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Evening Meeting.

Monday, May 20th, 1867.

CAPTAIN FREDERICK A. B. CRAWFORD, R.N., in the Chair.

FLEET MANŒUVRING.*

By Commander POWNOLL W. PELLEW, R.N.

At the commencement of a paper on so important a subject as the evolutionary system proposed for the future manœuvring of our magnificent steam fleets, it will be right, I think, to enter a disclaimer against being thought to assume any more special knowledge of the subject than can easily be acquired by any one interested in so doing. There are, however, a great many of my brother Officers who doubtless have not had the same opportunities of gaining experience on the subject that I have had; and to them and any others who may think the matter of any importance, I will address myself.

On joining Sir William Martin, in 1861, as his flag lieutenant, I found him employed on the revision of the present system of evolutions, and consequently for the next two years I was also employed on that subject, during which time, one written and three printed editions of a revised system, intended to suit the requirements of the present day, were brought out.

During those two years, we had not only had the advantage of a considerable amount of steady practice with the squadron itself, in the Bay of Naples, but also of a constant series of exercises with the boats of any of the ships chancing to be in company with the flag-ship. Officers employed about it will not easily forget the continual cruising up and down Malta harbour, or about the anchorage at Corfu; while, as a further means of ventilating the subject, before and after nearly every practice, the Officers detailed for that duty used to assemble on board the flag-ship, where proposed evolutions would be discussed, and opinions be freely asked and given.

* The sketch here given, is immediately to be followed by a publication on the same subject, going into the whole of the propositions in detail. 8th Nov., 1867.—P.W.P.

The Admiral had also the satisfaction of receiving opinions highly favourable to his views, from the Captains of the ships composing that squadron of evolutions. The book, however, was not approved at home, and I dropped the subject until April, 1865, when I was appointed, together with Commander Colomb, to assist Sir Sydney Dacres in a contemplated total revision of the Naval Signal Books. Unfortunately for me, however, after about six weeks work, my health broke down, and I was forced to give up my appointment, not, however, before having had the opportunity of seeing and taking notes of all the propositions on the subject that have from time to time been presented to the Admiralty by many distinguished officers.

With this short preface, I now propose to bring to your notice, and explain in as brief a manner as possible, the formations and evolutions, that seem to me to be absolutely necessary for the proper manœuvring of steam fleets. It is not, I fear, a subject that can be made particularly interesting. I am not going to slip into it any reviews of old naval battles, nor, even if I had any, am I going to launch my ideas as to the manner in which new ones are to be fought; I propose simply to sketch out a plan, by means of which I consider a fleet may be kept perfectly in hand, while being manœuvred with the utmost possible rapidity and freedom.

The first point in order, will naturally be the proposed sub-division of the fleet, and in immediate connection with it, the various formations that it would be advisable to provide for.

The present organization divides the fleet into two divisions, and each division into two sub-divisions; or into three squadrons, and each squadron into three sub-squadrons. A sub-division and a sub-squadron are therefore two different things, and it is a very difficult matter, as has often been proved, to work the two arrangements together. It is also inconvenient, and seems like a mistake to have arranged, that the half of the fleet should only be sub-divided into two parts, while the third of it, is sub-divided into three. Thirdly, it is impossible with such a sub-division to arrange any convenient plan, by which the fleet can be passed from two to three, or from three to two columns.

As a complete remedy for all this, I should propose that the fleet should be primarily divided into six sub-divisions, three forming a division, and two a squadron, the unit or sub-division of each of which being the same, does away with the old jumble of four sub-divisions, and six or nine sub-squadrons, and enables an additional order of steaming, "that in sub-divisions" to be provided for use, if required.

This sub-division of the fleet almost settles for us the character of the formations we have now to arrange. For as it is difficult to think of anything more manageable in the way of a formation, than one or more columns, and as a small fleet would naturally be in one, a little larger in two, and larger again in three, it is evident that such a sub-division as I have described, will exactly suit this arrangement. I say a fleet is formed naturally into columns, by which I mean ships at equal distances apart, ranged on one line; for though we hear of double lines of bearing and indented lines, yet these are looked on merely as exceptional formations, and in the case of the latter at all events will, I

Dia. 1.

Dia. 2.

Comparison of the methods for forming a line ahead on a four point bearing.
Proposed New System. *Old System.*

Dia. 3.

Dia. 4.

First Class of Evolution
Changing the formation by a Flank movement.

Dia. 5.

Dia. 6.

Second Class of Evolution.
Changing the class of a formation by turning it on a pivot.

Dia. 7.

Third Class of Evolution.
Changing course by a Flank movement

Dia. 9

am sure, be found totally unsuitable to the requirements of the present day.

It will further be found on examination, that, to enable a fleet divided into more than one column, to be manœuvred with the greatest facility, the columns should be opposite each other, and at a distance apart about equal to their length.

For general purposes, I should consider the three formations described above, as a sufficient number of what may be called "general formations;" but as we have a further division into sub-divisions ready provided, and as such a formation might in exceptional cases be useful, I should include an order in sub-divisions, on the same footing as the others.

I have especially restricted to three the number of columns in which a fleet should be usually manœuvred, because everything seems tending to the belief, that fleets in future are not by any means likely to consist of so large a number of ships as formerly; more particularly as I should propose that fleets of any size should invariably be divided into two or three small fleets, capable of being manœuvred separately, and thus so reducing them in size, that the one, two, and three columns, formerly found sufficient for sailing fleets of enormous magnitude, would be surely sufficient for the free manœuvring of the more moderately sized fleets propelled by steam, that I am trying to provide for.

This system of cutting up large fleets into smaller bodies so much more easily manœuvred, I consider to be of essential importance, especially with respect to the facilities it affords for rallying or detaching, and for keeping the ships together at night. To understand the arrangement, the division into smaller fleets must be considered quite independently of the regular fleet organization, which is applied in its full extent to each; they would be called the van, centre, and rear, or the van and rear fleets, and under their own commanding officers could each of course be worked independently. When, however, it was desired to manœuvre as one fleet, the small sub-divisions, into which, according to the fleet organization, each fleet is divided, must be clubbed together by twos or threes, according to the number of fleets, so as to form six large ones in all, and the whole can then be manœuvred as one, until again required to work independently.

At present one column, two and three columns, with no means of passing from one to the other, a couple of signals proposing to form four and nine columns never used, because the necessary directions are not given, are all the formations in line ahead. Then we have a single line abreast, a single line of bearing, and the double lines of bearing, and, as far as my memory goes, that is all. Many people, eager for simplicity, and thinking only of convenient formations for cruising in, will say that that is quite enough, but I will endeavour to show, that if only to avoid great unnecessary loss of time in manœuvring, there must be a great many more: there was a great want of freedom, also, in the manner of getting into or out of these formations, few as they were.

Suppose now a fleet in two lines ahead, which for some sudden reason, perhaps no room to wheel, or change the course on a pivot,

alters course together eight points to one side or the other, they are now in two lines abreast, and how are they, keeping their present course, to get back into their two lines ahead? At present there is no recognized way, and the Admiral would have to invent some special contrivance suitable to the occasion; and this shows that two lines abreast should be one of the regular formations, as well as two lines ahead; and changes of formation should be capable of being made to and from it, although it might not be considered a desirable formation for cruising in. There are numerous other occasions on which it would be equally convenient, and whatever may be said for two lines, may also be said for the three and six lines, into which the fleet can be sub-divided.

But it may not be necessary, or desirable, to change the course either precisely eight, or sixteen points, and any other course adopted simultaneously, will throw the fleet on oblique lines; now for some reason it is wished immediately to change the formation, but nothing can be done, because of this kind of formation, the single column only is recognized. It is therefore desirable for this among other reasons, that there should be certain means of manœuvring when the two, three, or six columns, chanced to be thrown on oblique lines, or that they also should be "recognized formations."

We have thus arrived already at twelve formations, but there is no occasion for counting up to so high a number; by calling the single column the first formation, the two divisions the second formation, the three squadrons the third formation, and the six sub-divisions the fourth formation, and according to the coincidence or otherwise between the course steered and the line of the columns, classing them as in "line ahead," in "line abreast," or on an "oblique line of bearing," we can stop at four formations.

There is yet one other essential to be provided for, a point of which very little notice is taken in the present arrangement; it is to provide for the principle, that it is as likely to desire to form the lines abreast with the numerical succession counting from one side as the other, and the formations in line ahead, or on oblique lines, with the columns ranged in order from the "left front," as from the "right front:" to provide for this, we must have two orders of each formation; with the sub-divisions placed in succession from the "right front," the formation is in "direct order," and if from the "left front" it is in "reverse order."

The only other formation that I think needs to be provided for, is that at present called "on double lines of bearing," but which I should call after Sir W. Martin, the "angular formation;" it consists of the whole or any indicated portion of the fleet, divided at or near its centre ship, from which the divided parts called the Van and Rear wings, can be placed on any desired bearings forming an angle with each other; it may be formed in "direct, or reverse order."

These are all the formations that it seems to me to be necessary to provide for. Such a number as six columns are quite as many as it would be desirable to manœuvre together, but if more are required, I would provide for it as I have already explained, by dividing the fleet into two or three smaller fleets, which by being worked separately will

allow for an almost unlimited number of columns, and will be altogether in my opinion, a more desirable manner of manœuvring large fleets.

I wish here again to disclaim altogether any intention of suggesting formations for taking a fleet into action; so many people confound the mere manœuvring of a fleet, intended to be provided for in a system of evolutions, with the special arrangements that would be required for action, that such a disclaimer is necessary. One of the most common objections one hears, is, that in the smoke and excitement of action, every Captain would have to act as his judgment directed, and all these signals would be of no use; forgetting that the manœuvres before a battle are often more influential as to its result than the actual chances of the fight. With a large number of ships at the distance, that from their size, they will require to be kept apart, there will still be constant opportunities for making a concentrated attack on some one portion of an enemy's fleet before the other can come up, short it may be, but with the modern improvements at which we are arriving, not perhaps proportionably sweet. It may be an object to place your fleet before the attack, between the enemy and his port, or to get at a convoy he is protecting; to do these things, and at the same time to be prepared for any counter-strokes, there must not only be almost unlimited powers of manœuvring, but any means that may have been provided, will require to have been previously well studied and practised; while, independently of all this, an Admiral will still have as heretofore, to make his own plans for the actual conflict.

It will be natural to suppose, considering their variety, that any such selected plan of attack might be based on one of the formations provided, at any rate that it could be more easily delivered from some particular one, than from the others, and therefore a thoroughly free system of manœuvring such as I here recommend, will be useful up to the latest moment. With this end in view, while preparing the system of changes of formation, I am about to describe, it has been my endeavour, while making the evolutions take up the shortest possible space of time, to give as much variety as possible, and it may be that in doing so, particularly in such cases as changing the direction of the line of bearing and others analogous to it, a certain amount of precision and regularity has been sacrificed, at all events to the appearance of the evolution. I will, however, at once confess that I do not attach such very great importance to mere regularity; a line of bearing, or a line abreast, is equally efficient as far as the bow fire is concerned, although the ships may not be by any means in an exact line, and as that is in all probability what is required, I would not delay getting it for a single second more than is absolutely necessary. In contrasting for instance the plan I should adopt, which in substance is that which already exists in our Navy, for changing from a line ahead to a four-point bearing, with that proposed in the French book and in other quarters, I should say, that while they sacrifice time to regularity, we, though not on account of any departure from these suggestions, sacrifice regularity to time. At the same time I do not admit that we sacrifice any essential regularity, any more than that they, by a plain sacrifice of time, have really gained it.

Again, by insisting that each ship should always turn on a certain sized circle, you evidently suppose that every ship is in her exact position. But from what I have seen of manœuvring ships, whose officers were doing their utmost to keep them in their station, and where, the evolutions being only performed for exercise, plenty of time was allowed, I am led to have great doubts as to any great precision being arrived at when a fleet is being hurriedly manœuvred, and with lines irregularly formed; every advantage should be taken of any turns, simultaneous or otherwise, that may be demanded, in order to rectify their positions.

To return now to the means provided for making a change from one formation to another. The four general formations in the two classes of line ahead and line abreast, are made capable of being changed from any one to any other, involving in all, one hundred and twelve changes, and these are all provided for in eight signals. With regard to the third class, or the formations on an oblique line of bearing, I have found it impracticable to do more than make them interchangeable on similar bearings, but by wheeling them on a pivot, they can be changed into the other classes of the same formation.

As to the angular formations, they can be formed in either order, from single columns, and changed back into single columns of any class of formation.

It being so absolutely essential to provide that each change of formation may be made with reference to the new formation being desired in "direct or reverse order," and also so desirable to provide for manœuvring without reference to the relative positions of particular ships, it is arranged, that when once formed in a formation, the evolutionary names or numbers of its various component parts shall be wholly positional, original names or numbers when alluded to, having the word "prescribed" affixed to them. Any ship chancing to be leading is therefore called the "leader," the sub-division that comes first, the "first sub-division," while the divisions and squadrons will take their names in accordance with the numbers of the sub-divisions. Although the sub-divisions are thus made entirely interchangeable, it will be seen that as to the individual ships of which they are composed, their order is not disturbed, and that they will always be found placed with their "prescribed leaders" towards the same extremity of the column or formation, and this therefore fixes for us an extremity of each column, which I call the "leader's end," from which extremity, the compass bearing of the line of bearing called the "column bearing," is always taken.

I will now proceed to describe the evolutions by which it is proposed to effect these changes of formation, and otherwise manœuvre the fleet: they may be classed as follows:—

- 1st. To change the formation, by a flank movement.
- 2nd. To change the class of a formation, by turning it on a pivot.
- 3rd. To change the course of any formation, by a flank movement.
- 4th. To change the course of any formation, by wheeling it on a pivot.
- 5th. To exchange the positions of any two columns.

6th. To invert the order of the ships of any column, and

7th. To increase or decrease the distances between adjacent columns or ships.

To begin with the first in order, or "changing the formation by a flank movement." What is here called "a flank movement," is a class of evolution first brought prominently forward in connection with Naval Manœuvring, in the French book of Naval Tactics translated by Captain Phillimore; being mathematically the quickest, it will also be found practically the most advantageous method of making the changes of formation in which it is employed, having this additional great inducement to its use, viz., that of not requiring the speeds of the ships to be interfered with. Its principle is, that the rear ships, or columns, shall be the standard by which the formation is to be completed, instead of the leading ones, as formerly; and on account of its obvious advantages, I have employed it in all the one hundred and twelve interchanges between the formations in line ahead and line abreast. Diagrams 3 and 4 (Plate xlv) will show the style of movement, and on comparing it with the same evolution, as performed by the old method, the gain is at once apparent. In the given example, where the one column in line ahead is being changed into two, it will be seen that without any change in the speed, or any difficulty in deciding on the change of course, the new formation is completed, as soon as the rear division can fetch up 'on a level with the van, or when it has steamed a distance equal to the length of the column; while by the old method, even supposing the speed of the van division to be instantaneously stopped and resumed, it had to steam over a space equal to the hypotenuse of a right-angled triangle, whose other sides each equalled the length of the column; but, of course, the speed is neither instantaneously stopped, nor is it entirely stopped at all. Its resumption is also a matter of time, the whole of which is so much additional dead loss, as compared with the former method.

Having thus briefly described what I mean by changing the formation by a flank movement, it only remains to repeat that it is the system selected, by which all changes of formation that can possibly be based on it are performed, and then to proceed to the consideration of the second class of movement on the list, described as "changing the class of a formation, by turning it on a pivot."

I have already described how the four general formations, that is, the one, two, three, and six columns, have their two "orders" and three "classes" respectively. Taking, for example, the second formation, or two columns, we can have them either in "line ahead" or "line abreast," or on an "oblique line of bearing;" and it is easy to conceive that, taking one angle as a pivot, and keeping to the same course, the formation, if turned round, will pass through the different classes in succession. The detailed plan for doing this is merely an adaptation and extension of the old method of forming a "line abreast" from a "line ahead," but its principal use is now intended to be in making small changes in the line of bearing when it is not desirable to change the course. It is performed by one ship, selected according to her position, and the side to which the change is to be made, acting as a

pivot for the rest, by reducing her speed according to the change of bearing, while keeping a steady course, and each other ship under certain restrictions, circling round her "next towards the pivot" to her new bearing. Treated in this simple manner, this evolution is an exceedingly useful one. True it is, that if time is an object, it should only be employed for small changes of the bearing, leaving the larger ones to be done on the flanking system; but it gives a simple and easy means of doing that which, in the case of hurried evolutions, would constantly require to be done, viz., the making of small changes in the line of bearing of the columns.

We will now pass on to the third description of evolution, or "the changing of the course of any formation by means of a flank movement." In common with all the other flank movements, these are taken in substance from the French tactic book before mentioned, and the system is applied to all formations in line ahead or line abreast. They are intended to be employed when the course is to be changed more than four or five points, and are invaluable above these limits whenever it is desired to preserve the formation in its present succession; a great gain in time being attained, as compared with the old system.

Supposing a fleet to be formed in two or more columns, in line ahead or abreast, there are two methods of changing the course up to about four points. The first and most common is to wheel the formation on a pivot, or as it was called when, as formerly, it was only employed for lines ahead, to "alter the course in succession." The second, and I think in no way the inferior plan, though involving two signals, is to change the course together to the new course, throwing the formation on to oblique lines, and then, by the evolution just described for rectifying the line of bearing, wheeling it up on one of its angles as a pivot to its original class of formation. This latter method would also be the most advantageous when the change of course was more than twelve points, and an inversion of the order of the ships in line ahead, or of the columns in line abreast, was immaterial; but between about four and twelve points, the superior plan beyond all comparison, is that by the flank movement which I will now describe. Let us take a squadron in two columns in line ahead, steering north, and the course to be changed to south-east, by a flank movement to the left of the new course; the leader of the starboard column at once turns to a direction eight points to the left of the new course, followed by the ships of his column, while the leader of the port column leads his ships, in the first instance, on a line eight points to starboard of his present course, arranging his speed so as to strike in astern of the last ship of the starboard column. This is the moment at which the signal should be made for the assumption by the leaders of the new course itself "south-east;" but in case of delay, the leader of the port column must turn after the starboard column, and follow it. The two leaders may, therefore, be steering the new course in their proper relative positions, in the time from the commencement of the evolution, that it would take to steam the length of the column, and the whole of their respective columns may be formed in their wakes in the same time over again; and taking into consideration the

time lost in reducing and regaining the speed alone by any other method, it is the shortest possible evolution by which the change can be effected.

The fourth subject in order is that already now partly discussed—“changing the course of any formation, by wheeling it on a pivot.” As applied to formations in line ahead, this evolution is called “altering course in succession,” and I shall here only proceed to describe it, as applied to those in line abreast. In the first place, let us take the case of the single column, or the “first formation.” The extreme ship on the side to which the course is to be altered, turns to the new course, the other ships, at the same time turning towards her half the angle only that she has herself turned, each then keeping its distance from the next ship on the pivot side, steams up into the line abreast as fast as is consistent with not passing before the beam of such next ship, or beyond the “line produced” between her and the pivot. The speed of the ship acting as the pivot, must, of course, be reduced, in proportion to the extent of the change of course. This method as to the single column might be used with safety to the full extent of sixteen points; but above four or five, the flank movement system is so much to be preferred, that I should limit its use to four points at a time, thereby allowing it to be applied to the second, third, or fourth formations in line abreast, as well, in the following manner:—While the leading column is wheeling as described above, the other columns, with their original distance from the column ahead carefully preserved by their pivots, are forming up on a bearing from their pivot ships corresponding to the line of bearing of the new line abreast, so that when the first column having wheeled, the whole proceed at their former speed, each succeeding column will have merely to turn together to the new course as they arrive in the altered wake of their preceding column.

We now come to “exchanging the positions of any two adjacent columns,” and “inverting the order of the ships of any column.” These are very old and simple evolutions, and beyond saying that safe means are provided for performing either, whether the columns are in line ahead, or line abreast, it will not be worth while here to discuss them.

Lastly, we come to the important point of “increasing or decreasing, with the utmost rapidity, the distances between adjacent columns or ships.” As far as the columns themselves are concerned, it is necessary to provide, that unless a particular column is denoted, the extension or compression is to take place with respect to the centre of the formation; whether that position is filled by a column or not, except in the case when the formation chances to be on oblique lines, when an extension must be made from the column most astern, and the compression towards the column, furthest ahead. In the formations in line ahead, the moving columns are to turn out or in four points, and with oblique lines, in a proportion of one point less than four, to each two points of obliquity; in lines abreast, the moving columns attain their object, by regulating their speed alone.

The extension or closing of the distances between adjacent ships, to be rapidly performed, will demand considerable care and skill, espe-

cially in the case of formations in line ahead, which we will now consider. It is simply enough described. Any ship may be selected by which the column is to be regulated, and such ship is to continue exactly at her former speed; the other ships are to increase or decrease their speed together, or as nearly so as is consistent with waiting for the change of the speed signal of their next ship, towards which they are to close, or extend, by which they will not only be aware that such ship has commenced her evolution, but will also be informed of the extent of her alteration of speed by which to regulate their own. Easy as this is to describe, there is no doubt, that to close a large number of heavy ships on one point with precision and rapidity, is one of the most delicate manœuvres a fleet can be called on to perform. It will perhaps be found an easier evolution, when applied to columns on a line of bearing, other than a line ahead, when it should be performed as follows:—If closing the order, the most advanced ship of the formation would, as a matter of course, be that on which the column should be closed, and this ship should continue her course, the rest of the ships, at their former speed, should turn towards her an angle, equal to half the obliquity of the line of bearing, the regulator reducing her speed, so as to keep them during the movement on their former bearing; then each ship in succession, as she arrives at the proper distance, resumes her course and reduces her speed. If extending the order, the rearmost ship must be the regulator, and should the line of bearing be a line abreast, any ship may be selected.

Having thus explained briefly, though not enough so, I fear, for the patience of my hearers, the descriptions of evolution that seem to be required, it will be necessary to notice the arrangements by which it is proposed to render their actual execution sufficiently precise. At present it is always rather a matter of doubt and opinion, among other things, as to by what ship the formation is to be regulated, supposing the Admiral's ship to be stationed in the centre of a column, instead of at its extremity. A similar case of difficulty arises, when a column has to be conducted to a certain position with reference to another, and the senior Officer happens not to be at the head or flank of his column. There are many other cases of difficulty of this sort, of greater or less importance, but all of which interfere prejudicially in a corresponding degree with the free manœuvring of the fleet. I have therefore considered it absolutely necessary that some ship in the formation denoted solely by her position, should act as "regulator" for the whole fleet, and should the fleet be in more than one column, that the ship in a corresponding position in each other column, should be the one by which that column should be regulated; I call these ships respectively the "fleet and column regulators." In the formations in line ahead, and line abreast, it is considered advisable to be able to regulate the fleet from either side at will, and the "fleet regulator," therefore, in these formations, is the ship at the extreme "right front," or that at the extreme "left front," in accordance with whether the fleet is being manœuvred in direct or in reverse order. By this arrangement, during the flank movements, by which all changes among these classes of formation are effected, it becomes possible to regulate the fleet by its

"fleet and common regulators," during the actual progress of the movement; a point of essential importance. With regard to the second difficulty mooted, that is, the impossibility of the senior officer of a column, being able to give the precise courses required to his column, say to conduct it in line of bearing astern of another, unless in a certain position, it is provided that this shall be done by the "column regulators," under the correction of the senior Officer.

I will now say a few words as to the facilities afforded for the keeping in their station of the individual ships. Take the case of a ship in a longish line ahead, which by accident, or carelessness, has dropped, or shot ahead a little out of her station. Now, as at present each ship keeps her station solely with reference to her next ahead, this error on the part of the ship we are noticing, is felt by every ship astern of her, occasioning a great commotion, and a large extra expenditure of coal, the general result being that you rarely have the rear ships in anything like their stations. To remedy this, I should recommend that the next ahead should only be retained as a guide, so long as she was in her own station, which is to be ascertained by observing the distance in addition, of any of the near ships ahead of her that can be seen, so that a ship, whose steam, for instance, has accidentally got low, will be able to drop and again regain her station, the proper precautions being taken, without throwing the whole line out, as at present. In the case of a ship being actually unable to keep up, the fact of her making it known to the Admiral, and sheering out of the line, which she should immediately do, would be the signal, unless the speed of the fleet was at once reduced, for her place to be filled up by the ships concerned, without further directions.

It is of course impossible here to give more than a bare outline of the provisions on this and other subjects; but to those who have given any previous attention to the matter, they will, I hope, be sufficiently intelligible; and I will now, before concluding, make a few remarks on the general working of the system proposed, for instance as to what plan, if any, should be followed in originally placing the ships in the sub-divisions. It would, I think, be desirable that ships of a particular class should be kept together, but their particular arrangement must depend on circumstances; by keeping ships intended for ramming, or other especial purposes, in sub-divisions by themselves, much trouble and confusion might be expected to be avoided. Perhaps in default of other more important considerations, such as speed, the ships might be placed in their respective sub-divisions with reference to their turning powers, the fastest turners at one end, and the next fastest in succession; but this is, I think, a matter of small importance. A turning circle, of the smallest radius that all can turn on, should certainly be fixed on, and made obligatory on the "fleet regulator," while all others should go as near it as is consistent with, at the same time rectifying any discrepancies in, the position of their ships.

As to the formation in which it will be most advisable to keep fleets while cruising, I cannot help thinking that too little attention has been paid to the advantages offered by the line of bearing, or line abreast, at all events for day work. The difficult work of keeping a ship in

her station, it will be allowed by all, is the management of the speed. What has made this appear so difficult is, that when in line ahead—the order in which our ships are always kept—it is impossible, without very careful watching with the sextant, to detect those small beginnings in the variation of the distance, which it is so necessary to check. The difficulty is also increased, by the relative positions of the two ships, for as everybody knows, when looking at another ship right ahead, it is very rarely that something or other does not intervene, and partially obstruct the view. Now in a line abreast, or line of bearing, the management of the speed at once becomes the simplest part of the affair, and the chief difficulty is thrown on the management of the helm. With the form of compass card which I have proposed for use, by which all mental application of the error occasioned by local deviation is avoided, combined with common care in the matter of comparing the compasses of the fleet by simultaneous azimuths, or otherwise, this difficulty would I think be found to be reduced to a minimum.

Most people's experience of an oblique line of bearing, is unduly influenced by the difficulty they have found in keeping station, after wearing together in a squadron under sail, when it was blowing too hard to tack. No comparison, however, should rightly be made between this and the same formation in moderate weather, with ships under steam. By keeping the ships in a line abreast, or on an oblique line, all unnecessary risk would be avoided in case of a fall overboard; much coal would be saved in keeping station; the Admiral would see much more of his ships, and would be sure of having them close up in their places. At night the bearing might be diminished to three or two points from the fore and aft line, and the firing of a gun, or other signal, could cause the simultaneous sheer into the wake of the next ahead, requisite to avoid the chance of a collision with a passing ship.

When speaking of oblique lines, it would not be right to omit all notice of the "double lines of bearing," or the "angular formation." As these formations have hitherto been arranged and manœuvred, they have not I confess been particular favourites of mine. By the laws of their formation the order of the ships was so broken up, that no manœuvring was possible, until by an awkward process, impracticable if pressed by an enemy, you had got out of it as you got in; and now, although after a great deal of trouble we have succeeded in providing the means of manœuvring them, I do not feel inclined to say much more in their favour. Even for a retreat I see no great advantage; a pressing enemy would of course cluster on one side, and so render the other useless; and while it certainly keeps the ships concentrated, and so renders it more difficult to cut a part off, it renders them proportionably helpless, in case of an attack by rams.

Now as to the rams, the arm of naval warfare to which I attach the chief importance. In my opinion, the aim of all manœuvring, and preliminary practice with the guns, should be to get a fair opportunity for letting slip the rams. It may be very easy to prove how difficult it is for one ship to strike another, prepared for, and trying to avoid the blow, and in the case of single ships fighting on the open sea, I fully admit it; but with two squadrons bent on fighting, the opportunity is

certain to be given by one or the other, and victory will rest with that which best knows how to take advantage of the chance afforded it. An enemy may be caught embayed, rocks and shoals may prevent his free manœuvring, and then for the rams. Never mind their guns and armour, but have them low, unsinkable, quick turners, and of great speed. Keep them in the background until wanted, and depend upon it they will be found the most suitable engine for the work required.

I have now I think, touched on most of the important points connected with Naval Evolutions. An organization has been provided which will always preserve the fleet, or what may remain of it, in a state to be manœuvred so long as the ships can be collected together, admitting as it does of any extent of expansion or contraction. The means of changing from one formation to another have been carried to their fullest extent, while the mode provided for manœuvring in every possible way, and in the quickest manner, has been briefly explained. It will I am afraid appear that I am speaking in a very egotistical manner; but I will here repeat that I lay no claim to any special acquaintance with the subject, over those who may have given any attention to it; while the very system on which the whole of my observations are based, is that, I before mentioned as having been submitted to the Admiralty in 1863 by Admiral Sir William Martin. Any one however who has tried his hand at a paper of this description will, I feel sure, understand the difficulty there is, in assigning to each originator of a proposed improvement, his proper credit in the actual course of the description. The subject is a very old one, and most of the original proposers are to me unknown. But it will perhaps be considered sufficient to avow that with the work of Sir William Martin for a basis, I have taken the fullest advantage of all the previous writings on the matter that I could get at, as well as of the hints kindly furnished me by those officers of the Mediterranean Fleet, who were associated with me in practising the evolutions.

While thus admitting the very large share Sir William Martin had in the proposed system, I must fully exonerate him from all responsibility as to any extraneous views or opinions that I may have advanced in the course of this paper, and for which I must crave your kind indulgence.

The system thus worked out, has been so repeatedly under discussion, and as to its principal parts, so often put to the test, that perhaps a certain amount of confidence when speaking of it, may be excused. On public grounds it is certainly necessary to speak strongly, and I only wish that I could here place the subject in so strong a light, that more of my brother officers might be induced to open their eyes to its importance.

I am quite aware—and herein lies the great difficulty in pressing the matter forward—that with the present system, or at all events the system in force up to the spring of this year, a fleet may be very easily and safely cruised about. It may make a very fine show, and there may be plenty of evolutions, that with a little selection, it can well perform; but admitting all this, I am still afraid that it would be at the most imminent risk that any attempt would be made to put them to

the test in the presence of an enemy. Then, instead of being able to pick the evolutions which you know you can do, and which everybody knows, you will find a terrible pressure put upon you, and most of all for time; your rams are at the wrong end of your line, and you have no time to change them; or your ships are too extended, and you have no time to close them. At last, when hurriedly forced to adopt certain movements, you will find that these are the very evolutions that previously you had so studiously avoided. Somehow, the ships all seem to be going as if they did not know by which to guide themselves; each column slackens its speed, so as to regulate itself by another. Then you find, that smart as your signalmen are, the signals cannot be made quick enough; eventually the poop gets enveloped in flags, and the men look nearly as puzzled as you do. Then the ship leading seems to have forgotten to apply the point-and-a-half deviation that belongs to her compasses, or has done it the wrong way by mistake. You try more signals, but the end has come, time forbids further changes; in despair you whip up a final signal for close action, clap on full steam, and trust to luck and Providence.

Now, this may be a strong picture, but I have seen as curious scenes, without the extraordinary pressure of an enemy's fleet. I do not mean to assert, that such as I have described, is certain to be the result of an attempt to manœuvre an English fleet, but unless changes are made, it may be; and I do not mean to assert that the opposing fleet is always to be well and skilfully manœuvred; but again, it may be. Now, if by bad luck these two may be's should come together, I do not like to anticipate what the result would be. Judging, indeed, from the apathy one generally sees displayed on the subject, the consequences should not be serious, and I try to imagine that we should soon build more ships, and have another try for it. It is as well, however, if the opinions I express are found to be shared by those in whose experience, confidence should, if anywhere, be placed; that people in general should have some idea of what they have to expect.

A fleet, skilfully and rapidly manœuvred, would have as great an advantage over another in a less advanced state of preparation, as the superior organisation of the Prussian army gave them in their late war with Austria. A naval engagement, now-a-days, will not probably be a very long business; half an hour might see one fleet or the other pretty nearly demolished, and it would be suicidal that our fleets should be sent to their work wanting that confidence and promptitude which could so easily be acquired by practice. Eighteen or twenty gunboats, manned from the Channel fleet, and collected for a couple of months yearly at Portland, would, at a most trifling expense, soon effect an utter revolution in people's ideas generally on the subject of fleet manœuvring. The gunboats, I believe, the officers and men, certainly, are all ready, and the comparatively small expense of the coal required, should on no account be grudged.

How would armies be manœuvred, if officers and men were never instructed in anything besides the manual and platoon exercise, with an occasional march to and from their barracks? That is about the counterpart of the experience the Navy is permitted to obtain. What

Admiral ever has an opportunity of taking out twenty or thirty sail, and trying his hand at manœuvring them? I do not mean at jogging along at five or six knots, with the ships at great distances apart, and taking all the forenoon to change from two to three columns, or form a line abreast, but really to manœuvre as if going into action, with his ships at a high rate of speed.

At present, I am afraid, it must be confessed that we know very little about the matter; but it is to be hoped that a brighter day is dawning, and that our future leaders will yet be permitted to pick up their experience before the time of trial comes. My time, and the object I had in view, being now alike disposed of, I will conclude by thanking, most sincerely, the Chairman, and my hearers generally, for their kind attention.

The CHAIRMAN: We shall be glad to hear any observations that gentlemen may wish to make.

Vice-Admiral E. P. HALSTED: I think the main observation which any of us can well make is, how very much we are obliged for such a paper, and how very disqualified the greater portion of us are for really going into the true merits which belong to it. There is not a single shadow of doubt that none of us have any possible means, not even to the extent of gunboats, not even to the extent of ship's boats, of apprehending practically the manœuvring of a fleet. Therefore, truly we have to acknowledge with gratitude the attention which has been given to the subject, and the ability with which that has been done. As for discussing it, I am utterly incapable of doing it myself. I beg to offer my full meed of grateful thanks for what has been put before us. The paper contains evidence of having been prepared with great ability, as well as a great practical apprehension of the whole subject. Beyond that, at this present moment, I am quite prepared to sit down.

Captain W. HOUSTON STEWART, R.N., O.B.: I should like to make one or two remarks. While most fully agreeing with the observations of Admiral Halsted as to the little opportunity that Naval Officers have, of learning how to manœuvre their ships, I very much regret that there is not a much larger attendance of Naval Officers; and I still more regret that there are none of our directors or rulers here—those who might give the Officers of the present day the means of learning what they will one day find the want of, as Captain Pellw has put it in much abler and clearer language than I can do, at the conclusion of his most able lecture. I think it is a most valuable lecture, because Captain Pellw is thoroughly master of the subject. Being ignorant of it myself, I had the advantage of being a pupil of his for some time, when he was flag lieutenant under Admiral Sir William Martin. For two years he gave his entire attention to this system; studied the various systems of naval tactics of every nation in the world; and I believe that every system of manœuvres in these naval tactics was tried by him, either with dummies, or with pieces of wood representing boats. The system of manœuvres now before us is formed upon improvements made upon other systems of tactics. Having occupied the position which Captain Pellw did of flag lieutenant, he has had the opportunity of observing the great necessity there is for a system of tactics. Those outside the Navy, if there are any such present, would hardly believe, how helpless our ships are in the way of manœuvring. No one is to blame for it, because we really never have the opportunity. Captain Pellw says that he believes there is a brighter day dawning for us. I hope there is. I do hope that the subject will be brought before the British public, for they seem to be the masters at the present moment. Our Navy is without a system of tactics. I can only say, with reference to this system, that I have seen a party of twenty-four Officers, midshipmen and lieutenants, who had never seen a single manœuvre, assemble in a cabin, and in one hour the manœuvres were performed without the slightest mistake. That shows how simple the system is, and how easily it may be acquired.

Admiral RYDER: There are two or three remarks I should like to make; but I would much rather hear Captain Colomb speak first.

Commander COLOMB, R.N.: Admiral Ryder has been good enough to refer to me as being possibly capable of discussing the very able paper that we have heard read. Having a little knowledge of the difficulties that Captain Pellew spoke of in preparing a paper of this sort, it strikes me that Captain Pellew has shown a very great grasp of the subject, in the way in which he has addressed himself to it. I say that, because I know how difficult it is to draw up a paper of this kind. I think the service sustained a loss in the fact of Captain Pellew's health having broken down when the Admiralty awoke to the necessity for having a complete system of tactics before them. But Captain Pellew worked with me long enough to impress me very much with his practical knowledge of the subject; and I must say that I made the fullest use of it in what was done under the direction of the Admiralty. Sir William Martin's book was the only complete system of tactics which was before us when we had to draw up the new plan. Not only was it the only complete system, but it was the only system which was based upon a principle that could be carried out throughout. I suppose I break no confidence in a professional meeting in saying that by far the greater part—I may say nearly the whole—of the principle of that book has been adopted by the Committee which sat to investigate my work. I based the system of tactics almost entirely upon that book, making alterations in language here and there, and the Committee which sat to investigate the system adopted it almost throughout. I hope it will form a basis. Of course, it can hardly be said to be complete, because until it has really been practised by the fleet, it is impossible to say that any system can be complete. But I hope when the system has been practised, that it will be no longer possible to say that the Navy is without a system of tactics. Captain Pellew, I think, spoke very justly of a remark that we constantly hear: "Oh, fleet manœuvres and signals are not very important, because 'the Admiral must arrange his plans beforehand.'" It has always struck me that it would be easy enough for the Admiral to arrange his plans completely beforehand could he know in what position he was going to meet the enemy's fleet. As it is impossible for him to tell this, I look upon it that the Admiral, who best understands his work at the present day, will trust more to his signals, and more to his capacity for manœuvring his fleet on the spur of the moment, than he will to any detailed plans before made; because we all know that any detailed plan of attack may be utterly thrown to the winds; if the fleet he means to attack does not happen to meet his attack in the way he expects it. When I say I believe the Admiral will trust to his signals on the spur of the moment, I do not mean that he will do that if the action has commenced. I think Captain Pellew spoke very justly in saying that the most important manœuvres take place before the commencement of the action. It is the mode in which you deliver your attack which gives you victory, and loses it for you; and that, I believe, is arranged before the action commences. I believe that the period of time during which fleets will now be under fire will be very short. We saw in the action off Lissa, as I remarked the other night, one of the changes coming over naval battles; that is, the fleets are more likely to pass through one another, engaging while they pass, to separate again, and reform for the attack. Therefore, if that is the true idea, the importance of evolutionary signals based upon a proper system, and the importance of securing that your fleet shall move from formation to formation in the quickest way, cannot be exaggerated. Captain Pellew spoke rather in disparagement of the necessity for ships turning upon the same circles. The necessity for such a thing was first pointed out by the Russian Admiral Boutakoff. I had the honour to carry out in the Channel squadron some experiments to test how far the necessity for similar circles was practically necessary—reversing the line, the fleet being in line ahead—altering the course 16 points, that is, to the opposite course, to the right or left—and we found that invariably, unless steps were taken to make ships turn on the same circle, the formation was utterly destroyed—not partially destroyed, but utterly destroyed; that there was no longer anything like a line. But when ships were taught to turn upon the circle of the ship which was least under steering power, that then the time lost was insignificant, but that the fleet, on arriving at the new course, 16 points from the old one, came

immediately into their places, without either difficulty or trouble. The difficulties that a modern fleet has to contend with in manœuvring in the face of the enemy are, that the rear may be the front, or the right the left, at any moment; and it is absolutely necessary to have your system of tactics arranged on such a plan that it will enable your rear to act as your van, the van as your rear, your right as your left, and *vice versa*. The plan that has been adopted for the present is to establish a set of local terms. It is merely carrying out to a further extent what Admiral Martin has noted in his book in three or four places, and what Captain Pellaw has spoken of again to-night—having a system of local terms referring to parts of the fleet; and in the evolutionary signals these local terms only are used. The “star-board column,” for instance, will be the starboard column at the time the signal is made; the “port column” will be the port column at the time the signal is made; the “leading column” will be the leading column at the time, and the “rear column” the same. If the fleet alters its position the columns alter their names in in the same way. That is a plan that, as far as I can judge, will tend to simplicity in the arrangement. A very important matter also brought before us to-night is, how much better it is to manœuvre a fleet by the helm only than by the speed. If the speed of a fleet be uniform, as it ought to be, and the ships are accustomed to turn in the same circles, then a movement of the helm has a similar effect upon every ship; but if you come to alter the speed, you immediately alter the size of the circles in which the ships turn. Besides that, the helm is under the control of the Officer of the watch; the speed is only partially so; therefore, if you can manœuvre your fleets, and I think you can, by the use of the helm, you gain in simplicity. The question upon which ship fleets are to form is also a very important one, and I fully agree with most of what Captain Pellaw has said upon that subject. It also shows us a point which I have before remarked upon—that is the difficulty of making the Admiral part of the formation. If you make the Admiral part of the formation, whatever the orders may be, they will insist upon making him, wherever he may be in the line, the pivot; whereas it constantly happens that the Admiral is not the pivot, and ought not to be the pivot. The consequence is, that ships are thrown out of their position by the double idea of the proper pivot, thinking at the same time that the Admiral is the pivot. I recollect once the Channel squadron being detained half an hour, because we had got the Admiral in rear of the line. We wanted the leader to go on, and we were fully half an hour making signals to her, which she could not understand, before we could go on. Such an instance happening in the face of an enemy might be fatal. As regards the oblique line of bearing, I agree with Captain Pellaw that it is, or ought to be, a good cruising formation; but it is a formation very difficult to maintain accurately, and I think Captain Pellaw agrees in that—it is not a good formation in action; it is too difficult to maintain accurately. But as a cruising formation, where it need not be very accurately kept, I think it is a very good one. As regards the angular formation, I agree with every point that Captain Pellaw has stated throughout. Nearly the last point he adverted to was the question of rams. I must say I am very glad indeed to get a little support in that direction, because when I read my paper here the other night there were no remarks made upon the subject, except adverse to the idea of the ram being the chief weapon. The more I think of it, the more I go into the matter, the more satisfied am I that the ram is and will be the chief weapon. I do not say actual running down will be. It may be that some arrangement of the torpedo, such as I have heard adverted to, on the stem of a ship, may be the weapon; or it may be a very sharp spur, which, just touching a ship, will be able to destroy her. But whatever it be, I believe, the power of your engine driving your ship will give you the weapon that will be the most employed. In saying that, I do not mean to say that the ram will do the most destructive work; but I believe it will become the governing weapon of fleets, and that fleets will have to fight more with reference to avoiding the stroke of a ram than getting their guns to bear. It has been adverted to over and over again what a difficult thing it is to hit a ship. Now, I have had sent to me within the last two or three days a paper by Captain Randolph on the “Rules of the Road.” I want to quote two remarks from it to show how, if it is difficult to hit a ship, it must be equally difficult, in a Naval

Officer's opinion, to keep out of the way of a ship, which, I presume, cuts the ground away from the first difficulty. He says, "How a ship is to keep out of the way of 'another?' This is exactly the difficulty for which we want a rule for the assistance 'of people in charge of ships, especially the inexperienced, nervous, or suddenly 'alarmed.'" Now, it has been said there is a natural impulse to move the helm somehow. I quote this merely to show that while Naval Officers persist in saying that it is a very difficult thing to run down a ship, they are at the same time asserting it is a very difficult thing to get out of a ship's way. I do not think Captain Pellew drew too strong a picture of the state of affairs at the conclusion of his lecture. I believe what he stated is literally and actually true. As regards the employment of the gun-boat squadron, it is one of those things which people have been recommending until they are tired of recommending; but I hope when we are all thoroughly tired, we shall at last see something of the gunboats.

Rear-Admiral A. P. RYDER: I will not detain you with more than a very few remarks. I have been looking forward to this Lecture with great interest, as Captain Pellew knows, and I am very glad to see Captain Colomb here. I know they are equally good authorities on the point, and that we should hear much that was interesting on the subject from both of them. There are one or two points I should like to allude to. One is the question of speed. In my own experience—but I believe some officers will differ from me as to whether it is a good practice to adopt—I found great assistance in maintaining a regular speed by always dictating to the engineer the *number of revolutions* he was to maintain. If you tell him, "Go on faster! go slower! slower still!" and so forth, you never arrive at any regularity. But if you tell him to go at 41 revolutions, for instance, he then knows what he has got to do. He is not content merely with opening or closing his throttle valve, but he is constantly ascertaining the speed of his engine, and, if his steam is high enough to enable him to follow your orders, he maintains the speed you dictate to him. This seems to me a wiser plan than to tell him to "go faster" or "slower," which I know is the common practice. I had the dial plate on deck and the dial plate in the engine room divided for revolutions, so that the order from the deck was constantly under the engineer's eye. Captain Pellew referred to the possibility of applying the deviation the wrong way, and of the ships being led away from the course. In the "Warrior" they adopted a practice which is always useful, and which would not lead to any error as long as ships were cruising in the same geographical position; that is, to have a compass with all the points altered for the deviation, so that they should be absolutely accurate. This is of great importance when fleets are cruising and no great likelihood of changing their geographical position, and I should think it would be advisable to have one compass-card so altered in each ship. It is evident that no error can possibly occur as long as the deviation does not alter. I think it would be a useful thing for an iron-clad fleet, if they had their compasses adjusted in that way, viz., one card permanently altered for each cruising ground; be it the Bay of Biscay or the Mediterranean, there would be no great difficulty in either place. Both Captain Pellew and Captain Colomb have alluded to the advantage that officers would have, if they had the opportunity afforded them of witnessing evolutions. I imagine all officers who anticipate or hope to serve in the fleet, and who are now on half-pay, would be willing and desirous, if they had the opportunity, of witnessing the new evolutions. Whether the Channel fleet, which is shortly to proceed to sea, is going to practice the evolutions which, I believe, have all been prepared, and are in print, I am not sufficiently in the secrets of the Admiralty to know. But I can tell any Naval Officers who are here present, and who might wish to witness those evolutions, the amount of success, or rather the non-success of an application I made to the Admiralty, to know whether they would allow some small vessel to accompany the fleet, with half-pay officers on board (who certainly are not likely to go to the Bay of Biscay with any expectation of comfort or pleasure.) The "Vivid," or any other vessel of her class, would answer the purpose. I hoped that they would allow such a vessel to accompany the fleet, and enable half-pay officers to witness the new evolutions, and learn, as far as they could learn on half-pay, what they could have no other opportunity of learning. The answer I received was, that their Lordships had no intention of sending any such vessel with the fleet.

Lieutenant A. GILMORE, R.N.: I think there is no reason why the Admiral, at noon, should not telegraph to the rest of the fleet the deviation of the compass of his ship, each ship would then know what the deviation of the Admiral's ship was, and what course she was steering, and there would be no difficulty whatever in keeping the same course that she did. I would also remark, that in the present day when ships differ so much in speed, and in force as regards guns, and the disposition of guns, that the system of naval tactics is very difficult to bring to any issue. I fancy that rams will be kept as a reserve; that the ships of the line will go into the conflict, and the rams will be kept in reserve to go and ram the enemy that is engaged with their friend. As regards the regulation of the speed of the ship by the engines, all the ships should be regulated by the speed of the Admiral. There would be no difficulty whatever in the officer of the watch, or the captain of the ship, after half an hour, knowing the relative speed of the vessels, and sending word down to the engineer, "So many revolutions!" instead of "half power!" or "full power!" Then the ships would be regulated to the same speed, and the same amount of helm would influence each. As I said just now, it is most difficult at present to introduce any system of naval tactics from a line of battle, when ships all differ in speed and effect; one going 14 knots, another 12, another 8. There are no two vessels in the Navy built on the same principle, or calculated to effect the same purpose. One carries a 12-ton gun, another an 8-ton gun, another a 6, another a 4; no two are the same. We all know that the speed of a squadron or fleet is the speed of the smallest vessel. You must either go ahead, and leave her in the lurch, to be attacked and taken, or you must slacken the speed of your whole squadron to her speed. I think that fact is overlooked in all our naval constructions. In the last few years, Mr. Reed has tried to put undue steam-pressure into ships to drive them ahead. The effect must be that those vessels, after a very short time, will become overstrained and unseaworthy. Whereas, if vessels were built on one principle, and contented to attain a due rate of speed, naval evolutions would be much more simple, because things would be equal. At the same time, a few vessels might be attached to each fleet, as rams, to go in at high speed with powerful prows, when an enemy is in line attacking our fleet, and to ram our opponents. I think, when our Channel fleet, as at present, consists of about seven vessels, some of one speed, and some of another; some with one size of guns, and some with another, that Captain Pelléw's system is all thrown away; and until a more uniform practice of building, &c., is introduced, he will never be able to see his system adopted.

Captain HEATH, R.N., C.B.: I am one of those who are rather afraid of too much tactics; and I suggested to Captain Pelléw whether, by sub-dividing into four instead of into six, his object of avoiding the difficulty of turning over three columns into two, will not be equally attained, whilst my object of simplicity will also be attained. I agree with those who began the discussion, in saying that it is impossible really to discuss the important paper which Captain Pelléw has put before us, for want of preparation on the subject. But I must say that I think the old signal book is quite competent to do a great deal that is wanted to be done—"Alter course together!" "Alter course in succession!" "Preserve a certain line of bearing! a compass line of bearing!" With respect to columns—"Preserve a certain compass line of bearing!" Those old signals will do a very great deal which you are now attempting to do, by more intricate rules. It must always be remembered that these rules are variable, and intended to be put in practice only in order of sailing; that in sight of an enemy, your first object is to form your order of battle. Once your order of battle is formed, you must never forget Nelson's rule, "No captain can do very wrong who puts his ship alongside his enemy."

Captain FREMANTLE, R.N.: I did not intend to say anything at all, but after what has fallen from the last gentleman, having had some experience in the manœuvring of fleets under the old system in the Channel fleet, I think it right to state what my experience is. Under the old system, with the old signal-book, it was extremely difficult to manœuvre fleets at all, especially under steam; and when we got the fleets into some particular formations, which were easiest and best understood, they would not be the formations which we should more particularly have required in case of action. I may specially mention that which Captain Pelléw has referred to,

namely, the angular formation. Certainly, when fleets are formed in two lines of bearing, it requires several formations to get them into their lines of battle, or lines of squadron sailing. Captain Colomb said something about signals with regard to columns. As far as I understand him, it would be simply a question of flags; the flags would not always refer to the same division; that is, the flags would be changed as the divisions changed. That is to say, if I may use an old illustration, the letter M would not always be the starboard division. I do not think anything could lead us into a greater mistake than that; because I found, in manœuvring fleets, it was a great advantage that letter M always meant the starboard division, namely, certain ships belonging to a special section of the fleet. That was the only safe guide you had.

Captain COLOMB: Perhaps I may be allowed to make one remark in answer to what has been said. We have employed two distinct modes of naming divisions, or squadrons. The squadron flags addressing them, always address that particular division, no matter what its particular position may be. But when the divisions are spoken of in the signal, then their local signification is given. So you have two distinct methods of speaking to the divisions; they are first, second, third, and they are also named the starboard division, the port division, and so on. I may also read the second paragraph from Captain Randolph's book, to which I called attention:—"The rule of giving way may be a very good rule for the open road, but it is no guide at the moment of impending danger, if not an embarrassment. I can conceive it highly probable, that if three people were on the bridge, one would advise starboarding, another porting, and the third stopping." This is from an officer who has very gravely considered the subject, not with reference to rams, but with reference to getting out of the way of ships. They are, I think, some of the most important words that I have seen written.

Lieutenant A. GILMORE: I would also remark upon the great difference there is in the classes of vessels. In the old time of war we had the three-decker and the two-decker, the three-deckers leading the van, and the two-deckers forming the second line. Now, we have a great variety of vessels, and if our fleet went into action it could not adhere to the order of battle. The Admiral would have to form a different arrangement. It would be useless for the "Warrior" to attack a two-gun turret vessel, or for the "Wivern" to fall foul of such a ship as the "Magenta." The fleet would have to be arranged in such a way as that the ships composing it shall be able to attack vessels of a corresponding class.

Captain HOUSTON STEWART: May I be allowed to make one other remark? I was much struck with what Admiral Ryder said about the revolutions of the engine. I dare say Captain Pellew remembers that we had to introduce that practice in the Mediterranean fleet. I happened to be Flag Captain, and had charge of the "Marlborough." I found I could make nothing of it, until we introduced this system of directing the number of revolutions, and the captains of the other ships, with great success, adopted it. I dare say Captain Pellew remembers how, after a few days, the ships manœuvred almost as one ship. Captain Pellew will, in his reply perhaps, refer to the method of using boats for the instruction of Officers. We older hands, though we may hope once more to smell salt water, are right, I think, in considering what measures should be taken for bringing up the young officers, so that those who are now coming forward in the Service may learn to manœuvre ships as they now learn navigation, and every other useful science. I would, therefore, ask Captain Pellew, in his reply, to give his opinion as to the use of boats for instruction; because I was really struck with the great utility and the facility of giving instruction to the officers, as Sir William Martin did in the Mediterranean, by means of boats. I am sure that those midshipmen and officers who took any part in the manœuvres, directly any signal was made to their ship, would have known what was to be done; they would not have had the slightest necessity for thinking what they were to do, or where they were to go. The only thing they had to do was to manœuvre their ship, but how to manœuvre her, they had learned before. I cannot see that there would be any expense or trouble in employing boats for instruction. Captain Colomb has told us that the new signal-book is coming out. I am sure it will be a very valuable one. But why should not the Captains of the ships in the Channel squadron learn

manœuvring with boats as we did in the Mediterranean. We saw every manœuvre that a fleet could perform :—"Line ahead!" "Line abreast!" &c., without the slightest mistake, and after very little trouble. An officer might learn this system of tactics from boats alone.

Captain F. A. CAMPBELL, R.N. : I can bear testimony to the truth of what has just fallen from Captain Stewart. It may be thought that the practice is not kept up. It is kept up in the squadron, at least it was a year ago. After Sir William Martin's time, the boats generally assembled two or three times a week, under different Captains. It was, no doubt, an excellent school for young officers; the midshipmen, lieutenants, and captains themselves learned a great deal from it. When under steam, if a signal was made, they knew at once what they had to do, from perpetual practice in Valetta and elsewhere, under oars.

Captain HEATH : It fully bears out what I said of the fears I have, of too much science being introduced into this practical business. My first experience in learning fleet manœuvres was also in boats, thirty years ago. But if the captains have to go into their boats to learn the existing manœuvres, why, you will have to rely in future upon captains who have pulled about with your midshipmen in their boats. I mean to say that it is an argument for keeping the thing as simple as you possibly can. If the old, simple rules are not known to the captains, how are the new and more intricate rules to be known to them?

Captain FREMANTLE : I do not think the old rules were very simple. They were rather complicated; they were obliged to be complicated on account of the sails, and of those that were put in afterwards for use under steam—namely, beginning from 0 up to 100; I think there were 30 or 40 of them. I only speak from memory; there were very few, and, if I may presume to say so, I do not think they were particularly well put together.

Captain PELLEW : Captain Stewart, in a very flattering manner, has asked me to give my opinion about the use of boats for the purpose of teaching the manœuvring of the fleet. You learn a great deal from boats; a great deal in the way of practical experience. Of course it was easier in the Mediterranean, where you have no tides, and generally calm weather, than it would be in our harbours at home; though I have no doubt we could get the time in the summer to do it.

THE CHAIRMAN : I think we all row in the same boat. With few exceptions we do not know much about the subject, because we have not had the opportunity of learning it. I am sorry that with all our zeal we have such a small attendance of Naval Officers to listen to Captain Pellew's able and interesting paper. I compliment him upon the very able manner in which, in a small compass, he has told us a very great deal.