarterly magazine *Naval Science* in 1872 he said: “*It would appear from the outlines we have traced that the true form of a Rule of the Road at Sea should be negative. Instead of prescribing what ships should do, it should prescribe what they are not to do.*” He thought that such a rule should be written in the following terms:

“*No ship shall cross the path of another, unless there is space to do so without alteration of course.*”

He saw no difficulty in placing the duty of avoiding collision equally on both ships as he had spent his early career at sea in the era when both ships were required to alter

course to starboard and he had observed that invariably one would alter first, thereby relieving the other of the need to alter. In observing ships in this way, he also gained his greatest insight into the behaviour of ships approaching each other on a collision course:

“It may be perceived as an axiom that the broader on the bow any ship appears to another, the less hasty will be the latter’s movements, and the more likely she will be to pursue her course unaltered.”

This, of course, was the same behaviour which Captain Evans (the inventor of the tri-colour system of lights promoted by the Waterford Chamber) had observed in day time in the pre-port helm rule era, though Evans appears to have observed it as a practice of behaviour which was consciously used to determine which ship ought to alter. The ship which is least advanced towards the point of collision (to use Evan’s terminology), being the ship which is broader on the bow of the other (to use Colomb’s terminology), sees the other closer to her own bow and perceives the other to be the greater threat, literally threatening to block her way ahead. She herself is the one which has to swing her head least to make the situation safe and she is also the faster ship. Therefore, she is the one best equipped to take action.

8. CONCLUSIONS. That collision can be best avoided by steering to clear the stern of the other ship appears not only to be a self evident truth, but also appears to be intuitive and readily acted upon by seamen unless they are constrained by rules not to do so. It appears to be less self-evident and not consciously intuitive at all, though a true axiom none the less, that, where ships are free to pass under the stern of each other, the one which is most motivated and best placed to do so is the faster of the two. In practice, if there are no constraining rules, it does not matter if the faster ship does not alter because the other ship is always free to do so herself. Fear that neither ship will alter is a legacy of a sailing ship time when the gaining of ground to windward was paramount in a commander’s mind. It is submitted that the port tack rule is redundant, even for sailing ships, in this collision conscious age and that the same objective of motivating one ship to alter can be achieved by making both ships to blame in the event of a collision. It is submitted that these axioms, taken together, offer the e-navigator a method of avoiding collision at sea applicable to all situations; the only technical requirement for its safe conduct is to be able to tell instantly and accurately at any moment how the other ship is heading.

REFERENCES

- ¹ Kemp (1976), “Two Hundred Years of the Collision Regulations”, *The Journal of Navigation*, **29**, pages 341–349.
- ² The 20,000 or so satirical and humorous prints that were published in London between 1770 and 1830, in the golden age of graphic satire, are a goldmine for the historian of cultural change. G. M. Woodward was the master of this form of genial comedy. He is said by Gatrell (2006), author of *City of Laughter*, London, 2006, to have haunted taverns to study and sketch his characters.
- ³ Report of the Select Committee on Steam Navigation (1831), *British Parliamentary Papers*, Transport vol. 2 at page 20, Irish University Press.
- ⁴ In the convention of the time, putting the helm a-starboard meant turning the ship’s head to port.

- ⁵ National Archives, Kew, ADM 1/4059 “*Letters from the Packet Service Hobbs Point, 1838–1839*”. I am grateful to Dr J. R. Owen, historian of the steam packet ships, for furnishing me with a copy of the petition from which I was able to study the collision situations described by Captain W. D. Evans.
- ⁶ Report on Steam Vessel Accidents, Appendix at pages 41–42 and plate I, ordered by the House of Commons to be printed 1839.
- ⁷ The rules as drafted by the Board of Trade, and concurred in by the Admiralty and the Admiralty Judge who had been consulted, reintroduced the traditional port tack rule for sailing vessels and had no crossing rule for steamships, Trinity House noting: “But it will be observed that it gives no rule for steamers crossing; this, it is considered, must be left to circumstances, and to the judgment of those in charge.” However, the final form of the rules, at the proposal of the French, extended the port tack rule to vessels with the wind on the port side and introduced the crossing rule which placed the duty of keeping out of the way on one ship only: Copy of Correspondence between the Board of Trade and other Departments respecting the Settlement of the Rule of the Road at Sea and the Lights to be carried by Ships, ordered by the House of Commons to be printed 18 May, 1871.
- ⁸ In their book, *The Law of Port Helm*, Colomb and Brent had argued for the complete abolition of the “end-on” meeting rule since it had caused more collisions than it avoided; they appear to have thought that truly end-on meetings were not dangerous and that ships truly “end-on” could be left free to alter either way without a rule; that, in practice and without a compulsory rule, a ship would take the time to determine whether she was on one or other bow of the oncoming ship and bring herself within the crossing rule. This paper has approached the end-on meeting as the limiting case of a crossing situation – that, in practice, no special rule is needed to cater for it.