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SUBJECT: A STUDY IN FLEET NAVAL TACTICS --  
A PROPOSED BATTLE DOCTRINE.

(June 25, 1917)

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by

Captain A. P. Niblack, U. S. Navy.

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## A PROPOSED BATTLE DOCTRINE.

By Captain A.P. Niblack, U.S. Navy.

WARNING.

While there is such a thing as being too much occupied with the theory of war under ideal conditions to be adequately prepared for sudden hostile encounters under actual war conditions, yet it is only by the application of science to warfare that new weapons are developed and scientifically employed. Imagination, invention and thought are as much weapons of warfare as guns, mines, and torpedoes, but only when translated into the offensive. Mr. Simon Lake said recently that when he first showed plans of both offensive and defensive types of submarines to the Germans in 1905, Admiral von Tirpitz said:- "It is the offensive we are mostly interested in".

In land warfare, in the great war now going on in the world, the early tactics of the Entente Allies was merely the "echo", or simply copying what was done to them. To such a defensive is permitted only the slow and disheartening process of continually devising new replies, not having time to start anything new. Until such time as the other side is made to do the guessing decisive victory is not possible.

In modern war on the sea, with our naval frontiers on two great oceans, we must train for war in all climates, in all weather, and of every character, for, gloss it as we may, we have an empire to govern and defend. We originated the monitor, the all-big-ship, the aeroplane, and the two

successful types of submarines (Holland and Lake) only to see them perfected by our rivals, and we are only now beginning to overcome the inertia of pacifism, party politics, and local coast defense heresies. The average civilian yet fails to see that it is the battleships of England which control the surface of the sea, and the struggle for the moment is the subsurface control of the sea and the control of the air that remains to be decided. The battleship is merely temporarily eclipsed by the feverish developments of new auxiliary weapons.

#### THE STUDY OF NAVAL TACTICS.

Any study of applied naval tactics must take into consideration all the weapons and naval forces as they actually exist at this time, the methods of their use, and the probable theatres of operations, but, after all, any given naval battle is only the solution of a given tactical situation of which there may be any number of different ones. Any officer in control of even the smallest vessel may, at any time, be confronted with a situation requiring quick and accurate tactical judgment, but manifestly no set of rules can be formulated to cover all contingencies and it is difficult, in sudden emergencies, to apply general principles and tactical axioms to the particular situation confronting us. This is where battle doctrine comes in. It prescribes the employment of the various weapons in all general situations, leaving the plan of battle to apply it to the special situation.

The value of doctrine is shown in the manner in which generals retired for age are given high command in the German army, where doctrine permeates the whole organization,

and where the older the officer the better he is fitted to command up to the point where his physical powers do not relax. If, therefore, experience and training count for what they should, youth may stand for dash and physical endurance, but not necessarily for fitness for high command, whereas, with doctrine in the fleet, seniority is as good a method of promotion as selection up or political preferment and not nearly so demoralizing. Without doctrine permeating the service, it makes no difference what the retiring age is or how high command is distributed, as all depends upon the character and forcefulness of the leaders.

We already have the beginnings of a fleet battle doctrine in the "Battle Instructions" of Admiral F. F. Fletcher, U. S. Navy, but in order to go much further we must get down to first principles, and understand what a doctrine implies. A doctrine may be general, such as the "teachings of the schools" or it may be the "teaching of a school". It may be the teaching accepted by all or by some, but, as applied to a fleet, it is what the commander-in-chief prescribes and what any succeeding commander-in-chief may be expected to adhere to and expect all others to do the same. In its very essence it is dogmatic, because founded on sound fundamental principles.

In what follows, the paragraphs in *italics* constitute the proposed fleet battle doctrine, as justified by the explanations and reasonings which goes with it. Stripped of all discussion and reasoning and taken as a whole, the paragraphs in *italics* constitute the doctrine.

Battle doctrine (or Battle Instructions) is a code of rules based upon correct principles and methods of conducting war upon which we act spontaneously and without orders for the accomplishment of a definite purpose.

STRATEGY AND TACTICS.

Hamley says, "The theatre of war is the province of strategy; the field of battle is the province of tactics."

Arts. 5354(6) N.I., U.S.Navy Regulations, 1913, says: "Tactics applies to all naval movements and operations made after contact with the enemy's forces. The term 'contact' is here employed in a broad sense, meaning such proximity to the enemy as affects fleet formation and renders battle imminent" - but this is more a prescription than a definition.

Tactics may be defined as the best employment or handling of forces in contact with those of an enemy to secure, by decisive battle, those definite results which alone end wars and establish the aims of policy.

If policy should deal with preparation for war, strategy with the conduct of campaigns, and tactics with battles, a wide spread knowledge of strategy is not so important to naval officers as tactics, for few will deal with strategy, because operations will determine it. Battles are thus the decisive phases of campaigns which have been planned in pursuance of policy and strategy, and are upheld by efficient logistics and sound tactics.

Tactics may therefore be defined as the theory of fighting battles. Hamley says, "The object of tactics is to win battles."

BATTLE.

Baudry says, "To fight the enemy is nothing - we must beat him. We must mean to win." Hamley also says, "No battle has ever yet been won by purely defensive tactics." Aggressive fighting, on the old Nelsonian principle, is the basis of tactics, "To seek the enemy, to come up with him, and to beat him with superior forces." Thursfield calls it the "animus pugnandi" - the desire to get at the enemy in anything that floats.

All modern battles have been a series of combats, - Trafalgar, Nile, St. Vincent, Tsushima, Jutland. This will be increasingly true as types of ships multiply and groups come to be less and less homogeneous in the matter of speed.

The theory of battle requires that every group, or factor, that can in any degree contribute to success be brought into the action and utilized to the limit of its possibilities.

The distinct groups with which we have to deal, are (a) the main body made up of battleships; (b) battle cruisers, not built to "lie in the line", but of great strategic and rather limited tactical value; (c) destroyers; (d) scouts; (e) fleet submarines, and (f) submarine and surface mine layers. So much the worse for us if it includes a train of auxiliaries because we have failed in time of peace to provide adequate naval bases near the theatres of probable operations; so much the better if it includes special types such as fast mine layers, dirigibles, airplanes, and aircraft scout vessels. The groups, or squadrons, may be subdivided within themselves into sections and divisions, but each group must operate with some degree of independence. This is secured through doctrine, but to co-ordinate them into a concentrated attack is the function of tactics. If any subdivision fails to take its part to the limit of its power, then there has been wasted energy. Owing to the suddenness with which sea battles may take place, much depends upon the relative positions of the opposing forces when they reach effective gun fire range, at which instant the relative strength of the opposing forces will begin to change rapidly, as one or the other gets the initial advantage.

The time has gone by when we can regard tactics as merely opposing one column of battleships to another, and

much yet remains to be done in fleet training in divided fire, in signalling under battle conditions, in divisional and squadron collective torpedo-fire, and range finding.

#### TACTICAL PRINCIPLES.

The power of a fleet, and its success in battle, are based on four variables:

1. The employment of weapons,
2. The training and morale of the personnel,
3. The team work, based on excellence of organization and the habit of co-operation.
4. Leadership.

We may not place our reliance on any one of these variables alone, but the Commander-in-Chief must know how to utilize all the elements or to compensate for any lack, so as to secure the necessary superiority to win, for, if there is such a thing as an elementary or basic principle of tactics, it is:

"Be superior in force to the enemy at the decisive points of contact."

Quick judgment, concentration of purpose, energy, fearlessness of responsibility, intrepidity, and even audacity have their sphere in leadership, but once the action is joined, the fight must take its course under doctrine, unless one side or the other decides to withdraw, and, which is more to the point, is able to do so as the Germans did in the Jutland fight.

The principles of tactics derived from history, from games, and from theory (mathematics) may be enunciated under the following heads:

- I. The Effective Employment of Weapons.
- II. Co-ordination.
- III. Mobility.
- IV. Concentration.
- V. Surprise and Shock.
- VI. The Offensive.
- VII. The Plan of Battle; Battle Doctrine; Indoctrination; and the Initiative of the Subordinate.

#### I. THE PRINCIPLE OF THE EFFECTIVE EMPLOYMENT OF WEAPONS.

History shows that the principles which govern the conduct of battle do not change, but that their application varies, not only with the changes in weapons, but with the character of the vessels carrying them. It was Morogues, in his theory of tactics published in 1763, who laid down the law that the weapon is the basis of all tactics, and that it is only in relation to changes in weapons that tactics may change.

The destructive weapons of decisive battle are the gun, torpedo, mines, bombs from air craft, and, rather infrequently, the ram, but, on account of its great accuracy, long range, and destructiveness, the gun is the paramount weapon. The weapons other than the gun must therefore be considered as weapons of occasion. A study of their offensive qualities and of the various classes of tactical units carrying them should result in a determination of the tactics best suited to each in a modern naval engagement, and especially in co-ordinating their employment. Broadly speaking this is a matter of doctrine, for, as Baudry says, "the weapon is worth the man behind it, and no more." We are therefore justified in enunciating it as a principle:

Tactics is founded upon the employment of the major weapon. Other weapons, being weapons of occasion, should depend for their use on doctrine, and should regard their role tactically as influencing and seconding that of the major weapon.

## II. THE PRINCIPLE OF CO-ORDINATION.

In speaking of superiority to the enemy at "points of contact" the use of the plural emphasizes the thought of mutual support, or co-operation, secured through co-ordination in those maneuvers prior to battle, and during battle, which are embraced in the plan of battle, and which lead up to battle during the contact and approach periods.

There is nothing in tactics so elusive and hampering as co-ordination, for an unexpected movement of the enemy may thwart even the most skilful attempt. Co-ordination thus means team work, unity of action, organization, and thus implies intensive training to form the habit of co-operation and to develop skill. Concentration of numbers, which will be discussed later, is based on co-ordination of all weapons. Each subdivision is assigned its task in the plan of battle, for, even if the whole situation suddenly and unexpectedly

changes and the co-ordination fails, the doctrine and the "mission" remain. This implies knowledge of the doctrine and of the mission; loyalty to the plan of battle; and familiarity with the ideas of the Commander-in-Chief in the method of executing the plan in accordance therewith.

The difficulties on the game board of co-ordinating the movements of, say a main body, a "fast wing", and destroyer attack are stupendous even where subordinates are loyal and understand thoroughly the doctrine and their exact tasks. In battle they will prove more stupendous, for it is difficult to predict what the enemy will do, or to foresee developments, sometimes entirely fortuitous, which will upset the best plans, and even make co-ordination undesirable under the new circumstances. The failure in all plans not backed by or founded on doctrine is generally due to the fact that the enemy would not have done what he did had you not done what you did. Also what you might have done must always include what he might have done in reply. The forward pass at football fails so often, not because the player is not trying to get there to catch the ball, but because good interference prevents him. One mistake in the course taken may throw a game and may also throw a battle. Football and battle turn often on seizing upon the mistakes of the opponent.

Or the other hand, a smoke screen of a destroyer flotilla, adroitly planned for a co-ordinated attack, may, by a change of course of the enemy, not only spoil the gunfire of your own force, but give the enemy a chance to make a surprise movement under its cover. One's own forces also may suffer from mines laid or strewn for the enemy.

However, the elements of co-ordination are (1) definite orders; (2) a simple plan; (3) indoctrination; (4) association or habit through training; (5) quick signalling; (6) quick

understanding; and (7) quick action. As Baudry says, "Rapid assimilation requires that every one should know, foreknow, the chief's plan x x x. And, if the men who carry out the maneuver know it beforehand, its effect upon the men on whom the surprise is sprung is redoubled."

While chance or luck may enter into co-ordination and success therein, it requires sound judgment, founded on knowledge, plus training, plus experience through making errors, and plus thinking a good deal about it. There are good coaches for training football teams, but a billion dollar navy can find employment for more tactical coaches than we have at present.

Co-ordination is co-operation for mutual support to establish superiority at the decisive points of contact, and its elements are a definite plan, doctrine, and tactical skill.

### III. THE PRINCIPLE OF MOBILITY.

Mobility means much more than speed, for, as applied to tactics, it implies not only rapidity of movement, but skill and flexibility. Flexibility implies skill through training in the handling of weapons under all conditions likely to arise. Speed, after all, is only relative, while rapidity may be obtained through operating on interior lines, which is geographic and hence largely strategic.

It is through mobility that force, time, and space are co-ordinated and brought to bear at the decisive point. Mailard, as quoted by Baudry, says, "Surprise, mass, energy, and speed are the elements of decisive attack." As compared with the restricted movements of land forces in protecting lines of communication, etc., the mobility of sea forces gives a wide area of operations to naval tactics in a given time and space, and hence is replete with more surprises. Aircraft and fast scouts reduce the chances for surprise.

The principle of mobility implies similarity in handling

or turning power of groups of ships; similarity in types of weapons; robustness of machinery to insure sustained sea speed; good sea keeping qualities; fuel endurance or radius of action; and, in general, homogeneity. Homogeneity covers both the tactical and strategical requirements of mobility, but homogeneity and progress in design are difficult to reconcile. The tactical principle of mobility may be expressed as follows:

"To strike quickly is the first step towards striking hard."

#### IV. THE PRINCIPLE OF CONCENTRATION.

The studies and published works of Clerk, Morogues, Hoste and others, has led to the general acceptance that what we should strive for in battle is to concentrate upon a portion of the enemy force, leaving the remainder impotent. Succeeding writers have added to this, but the speed of modern ships have somewhat modified its application, as in the days of sailing ships, since the van can now turn to help the rear, if attacked as formerly. That conception at least is out of date.

In its simplest conception, concentration is merely combined attack. Mutual support is the tactical defensive idea of which concentration is the offensive expression, and we should always retain the offensive idea as the dominating principle.

When two fleets equal in number of ships meet in battle one can have the advantage over the other side through mutual concentration either

(1) By having a position which permits a concentration of fire on a part of the enemy's formation, and, at the same time, places some of your own ships beyond his gun-fire, or, to express it differently, the advantage of position is that your own average mean range is less than the enemy's. This requires that the nearest enemy ships should be concentrated

upon while other enemy ships in range are also kept under some gun-fire.

(2) By having a greater number of larger, longer ranged guns mounted on larger ships, whereby, having the same number of units, you secure superior concentration with only slight loss of mobility due to larger size of ships. Indeed such ships may open out to slightly greater distances in formation, with little loss in hitting effect, but keeping a well "closed up" formation is an element of "density of fire". In the ideal conception, if ships could be coupled together like freight cars, we would get the maximum effects of concentration through "density of fire" (or "battery concentration").

Superiority (a) by relative position and relative power is one form of natural concentration, and the other is (b) superiority in the NUMBERS of ships, where other things are equal.

When we come to consider numbers, however, the advantage is greater than the simple numerical ratio, because, through gun-fire, the chances of success are not directly as the number, but are approximately as the squares of the numbers of similar units. However, a great number of small ships requires close formations to obtain battery concentration, and this involves (1) lessened mobility through having to "close up", (2) complicated movements; and (3) added difficulties in signalling. Moreover the close order which is favorable to concentration of effective gun-fire is the most dangerous in which to receive torpedo attack. The two corollaries of this are (1) all big gun ships, and (2) the use of the torpedo threat to compel ships to open out in formation.

With intensive fleet gunnery training in divided and concentrated gun-fire, a squadron or fleet may, according to its degree of efficiency therein, use what is known as artificial concentration.

Assuming equality in number, position, and power of ships, the principle governing artificial concentration is that the enemy leading ship should be concentrated on by the two leading ships of our formation, and our last ships, or ship, should divide their fire on the two enemy rear ships.

There are many variations, however, of this formula, the governing condition being that all enemy ships must be kept under some gun-fire from our ships so as to do away with their "target practice conditions", or, in other words, to interfere with their fire control.

It will be noted, however, that when two ships are firing on one, there is danger that confusion in spotting may result, unless each ship distinguish its own salvos, and there may be a loss of effective fire owing to having to slow down the fire in order to spot carefully, or owing to other difficulties of fire control. Also, when the enemy leading ship becomes disabled by this concentrated fire, and drops back, it will become necessary for all ships (except the rear ones) "to shift targets, thus resulting in a loss of salvos and fire efficiency, until the control can be readjusted."

Our doctrine should be:-

"When two ships are to concentrate on one target, the one which is following should regulate its firing with the other so as to avoid, as far as possible, interference in salvos. When one ship is firing on a target and another ship subsequently chooses the same target, the latter should regulate its firing to that of the former to avoid confusion in salvos."\*

If it becomes necessary for one of our ships to drop out it shall be the duty of the next astern to divide its fire to take over its target, but if an enemy ship drops out, our fire should remain unchanged except for ships which have lost their targets. These should shift to the next enemy ship ahead or to the new leader, if it is the leader which drops out. The effective gun fire of no ship should be reduced because of too many other ships concentrating their gunfire on the same enemy ship.

Superiority of concentration should be at the decisive point, and on a portion of the enemy force which is unable, for the time being, to be effectively supported by the remainder of his force.

Artificial concentration of gun-fire is not so effective at long ranges; is very effective at shorter ranges where "the number of ships overcrowd the tactical area", and is easier and more effective the greater the number of ships.

One of its great advantages is that, when an enemy ship is damaged and falls out of formation, the morale of his forces

\* War College Conference, 1916.

is effected adversely out of all proportion to the numerical loss, but the numerical loss itself is also great as the "N-square law" begins to take hold.

"No vessel able by any means to retain her station should leave the formation; and any vessel that for any reason is forced out of formation should strive by every means within her power to rejoin."

"Vessels that drop out should be left unguarded to care for themselves, and should report when opportunity affords the extent and nature of their damages, their present and prospective speeds."

"Gaps left in the line by vessels falling out should be closed by vessels in the rear increasing speed until stand-ard distance is again attained."

"If the damage received causes a loss of speed that will prevent a vessel from remaining in or regaining position in formation, she should remain within the tactical field to do whatever may be possible to further the success of the issue, in absence of any orders to the contrary."

"Vessels dropping out of the enemy formation and which no longer constitute a menace to our main battle line should be disregarded by the main battle line (and by vessels capable of joining it) until the main issue has been decided."

"The distribution of fire should be as simple as possible and crossing of fire should be avoided. In general, all of the enemy capital ships within effective range should be kept under fire. Since we may be superior, inferior, or equal in number to the enemy's capital ships at the point of contact, the distribution of fire will require the closest coordination among ships and between the ship control and fire control parties of individual ships."

"Once fire is opened targets should not be changed unless there are strong and evident reasons for its necessity."\*

It is the superiority of one fleet over the other in efficiency in artificial concentration that will break the equilibrium, where no other advantage seems apparent.

It must not be thought that concentration refers only to gun fire.

Superiority at the point of contact may be in numbers; in types of ships; in guns, torpedoes, or armor protection; in speed; in skill, experience, morale, or doctrine; in fixity of purpose; or in all or several combined. The sum total must outweigh that of the enemy to insure victory.

When two forces are opposed to each other, we have what is called the N-square law, which may be expressed as follows:

\* War College Conference, 1916.

The fighting strength or ratio of power between two forces composed of equal units is approximately that of the square of the number of units engaged.

Suppose, for example, that A is opposed to B and C, "all three being identical ships, each capable of firing one round a minute, and assumed to be put <sup>out</sup> of action by four rounds."

A would be destroyed by B and C in two minutes. B and C would be destroyed by A in eight minutes. Therefore  $\frac{B + C}{A} = 4$ . "That is, the fighting value of two vessels fighting one is four times as great as that of one vessel fighting. Similarly, three vessels fighting two would stand to them, in point of fighting value, in the ratio of  $\frac{9}{4}$ ." (Baudry, "The Naval Battle, pp 99.)

This theoretical ratio may be actually assured by superior position and judicious gun-fire distribution.

Where destructive values, or relative fighting values can be assigned to the units, the fighting strength of the whole force is as the square of the number multiplied by their individual strength, or we may express it thus:

"Where the component units differ among themselves, as in the case of a fleet that is not homogeneous, the measure of the total fighting strength of a force will be the square of the sum of the square roots of the strength of its individual units."

This is so important as to merit clear illustration, but first let us clear up the relation between dreadnoughts (AA) and pre-dreadnoughts (A). The 8-inch guns of the latter do not come into play until 16,000 yards is reached. Six A would have 24 - 12-inch and 48 - 8-inch guns, and we take them as an example. The chance of hitting as demonstrated actually for an 8-inch gun, at the above range, is as to the same for 12-inch as .02 is to .035, but the effect of an 8-inch hit will be only one half of a 12-inch hit. We may establish the relation between the 48 8-inch guns, and the 12-inch, according to Captain N.C. Twining, U.S. Navy by the equation,  $48 \times .02 \times .5 = .035 X$ .

$$X = 13.7$$

or, at 16,000 yards, 48 8-inch are equivalent to 14 12-inch. (At 10,000 yards we would have:

$$48 \times .12 \times .5 = 17 X$$

$$X = 17.)$$

In other words at 16,000 yards four 8-inch guns are equivalent to one and one sixth 12-inch. We can drop the one-sixth, so that an A may be said to have 5 12-inch, at this range.

Now if a ship's offensive power, relative to another, is the length of time it will take it to put another ship out of action, we must consider its "defensive power" as the number of hits it can stand, in other words, its "life".

It is generally assumed that the life of an AA is 20 hits, and of a BB and A 15 hits.

To apply all this practically. The "Power Factor" of a ship is the product of the number of its big guns and its life, or protection, or defensive power, in terms of number of big hits it can stand.

The "Fighting Strength" of a homogeneous force and the "Total Fighting Strength" of a non-homogeneous force is the product of its total big guns times its total life.

As to number of guns, an AA may be assumed to have 10; an A 5; and a BB 8.

As to life, an AA may be assumed to be destroyed by 20 hits (12 inch), and an A or BB by 15 hits.

From these assumptions Captain N.C. Twining, U.S.Navy, deduces the following:

<u>TABLE OF POWER FACTORS.</u>	<u>Power Factor.</u>
AA = 10 (guns) x 20 (life) = 200	1.0
BB = 8 " x 15 " = 120	.6
A = 5 " x 15 " = 75	.375

Taking the square of the number of ships of each of the above types in a fleet, and multiplying by the power factor for each type, we may get the power multiples for each group. The square of the sum of the square roots of the power multi-

ples for the groups will furnish the basis of comparison with another fleet whose value we similarly computed. Taking the range as 16,000 yards, where 8-inch guns come into effect, we may make up a series of tables for successive numbers from 2 to say 30, and also of AAs and BBs, from which we could quickly compute, and compare, the fighting strength of two opposing forces.

Let us take several problems by way of illustration:

A Red force of 13 AA, 20 A, and 5 BB is to be compared with a Blue force of 10 AA and 22 A, with a view to determining whether or not the 5 BBs may be spared for a special mission.

	No.	Square	Power Factor	BLUE FORCE.		Square Root.	Square.
				Power	Multiple		
AA = 10		100	1.	100		10	
A = 22		484.	.375	171.7		<u>13.4</u>	
						23.4	547.56
RED FORCE							
AA= 13		139	1.	139		13	
A =20		400	.375	150		<u>12.25</u>	
						25.25	637.56
BB= 5		25	.6	15		<u>3.87</u>	
						29.12	847
Total							

Blue 547.56 is 65% of 847.97

Blue 547.56 is 85% of 637.56

Red may take a chance, if he feels inclined, and detach his 5 BB.

We may take also the problem of a Blue force of 9 AA and 28 A opposed to 9 AA, 4 BB, and 18 A.

	No.	Square	Power Factor	BLUE FORCE.		Square Root.	Square.
				Power	Multiple		
AA = 9		81	1.	81		9	
A = 28		784	.375	294		<u>17.15</u>	
						26.15	683.82

## RED FORCE.

	<u>No.</u>	<u>Square</u>	<u>Power Factor</u>	<u>Power Multiple</u>	<u>Square Root</u>	<u>Square.</u>
AA =	9	81	1.	81	9	
BB =	4	16	.6	9.6	3.1	
A =	18	324	.375	121.5	<u>11.02</u>	
					23.12	534.53

Red Force (534.53) is 78% of Blue force (683.82)

The application by Nelson of superiority of numbers, in his tactics at Trafalgar, differed slightly from that set forth in his famous "memorandum", but one authority claims that "Nelson, if not actually acquainted with the N-square law, must have had some equivalent basis on which to figure his tactical values used in the memorandum." \*

Captain Twining says, " The N-square law is unquestionably sound but it must be remembered that it furnishes a static comparison only, and is, in the language of mathematics, -"instantaneous"- that is to say, it furnishes a comparison based on strength when both forces are in a certain assumed condition, where each unit has the assumed power factor; it takes no account of position or ability to gain position."

#### V. THE PRINCIPLE OF SURPRISE AND SHOCK.

Moral forces, or morale, cannot be improvised, for like confidence, of slow growth, must be developed through discipline, long training, and those high qualities of leadership which inspire mutual respect, trust, and confidence in all the members of a ship's company and in all the units of the fleet. Napoleon valued morale in the ratio of three to one over material forces. Invisible and imponderable, it is a dominating factor in war.

It takes organized violence and shock to break down this moral force, and, as Baudry puts it, "In battle one common doctrine is action upon the enemy's morale by violence and

\* "The Principle of Concentration." Lanchester, 1916.

surprise, by concentration, and by initiative in maneuver.  
 x x x To attack is to impose one's will on the enemy from the outset, to retard the development of his plan and his attack; it is equivalent to dominating the enemy by surprise.  
 x x x The factor of 'surprise' is to be found in all decisive battles."

Surprise is accomplished by mobility and co-ordination, and especially by doing what the enemy fears you may do. Its effect is psychological, and he will imagine exactly what he fears, and all that he fears. Sudden attack by night or day is a severe test of the discipline, morale, and organization of the force attacked. The torpedo, mine, and submarine are peculiarly weapons of surprise, and their menace has had the effect of reducing the initiative of the battleship, which was formerly the bully of the seas, not only restricting its activities but in a measure immobilizing it.

The replies to a threatened night attack on a fleet at sea are evasion; to offensively scout out such areas by day as will be traversed at night; a judiciously selected open formation with outlying screens; or a radical change of course or speed, or both.

The elements of a surprise attack are accurate information of the enemy's movements and formation; nearness to the enemy; adroitness of plan; and rapidity in executing tactical concentrations.

In chance encounters that force is least surprised which is the better trained, but we must not disassociate surprise from violence and "frightfulness" for there is a point at which the resistance of any organization of human beings, held together by habit, by discipline, and by morale, will break down under what Baudry classifies as destructive, demoralizing, and disorganizing blows and which he further describes as (1) destructive to material forces (elimination of men, units, guns); (2) demoralizing to moral forces (shock to morale, the physical human factor) and (3) disorganizing to organic forces (organization, training, interior and exterior communications,

"dislocation of prearranged order of battle.") Therefore as a tactical principle:

Surprise and shock should be used whenever possible as elements of decisive battle, but, with proper use of air craft, and fast scouts it should be impossible to be surprised by day.

#### VI. THE PRINCIPLE OF THE OFFENSIVE.

The offensive, as a tactical principle, means the initiative, or "doing it first".

A force which is compelled to regulate its movements to correspond with or to co-ordinate all its units with one slower than the fleet speed of the enemy force is automatically on the defensive. Such slower force cannot permit its units to operate away from supporting distance at the risk of being defeated in detail. At sea the defensive has not the advantage of being firmly intrenched, as on land, and the attack is moreover no less exposed than the attacked. On land it is always possible to bring on a battle by attacking, but in sea warfare a force may withdraw into fortified bases, abandon its sea communications and command of the sea, and submit to blockade.

In war on the sea, as Daveluy says, "When a squadron finds itself in a bad position with relation to the enemy, it ought to renounce every enterprise (initiative) until it has dis-engaged itself. It will thus be on the defensive. That is a position that is accepted, but is never sought; it always implies a critical situation."

There are four classes of tactical maneuvers in naval battle two offensive and two defensive. The two offensive are (1) the "initiative" and (2) "range movements". The two defensive are (3) "safety first" and (4) a "temporary defensive attitude."

(1) The "initiative" requires great skill and tactical understanding during the approach and in the engagement to impose our will on the enemy, placing him on the defensive and constraining him to movements in reply to what we do to him from our superior position and concentration thereby compelling him to lose effective gunfire if he turns away, at least during the movement.

(2) "Range movements" are maneuvers to open or close the range, or to maintain the range.

(3) The "safety first" movements are those (a) to evade a torpedo, mine, or submarine menace; (b) to avoid dangers to navigation; (c) to escape from the handicap of bad sunlight, spray, swell, or smoke - or in any disadvantage which may require a fleet to turn away with resultant loss of effective gunfire.

(4) "A temporary defensive attitude" may be defined as an apparent but not real acceptance of the defensive, or as partaking of a withdrawal movement, such as

(a) A retreat in the nature of a rear guard action.

(b) To lure the enemy over a mine field or towards a trap.

(c) An engagement to detain or delay or hold an enemy force to help out a co-ordination or the arrival of re-inforcements.

Commander Blamer says that historically, "The defensive has not a single naval victory to its credit; the cautious offensive has many partial victories; but only the impetuous offensive has won complete victories", and he defines the impetuous offensive as that in which all losses are accepted, and menaces disregarded.

While insisting on the desire to fight and the principle of the offensive we must nevertheless recognize, classify, and diligently practice in the fleet those simultaneous and successive movements which have to do with (1) "safety first" and (2) "temporary defensive attitude", which contemplate an immediate resumption of the offensive."

If the enemy gains the initiative we must plan to deprive him of it. These movements, (the above maneuvers) and movements to open and close the range constitute the purpose of tactical maneuvers in battle, animated by the spirit of the offensive.

Clausewitz says, "The essential characteristics of offensive warfare are rapidity, decision, and continuity of action". It is thus a question of leadership, doctrine, and morale.

The fleet at sea is always mobilized and concentrated, and, therefore, ready for the immediate offensive. There are no reserves. If the ships of the fleet are destroyed they can not be replaced for some years.

If, in order to parry a menace, the tactical defensive is forced upon us, all our subsequent operations and maneuvers should be dominated by "an offensive idea", "the feeling of the offensive", - the spirit of attack. An active fleet with a positive object in view should be aggressive from the first contact, and have, as its fundamental doctrine, to take the offensive and keep it, leaving to the enemy only a reply limited to either what you permit him or what you may foresee and turn to profit.

VII. THE PLAN OF BATTLE; BATTLE DOCTRINE;  
INDOCTRINATION; AND THE INITIATIVE OF  
THE SUBORDINATE.

These are questions which are still somewhat in the air, or at least in the realm of discussion from which so little of practical value has yet emerged that most officers are beginning to think it is about time something substantial should be forthcoming.

We all agree that a general plan of battle is essential before action. It should and must be simple. Tasks must be assigned to each group or force. Some initiative and independent authority must be permitted, but all units must cooperate and co-ordinate.

"The plan of battle will specify the role to be played by each subdivision of the fleet; it will fix the direction, with reference to sun, wind, sea, or swell from which the enemy is to be attacked, the speed of the force (relative to the enemy's speed or absolutely) the direction in which the enemy is to be turned or the turn that is to be denied; whether the attack is to be pressed home to short range or kept at long range; whether a quick decision is to be sought for, or containing tactics adopted; whether destroyers are to attack the enemy, deny him certain areas, or remain in reserve as means of giving the coup de grace" etc.

But when two fleets are approaching, and, after scout contact has been made, the Commander-in-Chief "cannot issue long, detailed, and possibly intricate, instructions as to the particular part each group of his force is to take in the impending battle. Yet each detachment commander must know what his force is to do, and, also, equally important, what other detachments are to do."\* This is the function of the plan of battle. Once the action is joined the subordinates are dependent upon their own initiative, because signalling in battle is difficult, and hence arises the necessity for battle doctrine. In the rapidly changing phases of battle, after the attack is once launched, decisions must be made and must be executed without the loss of the time necessary to signal to higher authority, for probably by the time our answer could

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\* War College Conference, 1916.

come back the conditions would be changed entirely. Thus arises the principle of the initiative of the subordinate, growing out of battle doctrine, the plan of battle, and indoctrination. It is important that we go further into these questions to define them more accurately, and clearly.

Yarnell, speaking of battle doctrine, says "It is instilled by study and practice. It is based upon skill, knowledge, and experience, and aims to give one mind, and from it flows the 'initiative of the subordinate' from which he may act correctly in an emergency when orders or instructions from higher authority are not available."

A plan of battle flows from a previously formulated doctrine, and merely applies the doctrine to the particular situation confronting the Commander-in-Chief, who, after a rapid "estimate of the situation," giving due consideration to the enemy forces and his own, his mission, his enemy's probable mission and intentions, hydrographic and meteorological conditions, time of day, wind, swell, spray, etc. then determines his plan of battle and signals it.

Doctrine is thus not only the comprehensive conception of the conduct of battle, but is the guide for the formulation of the plan of battle, which is merely the distribution of the forces and the assignment to them of the tasks necessary to crush the enemy in the given situation. But we must recognize that, antecedently, in strategy there has been a plan of operations outlined well in advance (1) to fit the character of the forces on both sides; (2) to conform to the geographical requirements of the theatre of operations; and (3) to prescribe the methods by which the weapons available are to be assembled, organized, and employed. The doctrine deals with the employment of the weapons in all general situations. The plan of battle takes care of the particular situation, and is, in a measure, a guide, in the approach, to bring all the forces or groups either simultaneously or in co-ordinated succession in approximately the relative positions and at the time intended, as in a game of checkers,

and, if the plan of battle even approximately does this work, it will have well served its purpose, for once the battle is joined only trained doctrine can meet the rapidly arising situations.

In the engagement or battle, a hard and fast plan would be undesirable, as the mistakes of the enemy offer splendid openings which no plan can foresee, and, on the other hand, he may spring such surprises that no plan but only doctrine can meet.

Any plan of battle, however inadequate or defective, is better than none at all, for, given a battle doctrine the plan is designed to assign tasks to fit the characteristics of the types composing the groups, and those of their commanding officers, and, therefore, the more we can accomplish by battle doctrine the less there will be to signal in the way of plan of battle. There is, in this intermediate ground between battle doctrine and battle plan, a field for an efficient Commander-in-Chief to impress his personality and methods upon those under him. It is this phase, or function, of leadership which is limited only by the personal abilities and magnetism to which the term indoctrination has been too often so very wrongly and narrowly applied.

It is entirely misleading to use the word indoctrinate to mean "When all the units of a force are trained to act effectively in accordance with the ideas of the Chief Command they are said to be indoctrinated" for suppose his ideas are not in accordance with correct principles what happens in battle and also when another officer takes hold? On the other hand indoctrination should mean, as it does in Germany, where all the officers are trained to act according to principles accepted by all as sound and more or less binding. This war has shown that the German army has been so thoroughly indoctrinated that for two and one half years it never lost the initiative, and that its corps commanders have all seemed Napoleons in strategy and

tactics, and Kitcheners in logistics.

Even if some one should work out for our Navy a perfectly acceptable and comprehensive doctrine for our fleet, it would take time to indoctrinate subordinates for its successful execution, but if resisted by them through disbelief, there would be "sand in the gear box" . While the initial plan of battle is rarely carried out in its entirety, what doctrine does not supply must be left to chance for battle doctrine saves lost motion, and leaves as little as possible to chance through the initiative of the subordinate.

During the engagement it is essential to insure against all undesirable actions of the enemy, to follow our mission, and deal with all unforeseen emergencies and hence arises the initiative of the subordinate.

It is a paradox that the less the plan of battle is based upon "common doctrine tested and mutually accepted as sound," the more the initiative of the subordinate will be limited, and the more he will be bound by what orders he has. "In the extreme case of no plan and no doctrine, the subordinate will be able to exercise no initiative whatever. In order to preserve cohesion in purpose and in effect in such a case, the subordinate would have to act under command rather than under orders and instructions."\* Thus we see the reason for the paradox that the effect of battle doctrine and a harmonious plan of battle is to open up the field to the initiative of the subordinate, or as it may be expressed:

"When acting in accordance with a common doctrine and within the frame of a battle plan, there should be no restriction upon the initiative of the subordinate commander in battle."\*

This is not at all the popular conception and there is

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\* War College Conference, 1916.

much resistance to its acceptance, but when subordinate commanders know the whole plan and the doctrine they can act. When they do not they must stick to orders and commands (signals).

If indoctrinated a subordinate can modify his movements as special situations arise and can make his actions contribute to the plan in the direction of the end at which he knows his superior to be aiming.

As long as possible the mission and not the enemy's movements should be considered the governing factor.

The Initiative of the subordinate has as its guide (a) to further the general plan, (b) to take advantage of mistakes or of positions gained, and (c) to work out of positions of disadvantage.

Co-ordination is made possible by indoctrination plus the plan of battle. Concentration is made possible by co-ordination. "Effective concentration, combined with the spirit of the offensive makes victory possible."\*

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\* War College Conference, 1916.

PHASES OF NAVAL TACTICS.

The tactical phases of fleet or naval battles are:  
 (a) Scout Contact, (b) The Approach, (c) Engagement, and  
 (d) The Pursuit.

Each of these phases has a tactics of its own. Therefore we must consider, as a preliminary, the more general questions of the tactics of the employment of the various weapons of naval warfare, and the tactics of the employment of the various types of ships.

THE TACTICS OF THE GUN.

Gunnery under "target practice" conditions is better than where the target is itself shooting back and especially if it is hitting you. Therefore, if we get the enemy's range first and begin to hit him the resultant disturbance of his gunnery will bring about comparative target practice conditions for us. As this "priority of gun fire effect" or "initial advantage" is what we should strive for, the tactics of the gun, and our doctrine should be to:

Inflict at the earliest possible moment the maximum number of hits on the enemy thereby permitting him the minimum number of hits on us.

In considering the "fighting value" of a ship, we have seen that its "power factor" includes both its ability to inflict damage, and its resistance to projectiles at the range at which it is intended to fight. A gun's chances of hitting and number of hits depends upon (1) accuracy of aim; (2) accuracy of sight bar range; (3) size of danger space; (4) density of fire, and (5) calibration of guns for ranges to be used in order to reduce preventable dispersion, and (6) unpreventable dispersion, a certain amount of dispersion being desirable in order to admit of spotting salvos.

The actual effect of a hit depends upon (1) the remaining velocity of the projectile; (2) the weight and character of the projectile; and (3) the location of the hit. Some luck enters into the question of where it hits, but:

"The destructive effect of a gun, at any range, relative to the same gun at any other range, is represented by the square of the remaining velocity multiplied by the percentage of probable hits at that range."

From the results of our fleet target practice from year to year, we may make out fire effect curves from which we may obtain, for every caliber of gun and for all ranges, the probable percentages or chances of hitting.

Baudry in his "Naval Battle" shows, mathematically, that, if two equal ships engage at ranges where each can get hits and one has four minutes priority of fire, the decision in his favor under modern conditions would be reached theoretically in twenty-six minutes and the winning ship would still have "60% of her power intact". This priority of effect does not count lucky shots, but supposes that, after being fired on for four minutes the other ship succeeds in getting on the enemy ship and replying to his fire. When a ship is damaged by gun fire the geometrical ratio of loss of "fire effect" through damage begins its fatally increasing preponderance. It is therefore thought that Baudry overstates rather than understates the time, and that the decision would be reached because of loss of morale through demoralization and destruction, for Napoleon says this factor is as three to one.

Priority of fire effect, as the initial advantage so much to be sought may be obtained:

(a) By better fire control, viz: spotting, training, installation, and system.

(b) By divided fire using artificial concentration.

(c) By tactics viz. maneuvering into a "position of advantage" to secure natural concentration.

(d) By a more concentrated formation actually, or by having larger long range guns in larger, heavier ships.

Or to sum up, (1) by maneuver, (2) by fire control (3) by bigger ships.

In this treatment of gun fire effect we have given much importance to mathematics. It is well to incorporate in our doctrine a belief in the mathematical theory as follows: Most sound tactical principles are pure mathematics. By the theory of probabilities, certain laws hold for the average of a sufficiently large number of cases, while leaving no certainty in any individual case.

As to the extreme ranges at which we are justified in opening fire our doctrine should be to:

"Open fire on the enemy at the range at which we may probably get one hit out of a salvo, or one hit out of every half salvo, and seek to close the range to follow up the advantage, because with either superiority or inferiority of gun power the answer is the same - close action.

This contemplates firing ranging half salvos instead of single shots to establish the range, at the present time at from 20,000 to 25,000 yards, if visibility is good. In closing the range due regard must be had to effective torpedo range and other conditions.

As to effective methods of finding and keeping the range, due to modern conditions of high speed and long ranges:

Superiority in the ability to predict the sight bar range of the enemy is, more than any other, the one factor in priority of fire effect. This, with ability to keep the range, should be the aim of gunnery training. With this in view no expense should be spared in improving our mechanical aids to gunnery.

As to artificial concentration of gun fire in a fleet action, the doctrine should be:

If the enemy fleet is the faster, concentrate gun fire on the rear of the center of his formation. If our fleet is the faster concentrate forward of the center of the enemy's formation, preferably on the leader if he is near the normal from the center of our formations.

The question of artificial concentration and divided gun fire is one of intensive training, and this, in connection with director firing, will give that flexibility which is essential to firing under any conditions of wind and weather. Gunnery is a profession, our profession, and commanding officers owe it to themselves to exact from the personnel under them such efficiency in fire control and to demand such equipment of their ships as will permit divided fire for each turret should be so fitted that its turret officer can fire not only each gun but all the guns of his own turret alone or in combination with any other or all other guns or turrets by salvo or director firing. This sounds complicated but is elementary. With each ship fitted with two or more plotting rooms and separate fire control installations, and with each turret having its own range finder, separate loading for each gun, and the necessary fittings to each turret to enable it to fire either independently, or salvo, or director, we would get that flexibility which we have a right to expect. Added to this should be both mechanical and hand loading in all turrets. To say that all this is too complicated is begging the question.

Initial superiority in gun fire has, as its elements the seven Ss, jokingly christened the "Seven Southerland Sisters", viz. (1) Scouting, (2) Seeing, (3) Sun, (4) Smoke, (5) Spray, (6) Swell and (7) Spotting. Let us consider them severally and jointly in relation to tactics.

(1) The first great initial advantage before all others comes with that information of the enemy's formation, composition, course, and speed, which we should seek to gain through Scouting.

This is called tactical scouting and has a tactics of its own, in which the battle cruiser is important in pushing home scout contact and denying information to the enemy as to our own forces.

(2) When the enemy is sighted by our battleships, our advantage in seeing will depend upon the artificial or optical installation on our Basket masts, which will enable us to utilize our advantage through long range spotting and directorscopes, at the same time avoiding interference for smoke or spray from such high positions.

(3) The sunlight has to be considered. While a glare on the water or sun in the eyes may be neutralized by ray filters or shade glasses on the gun sights, nothing can help the spotting. An altitude of the sun greater than 20° is not apt to interfere.

(4) The wind may blow the smoke and gases from the funnels, and from the guns themselves in such a way as to not only smudge the gun sights and optical instruments, but to prevent seeing and spotting, or greatly interfere with them. Firing towards the wind is advantageous for gun fire as to non-interference with visibility of target, however much it may have disadvantages from spray or an enemy smoke screen. Director firing overcomes some of these disadvantages.

(5) Spray has to do with the wind and the sea, the two combining to bring the spray aboard, deluging the sights and optical instruments of a ship in the leeward position which is firing to windward; or the wind may blow the masses of water aboard thrown up by the splash of enemy projectiles which fall just short.

(6) Swell is not the same as sea. There is often a long swell that has no relation to the wind and sea at the moment. The rolling period of our battleships is about seventeen seconds, while the period of the seas is from three to six seconds. While each ship has its peculiar susceptibilities, a quartering sea fetches most ships. The worst feature of rolling, from a gunnery standpoint, is the yawing. The director system is designed to overcome the disadvantage of rolling, and firing in the middle of the roll, when the ship is on an even keel, eliminates yawing. When the ship is rolling she exposes vulnerable parts below the armor belt.

(7) Spotting is essential to effective gun fire, and should be effective from both high and low positions.

However much we may realize the importance of the seven Ss we may remember what Bellaire says:

"The sea in all its aspects is always the ally of the best trained and best equipped navy."

In former days the windward position, the old "weather guage", was sought, but now it brings with it interference from smoke and gases in firing to leeward. It is valuable for a smoke screen attack, but today the leeward position is preferable, although director firing and spotting from high positions relieves much of the penalty for wind and smoke in the windward position.

It is axiomatic, therefore "that the combined fire of as many guns as possible, concentrated according to a definite plan, by means of a well directed fire control, is the essence of naval warfare and the true basis of naval tactics."\*

This implies the obligation for us to develop fire effect to its fullest extent.

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\* Naval Inst. Proceedings No. 118 "The Elements of Fleet Tactics."

THE TACTICS OF THE TORPEDO.

We will consider only torpedo fire at a number of ships in formation. The "speed point" is the advantageous position in advance of the enemy formation from which to launch a torpedo attack. If all the torpedoes fired are assumed to pass between the end ships of the enemy formation "the chances of hitting are proportional to the ratio of length of ship to the 'open water' which can be seen at the instant of firing. When no open water is seen between target ships, all torpedoes will hit", if conditions are what they should be. Our doctrine should be:

"The point of aim should be the center of the formation or part of a formation selected for torpedo attack." \*\*

Our doctrine should be:

Battleships should not attempt to gain favorable positions for torpedo fire at the expense of their own gun fire, whereas battle cruisers, operating as a fast wing, should do so when this fire appears more important than their gun fire. It is permissible for any ships to fire torpedoes which finds herself in a favorable position to do so, just as it is for her to use her secondary battery for torpedo defense, in case of a torpedo menace.

It is not possible for battleships under heavy gun fire to fire torpedoes by salvos or with prearranged dispersion. By firing at the center of the enemy formation, or leading division, the personal errors in determining the setting of the directors will automatically give the desired amount of dispersion.

The tendency of a torpedo menace is to make a fleet open out, and to divide both his "interest" and his gun fire. It may also force it to turn away, or to maneuver under gun fire. This is the role of the destroyer whose tactics will be considered later on.

THE TACTICS OF THE MINE.

There are really three classes of mine fields to be considered tactically, as distinguished from more or less permanent mine fields of electro-contact mines regarded as part of the fixed defenses of a given region. These are (a) floating mines of limited activity

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\*\* War College Conference, 1916.

adroitly strewn by fast vessels across the path of an approaching enemy force; (b) anchored contact mines laid on soundings by sea-going mine laying vessels of high speed accompanying the fleet; and (c) torpedoes of very limited range fired by groups of small submarines, operating only several days distance from a base. It is clearly proper to regard such submarines not as torpedo vessels but as mobile mine fields of limited radius of action, but performing the functions of mines over an area limited by their ability to place themselves in a favorable position, to fire torpedoes, or to themselves lay mines ahead of an approaching enemy.

In all cases the enemy force must not only approach but actually traverse the dangerous area to make the weapon really offensive. The tactics is therefore essentially defensive in character.

"It must not be overlooked that our own mines may become serious menaces to our own force. Clearly, therefore,

The use of mines may not be haphazard but should be in accordance with the plan or under the direct command of the Commander-in-Chief." \*

#### TACTICS OF THE EMPLOYMENT OF TYPES.

(1) Battleships. With dreadnoughts the maximum gun fire is limited to 30° on the bow or quarter, whereas, with pre-dreadnoughts, the angle is 45°. "Battleships of either type, or of both types in combination, will be used to receive and deliver the heaviest blows in the gun fight at sea." \*

If equal ships, in two columns, are engaged on parallel courses, they are at an equality as regards advantage of gun fire and range. If their courses converge, that column nearer to the point of convergence has the shorter average range, and will get only bow fire from an increasing number of opposing ships as he closes on the point of convergence, until, at the T or cap, he is opposed only by the bow fire from the enemy leading ship. This convergence is secured by speed only where the other force stupidly stands on. The density of fire is increased by closing up in formation, and fire effect is multiplied by concentration and divided fire.

(2) Battle Cruisers are useful for (1) Reconnoitering for information and denying it to the enemy; (2) Breaking down enemy's screen and scouting plan; (3) Raiding. Tactically the instant we put them in the line of battle we lose their superior speed, and expose their weak armor, hence their best tactical employment is to use their speed to operate against enemy flanks to disorganize his ships by gun and torpedo fire, and to force him, by menace or attack, to make undesirable changes of course under gun fire. The enemy replies to a fast wing, adroitly used, are to either turn away, or to detach a force of battleships superior in gun power to operate against it. The necessary condition of such employment of a fast wing is that the battle cruisers must be superior in speed to any group of enemy battleships. <sup>much</sup>

\* War College Conference, 1916.

The present status of battle cruiser design which we are called upon to meet is shown in the following table.

TABLE OF LATEST BATTLE CRUISERS.

England,	displacement,	30,000.	Guns	8	13.5"	Speed,	30 knots.
Germany,	"	28,000.	"	8	12"	"	28.5 "
Russia,	"	32,000.	"	12	14"	"	32 "
Japan,	"	27,500.	"	8	14"	"	27 "

(3) Destroyers. Destroyers may be employed for a night attack, or in a daylight action.

"In a night attack, destroyers should operate in groups, dispersing for search and concentrating for attack. In daylight action, in co-operation with capital ships, they should operate and attack in groups, supported by gun fire of major units and by an effective use of smoke screen, if conditions warrant." \*

Destroyers are essentially weapons of offense. They should remain beyond the range of the enemy's guns until the time has arrived to close to torpedo range. They should keep the enemy in a state of constant uncertainty and expectancy, and to this end they should make feints.

"Destroyer attacks against destroyers are likely to prove unprofitable; but may be justified under special circumstances, as for example, in carrying through and offensive against enemy major units or enemy submarines." \*

The force which first pushes home a torpedo attack will have leisure to deal with the enemy's destroyers afterward. The day attack may be delivered in any one of three ways:

(1) Where the destroyers are on the disengaged side of our own force, and smoke interference interrupts gun fire, by going through our own formation and traversing the zone of fire.

(2) Coming down on the head or bow of the enemy's column, especially from the windward with smoke screen.

(3) Attacking the head of the enemy's column, compelling it to maneuver.

The tactical defense against a destroyer attack is to destroy by gun fire, and turn away from approaching torpedoes, out of the danger area.

"When the conditions are favorable for creating and maintaining a smoke screen, it may be used tactically with effect in:

1. Furthering an attack of destroyers.
2. Concealing maneuvers from an enemy.
3. Protecting a weaker force endeavoring to escape from the gun fire of a superior force.
4. Covering operations against fixed fortifications or by such fortifications."

\* War College Conference, 1916.

"The conditions most favorable for laying an efficient smoke screen are:

1. Rainy or misty weather.
2. Low barometer, strong wind (from force 4 up) and high humidity.
3. At night." \*

The main consideration in the laying of a smoke screen is the question of whether or not the enemy, by turning away, may convert it into a disadvantage to us.

(4) Cruisers or Scouts are to obtain information of the enemy dispositions; then as a flank guard to the main body against destroyer attack; or to support and protect our own destroyers in their offensive against the enemy.

(5) Submarines. At night submarines operate on the surface as torpedo craft. By day they are simply submerged moving or mobile mine fields of 6 to 12 knots speed, for limited distances. Their tactics is to operate on interior lines, and to await the approach of the enemy.

The larger type of submarine, for the offensive, has all the qualities of a cruiser, destroyer, and submarine combined.

It being exceedingly difficult to co-ordinate between submarines, our doctrine should be to station them along a line at distances of five to ten miles apart in the probable path of the enemy. An important tactical use is to deny certain areas to the occupation of enemy forces.

Against submarine attack of our ships in formation, our doctrine should be: If, cruising in column, an enemy submarine appears within 6 points from ahead and within 1000 yards, the leading ship turns four points towards the submarine, stands on, and then turns directly for it to ram it. Other ships in same division also turn towards it in same way. Following divisions turn away.

During the approach, or in battle formation ships do not turn out to avoid a general submarine attack, but each ship maneuvers to avoid any torpedoes it sees coming at it, getting back into formation, and position as soon as practicable.

To a ship not approaching a submarine the chances of a torpedo hitting is so small at one thousand yards that, at any greater range, the ship's best chance is to turn away, compelling the submarine to completely submerge by a well directed and vigorous gun fire.

A periscope can be seen usually at from 2500 to 3000 yards and a submarine in an awash condition is visible about 12 miles. It is particularly visible when on the horizon, and for about three miles beyond and three miles inside the horizon. There is a relatively invisible zone up to about three miles for a submarine. Within two miles it is easily detected by day, but if it has long range torpedoes, and ship is approaching it, quick action is required. Turning away is usually the best tactics. For a single ship, irregular ziz-zagging is advisable in proceeding at sea, but vigilance is the price of immunity.

\* War College Conference, 1916.

Submarines are the best tactical mine-layers, and conversely the mine and bomb, with hydrostatic piston, are the worse enemies of the submarine.

(6) Mine-Layers. Tactically great speed is a requirement of a fleet mine layer, hence destroyers and scout cruisers are best to lay mines in hostile areas, and get away quickly. Not only should they be able to lay contact mines, and strew floating mines, but they should also carry supplies of dummy periscopes with live mines attached.

The slower types of mine layers are for local defensive purposes.

(7) Air-Craft. "The tactical value of sea planes and dirigibles, or other air craft, is so great in their possibilities, as scouts, as aids in gunnery, and in offensive operations, that the development of this new branch of naval science should be stimulated and encouraged to the maximum."\*

The role of air craft is largely to prevent or aid surprise attacks.

Baudry sums up the employment of torpedo and light craft, in general, very aptly as follows:

"The role of the torpedo craft is that of a reserve which, by their superior speed, can be thrown into action in such a position as to force the enemy to maneuver under fire, or to take the real risk which a torpedo attack pressed home would involve. They must never remain inactive, otherwise they lose all their value which is largely moral."

Baudry also says:-

"Light vessels, especially torpedo craft, are a species of true maneuvering reserve of the engaged fleet. It is their only true and logical function. The vessels carrying guns will be massed at minimum distance. They are all engaged from the beginning to give the knockout blow, each one by the maneuvers of lines or groups, striving to create a superiority of gun fire in his favor. But is this advantage possible of attainment? If both sides have maneuvered equally well or equally ill, do we not see, no matter how we have endeavored to avoid it, the action in parallel lines thus producing a uniform diversity of fire? Here it is that the light vessels, the maneuvering reserve, moving to a desired point, breaks the equilibrium of the action and inclines the victory in our favor. A victory which is inclining towards us is won."

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\* War College Conference, 1916.

TACTICAL SCOUTING.

Touch contact, as distinguished from sight contact, is on the border line between strategy and tactics, just as at the War College, when a chart maneuver is brought to the tactical game board to reach the final decision. At this stage the initial advantage is information, and (a) touch with the enemy must be maintained; (b) information as to our own forces must be denied; (c) our various forces must be brought into position for mutual support and disposed in accordance with the general plan of battle; (4) the preliminary attacks and repulses amongst the contact forces must be out of fleet gun fire range, and (5) finally the approach and the engagement must be conducted.

The tactics of scouting must be such as to secure that superiority at points of contact to get through the enemy screen with fast scouts, battle cruisers, or any vessel strong enough, and this implies proper scouting dispositions, while also suggesting that it is at this stage that air craft have their great future usefulness.

In the absence of definite information, it is not wise to wait to form for battle as sight contact and gun fire range are now almost one, and the order of cruising should at this stage be the order of battle. With good information will come, at this stage, (a) a quick estimate of the situation; (b) promulgation of plan of battle, or changes in previous plans or dispositions; (c) the preliminary moves to secure the desired positions. Daveluy says, "Before coming in contact with the enemy, the Admiral will without doubt know what he intends to do; but he will not yet know how he will do it. The enemy alone, by his disposition will determine the line of conduct to be followed."

THE TACTICS OF THE APPROACH.

In general terms the approach is made by maintaining the enemy on a bearing normal to our line. If the approach is made in column our course will not converge more than 18° ordinarily the approach will be made in line of bearing that will maintain the enemy on a constant bearing approximately normal to our own line of bearing.

That phase from scout contact to gun fire range, during which the combatants close the distance separating them, is called the approach - "distant" at first then "near". In the distant approach, in seeking to bring the sun at our back and the sunlight on the enemy; the sea and wind on the engaged bow; the swell not astern or on the quarter; etc; it is an elementary consideration that we take what we can and make the best of what we cannot, and this is especially imposed on us by the initiative. We keep the enemy in a state of uncertainty by denying him information. We use what information we get to so dispose our forces that there will be no reserves; all guns pointing at the enemy; all available groups utilized to the best; take the offensive; approach quickly; avoid detached engagements until the attack is co-ordinated; strike at the decisive or vulnerable part of the enemy's formation with all forces supporting the effort; close the range; keep all his ships under some gun fire; and all ships take all possible part in the action.

It is well, at the outset, to consider what constitutes tactical units or groups. It is elementary (a) that groups should, if practicable, not have speed less than corresponding enemy groups; (2) that division into groups implies no division of effort; and (3) groups should not be larger than can be handled in mutual support and controlled by a single mind. As two battleships are a gunnery unit, the logical division is four ships and the squadron eight, ten, or twelve ships. Groups should, as far as practicable, be identified in (a) tonnage, (b) turning, (c) calibre of guns, (d) general arrangement of battery, (e) speed, and (f) fire control doctrine.

Their disposition in groups, in field of action, depends upon whether you are inferior or superior to the enemy force in speed and gun power, and it is, therefore, necessary to generalize. In seeking the advantage of light, sun, wind, and smoke; in bringing all forces into action simultaneously or in definite succession with no forces left unengaged (and at an initial shorter mean range) we must adopt the "frontal attack", with such flanking movements with battle cruisers, fast dreadnoughts, destroyers, or submarines as may be available, but such use of capital ships will conform to our doctrine.

Flanking movements by fast wing capital ships to gain positions of advantage are not justified unless the speed of our main body is at least equal to that of the enemy main body.

If such divided movement is contemplated the deployment should be made before sight contact. This group should decisively engage an enemy detached group sent out to meet it, if it is superior to it, but, if inferior, should contain and hold it at long range to keep it out of the main action.

Every group should seek to take its share of punishment, where, by so doing, it distributes it among many on the principle that there should be no idle forces, but not on the principle of permitting the enemy to defeat our groups in detail. To the end of co-ordinating the attack, all detached groups should take their guide on the main body; keep within mutual supporting distance, and have in view the adjustment of their ranges so as to be attacking or all firing at the time of or after the opening of the decisive attack.

The plan of battle is largely a plan of approach, and consists principally of whatever dispositions of our forces for the attack it is best to make.

Our main battle line of capital ships should have the slower battleships in that part intended as the pivot of the maneuver; the heavier ships in that part from which it is intended to deliver an attack; and fast capital ships, if in the battle line, in that part which is intended to be the wheeling flank. If no group of four capital ships has a decided advantage over the enemy in speed, it has no place outside of our concentrated formation.

If the enemy has units in the battle line superior in speed and employs that speed to make a divided attack, a division of force to meet the enemy threat may be imposed; but the principle of concentration should be the guide, and, if a superior concentration on the enemy may be effected by virtue of his separation of force, this advantage should not be relinquished to meet a threat of an enemy detachment. However, detached enemy forces should not be permitted to obtain position in which they would be favorably disposed to deliver enfilade fire, torpedo fire, or to lay mines. If, in the approach, the superior speed of one or more detachments will permit an advantageous concentration, forces may be divided with that end in view. It should be realized, however, that such division of force has elements of great danger, and is only justified if confidence exists that the training has been such that co-ordination of effort will result in effective natural concentration." \*

Our fast cruisers should advance towards the enemy's flanks circuitously to obtain information, operate against enemy destroyers, and lay real or dummy mines, or fire torpedoes, if the enemy turns towards them. They should remain out of major gun fire, however,

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\* War College Conference, 1916.

and aim to co-operate with our own destroyers when they attack. A few groups of destroyers should operate with these scouts, and our battle cruisers, if available should act as supports. Our battle cruisers, however, are best utilized in attacking the enemy's flanks, thus making the enemy turn to his disadvantage; in supporting our cruisers and destroyers; or in driving back enemy scouts and destroyers intending to attack; but above all to co-ordinate their attack with guns or torpedoes with the main battle line in the real gun fire battle.

A few scouts should be employed on the flanks to protect the main battle line against torpedo attack.

The main force of our destroyers should be deployed towards that flank of the enemy which they are to attack. If we intend to attack to leeward, from the windward position, our main destroyer force should be in the rear of the battleship lines, so as to launch its attack at the appointed time. If we intend to attack to windward, from the leeward position, our main destroyer force should be many miles in advance of our flanks to deliver an attack on the enemy's disengaged side, using a smoke screen.

Submarines can operate only fortuitously and should be deployed well out on our flanks to meet a change of plan of the enemy in case he comes their way.

Vessels or scouts carrying air craft should remain in the rear of the main battle line or well clear to recover their sea planes after they secure the necessary information.

Ships of the main body must be in order of battle before reaching fighting range. The distinguishing features of the approach, as compared with the engagement, are (1) facility of deployment, (2) ease of signaling, and (3) line of bearing approximately normal to the enemy bearing.

"The best formation for the approach is line of bearing or lines of bearing of tactical groups; the line of bearing of leaders being maintained approximately normal to the bearing of the enemy."

"When nearing gun fire range it is important that the formation should be shallow to permit rapid deployment into the battle formation."

"In the earlier stages of the approach the formation should be flexible and compact. This suggests a formation in line of division or line of squadrons."\*

In this way, the leaders of groups receive and transmit the signals, there is ample room for maneuvers; smoke interference of rear snips is unimportant at this phase, and there is less danger of the fleet being thrown into disorder.

The deployment with all guns ready to bear on the enemy must be completed outside of gun fire range.

To facilitate range keeping and accuracy of fire, it is important that the battle speed be taken up before the end of the approach.

To avoid interference of gun fire and getting into bad torpedo position, through groups getting separated, the slowest group should become the base or guide about which our tactical plan is developed, and should be in that part of the formation which is intended to be the pivot.

\* War College Conference, 1916.

Where there is lack of information of the enemy, or where we know that his main body is faster and that he has fast groups, our own heavier and faster ships should be on the ends, and weaker slower units in the center, with the flagship in the center. This permits of a concentration against either end of the enemy's line, and also best replies to a similar effort of the enemy. It also permits of a reply to the enemy's fast wing attack on either flank; keeps the formation closed up; and admits of turning to the right or left with equal advantage.

### BATTLE, OR THE TACTICS OF THE ENGAGEMENT (BATTLESHIPS)

Admiral Fletcher's "Battle Instructions" says,

"In general, all tactical movements of the battle line while under fire will be limited to the simple movements of steaming in column and turning in the wake of the leader, of making simultaneous movements of ships right or ships left, and of steaming in formation upon relative lines of bearing. A close analysis of the requirements of battle indicates that by these simple movements, one battle line can always be maintained in a position with respect to the enemy that will give the maximum efficiency of gun fire. Experience has shown that when tactical evolutions of the line are limited to these simple movements, and do not involve changes of speed, the line can be maintained in satisfactory formation. On the other hand, it is found that evolutions that involve differences of speed in ships (such as the oblique method) are apt to endanger the accuracy of our formation to such an extent as to lessen the efficiency of our gun fire."

The above was arrived at by practical experience in the fleet, for two years or more, with a system which violated it, and corresponds with the theoretical teaching of the War College, but there is a step further. It should be permissible to swing the line by very small increments.

It may be expressed:

Fleet battle tactics, under gun or torpedo fire, or both, should embrace only simultaneous or successive changes of course (rectangular method), but it is permissible to develop and employ certain special methods of swinging or revolving a line of bearing by increments or gradual changes of the flank ships (one or both flanks) in conformity with a definite signal or battle doctrine.

"While under fire, evolutions should be limited to movements that are simple and practicable, that minimize changes of speed and conserve regularity in formation, position, and course." "Frequent or unnecessary maneuvering should be avoided as it tends to reduce effective fire. Maneuvering should be limited to such as is necessary (1) to secure an advantageous position; (2) to escape from a disadvantageous position; (3) to embarrass the enemy's fire control."\*

Surprise by novel and unexpected methods of attack will, in the near future, be nullified by air scout information.

"Damaged enemy vessels, leaving the enemy formation, are to be disregarded by vessels still in our own fighting formation or capable of joining it, until the main issue has been decided.

Paralleling the enemy leads to equilibrium and no decision. To break through his position is prohibitive in cost.

Our methods must be towards the envelopment of his flanks or ends, thereby putting some of his ships out of range or interfering with their gun fire. Position is merely potential and the use made of it determines its advantage, for it is easily lost.

Ships badly damaged by gun fire should remain in position in formation, if possible, to avoid the bad moral effect of dropping out

\* War College Conference, 1916.

The three replies to a threatened T are (1) to turn away gradually (2) to turn about and cross the tail of his formation, or (3) to adopt pursuit or retreat tactics.

One long column, being difficult to handle and vulnerable at both ends to concentrated gun fire and torpedo attack, there is a marked tendency towards a division of the fleet into homogeneous squadrons and divisions within supporting distance of one another. Such a rather limited division of forces, allows for considerable initiative on the part of subordinates, and facilitates operations against detached forces of the enemy, as in the battle of Jutland, and facilitates operations against enemy detached forces which may be attempting concentration upon the van or rear of the main body. The fundamental conditions are however that (1) no group should get beyond supporting distance in the main attack, and (2) no group should fail to get into the main action, unless containing an equal or superior force in a detached engagement.

Column is too deep for approach, retreat, or pursuit, but during action it is best for enveloping. Lines of bearing involve a great deal of "ship control", require constant change of course and speed, tend to bring about interference with each other's gun fire, are difficult to maintain, and require definite signals, but just the same the fleet that can not maintain a line of bearing or revolve one about the center ship should be drilled until it can. The necessity for revolving the line by small increments is to enable it to reply to enemy movements, and it is particularly requisite for the force having inferior speed, so there is never a knuckle in the formation.

It is important that we recognize, adopt, and practice in the fleet the revolving or "creeping" of a line of bearing by small increments of five degrees or less, not to disturb gun fire.

The difference between a tactical movement and a maneuver is that a movement is a simple change of course or speed, whereas a maneuver is a change of formation, course, or speed, consisting of several movements.

Movements or maneuvers in battle are to change the course, or to change the absolute or relative line of bearing. In the main they have to do with getting and keeping the fundamental tactical position. It can not be emphasized too emphatically that oblique or direct movements should not be used in battle as once begun they must be completed and during the movement the ships are out of formation, and making changes in both course and speed. By the rectangular method simultaneous and successive changes of course are made but there are no changes in speed.

As previously stated the speed to be used in battle should be taken up during the approach.

"The standard speed of the main battle line should not exceed a speed of two knots less than the maximum of the slowest unit in the formation. All vessels should maintain full boiler power when an engagement is probable and be ready to develop maximum speed at any moment." \*\*

Special use of cruisers and scouts not usually specified for battle is as repeating vessels for signals, and of destroyers to guard against submarines and lay smoke screens for tactical purposes. The doctrine for the latter is;

"The destroyer should be recognized primarily as a weapon of offense with a mission to attack enemy major ships. Destroyers attacks against destroyers are likely to prove unprofitable; but may be justified under special circumstances, as an example, in carrying through an offensive against enemy major units or enemy submarines. Destroyers should operate and attack in groups, supported by gun fire of major units." \*\*

\*\* "The destroyer smoke screen may be used to protect the destroyers in attack, to mask a maneuver; to isolate a portion of the enemy force

Torpedos should be fired from capital ships only when the position relative to that of the enemy gives a reasonable probability of torpedo fire being effective against the enemy and not a menace to the force firing.

It is idle to discuss what is the "vulnerable point" or "decisive point" of an enemy formation because the fundamental tactical position and a searching gun fire will develop many weak points which may offer opportunity to divide the enemy forces. History shows that in most battles one side has really maneuvered, and the other has passively accepted the situation forced upon it by surprise or otherwise, and as a result has been decisively defeated in detail. Maneuvering is a two-edged sword. It confuses

\*\* War College Conference, 1916.

the enemy, but confuses one's own gun fire, and tends to a separation of forces. The paramount importance of priority of effective fire implies due notice to the fire control of every maneuver decided upon, because the development of fire effect to the fullest through mutual and artificial concentration is the essence of battle. To merely maintain our line of bearing normal leaves the variation of range entirely in the enemy's hands and renounces the offensive. Outside of safety and range movements there are those to take advantage of a mistake, to keep some of the enemy ships out of the action, and to divide his forces. Detached movements of groups to co-ordinate their attack, have as their secondary purpose to force the enemy to maneuver under fire.

Any movement which interferes with the utilization of all guns to the limit is tactically faulty unless for safety first, or to seize an advantage. To close the range, hold the enemy on a bearing a little forward of the beam. To open the range, or to prevent a T, keep the enemy slightly abaft the beam. To hold an advantage regulate the speed. The principles which should guide us in action are (1) the maintenance of the fundamental tactical position; (2) mutual support through simultaneous or successive attack; (3) closing the range to decisive distance; (4) alertness to profit by his mistakes; (5) seizing a chance to separate two portions of his main body and envelope it, and (6) allow the enemy to settle on a steady course, and, after due notice to your own fire control change your range to confuse his spotting.

One of the things which disturbs fire control and fire distribution quite as much as ships falling out of formation is smoke, which frequently requires redistribution of gun fire, and this is not easy to regulate by plans or by doctrine, and therefore requires some signalling. Smoke screens can be used, as did the Germans in the Battle of Jutland, to withdraw from too close action, or to protect our exposed flanks from a dangerous concentration, but smoke has a way of suddenly cutting off visibility and introducing the element of painful suspense as to what is going on behind it. Smoke interference is therefore to be reckoned with.

All flagships should be provided with a plotting room and observing instruments to enable the flag officers to plot and follow the movements of forces. We study movements on a chart or board, in the horizontal projection, but the eye sees the forces pro-

jected on a vertical plane, which fails to reveal the real formation and movement especially at long ranges. Yet this knowledge is crucial.

The Commander-in-Chief should be at the focus of the offense, where the influence of his will is felt, where he may best adjudge the relation of the forces, and where he may direct the necessary changes in disposition. This implies that the flagship should be in the line of battle. "Follow the leader" implies that he will lead or be on the advancing flank, but modern conditions as to being in gun fire range almost as soon as sight contact is made must inevitably lead to symmetrical formations with the flagship and the slower ships in the center, and faster, heavier ships on the flanks, with the ability to turn either way. Under any circumstances flag officers should be distributed so that one is at each end, or in other words responsible authority should be "diffused throughout the battle formation."

"No action should be taken with respect to our own damaged vessels, pending the decision on the main issue."\*

If the flagship is not the leader or guide, the best position of the guide is in the center of the formation, because the center ships are slowest, and it will prevent forces getting away from supporting position. There is always a tendency for "speed" to run away with its possessor, and dis - co-ordinate movements.

Daveluy says, "The councils of war that have followed our great disasters put in evidence the inefficiency of signals." It would be fairer to say that we can not signal in battle is to beg the question. We must and can. Battle plans and doctrines may obviate the use of some signals, but precision of meaning is the first requisite of a battle code, and good methods of sending it quite as important.

The question of visibility of signals in the earlier stages of the battle may be solved by having one or more repeating ships on the flanks, but, after gun fire begins, the difficulties will multiply. It is however essential that we provide certain and

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\*War College Conference, 1916.

reliable methods of transmitting safety, range, and position movements and changes in gun fire distribution independent of plans and doctrine as to concentration of gunfire. To say that signals cannot be sent in battle is to pass flag officers out of battle.

With regard to "safety first" movements. It is well to regard the very appearance of enemy destroyers as a menace and to open fire on doctrine without specific orders. "The position of forces which are opposing one another must be plotted and the enemy must be carefully tracked. By this means only is it possible to avoid torpedo water or to procure the data necessary for long range torpedo firing. Very slight changes of course, or of speed may be sufficient to avoid torpedo water or to procure the data necessary for long range torpedo firing. Simultaneous changes of courses away from the enemy may be particularly effective for the purpose. Holding the enemy abaft the beam reduces the torpedo menace to you while, at the same time, it increases your effective torpedo range."

In the same way as regards floating mines, careful plotting may enable a force to avoid passing through a floating or anchored mine field. With regard to submarines, frequent changes of courses and high speed are the best means of avoiding an unlocated force but constant patrol with all sorts of craft, and steel nets laid by destroyers are essential in regions where they may be able to operate.

No consideration of tactics can be adequate which leaves out of consideration the speed factor. Speed is a function of coal endurance. In general terms <sup>speed</sup> facilitates the offensive (or initiative) co-ordination, concentration, surprise, scouting, approach, engagement, and pursuit. It enables the possessor to attain the "speed point" or position if the opponent does not turn away. It enabled us to force, evade, or delay the engagement, and to regulate the range, but speed to be the real factor in tactical supremacy must not have gained it by undue sacrifice of other qualities, nor

should it be allowed to run away with the head which is guiding it. The possession of speed unquestionably improves the morale of the forces possessing it, for it has the latent advantage of being able to circumscribe the movements of a stronger fleet by menacing its flanks. This power to exert a turning effort may be greatly augmented by certain condition of wind, sea, or nearness to land or shoals. In operating near land it aids in attaining a position of both strategic and tactical importance. When there is plenty of sea room there is very little tactical advantage to be gained by a small superiority, say four knots, because it can be neutralized by turning gradually away.

Unless both sides want to fight, the action will take the form of retreat and pursuit in which gun fire range is under the control of the speedier force which opens, closes, or maintains it at will, without the loss of fire effect. The importance of speed increases with the number of tactical units engaged. The tendency of superiority of speed in certain groups tends towards a division of forces, otherwise all speed (that is to say "fleet speed") reduces to that of the slowest group, and as speed is obtained at the sacrifice of other qualities, to retain them with the slowest group is to fail to utilize their one quality in which superior, and expose them in those which weakest. The tendency of speed is to lead to dangerous division of forces and being defeated in detail.

Inferior speed tends to reduce a fleet to the defensive or to a defensive attitude, for both in the approach and engagement the faster fleet can delay action until it has reached some position favorable as to sun, wind, sea, or swell, or concentration. It can also choose the range best suited to its battery and armor protection, and, in case of victory, can overtake and destroy the enemy's ships which are attempting to escape, whereas, if defeated is able to withdraw.

In all that has been said:

Speed is relative, but refers to "Fleet speed" which should be three knots less than the best speed of the slowest group, which group should, in most cases, be the guide in the engagement.

THE PURSUIT.

Once the enemy begins to waver and victory looks promising, the enemy must not be permitted to withdraw, but every advantage must be relentlessly pressed until his cohesion has been utterly broken. Total destruction is the object, and not one single vessel should be allowed to escape. But in the pursuit, judgment must be used as mines may be layed in the path of the retreating force. If the enemy remains concentrated the pursuing vessels should not disperse too much as they may turn and defeat our force in detail. If the enemy scatters then we should also scatter. Pursuit means a force on each quarter of the fleeing enemy group for if you have it on only one quarter he will turn away towards his other flank and that is what you may not wish him to do.

NIGHT ENGAGEMENTS.

"In general, it is not contemplated that capital ships shall attack during the hours of darkness, However, all guns and torpedoes should be kept ready for use at night and the organization of all ships should provide for the effective employment of all weapons."

"A numerically weaker force, well drilled and disciplined, might throw consternation into the ranks of an unprepared but far more numerous fleet by a vigorous night attack."

"At night the order for opening fire on hostile vessels will be given by the Commanding Officers under such restrictions as may be imposed by the Commander-in-Chief."

"The methods for the night work of torpedo craft should be prescribed by the Force Commander and thoroughly understood by all concerned,"\*

CRUISING FORMATIONS.

In general the formation for cruising should be the formation for battle, or one which permits a quick and easy deployment into proper battle formation.

By day, the scouting forces should be in advance and on the flanks to gain and deny information. "Battle cruisers and destroyer groups as supports to scouts should be disposed between the scouts and main body. Battleships in lines of squadrons or divisions

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\* War College Conference, 1916.

with accompanying cruisers and main force of destroyers."\*

The distances separating the advance scouts, supports and main body depends on circumstances, but the principle should be to prevent surprise and maintain tactical concentration of all forces.

"In night cruising the problem is one of providing for the safety of the fleet from:-

- "1. Surprise attack by the enemy.
- "2. The consequences of unexpected contact with unidentified elements of our own force.

"The close defensive screen sometimes advocated is ineffective for the first and courts accident from the second.

"The first defense of the fleet at night consists in moving it through an area which, through search operation conducted in daylight, is known to be clear of the enemy and such action should be taken whenever and to the extent possible.

"Against attack of enemy vessels which may make contact with our forces during the night a potent element of defense lies in an open formation, a dispersion of units. The limit of such dispersion will depend upon conditions that shape the situation. The importance of a simple and reliable system of night recognition signals is manifest." \*

In sighting enemy vessels or smoke reports by radio should be made in the following order, (1) Object sighted, (2) latitude and longitude of the object; (3) its bearing and distance from reporting vessel; (4) course object is steering if observable; (5) What action reporting vessel is taking.

#### TREATMENT OF NEUTRAL VESSELS ENCOUNTERED.

One of the most difficult questions in scouting, and in screening a fleet is to dispose of neutral merchant ships encountered which are thus in possession of information valuable to the enemy, such as the composition, formation, course, and speed of our force or forces. One of the most effective things to do, if it

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\* War College Conference, 1916.

is not possible to make him change course radically and get out, is to disable his radio, either temporarily or permanently, and to pay damages for it. Another method is to detain the ship; force her to accompany the fleet for the necessary length of time; and pay for the delay. It might be even necessary to seize her under the pretext of examination for contraband of war, and pay damages for detention.

#### BATTLE SIGNALS AND SIGNALING IN BATTLE.

The present situation in relation to Battle Signals is very unsatisfactory. It is essential that we provide a simple code covering the necessities of signaling in battle. This code must be capable of transmission accurately and rapidly by every known method of signaling so that if one method fails another shall be available. With twenty-six alphabetical and ten numerical characters with the necessary repeaters, designators, and special meanings, it is easily practicable to provide signals whereby no signal book would be necessary, because the necessities to be provided for tactically are for changes in speed, or in courses to the right or to left; to follow the leader; to attack or commence or cease firing; to distribute gunfire for artificial concentration; to designate special plans, formations, or schemes by serial numbers; to indicate distances; to use some special method of executing maneuvers; to make withdrawal or "safety first" movements; to indicate degrees of compass or line of bearing; and to designate positions to be taken by detached forces. The regular signal book could be used for other than tactical purposes.

#### DEFENSE OF THE FLEET AT ANCHOR.

Logistic and strategical reasons often demand that the main fighting forces anchor during certain periods. We may confidently look forward to the time, for instance, when Cape Cod, Delaware and Raritan and Delaware and Chesapeake canals shall be made great ship canals, and the East River cleared of all obstructions which would hinder our fleet from passing. This would

enable us to concentrate our naval forces in the Atlantic, in case of delayed mobilization, but it should never allow us to assume the defensive attitude with which this country is unhappily impregnated as if we were waiting for some one to kick us.

The question of the defense of a fleet at anchor is merely that of screening and shielding while getting ready to strike - power in repose.

"If the fleet is at anchor in a fortified harbor no relaxation of vigilance should be permitted and the general plan of defending the fleet should be the same as in an unprotected harbor with the exception that mine fields, in addition to those which may have been planted by the army will not be laid. For many reasons it is desirable to anchor the fleet as compactly as possible and in a harbor that permits of natural defense due to restricted entrance, difficulties in navigation, security from observation, etc., Aside from treachery the only serious danger to anticipate is attack from enemy submarines or destroyers. It is important to anchor capital ships as far inshore as the depth of the water will permit and to anchor train, mining vessels, destroyers, and cruisers toward the harbor mouth. Wherever practicable, the harbor should be closed by a double line of nets beyond which will be a series of mine fields. Hulks and booms may be used to protect shipping. Aids to navigation may be shifted or removed temporarily. Destroyers should be used for patrolling both by night and by day supported during daylight by such light cruisers and heavy cruisers as may be needed. After sunset all vessels approaching the harbor should be considered hostile. Box lights should be rigged on opposites of the harbor entrance and searchlights should be placed to permit the discovery and the most effective illumination of approaching vessels." \*

It is suggested that no one person may be supposed to suggest more than an outline of what should be the careful work of a special board of officers qualified to pass upon such vital questions as here touched upon.

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\* War College Conference, 1916.

The study here undertaken is merely a tentative fleet battle doctrine which is far from being a complete one. A further study of doctrine should include:-

- (a) Our cruising formation night and day with scouting and screening methods to obtain and deny information; what information our scouts should seek; the exact forms reports are to be made in; and the method of transmitting them.
- (b) A fleet escorting a convoy by night or day.
- (c) Treatment of neutral merchant ships encountered by scouts or fleets which may, by their radio, or otherwise, give information to the enemy of our presence, formation, course, etc.
- (d) Plans for fire distribution and methods of indicating same.
- (e) Radio instructions and radio interference, and methods of avoiding interference.
- (f) Use of searchlights in formation and in general.
- (g) Division and Squadron divided fire, and collective torpedo-fire, and range finding.
- (h) Use of torpedoes from capital ships, and light vessels (scouts and destroyers) (1) position for firing; (2) ranges to be used; (3) point of aim; (4) dispersion; (5) density of torpedo fire; (6) limitations of the use of smoke screen as an adjunct of torpedo fire.
- (i) Use of smoke screen tactically.
- (j) Method of revolving lines of bearing; method of turning away from a position of disadvantage of any character; and the method of signaling these.
- (k) Use of faster capital ships as a fast wing, and the limitations of such use.
- (l) Divided attack and its limitations.
- (m) Method of withdrawing and reassembling forces.
- (n) Night attack. Limitations in use of searchlights. Recognition signals.
- (o) Degree of initiative of the subordinate.
- (p) Disposition of auxiliaries or train in battle.

There is work ahead for all of us.