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Thesis

THE PRINCIPLES AND PRACTICE OF TACTICS APPLIED TO NAVAL
CONDITIONS OF THE PRESENT DAY.

LONG COURSE, 1912-13.

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EARLY HISTORY.

Fragmentary evidence exists of several periods of fairly advanced tactics during the days of the galley. Reference is later made herein to the Battle of Actium.

In the earliest fleet tactics of the sailing ship era, there was practically no organization, no formation, no co-ordination of effort beyond supporting a friend in trouble, and no formulated objective. The individual initiative of captains was very great, each ship selecting for an opponent whatever enemy ship was most favorably situated therefor at the moment. It resembled the fight of one mob against another, each man rushing in and striking right and left at whatever enemy he could reach. Getting the enemy between two fires was recognized as advantageous. For many centuries it was a point of honor not to allow any single vessel to be captured, and conversely the capture of individual enemy ships was sought. This led to great scattering of effort and to a dearth of fleet tactical conceptions. The honor connected with the capture (or loss) of flagships led to a natural concentration of numbers about them, in a hopeless melee, it being frequently impossible to distinguish friend from foe.

From the beginning the British endeavored first to damage opponents by gun fire and to make the "coup" by boarding - continental navies aimed to board as soon as possible.

As early as the 16th century developments came about looking towards the prevention of confusion and of blanketing fire. It became gradually to be recognized that individual effort must

be subordinated to that of the whole. This evolution culminated in the general adoption of the line ahead as the best formation in which to preserve order and to avoid blanketing fire. Individual initiative, which, on account of poor coordination, had been proved by experience to be unprofitable, became almost extinct. Formation grew to be a fetish, and to be an end rather than a means; even death was later the penalty for violating the formation.

The first glimmer of broad tactical sense appearing in the British fighting instructions is found in those of the Duke of York; to wit: "None *** shall pursue any small number of enemy ships before the main body of the enemy shall be disabled or shall run." It is true that breaking the enemy line came into favor for a time, but only for the purpose of getting the wind (when to leeward) of at least a part of the hostile fleet. Doubling was also recognized as advisable when superior in numbers to the enemy. The essence of the principle of concentrating on a part of the enemy was not understood. The preservation of formation came above all else and this led primarily to defensive dispositions and defensive fighting, which, added to the weakness of the offensive weapons, invariably caused indecisive battles. It is only fair to say, however, that the advantages of concentrating the major portion of a fleet against an enemy fraction was considered, and by some was advocated, though it was not recognized as a basic principle. The difficulties of maneuver and the short range of the gun in those days would have made concentration of the Nelson style difficult to execute without bringing about great confusion. The known disadvantages of confusion led to an effort to crowd the enemy into confusion rather than to crush him in detail through concentration.

The wars between the Dutch and English are the only ones

in history where large fleets of good and nearly equal morale were engaged; yet a paucity of results was invariable. This was due to the undeveloped state of tactics, to the defensive role imposed by the rigidity of fighting instructions to the fetish of maintaining formation, to the lack of offensive power and to the large number of soldiers in command of ships and fleets.

Between the Dutch wars and the advent of Nelson the fighting instructions were very gradually developed, important changes being introduced from time to time chiefly in the form of additions to the older instructions. This development was purely deductive. Up to Nelson's time the exposition of tactical principles had reached a comparatively high state. Most of the fundamentals were recognized, at least in some degree. They were not however well understood, and were so obscured by this lack of understanding as well as by strictly prescribed adherence to a mass of antiquated forms and conventions, that their application lacked the spark of genius necessary to give them true spirit.

THE NELSON TOUCH.

It remained for Nelson to weed out those forms and conventions in the tactical propaganda inherited from previous ages, and which stifled the proper application of the principles. He understood that what mattered was the substance and not the form. For example, formation to him was but a means to prevent confusion and to avoid the blanketing of the fire of one ship by another, and not in itself an end to be attained. Empirical rules, in his keen insight were to be applied only when applicable. He it was who divined a correct application of tactical principles to the ships and weapons of his day.

We have a great mass of evidence to show that his conclusions

were reached only after years of constant study. All the more credit is due him because but for him the advancement in tactics would have been retarded for generations. The mental calibre of officers of his time precluded the possibility of bringing forth the fruit by anyone else. This is amply shown by the fact that notwithstanding his frequent educational and indoctrinating talks to his subordinates continued through many years, the best among them, Collingwood, failed to grasp the essence of his teaching, and after his death reverted to old forms and conventions.

There is a curious similarity between the conditions of the art just preceding the advent of Nelson, and the present day conditions. A confusion of ideas. The recognition of certain principles. The blind adherence to certain forms and conventions. The failure of officers generally to cull out the essentials and find the true spirit. The deductive development has been done. The inductive theory and application remain woefully incomplete.

The tactical principles recognized, formulated, and applied by Nelson are, briefly:

(a) Principal objective is the complete annihilation of the enemy's fleet. Partial annihilation is not sufficient.

(b) Time is everything; five minutes makes the difference between victory and defeat.

(c) Concentration of own masses against enemy fraction.

(d) Business of the Commander-in-chief to bring the enemy to action on the most advantageous terms to himself.

(e) A close and decisive action is necessary.

(f) The less maneuvering the better.

(g) Signals are useless after close action has begun.

(h) Support each other and keep close to the enemy.

(i) Necessary for subordinates to know plans of Commander-in-chief.

- (j) Simplicity of method.
- (k) Victory must be followed up.
- (l) Order of sailing is order of battle.
- (m) Division of large fleets into squadrons whose commanders have the full direction of their line.
- (n) Consideration of the moral qualities of the adversaries is an essential factor.

(o) "Something must be left to chance." "No captain can do far wrong who places his ship alongside that of an enemy." i. e., the execution of the general plan was to be as circumstances dictated, subject to the general plan of concentration on enemy rear.

But Nelson's genius consisted of even far more than the codification of tactical principles and the correct application of them to the conditions of his own time. He it was who first injected into these somewhat dry and mouldy principles the divine spark which transformed them into a living thing. He invented, applied, evolved and perfected a system of command, the lack of which had completely frustrated the efforts of all his professional forefathers, many of whom were possessed otherwise of tactical sense nearly equal to his own.

This system of command invented and so successfully used by the great Admiral expired with him and, strange to say, has but seldom been even duly appreciated in navies since; much less adopted and used to any advantage.

Its elements consisted of:

- (a) A properly defined and well understood "area of discretion for subordinate leaders".
- (b) Education and indoctrination of subordinates in accordance with the views of the Commander-in-chief to produce co-ordination and unity of action.
- (c) The embodiment in the person of the Commander-in-chief of the primary attributes of the military character, i. e.,:

1. The power of inspiring his followers with sustained enthusiasm for and deep loyalty to the cause, to the leader, and to his plans.
2. Self-confidence and an enduring ego.
3. Courage and the will to conquer.
4. Knowledge of human nature.
5. Tenacity and a single eye to the principal objective.
6. Activity, determination and resolution.
7. Keen and quick strategical and tactical insight.

FIVE GREAT SEA ACTIONS.

At this point it will be profitable to examine into and analyze some of the great fleet actions. Actium, Texel, Trafalgar, Dissa and Tsushima have been selected for this purpose.

BATTLE OF ACTIUM (31 B. C.).

FORCES:

A. Antony and Cleopatra, whose fleet comprised more than three hundred and less than five hundred large ships incapable of rapid maneuver, with "sides which were so strongly built with great squared pieces of timber, fastened together with iron bolts, that their (Caesar's) vessels beaks would easily have been shattered upon them". They "were all armed with solid masses (of men including soldiers) and spikes of brass". Crews were short handed, of mixed nationalities, and indifferently trained.

B. Caesar (the younger) and Agrippa. The latter had been Minister of Marine for the ten previous years; had built a fleet armed with most modern inventions including artillery, and organized a complete naval establishment. The ships were comparatively small and handy. The crews had been systematically exercised, and had the further advantage of having been very actively employed during the campaign preceding the battle, while Antony's navy had remained inactive in port. Caesar had only about 250 galleys as opposed to the much more numerous and larger ships of Antony.

THE ENGAGEMENT:

Antony having been forced out of the harbor to attempt saving his communications, at first formed line in close order across the harbor mouth. He lay still with the hope of deceiving Caesar that the fleet was at anchor, and in that way enticing an attack. Cleopatra with 60 ships were held in reserve behind the center.

Caesar however did not attack but lay in line opposite to Antony about two miles off. "Antony's men, weary of expecting the enemy so long, and trusting to their large tall vessels, as if they had been invincible, began to advance the left squadron. Caesar (in command of right wing) was overjoyed to see them move and ordered his own right squadron to retire, that he might entice them out to sea as far as he could."

Agrippa, in command of Caesar's left wing moved to outflank the Asiatic right, which was met by the latter moving out and separating from its center.

As the big unwieldy Asiatic ships became more and more deployed they were each attacked individually by three or four Italian galleys acting in concert.

"There were always three or four vessels of Caesar's about one of Antonys, pressing them with spears, javelins, poles and several inventions of fire, which they flung among them; Antony's men using catapults also, to pour down missiles from wooden towers". "But the fortune of the day was still undecided, and the battle equal, when on a sudden Cleopatra's sixty ships were seen hoisting sail and making out to sea in full flight, right through the ships that were engaged. For they were placed behind the great ships, which, in breaking through, they put into disorder." Antony also followed Cleopatra's force with his flagship, though probably only because he considered the battle, and hence the campaign, lost. His desertion was not known, until

after the battle, except by a few. The fight continued until the Asiatics were thoroughly beaten and three hundred of their ships captured.

COMMENT:

The Italian navy at that period showed a remarkable degree of development, which marks Agrippa as one of the greatest sea commanders that ever lived. His operations preceding Actium were wonderfully correct and astute strategically.

While details are missing from the existing records the campaign leading up to and culminating in Actium shows conclusively that:

- (a) The Italian navy was a "regular" service, well organized, well equipped and well trained.
- (b) The Italian captains were well indoctrinated.
- (c) The Italians understood the fundamental principles of tactics; notably that of concentration of superior force at each point of contact and the defeat of the enemy in detail.
- (d) The Italians had studied and understood tactics as applied to the particular weapons with which the enemy and themselves were equipped. Their method of fighting was that favorable to their own weapons and ships.
- (e) They understood the doctrine of mutual support: not only employing their own forces in accordance with it, but maneuvered so as to entice the enemy to violate it.
- (f) Communications were sufficiently developed to render possible, when reenforced by doctrine, unity of action.

THE BATTLE OF THE TEXEL (1673).

This battle is notable chiefly for two reasons: (a) It is among the few large fleet actions in history where the moral factor was about equal on both sides. About the only other actions falling in the same category are those of the same period between the English and Dutch. (b) It was the first time that

the conventional "line ahead" was used in a large sailing ship action. The English used it there and were subsequently in later wars copied by the French, Dutch and Spanish; becoming eventually for all sea-faring nations a fetich.

The action also has many occurrences illustrative of tactical principles.

The opposing forces comprised about 70 Dutch ships against an allied force of 60 English and 30 French. De Ruyter's general plan was to contain the French and engage the English on equal terms.

The French, were allies of the English and were in the Van. They were sent ahead to gain the wind of the Dutch Van and place it between two fires. While this was in progress, and the Dutch Van had meantime moved out as a containing force to meet the move, the two centres became hotly engaged under the direct command of both Commanders-in-Chief. The French in the van succeeded in getting the wind, by a good margin, of the Dutch center and rear, due partly to De Ruyter running into close action, Rupert, the English Commander-in-Chief, keeping somewhat away.

The Dutch containing force of 12 ships found themselves "contained" by 20 French, to leeward. The Dutch boldly ran through the French Van and went to the support of their Commander-in-Chief. This was brilliant tactics and conformed with the following tactical principles:

(1) Avoid action with superior forces: (2) Support the point of major contact: (3) Concentrate the mass of your forces on a part of the enemy: (4) Avoid detached engagements and engage only with ships already under fire from friends.

The French force not only acted badly in permitting the inferior Dutch force to get through them, but afterwards committed the unpardonable blunder of not following their designated

opponents and of failing to support the English in the centre.

Meantime the English Admiral Spragge, commanding the rear showed equal poverty of tactical sense even though his valor was greater.

As a point of personal honor he wished to defeat the Dutch Admiral Tromp, and in order to bring the latter to action waited for him to come up. The English rear then became widely separated and out of supporting distance from its main body. The separate and personal encounter that followed had no effect on the main action. Here is seen an illustration of a subordinate placing his personal affairs and personal glorification above the general plan of his Commander-in-Chief, a pernicious type of disloyalty. In addition, Spragge flagrantly and deliberately violated the principles of (1) concentration; (2) mutual support; (3) unity of action.

In the meantime the British centre found opposed to it the Dutch centre plus the Dutch Van, and had to engage those two forces without any support from its own van or rear. De Ruyter succeeded further in applying the principle of concentration by cutting off the rear part of the English center, and containing this fraction, while he surrounded the remaining 20 English ships, including the English flagship of the Commander-in-Chief, with 30 or 40 Dutch ships.

That the British were not badly beaten is due to the ineffectiveness of the weapons of the day. Finally the English center succeeded in getting out of close engagement and ran down for the purpose of finding support for itself, to the detached rear under Spragge.

The Dutch followed on a parallel course, without either side firing (probably from shortage of ammunition).

Upon the junction of centers and rears, the battle was resumed, but it was then so late in the day that no decisive conclusion was reached.

The French were on the point of reenforcing the British, as the battle closed.

TRAFALGAR, 1805.

FORCES: Allied French and Spanish of 33 heavy and 7 light ships under command of Admiral Villeneuve.

British fleet under Nelson consisted of 27 heavy and 7 light ships.

PRELIMINARIES:

The allies in Cadiz were watched by frigates which vessels also formed a chain for communicating to the British Fleet at sea, guarding the Strait of Gibraltar.

When first sighted the allies were out of Cadiz in column heading about Southwest close hauled on the starboard tack. Wind was light from about West, Northwest. The British fleet was then about 15 miles to the westward and to windward; heading about North, Northeast, and in a formation of 3 columns separated by about 1-1/2 miles interval. The line of bearing of column heads was about Northwest. Nelson commanded the center with 11 ships, Collingwood the right or rear with 15 ships and the 6 fast light ships were on the left and comprised the Van.

About 7 a.m. the allied column were in succession and headed about north, and at the commencement of the action was in a column, with center bowed considerably away from the enemy, somewhat like a half moon.

Anticipating a concentration against his rear, Villeneuve kept his reserve squadron of 7 fast sailers just out of the formation and to leeward, abreast the rear center. His column was also well closed up, and further strengthened by a second column, just to leeward and abreast the gaps of the weather column.

As a defensive formation it was excellently devised to withstand the expected attack which was later realized.

Having the French to leeward, Nelson, at about 7 a.m. signalled to bear up and the leaders of each of his 3 columns headed in the general direction of the enemy fleet, course about east, wind west, northwest to west.

From the initial positions given, it will be seen that a continuation of this movement would bring the 3 squadrons into action in succession, Collingwood first, Nelson second and last the light squadron. Also that the ships of each squadron would come into action in succession and "teed" by the allied column.

THE PLAN.

Nelson had previously prepared a plan to cover the situation presented and had carefully indoctrinated his subordinates in its manner of execution.

Its salient features were:

- (a) To bring the enemy to action.
- (b) Minimize maneuvering.
- (c) Squadrons were to be maneuvered separately; i. e., the entire fleet as a whole was not to be brought into battle line as a whole.
- (d) The order of sailing was to be the order of battle.
- (e) The second in command was to have the entire direction of his line.
- (f) No captain can be far wrong who places his ship alongside that of an enemy.
- (g) Second in command was to lead through about the 12th ship from the enemy's rear and envelop his rear.
- (h) Commander-in-Chief was to lead through about the enemy's center; to include flagship of enemy Commander-in-Chief.
- (i) The third fast squadron was to reenforce if wanted, before action, one of the two main squadrons.
- (j) In addition to "leading through" the enemy center, Nelson's squadron was to "endeavor to take care that the movements

of the second in command are as little interrupted as is possible."

(k) In this manner the hostile rear and center were to be overpowered before it could be supported by the van.

THE BATTLE.

In accordance with the plan, and with Nelson's indoctrination, Collingwood conducted his squadron near the enemy's rear, formed a rough line of bearing to avoid the "tee" and vigorously attacked the eleven rear ships of the allies with his own 15.

Nelson with his own squadron and the small fast squadron first "endeavored to take care" that Collingwood's movements would not be interrupted by the hostile van. These two squadrons stood for the French van as though to attack it, until Collingwood was engaged. At this point, Nelson, seeing that the enemy van or center made no move to support its rear, now hotly engaged, changed course and stood towards a point a little in advance of the enemy center. The fast squadron remained unengaged as a containing force against French van.

This last movement of Nelson's squadron has been severely criticised chiefly owing to the fact that Nelson led his squadron "Teed" into the allied line. Data is incomplete and there is some, though not much, doubt that he did so. He made signal to bear up and it is probable that he meant it to be interpreted for a simultaneous movement. The fact that he headed about northeast for about a mile before making the signal, and thus paralleling the enemy with a part of his squadron, lends color to the belief that he intended some approximation to a line of bearing attack by his squadron.

The concentration on the allied rear was successful in winning a decisive action. The allied van did not support its rear, and even had it done so it is doubtful whether it would have arrived in the melee in time to have changed the outcome.

COMMENT.

Trafalgar is notable as being the only big fleet action in which a well digested plan preceded the battle. The plan was carried out loyally by the subordinates, resulting in that rare and difficult thing unity of action.

With special regard to Nelson's own movements, the writer believes that they were more than justifiable, and that the only fair adverse criticism that can be made was that he was a little too impetuous. Yet is not this a desirable thing in the person of the Commander-in-Chief at a critical point in a big engagement? His example means much psychologically to the subordinates in his vicinity and to the morale of the enemy. The security of his person is entirely secondary since the outcome in this respect cannot be known until the fight is won or lost.

To examine more closely what he did do:

Standing directly for the enemy fleet until just out of gun range, he changed course to almost parallel their line of bearing. This permitted his rear ships to close up and in part to form line of bearing paralleling the enemy formation.

Having the interior line and sailing free, a continuation of the maneuver would take his squadron out of supporting distance of Collingwood and would place Nelson's squadron opposite a part of the close hauled allied line where superior forces could be concentrated against him, thus violating first principles.

His movement so far kept the enemy in the dark and indicated to the latter an attack on the van center.

At this point, while still out of range, Nelson changed course abruptly to about east, southeast and led his eleven ships through the enemy column 6 ships ahead of Collingwood. His feint had the effect of discouraging concentration against Collingwood and his ultimate act was the throwing of his mass of his whole fleet still more strongly against the area of the enemy center

and rear.

He abandoned the fetish of "formation", sacred for so many centuries, and still sacred even after the event, for the sake of a more sound doctrine of using mass to crush a decidedly inferior enemy fraction before it could be supported. "Time is everything".

In this crisis Nelson acted in accordance with the following tactical principles:

(a) Support the point of major contact in the least time practicable.

(b) Keep concentrated.

(c) Avoid detached engagements.

(d) Isolate as much of the enemy as practicable while engaging the rest.

(e) Disregard formation when the situation so demands.

(f) Avoid action unless superior at the point of threatened contact.

LISSA (1866).

This action was the first in which any considerable number of ironclads were opposed to each other, and the only ironclad action except Tsushima from which fleet tactical principles may be gleaned.

The Italians were considerably superior in material, but decidedly inferior in preparation, training, and morale to their opponents, the Austrians.

The Italian Admiral Persano was from the opening of the campaign very dilatory and showed a poverty of strategic sense as well as of combative ardor. Rather than accept the inferior Austrian fleet as his principal objective, he chose, after a long period of inactivity, to attack the Island of Lissa. Worse still, in the execution of this eccentric mission, he permitted a scattering of forces and failed to take proper precautions against

surprise, so that when the Austrian Fleet suddenly and unexpectedly appeared he was very illy prepared to receive them.

Two days were spent by the Italians in the vain attempt to take Lissa. Many casualties occurred among ships and men. On the third day when first intimation of the approach of the Austrian fleet was received, the Italian fleet was widely scattered and busily engaged in bombarding and landing operations. Squally weather added to the plight of the Italians.

Persano had no plan, and his fleet felt the full psychological effect of a surprise. A "storm of signals sweeps over the squadron", Persano steamed confusedly about and managed in a comparatively short time to form a line of 9 ironclads. After several changes of formation he finally formed a badly stretched line, about at right angles to the enemy's bearing. One armored clad signalled she could not fight, and then deserted the field, two others were too far off initially to join action. The wooden ships were signalled to form behind the iron clad line, but did not obey.

As a final touch, when the Austrian attack was imminent, Persano stopped his flagship, and shifted his flag to another ship. A great gap was thus left in his already too extended column. "As soon as the Admiral was on board" the new flagship "he commenced to race up and down the line, doing little fighting but making numerous signals." Few captains being aware of the shift of flag "and as all the ships were so dressed with flags that signals could not be distinguished, nobody paid any attention to him, and the Italian fleet was left to fight in isolated units against a combined force; without leaders or orders, against captains who could see their Admiral and who knew his plans."

The Austrian fleet was massed; the iron clads in the lead in a wedge formation, and the wooden ships close in rear in two wedges, paralleling the Van. They hit the Italian line in the gap

caused by the stopping of Persano's flagship (and fifteen minutes after that event), and thus divided the Italian Fleet.

It is unprofitable to follow the detailed course of the action. A melee ensued, the Austrians keeping concentrated in two groups, wooden ships and iron clads, and the Italians becoming worse scattered. The value of a study of Lissa is not found in the geometry of tactics but in certain broad principles which were there accentuated more through the doing of the wrong thing than the doing of the right thing. These principles may be summarized as follows:

- (a) Enemy fleet is the principal objective.
- (b) Own fleet should not be weakened by engagement with shore defenses until command of the sea has been gained.
- (c) A plan is a necessary prelude to an action.
- (d) Before and during action keep concentrated. Employ all your means during action.
- (e) Formation is a secondary consideration compared with the concentration of mass at the critical point at the proper time.
- (f) Signals are a poor means for conducting a fleet during action and far inferior to that co-ordination produced by a plan combined with the united effort of subordinates.
- (g) Mutual support between fleet fractions is an essential requisite to successful battle.
- (h) Combative ardor of personnel is an essential to victory.
- (i) Surprise is fatal.
- (j) Against divided scattered forces the best attack is against the center.
- (k) All forces should be brought into action as nearly simultaneously as practicable.

TSUSHIMA (1905).

This action is notable because it is the only one in history where two large modern fleets were seriously opposed.

The Japanese had the advantage of their campaign during the preceding year, which served as excellent training in all the factors of naval warfare, and also as a means of elevating their own morale while depressing that of the enemy.

The Russians had a decided advantage in the number and the power of their ships, but a greater disadvantage in depressed morale, woeful lack of training in tactics and gunnery, incompetent commanders, and in the fact of having had to make a very long passage immediately preceding the action.

The Russian fleet was sighted soon after daylight by a Japanese scout, which though seen by the Russians was permitted to keep touch without molestation. The Russian fleet continued on its course and maintained cruising formation, in double column, until some time after the Japanese fleet was sighted standing on a nearly opposite course across the port bow of the Russians.

The Russians had some difficulty in understanding signals and consequently with interior maneuvers.

Just before coming within range the Japanese changed course about eight points left and stood across the heads of the two Russian Columns. Here Rodjesvenski tried to support his exposed column by obliquing to its support, but that support was given too late to save the leader of the port column which was concentrated on and sunk, the column being "Teed".

Rodjesvenski's supporting movement resulted in the Japanese, merely by continuing their course, teeing his own column, and in its leader being so badly damaged as to be forced to leave the formation temporarily.

The Japanese counter marched so as to hold the tee, and Russian head changed course four points right to remedy its bad position.

The Japanese again counter marched to parallel Russians, concentrated fire on the Russian knuckle and gradually completed another tee on Russian head, which was kept for a considerable time by counter marching after the Russians had turned sharply to port. This decided the action.

The Japanese had superior speed, and maneuvered by squadrons independently, but coordinated, and in accordance with a general plan. Most of their counter marches were done by squadron maneuvering by a simultaneous movement on signal.

The Russians were handicapped by the presence of a train which they endeavored to maneuver to protect and which prevented any effort at attaining higher speed which they might have done. The Russians steamed at about 11 knots and the Japanese at about 15 knots.

The Japanese apparently kept an eye on the wind advantage.

The weather was thickish, making Japanese grey ships difficult to see.

On account of rough seas, Japanese destroyers were kept in port during the day action and only attacked at night after the Russians were badly scattered. Japanese used their cruisers in the line of battle.

This action emphasizes the following points:

(a) The business of logistics, while necessary, is a function entirely separate from and should be subordinated to the business of preparing for and executing the fight. A commander-in-chief who permits his mind to be engrossed with logistics and administration is badly handicapped on the fighting end of his job.

(b) Exercise in the things to be used in battle, such as signals, maneuvers, and gunnery, is necessary if the fleet is to perform them well in battle.

(c) The moral element in war is the paramount factor.

(d) Well placed cruisers in the line of battle may be as good or better than poorly placed battleships. Every available ship should be used in action.

(e) Squadron operating with good degree of independence, and in accordance with a general plan, is a much superior method to that of attempting the maneuver of the entire fleet by means of signals from one source; particularly when in the latter case there is no prearranged plan.

(f) "The order of sailing" should be the "order of battle" when contact with the enemy is anticipated.

(g) Early information of the enemy's formation is of great value during the approach.

(h) Destroyers are probably not of much use in a fleet action when the sea is rough.

(i) Concentration of force and gunfire on the enemy flank is a murderous position.

PRESENT DAY TACTICS.

In applying the principles of tactics to the present day, we find, that, even since Tsushima there have been very great changes in type of ships, in weapons, and in auxiliary appliance. The dreadnaught type of battleship, the battle cruiser, the submarine, the sea-going destroyer, the long range torpedo, the floating mine, the radio apparatus, the perfected turret appliances, fire control apparatus, gun sights, the oil burning boiler, the hydroplane, etc.

While data concerning the performance of each of these has been obtained from practical experience with them, their proper use in action and their general influence on tactics, has been determined only on the game board. This method of tactical development and of tactical indoctrination is invaluable. Only by such means is frequent exercise at insignificant expense practicable. While game board rules must be founded on certain data which can only be obtained through actual practice, when

this data is once determined the game board is a more accurate method of tactical analysis than is that of tactical maneuvers with ships - on account of the impracticability of accurately recording movements of vessels on the water.

Consideration of our subject is simplified if accidental types are eliminated and only the pure types dealt in. These latter may be assumed to be: the battleship, the destroyer, the scout and the submarine.

Considering the operations of two hostile fleets of these types, the realm of tactics begins long before the two main bodies reach sight contact. Commander Pratt has stated that the tactical area includes some 400 miles in advance of a fleet at sun down, diminishing to about 80 miles at day-break. These figures are based upon the maximum distance from which the main body can support at day-break a destroyer attack made during the preceding night. This assumes the proper time for a destroyer attack to be preceding an action, and that such attack should be followed up by main body attack before the enemy has had opportunity to recover order, formation, standard distance and morale, which assumptions are heartily concurred in. Togo's use of destroyers at Tsushima, though probably induced by bad weather before and during the action, that of attack of crippled ships on the night following the fleet action is considered to be decidedly faulty. The employment of this type during a day fleet action will be considered later. He meant to make two steps in the fight previous to that which actually opened it.

Assuming then that each fleet commander will aim to get in a destroyer attack in force on the night preceding an action, information of the enemy main body at a time when the fleets are close enough to support such attack by battleships the next day, becomes of great importance. In view of the fact that the best defense against such an attack, is a similar attack on the opposing main body, it will be seen that information of our own main body is of equal importance to the enemy, whether or not he be acting defensively.

Normally then a fleet action will be preceded by vigorous and extensive operations by each side with a view to:

(a) Locating and delivering a night destroyer attack on the enemy, main body.

(b) Denying the enemy information of the whereabouts of our own main body and the avoidance by it of the enemy's destroyer attack.

In these operations all pure types should be employed. The scouts should keep close touch with enemy main body, trusting to her heels to keep out of trouble. V's should act on the information given by scouts as well as do some searching on their own account; deployment (preferably by small groups) is necessary during their search, and concentration before and during the attack. V's objective is the hostile main body so that screens encountered should be penetrated or avoided. In order to suffer minimum damage both while penetrating screens and while attacking subsequently, the main V attack should be massed near one point. The probability of the hostile fleet changing course, however, as soon as an attack in force develops and putting the latter astern, renders it desirable to precede the main attack by a feint or a secondary attack from an opposite direction, so that the fleet will turn into the main attack.

During the daylight preceding a destroyer attack, both sides will try and drive in the opposing destroyers. Scouts, and V's will be employed for this purpose, and these should be supported by fast battleships. The latter should in turn be supported by submarines, which are also of use in penetrating enemy screens and obtaining information of his main body even if own scouts be driven off and own V's and AA's be driven back.

No matter what dispositions have been made for screening, a wise Commander-in-Chief will at night, whether or not his location is known to the enemy, disperse his battleships rather widely

so as to reduce the torpedo target of the formation, and will be prepared to make a simultaneous change of course on radio signal, to put an attack in force eastern of his main body. Two thousand yards between ships and 4,000 between divisions does not seem too great a dispersion, and with a long range torpedo even wider deployment may be advisable. Of course, the least valuable battleships should be placed towards the suspected attack. The fact however that the enemy will prefer to make his destroyer attack just preceding daylight, makes this a very critical time because the fleet must be prepared to concentrate towards daylight to meet a battleship attack. Once having obtained good touch during the early night however, destroyer commanders will be very loath to postpone the attack for fear of losing touch later on.

THE MAIN DAY ACTION.

Once having passed through the stratego-tactical period and having gotten the two fleets into sight contact by day, the functions of the various types change materially. The battleship's chief role is of course obvious. The annihilation of the hostile fleet becomes the principal objective. The gun being the main weapon of the battleship, the latter will naturally form in a line of bearing at right angles to the general bearing of the enemy. The types whose chief weapon is the torpedo, i. e., the V's and the submarines, naturally seek a position on the bow of the enemy's formation. The water in advance of the two fleets will thus become the battle ground of V's supported by such fast types as may be available. Scouts and fast battleships will be formed there in order to control this speed area and to project from there torpedo attacks on the hostile column, as well as to protect our own head from similar attacks. It will be the aim to deliver these torpedo attacks after the main fleets have joined action so as to force, either a decided change of course of enemy

fleet under gun fire, or an acceptance by them of the risk of torpedo damage, accompanied in either case by a diminution of fire against own battleships while their fire remains undisturbed, due to enemy change of course or to their change of target to the destroyers.

The faster fleet will draw ahead, isolating the rear of the slow fleet and enveloping its head, unless the slow fleet turns away and moves on an inner circle. With submarines present they will have to have high surface speed if they are to be of use in turning enemy head. The slow fleet on the other hand may protect its head with slower submarines moving on interior lines. The slow submarines of the fast fleet may attack through its own column in safety and deliver a torpedo attack on enemy center or rear of a long column. With the advent of the 10,000 yard torpedo (now a fact) this weapon will have a marked influence on tactics. Fast battleships can get within torpedo range at the expense of but slight damage to themselves. The value of the submarine and the V in day action is enormously increased. So that it may with reason be expected that the range at which gunnery will be used will be markedly increased, and in addition the interval between ships must, also, be increased if the chance is to be discounted of a torpedo which passes through the formation making a hit.

A torpedo hit early in the action is of so very much more value than one hitting after the damaged ship has already delivered a great part of her gun fire that it seems likely effort will be made to make good torpedo damage in the early action and before closing the range. Thus an intermediate step will be introduced between the "approach" and deliberate general engagement at medium ranges. This may be termed the "torpedo" stage of the action and corresponds to the artillery stage ashore, though like artillery, the torpedo will be used to some extent during all stages of the battle.

Game board experience shows it to be a good precautionary measure against a torpedo drive from ahead as well as against a fast wing aiming to enfilade the head with gun fire, to open out some of the leading ships of the main column to about 2,000 yards in advance of that column.

COORDINATION:

During the approach and during the torpedo stage of an action when gun fire is light, coordination is comparatively simple. The various units give to each other and to the Commander-in-Chief mutual information; and the latter not only acquaints his subordinates with the salient features of his general plan as it develops in accordance with the information received from time to time, but also may give specific directions in regard to the movements and operations of the various detachments. As the torpedo stage develops into more general and closer contact, this frequent communication will become difficult and situations will change so rapidly that interior direction by the Commander-in-Chief will be impracticable. There is then necessity for a substitute for supervision of the Commanding Admiral, and no other method can be sound than such coordination as may be obtained through indoctrination preceding the action, coupled with a uniform system of command by means of which it will be well understood just what the function of each commander is in any undertaking that may arise. In every action there will very quickly develop a stage when formation, order and plans are badly paralyzed, and at this time united action is impossible except through subordinate commanders who know tactics thoroughly and are uniformly indoctrinated with the views of their chief. This is the critical stage of the action; that which has gone before is but introductory. Subordinates who then act in accordance with their doctrine and with tactical principles and with loyalty to the plan will win the fight for their chief in the face of vastly superior

force, if the latter be not similarly prepared. Let us now examine more closely those principles which should govern all, so that unity of action can be obtained.

The Fundamental Principle of tactics is the concentration of the mass of one's own forces against enemy fractions, at the critical time and place. This is easily understood as a principle, but its application is more difficult. From this principle the writer has deduced certain thumb rules for his own conduct on the game board which have so far in practice there appeared to be sound. These are: on the basis that doctrine is above the plan:

- (1) Keep concentrated.
- (2) Endeavor to get all forces into action simultaneously.
- (3) Support the point of major contact in the least practicable time.
- (4) Avoid detached engagements.
- (5) Avoid action with enemy forces not already under fire, and if possible isolate them from action.
- (6) Avoid action unless superior at the point of threatened contact.
- (7) Fast wing avoid action till main body engages.
- (8) Use individual initiative without signal where necessary to (a) further the general plan; (b) take advantage of a position gained; (c) to recover from a disadvantage.

THE TIME ELEMENT.

Before a proper conception of naval tactics is possible, the value of time must be thoroughly appreciated. Nelson has said that time is everything and that five minutes may mean the difference between victory and defeat. This is even more true today than in his age. In the opinion of the writer the one big defect in present game board rules is the failure to give this factor due weight. It is true that some concessions must be made in favor of simplicity, in order that the mechanism of playing will not involve so much labor as to consume much time or to kill

interest. But if simplification must be done it should be at the expense of insignificant factors involving such details as smoke, sun, changes of course and variations of speed. Farragut said: "The best defense against the enemy's fire is a well directed fire from our own guns," and in this saying lies the essence of the time factor today. A very slight superiority of gun fire will in a few minutes really become a very great superiority.

The damage done by our first salvo lessens the effectiveness of the enemy's succeeding salvo. Our damage is correspondingly slight and our fire effect proportionately greater thereby still further weakening the enemy fire. And so on; by this cumulative process any initial superiority becomes tremendously greater at the end.

It is this time element which makes it so inadvisable to tell off a reserve force at sea, except in the sense in which Nelson used a reserve; i. e., as a force to join a designated squadron before the fight. The battle will probably be lost before a reserve can get into action. This time factor also makes a containing force inadvisable to use; particularly when operating on interior lines. Better by far to get the containing force at the point of major contact for a few minutes in advance of the force that would otherwise be contained; it will thus serve a more useful purpose towards winning the fight. An exception to this may be made where submarines are available for use as a containing force or where inferior speed prevents getting the containing force into action.

THE PLAN.

A Commander-in-Chief who would go into action without a well considered and clearly formulated general plan would be grossly culpable. Not only must such plan be clearly understood by himself and staff, but it must be imparted to all principal subordinates in order that they may co-ordinate their efforts among

themselves and with the Commander-in-Chief himself to the end that unity of action may be obtained. As a basic principle of co-ordination and unity of action loyalty to the Plan of the Commander-in-Chief by all participants is absolutely essential.

Such plan must be firmly based on rudimentary tactical principles and should follow the lines along which indoctrination has previously followed. The battlefield is no place to introduce tactical novelties. United action is very difficult under the best conditions and impossible in battle except on terms entirely familiar to all the participants. In this connection it may be noted that one of the chief sources of a high morale is self-confidence which is born of familiarity with the task in hand, and this fact is one of the greatest arguments for previous training on the game board, in chart maneuvers and in tactical exercises with the fleet. Doctrine, which is essential to the successful execution of any battle plan, cannot be otherwise established co-incidentally with conviction of its soundness, and Doctrine without conviction is an empty form which will not survive the stress of battle.

The very simplest plan will involve more friction in its execution under fire than is desirable. Simplicity of Plan is then an essential to success. It may be remarked also that the plan should not go far into details; it must be very general and indicate only the principal intentions.

The unlimited discretion of the enemy precludes and possibility of carrying out a plan which projects much beyond the first few operations after the battle opens. The plan then is merely an introduction to the fight. Once begun in earnest the battle must resolve itself into the algebraic sum of the conduct of subordinate commanders previously educated, trained and indoctrinated in accordance with the tactical conceptions of the Commander-in-Chief, and previously enlightened with regard to the general plan for this particular battle.

Finally the plan must aim at the best use of the means at hand considered in connection with the means to be met, i.e., the enemy fleet. Every available means must be utilized to the limit of its capability or else the plan can not be an acceptable one. The slightest factor may mean the difference between victory and defeat.

FORMATION AND MOVEMENT.

The general arrangement of types on the battlefield has been previously sketched, and the fact has been noted that the two fleets will automatically take up positions on general lines of bearing approximately parallel to each other. As a rule the two fleets will move in the same general direction and at the maximum formation speed of each.

Formation is of course a means and not an end. The object of each side from the start will be to so distribute forces that the fundamental rule of tactics (concentration of own mass against enemy fractions) may be applied. But if each fleet seeks this object, each will concentrate forces as closely as practicable without restricting reasonable power of maneuver and without risking gun-fire interference or presenting too good a torpedo target. The normal result, taking into consideration all the above, is therefore the concentrated fleet in a general formation approximating "line ahead" or "column".

Many believe in the pure column formation solely on the ground that it is the best formation from which gun fire may be delivered, and argue that upon battle becoming imminent, column should be at once formed and retained without change as long as practicable. Certainly the best manner for the employment of all our means should be adopted, and since the gun is the principal weapon it follows that in selecting the formation to be used preference should be given to the gun. But certainly also is this reason alone inadequate for the maintenance of a rigid formation. It is dangerous to permit such doctrine to stand unchallenged.

It would lead to great poverty if tactical conceptions, restricted tactical development, and worst of all to a passive tactical defensive, since by column alone the tactical offensive is impracticable. With the general acceptance of this doctrine, the average officer will not be able to understand the necessity for a system of command, nor appreciate the difficulties or necessities of co-ordinating the actions of captains and flag officers. So long as the conventional column holds together, no individual initiative is required of any one but the leader; following in the wake produces perfect coordination of effort. If the enemy will be good enough to adopt a similar procedure the defects of our method will not become apparent, and it is only on the assumption of having such an obliging enemy that we could be justified in adhering to battle plan number one. What would happen to such a column if attacked by an up to date enemy would be difficult to predict, but surely sad to relate. Even assuming that danger from an early massed attack and a fast wing, or a V attack on the head has been avoided, once the heavy punishment stage is reached and the column begins to disintegrate in spots, the hitherto perfect co-ordination will become chaos. Lack of doctrine, lack of initiative and lack of tactical conception will bring panic and rout long before it is justifiable.

Just now our fleet would probably have to rigidly adopt the column throughout the battle because of our glaring weakness in co-ordination, doctrine and tactical conceptions. These latter must be developed to a high degree before real tactics can be attempted without grave risk.

But the principles involved are that formation is but a means and is a secondary consideration, that the proper formation to meet a given situation will depend upon the situation, that a fighting position should be sought at every stage of action, which will permit the employment of mass against enemy fractions, that

we should use our weapons to fight, and not fight in order to use weapons, and that morale rather than weapons is the chief source of victory. It seems probable also that not long after serious contact is made the time will come when the abandonment of all formation will be advisable, and that the fleet which is quick to gauge the proper movement for this will turn the tide then and there, against the fleet which still seeks to reform and retain its order and formation. Such a procedure could not be attempted except by highly trained courageous captains, sure of uniformity in tactical notions and certain of mutual support.

The lack of homogeneousness in most fleets introduces the problem of the proper order of ships in the formation. Many believe that dreadnoughts should be concentrated at one end; others that they should be concentrated in the center. In the latter case both flanks are left weak and the dreadnought speed cannot be used to advantage. In the former case one flank is weak, the dreadnoughts separate from the slower ships and the slow ships probably will not get into action against a faster fleet. This arrangement seems good against a fleet of inferior speed, as then all ships can certainly get into action. With a fleet of inferior speed, an arrangement which has been found advantageous on the game board is the slowest ships in the center dividing faster ships on each side of them and putting half the dreadnoughts on each flank. Here the formation remains concentrated and the fast ships utilize their extra speed in preserving the line of bearing perpendicular to the bearing of the enemy. The resulting movement is a wheel about a movable center, preferably by division columns. One thus accepts the defensive but has to submit to it anyway due to inferior speed, unless of course the fast ships are alone superior in force to the enemy fleet, in which event the concentration of speedy types which permits taking the offensive would be more advisable.

Movement in general under fire is better done by division columns than in any other manner. Simultaneous movements of single ships are no doubt impracticable not only on account of signal friction, but also because of risk of collision. Division column movements require well trained and well indoctrinated division commanders who will take the initiative promptly whenever the situation demands, without trepidation for the responsibility assumed. Divisions of three ships better serve the division column tactics than do those of four ships.

Any radical change of course greatly disturbs a ship's gun fire, so that they should be avoided. For the same reason if the enemy can be forced to turn abruptly while he is under fire, for example by a destroyer or fast wing drive on his head, a decided advantage will have been gained over him.

WIND.

In days gone by the weather gauge gave to its possession the choice of fighting or of avoiding action, and for that reason was of great value.

Recent experience with gun practice has developed the fact that funnel smoke and powder gas interference is decidedly disadvantageous to gun fire, and for that reason the lee gauge is considered preferable notwithstanding the other handicaps of spray from the sea and from enemy shorts, and of spotters having to face the wind. With the advent of fuel oil and the consequent ability to control funnel smoke, the advantages of the lee gauge will greatly disappear. In fact it is a question whether with oil fuel the advantages of firing to leeward will not more than outweigh those of firing to windward.

In addition to the gun fire factor, there is another question which enters into the problem of which wind gauge to choose for a fleet. It has been recently demonstrated that oil burning V's, by means of certain fuel feed and air adjustments, are able to make a tremendous quantity of smoke, on short notice,

so dense that it is comparable to a fog. Destroyers operating from windward may be able by day to make a close approach to battleships under cover of a smoke screen, with greatly reduced danger to themselves. If so the weather gauge is preferable to a fleet supported by many V's.

It seems probable also that the smoke screen can be put to other uses with advantage. Perhaps it can be used to effectively protect a fleet fraction until the arrival of re-enforcements or until it can draw away from superior force. Perhaps it can be used to cover maneuvers of our own fleet and enable it to escape from a dangerous predicament or to put the enemy in one. If used judiciously it is possible that a perfect concentration may be effected by obscuring all but a few enemy ships so that a large part of our own fleet may fire at them without suffering any return fire from the remainder of the hostile fleet. It has been suggested that the same thing be accomplished by means of a smoke shell, which will explode on impact with the water, fired from our own guns. The Bureau of Ordnance went on record about a year ago that in their opinion a satisfactory shell of this type could be developed, and it is understood that experiments are in progress.

TORPEDOES.

Frequent reference has been made above to the use of V's and submarines, which need not be repeated.

In the use of the torpedo in general, the most advanced conception is that the formation rather than the individual ship should be considered as the target. In the column formation the chance of hitting by torpedoes passing through the formation is the ratio between the length of the ships and the open water between. With other formations the chance of hitting varies greatly. In his study of the subject Commander Pratt has worked out these chances for various formations with torpedoes fired from various bearings. An intimate knowledge of this data by torpedo

officers is essential to the attainment of great efficiency with this weapon. With the column excepted the best position in general is about two points in advance of the line of bearing. Heavy ships will rarely attain an advantageous firing point early in the action, except perhaps fast ships operating as a detached wing.

There is considerable doubt in the writer's mind as to whether V's can be used to better advantage by day or by night. If the hostile battleships are unprotected by their own V's or other screening force an attack by night could scarcely be resisted, and is unquestionably justifiable. On the other hand where a screen must be pierced before the battleships can be reached there is some reason to believe that the V's had best be saved for the day action on the morrow. This is particularly true if the enemy has superiority of V's and more especially so if own V's are oil burners and capable of making an efficient smoke screen. It is too dangerous to heavy ships to use them as a support to a night V attack. The losses incident to screen piercing will be great, further losses will come from battleship fire after penetrating screen and in greater degree than if the screen had not been present to warn the battleships and enable them to maneuver to place the attack astern. Those boats not badly damaged will fire torpedoes at widely scattered targets and the percentage of hits will necessarily be small. There will be few torpedoes remaining to take part in the day action. At the latter time the enemy will be in sight, his course and approximate speed known, his formation concentrated giving a good target. The fire sustained by day will be relatively small if the attack is well supported and takes place while the enemy main body is under gun fire. He may shift all his battery to the V attack, but to do so he must greatly slacken fire on our own heavy ships whose fire will be correspondingly improved. If the V's come in under a smoke screen they will not be hit much and they will be

difficult to distinguish or to stop by counter attacking V's. Certainly a day attack of this sort is more in keeping with the fundamental principle of tactics - concentrated attack at the proper time and place - than is the night attack. It certainly would seem to offer better chances of undermining the enemy morale at a time so critical that a reasonably successful V attack then would win the fight. The effectiveness of V's is greatly enhanced by using them en mass. The failure of the Japanese to do this instead of using the boats individually in their war with Russia, has since been concluded by the Japanese General Staff to be the cause for their poor success.

Torpedoes furnish the only weapon of the submarine. Inasmuch as a position forward of the target beam is greatly preferable to one astern of it, it follows that submarines should have sufficient speed to place them in the desired position. So great speed under water being impracticable, it follows that high surface speed is the only solution that offers. Without such speed the usefulness of this torpedo carrier is reduced to that incident to stealth and to pure chance; except where the use of interior lines is practicable. At night the efficiency of submarines is reduced owing to their vulnerability at that time - for during darkness the periscope is valueless and the boats must operate in an awash condition, thus falling an easy prey to destroyers X or even to picket launches. When used in conjunction with V's in a night attack it is bad in principle to have the submarines accompany the V's. A better use is to separate them so that the submarines will be in position to intercept ships turning away from the destroyer attack.

The new type of large submarines fitted with heavy oil engines makes a craft of long radius capable of accompanying the fleet at sea and introduces a new factor in sea fleet actions.

* all recent submarines have one or more guns; our latest carry one 3" gun, about 25 calibers long, good at 1000 yds or less and capable of practically vertical fire.

Game board experience indicates that their influence will be to make both fleets wary during the approach period, but in the end one fleet must accept the hazard boldly and endeavor to break through the cordon believed to be surrounding the fleet on the defensive. Once inside this cordon the submarine's danger is greatly reduced, though never wholly eliminated. In the defense of bases and the guarding of passages the submarine is an extremely valuable auxiliary to which there is no satisfactory answer. The best reply seems to be in a superiority of V's and in speed. In one sense the submarine may be regarded as a moveable mine field.

The Russo-Japanese war brought the mine very much to the fore, both as a defensive and an offensive weapon. The defensive carrier can be any type of vessel. One of special type is preferable. For offensive uses the best type is one possessing speed thus supplying the factor of mobility which the mine itself lacks. Occasionally the battleship may have opportunity to use mines in an offensive sense, notably when retreating preliminary to an attack. Owing to this danger as well as to that of the submarine, fleets will no doubt in future be deterred from following a retreating foe which has not already been badly punished or is not greatly inferior, and even then the opponents' wake will be avoided if practicable. The offensive mine carrier par excellence is the X destroyer. These vessels equipped with floating mines will be very dangerous both by night and by day. A destroyer attack following mine damage will be very effective, particularly at night and by day as well if properly supported. No weapon has a greater influence on the enemy's nerve than this unseen one. Success in it will give all the well known advantages of surprise and will cause grave confusion and loss of morale by both men and officers.

The introduction of the floating, as well as of other types of mines, renders necessary constant sweeping operations

** Our latest destroyers have an outfit of mines and means of launching them.*

in advance of a fleet underway. Means for efficient sweeping have yet to be perfected.

In conclusion, it seems probable that attacks on the underwater body of ships will be a very deciding factor in the next war. Structural design to minimize the damage from this form of attack is an imperative necessity. *

MORALE.

Of all the many factors entering into tactics, as well as into the other branches of war, the moral one is pre-eminent. Without moral force "the material is worth no more than old iron

The field of battle is primarily a contest of will and character.

Victory comes to those who, regardless of the balance of material force, longest and most stubbornly keep alive their will to conquer and their conviction of ultimate success.

Once the confidence of strength and the belief of victory is badly shaken, the battle is lost. "Battle from its nature, exacts of man a superhuman effort that strains all the fibres of his organism; and this abnormal tension can only be produced and maintained by the hope of victory. As soon as that disappears, the reaction at once sets in, and the worn-out man gives up".

In planning and executing all his battles, Napoleon's chief aim was to shatter the enemy's morale. In his ability to do so lay the greatest secret of his success. It is well to profit by his example and to formulate our own plans with the same end in view, and to direct every detail with the principal object of undermining the enemy's morale. Surprise him, throw him into confusion and before he has had opportunity to recover throw the mass of one's forces into the critical area. The prompt following up of a real advantage or even of a situation which to the enemy only appears disadvantageous, is one of the best means

* The Bu. of Corr has stubbornly resisted
ed interior armor but has adapted
compartment plans to meet this condition

of lowering his morale and making him believe that his case is hopeless.

High morale springs primarily from self-confidence, and this in turn is derived from knowledge of or belief in one's skill and strength, as compared with the enemy. Familiarity, then, with war operations gained by frequent practice during peace constitutes a great element of moral strength. Another is the assurance of the mutual support of our fellowfighters. Still another is conviction of the soundness of the doctrines which uniformly guide our side.

In modern fleet actions the range will be so great as to prevent true appreciation of the damage which is being done to the enemy, our own damage being meanwhile subject to undue exaggeration and concern. This fact makes it more than ever necessary to exhaustively study the subject of morale and its allied subject of psychology. The spotter, the range finder operator, and the gun-pointer who are afraid or unduly agitated will begin the disintegration of our forces through lowering the efficiency of our fire and raising that of the enemy.

We must study man and particularly the American man, with a view to developing in our officers and our crews now, during peace, such moral qualities as will sustain us through:

(a) The pre-combat stage;—when the enemy is approaching, and nerves are at the breaking point.

(b) The punishment stage;—when men act mechanically, and habit and discipline may sustain them against the fundamental instinct of self-preservation.

(c) The disintegration stage;—when the fabric of our previously constructed system begins to go to pieces. Character will alone, then stand between defeat and victory.

D. W. KNOX