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### 1. THE FORCES ENGAGED

Between resolute powers the seal of victory is the occupation of territory and no application of science seems likely to change this aspect of war.

Occupation requires land forces; these, in our case at least, need sea power to permit of their concentration and supply. Armies and fleets must each have their proportion of aircraft to enable them to fulfil their own functions, and we need an air force to strike in conjunction with the land forces and the Navy. In short, we cannot beat our enemy without an army, and we cannot employ an army without sea and air power. Sea and air power are, moreover, essential to secure the ocean transport by which we live, and to protect our own land from air attacks.

For all that applied science may do, we shall probably need, for as far as we can see into the future, a Navy, Army, and air force in due balance and proportion. What the proportion will be we cannot say, but certainly the threat of European war would secure for the air force a much greater relative strength and importance than it enjoys under the present political conditions.

### 2. SURPRISE

The sailor, soldier, and airman charged with the defense of their country in war, face the simple fact that it can only be secured by destroying or disarming her enemies. They survey their new armory, and the advantages promised by surprise—always the most formidable of weapons—stand out as never before. In the past a nation, caught by surprise and staggering under the disasters that follow it, might yet pull herself together and restore the balance of a campaign. The attacker has generally been unable to maintain unrelaxed the merciless pressure of his first onset, and the defense has usually been granted a breathing space. The question whether a nation surprised and unready, can hope for such a respite in future is worth examination.

Complete surprise gives complete victory, but by land and sea the powers in the past have watched one another too jealously for surprise to be more than partial; no nation has been able to fall, fully mobilized, on an unsuspecting rival.

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The difficulty of concealing preparations for war by land and sea will not diminish; but the air presents a new problem—a problem that touches us nearly, because our sea frontiers offer no protection against attack by air.

Complete surprise on the great scale, however, will probably be as difficult to achieve by air as it is by land or sea. An unexpected air raid might be comparatively easy, but it would in itself throw away all chance of surprise in a subsequent decisive attack. For such an attack on any great country the aeroplanes necessary would be numbered in thousands, and such a fleet cannot be prepared and mobilized in secret. It is a popular idea that commercial aircraft can be diverted at will to war purposes. This is incorrect, and it becomes more so every year as the aircraft designed for battle and those designed for commerce diverge in type. This divergence has its parallel in the evolution of the battleship and the liner of today.

But the rewards of an initial surprise, if it can be achieved, will be greater in the future than in the past. The increased destroying power of scientific weapons alone would secure this; they would be comparatively unopposed while the surprise lasted, and could do irreparable damage before any counter measure could take effect. But there is, in addition, the new factor that the blow may fall, not only on the fighting men of the nation, whose discipline and training arm them against panic, but on the susceptible mass of the people.

As air power will be the chief agent of initial surprise in the future, so the first insurance against it lies in a strong air force, ready to act immediately.

### 3. THE OPENING MOVES

We are told by some, who should be well informed, that the next war will open by mutual air attacks on the belligerents' capitals, and that whichever side succeeds first in destroying the other's capital will win.\* This is founded on a false

\*Sir William Joynson-Hicks, M. P., in a series of articles published by the *Daily Telegraph* at the end of August and beginning of September, 1922, writes: "We cannot reiterate too frequently that the next Continental war will undoubtedly be fought and won almost entirely in the air. The Navy and Army will almost certainly be impotent spectators of an air battle or series of battles which will determine the issue by the destruction of the enemy capital before even the older services can get into operation."

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conception of strategy. The next war will certainly start in the air, but the main object of each side will be to seek out and destroy the enemy's air squadrons, wherever they are found—on the ground for preference. If, aided by surprise, by superior morale, or by overwhelming numbers, one side can do this, its enemy's fleets and armies will fight blindfolded and the war will be more than half won. The capital may receive attention, but not more than can be spared without prejudice to the success of the main effort against the enemy's air power. If a nation is lured by this apparent short cut to victory, and neglects the true strategic objective in favor of bombing cities, it must leave its enemy's air force comparatively unmolested. These will be free to attend to the attacker's air bases and bombing squadrons.

The sudden and complete destruction of a nation's capital would, it is true, leave its fighting services paralyzed for the time being, though intact; and such a nation might possibly be cowed into submission, without striking a blow. But complete destruction of even a small area needs concentration of effort in a sustained air offensive; it cannot be achieved at a blow. In the time required for this the defender's air forces can concentrate on their true business of destroying the attacker. Moreover, any damage to the capital would undoubtedly exasperate the nation attacked, and stiffen its moral. With whatever false conceptions a war might be begun, the unchanging law which demands battle as the price of victory, and allows no short cuts, would before long assert itself.

Air defenses, comprising aircraft, guns, searchlights, balloon nets, locating devices and a most complete system of intercommunication, absorb great resources, and can therefore only be provided for the most vital areas.

#### 4. BATTLE

##### (a) Infantry, tanks and cavalry.

The supreme act of battle on land is the assault, in which the attacker closes with his enemy to destroy him. It is the culminating effort of violence to which all else tends. Every activity of every arm is directed to its preparation, delivery, repulse or exploitation, and the arm that delivers it is supreme on the battlefield, demanding the services of all the others.

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In the past, this arm has been infantry; in the future, it will be infantry with tanks. There is the root of the matter, and it is this new factor that will most affect the conduct of battles.

It is necessary, then, to examine more closely the powers and limitations of the tank. These are summarized below:

(i) The present fighting tank (as issued, not as designed) is proof against rifle and machine gun fire and shrapnel bullets, and can be made gas-proof; it can maintain a speed of from  $2\frac{1}{2}$  to 5 miles an hour across country, and carries an armament of 6-pdr. or .303 Hotchkiss guns. In short, in addition to the protection which it provides, it combines the attributes of fire and movement to a very high degree. It can be used, in addition, to emit a smoke-cloud.

(ii) It presents an easy artillery target when stationary, and even when moving it falls an easy victim to guns at short range over open sights. It is stopped by certain kinds of country. Tanks cannot turn Infantry out of underground shelters or the upper floors of houses. They cannot, in an enemy's country, obtain information as cavalry can, nor lie perdu to avoid detection; their track is unmistakable.

They cannot continue long in action, nor go to ground like infantry at the close of any phase of a battle. They cannot stand still on the battlefield without great risk of destruction, nor move with infantry, taking cover as they go. Their movements must be timed to bring them into battle at the right moment, and to take them out of battle, when they have struck their blow, to rest and refit, and to escape the immediate menace of artillery and aircraft.

(iii) Many of these drawbacks are inherent in the nature of the tank, but in the near future some of them will disappear. In particular their speed and endurance will increase.

(iv) Regarding mechanized transport, we may say that it can carry loads up to three tons across country at what may now be taken as five miles an hour. These powers will no doubt greatly increase.

Some deny the right of the tank to be called a weapon at all; they would acknowledge it only as a method of transport for the older arms. This point may be settled by a reference to the Field Service Regulations, which state with characteristic restraint that the tank can destroy hostile personnel and weapons by passing over them. We know what our enemies thought of them; and if we may draw a parallel from the past, Hannibal's elephants were never dismissed by the Romans as a mere means of transport for bowmen.

At present, an attack on a position by tanks without infantry would fail before the close-range fire of anti-tank guns; and the training manuals of today clearly indicate the methods of cooperation between the two arms. In the future, the increased speed of tanks will put them in a better position, but it does not seem likely that tanks can ever dispense entirely with the cooperation of an ubiquitous and thrusting infantry to

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deal with the carefully sited gun. Whatever the respective roles of the two arms in the assault, ground won can only be occupied and consolidated by infantry, and that arm alone is able to protect tanks at rest.

The present tank, attacking in cooperation with infantry, moves with the leading companies. The faster tank of the future will not sacrifice its mobility in order actually to accompany the infantry with which it cooperates, but will make full use of its speed to outflank and defilade centers of opposition, and to offer as difficult a target as possible to artillery and aircraft.

If either side possesses a marked superiority in tanks its infantry will fight at a great and perhaps a decisive advantage. Hence it is probable that a general engagement will witness in its early stages a tank versus tank struggle for supremacy. This may be sought deliberately, or brought about by the tanks of one side, bent on some mission of destruction, being countered by tanks of the enemy. Imagination leads inevitably to pictures of outflanking movements by bodies of fast tanks with aerial escorts, to be met by tanks, air squadrons and anti-tank guns. Then, it will be asked, "Why not put your anti-tank guns themselves inside special tanks?" So by steps, each unassailably logical, the tank enthusiasts lead us to a vast mechanical battle of maneuver at high speed, where the sole duty of the infantry and cavalry is to keep out of the way; and artillery is only suffered because its greater range enables it to fight from a distance. Thus the doom of infantry and cavalry in open warfare is sometimes foretold!

But when the battle is over, who has won? The side that holds the position fought for. And how can it be held? Not by tanks, which must rally and refit after action, but by infantry and anti-tank guns, with due artillery support. "Infantry is still the only arm which can complete a victory and consolidate and hold the ground won."

It is worth while to recall the great losses among tanks in the late war, which more than once made it necessary for infantry alone to carry out attacks that had been planned for

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infantry and tanks in cooperation.\* These casualties were due to artillery fire, difficult going and mechanical defects; in the future increased speed and better design will reduce these sources of loss, but the greatest enemy of all, the hostile tank, was not in being in 1918, and it will have to be allowed for in the next war. We must remember also that it will be no more possible to bring overwhelming tank superiority against all parts of a front than it is with artillery. In each case force must be concentrated where a decision is aimed at and economized elsewhere.

We are thus led to picture an encounter battle with infantry†, supported by artillery and cooperating with aircraft, fighting to advance over the whole front until the time comes for the tanks to strike.

These have been moved by bounds from concentration to assembly, and from assembly to deployment areas; and at the right moment, deployed in depth against the chosen objective, they will pass at speed through or round the struggling line, and endeavor to get among the enemy's infantry, probably to be met in turn by his tanks.

Whatever evolution tactics may undergo to meet changing conditions, there will be occasions when fast enemy tanks will get among infantry, temporarily unsupported by their own tanks. This demands the development of an anti-tank gun as an infantry weapon. The requirements are that it should be small enough to be easily hidden, powerful enough to pierce tank armor, mechanically propelled at infantry pace across country, and able to carry ammunition for immediate needs. While tank attacks in force could be met only by tanks, such a gun would enable infantry alone to repel minor tank attacks. The battalion must have with them some defense against these attacks; failing a special gun, this defense can only be

\*"The Story of the Fourth Army," by Sir Archibald Montgomery, is full of examples of heavy tank casualties. The 27th American Division, when in that Army, had 39 tanks allotted to them for their attack north of Bellicourt on September 29th, 1918. Out of these, 12 were knocked out by direct hits, 7 were ditched, and only one succeeded finally in crossing the Bellicourt tunnel.

†Whether "infantry" in the future will include a definite proportion of tanks permanently distributed among the units depends on the evolution of the anti-tank gun discussed in a subsequent paragraph.

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provided by distributing a great proportion of the available tanks permanently among the infantry, instead of concentrating them for the decisive attack.

We have spoken of fast tanks' cooperating with infantry; it is clear that the more mobile the infantry the more effective the cooperation can be. It is hard to exaggerate the difference in fighting value between a fresh man carrying only his weapons and the laden infantryman who has been on his feet many hours. Infantry units destined to cooperate with tanks in the assault will probably have all impedimenta, except their actual arms, carried for them in tanks. Vehicles and pack animals of all battalions will no doubt be replaced in time by small carrier tanks, which can accompany the men at all times and reach them under fire. We may expect to see also before long a tank allotted to carry the battalion commander in action.

Our present tanks are but embryos, and none can say what forms the monstrous brood may take. The first of their kind were essentially man-killers, but their possession by both sides in the future will lead to tank actions of increasing importance. These struggles will give birth to the tank of the line, heavily gunned and armored, designed, above all, for battle with its peers. Lighter and faster forms will develop for other purposes, such as participation in protective duties, infantry attacks and exploitation. Science has reduced warfare to a grim and dreadful business about which the world retains few illusions of romance and glamor; but she may yet restore to battle something of its lost Homeric savor in the tank combats of the future.

An army moving to meet its enemy must guard against surprise. The most effective measures have been found to line in a screen of protective mobile troops covering the whole front of advance, with a local advanced guard for the immediate protection of each of the marching columns. No application of science appears to threaten this principle. Up to the present, the protective screen has consisted almost wholly, and the advanced guards partly, of cavalry. The screen covering the German advance into Belgium in 1914 was most effectively strengthened by the addition of armored cars, cyclists,

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machine guns, and infantry moved in lorries.\* These, through their added fire power, preserved the mobility of their own cavalry by sparing them the necessity for dismounted action, and checked all attempts at penetration by the French patrols.

This is the clue to the future. Cavalry, by their ubiquity; and individual initiative, can gain local information better than any machine-borne groups of men; but mounted patrols will be checked by the fire of mechanical arms unless themselves supported by similar arms. When the endurance of tanks has improved sufficiently to enable them to accompany protective cavalry, there is little doubt that they will be employed to give the horsemen fire support in an ideal form.

When protective troops have done their work and the armies meet in battle, a commander needs a weapon of opportunity, with which to take immediate advantage of any openings that may offer themselves. In the past this has been the work of cavalry with horse artillery; in 1918 the tank took part in this exploitation, and the faster tank of the future will take a greater part. But what will happen to the cavalry?

The campaigns of 1918 in Palestine and Mesopotamia show that cavalry, as good as our own, are not stopped by rifle and machine gun fire, provided that there is no wire. In Flanders, particularly east of Arras in the offensive of April, 1917, we had examples of the desperate situation of squadrons held up by wire under machine gun fire. In the future they must meet a new enemy, the tank, and fast tanks among unprotected cavalry would be as wolves among sheep. Mounted men, moreover, have not the facilities of infantry for local anti-aircraft defense; and apart from the actual casualties, no amount of schooling would break horses to bombing. These difficulties are great; but the value of cavalry at the right place and right time, and their effect on shaken infantry, do not diminish. No commander will ever have as many tanks as he wants, and if cavalry can be protected from the dangers of wire, tanks and bombing, there will still be work for them in battle. Wire is easiest cleared by tanks, and the latter, in conjunction with anti-tank guns, will be the best antidote against enemy tanks. The development of a cavalry anti-

\*See "Forty Days in 1914" by Sir Frederick Maurice.

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tank gun, to accompany the squadrons, seems essential. The best protection against aircraft will be found in the open formations evolved in the attacks on entrenched infantry in Palestine, combined with Lewis guns in the accompanying tanks. Probably all these methods will be tried in the next European war. If successful, no commander will consent to be without cavalry; if ultimately the machine prevails over the horse, it will not prevail over the rider, and the same bold spirit will find its outlet in the same act of swift and decisive exploitation, whatever the agency employed.

(b) Artillery and gas.

Science applied to gunnery will increase the newly-found power of opening sudden and accurate fire on a target, without the warning that is given by previous registration. The cross-country tractor will make medium and heavy pieces more mobile. This will render it more easy to give continuous support to advancing infantry and tanks, a support which was hampered in the past by delays in moving forward the guns.

But it is gas that will, if used at all, add most to the power of artillery fire.\* Only a small percentage of gas casualties was fatal in the last war; but the chemists promise to change all that, and we are assured that it will be merely a question of putting down a lethal or a non-lethal concentration at will. Although a concentration, to be lethal, must be of some intensity, yet a very slight taint of some gasses is enough to disable. We can picture the effect of gas-proof tanks, operating in a part of the enemy's position that has been so drenched with gas that its occupants are either totally incapacitated, or partially so, through having to fight in masks. The only effective reply would be the tanks of the defense.

A wood or valley filled with gas can be denied to the enemy for a period that will depend on the persistency of the gas used. Masks may protect, and will improve in effectiveness as gas grows in deadliness, but all the tendencies of the future make for a war of movement and maneuver; and in such conditions a man wearing a mask loses half his fighting value. Discipline and training can reduce this disablement; but it must always

\*The use of gas is banned between those nations that subscribed to the Washington Convention; but see the section on Restriction Conventions above.

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be great. We may expect, then, that artillery fire with non-lethal concentrations will be applied to direct the enemy's movements into certain definite channels, which will come under high explosive, shrapnel, or lethal gas shell. Such surprises as that successfully effected by the 9th Division at Meteren on July 19th, 1918, will be common. In the words of Sir Douglas Haig's despatch, "For some time prior to this attack gas was discharged, in conjunction with a smoke and high explosive shell bombardment. When at 7:55 AM on the 19th of July our infantry advanced behind a barrage of smoke and high explosive the enemy was expecting only a gas discharge, and had in many cases put on gas masks."

A short reference must be made to smoke, of which such extensive use was made in 1918. Its chief function is to conceal movement and to neutralize air attacks, and its extended use will be one of the many factors which will make for a war of movement rather than of fixed opposing trench lines, in the future.

Although tanks, in clearing wire and affording close support to infantry, carry out what was formerly the role of artillery alone, yet they need artillery support themselves to enable them to advance in face of the enemy's guns; their use will render unnecessary the long-drawn-out destructive bombardments that had to precede the attacks of 1916 and 1917, but it will not reduce the number of guns required for the attack itself. This is made clear in Sir Douglas Haig's final despatch, in which he says that, in spite of the 456\* tanks available on August 8th, the *expenditure of ammunition was greater than in any previous battle.*

## (c) Aircraft.

The fortunes of the armies in battle will depend more even than in 1918 on the success of their aircraft, scouting, observing, engaging troops on the ground, and driving down enemy machines engaged on the same work. If he is supreme in the air, a commander will be armed with that greatest weapon of all—surprise. He will be able to move troops, particularly tanks, unseen, while the enemy's movements are under observation. The tasks of aircraft working directly with the army will

\*This figure is taken from Sir Archibald Montgomery's "Story of the Fourth Army."

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resemble those of 1918, with the exception that the engagement of all troops on the ground will be on a much greater scale. The army will see and appreciate the work of the aircraft allotted to it, but the success of this work itself is deeply influenced by the unceasing struggle for supremacy sustained by the main air force, from the first hour of the war, against the enemy's air power. Of this struggle the soldiers will see little, though if it is successful the army will benefit immeasurably in the growing weakness of the opposing aircraft, and the moral effect on the enemy of air reverses at home.

(d) Mechanical transport, engineers, and signal communications.

With the perfection of the cross-country track vehicle, mechanical transport will become less dependent on metalled roads, though these will always be of great importance. The movement of armies in a country where roads have been destroyed or never existed is limited by the rate at which the troops can be supplied, and in the past this has been ruled largely by the difficulty of making or repairing roads. With cross-country transport instances of a victorious army robbed of the fruit of success by outrunning its supplies are less likely to occur. The new feature will facilitate maneuver in every respect; transport will be able to move across country, closed up on its front in parallel columns; and the problems of congested roads, crossing columns and movements to a flank will lose half their terrors. For work on the lines of communication, however, the great carrying capacity of railways will make them as indispensable in the future, for large forces, as they are today.

In most cases where the horse still holds his own, such as with light artillery, mechanical transport will probably take over the work when it is sufficiently developed. The reason lies chiefly in the greater ease of supply, since horses consume a greater weight in forage than the equivalent machines do in petrol, and horses, it must be remembered, must be fed whether working or idle. The great quantity of forage absorbs precious transport and is a direct drain on the nation's food supply. In addition, mechanical transport employs at the front fewer men than are needed for the number of horses required for the same work.

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The growth of applied science in war will make ever greater demands on the field engineers, and three problems in particular will come to the front. In the first place, the mobility of cross-country mechanical transport will be wasted if the columns, moving abreast over the land, must check and concentrate on existing road bridges when they come to a river. The first problem for the engineers will be the rapid construction of bridges for tanks and track vehicles. In the second place the construction of some form of tank obstacle will be required to oppose tanks in the same way that wire now opposes infantry—that is, by shepherding them into previously prepared zones of fire. The third task, and perhaps the greatest of all, will be the concealment of troops and works from air observation.

As war becomes more elaborate, commanders become more dependent on signal communications. Between 1914 and 1918 there grew up behind the lines in France and Flanders a vast telephone system, which commanders and staff came to regard as indispensable until they had to leave it behind in the advance of 1918. No army is likely to enjoy such a system in future; their own movements and the enemy's bombs will combine to prevent its growth.

A commander must be in communication with both his chiefs and his subordinates; this has kept him to the neighborhood of telegraph and telephone routes, and the number of these that can be made available in moving warfare is limited. In future the need for communications will not be less; but commanders who are in other respects more free to maneuver than they have been in the past will not be content to be tied to a wire. Something more flexible will be demanded, and wireless communication at once suggests itself. The dangers of overhearing by the enemy and of mutual interference between wireless stations have still to be overcome.

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**MILITARY TRAINING TODAY**

By Captain H. Meredith Logan. The Royal Canadian Regiment. 19 pages.—*The Army Quarterly* (British), April, 1923, p. 58.

In the complete article, the author advances the views that national interests should be guarded by professional

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soldiers; and that "there is a natural tendency in every age to consider the lessons of the past as out of date, taking the most recent experience as the only guide to follow, without pausing to weigh the special conditions which may have exercised an influence. . . . Every war has its special local conditions; and deductions hurriedly drawn, without due allowance for these conditions, are generally exaggerated, if not altogether wrong."

As regards military training, the author states that the importance of the officer in the training of his men has become more apparent. The best results today are obtained only where the officer takes a full share in, and complete supervision of, the training of the men whom he will lead in war. In proportion to the knowledge of the military profession which an officer demonstrates as an instructor, will be the confidence which his men have in him. For the officer who is unable, successfully, to accomplish his mission of instruction, a modern army can find no justifiable place. Training must be up to date, and this implies continued study by the instructor. The officer whose keenness flags is asleep at his post, and, normally, is just as guilty as a sentry in that condition. An officer who neglects his work, who fails in the duty of training his men, where pleasure takes first place, whose other interests supersede his work with his command, is a swindle on the public and a living disgrace to the uniform. There must be fidelity to duty as much in peace as in war, for it is during the days of peace that the only real preparation for battle can take place.

The training of, and the knowledge to be possessed by, the noncommissioned officer is just as important.

The training of a unit should not be undertaken by specialists. They train the trainer, and that should be the extent of their task. Specialists not only unbalance the instruction, but they tend to produce the evils which prevailed during the days of long service.

In conducting training, special attention should be paid to psychological principles. The development of those properties of mind and spirit essential to military training are more important by far, than the production of Herculean physical strength and endurance. The greatest attention

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should be directed towards the mind of the recruit for, while physical development becomes a routine, mental expansion is a study peculiar to each individual concerned.

Although the primary object of the educational training of a soldier is the preparation for war, when he is returned to civil life he is far better trained for his new tasks than ever before. His mind will be developed, his physique improved, his initiative strengthened, and with his self-discipline he will be a vast asset in the national life.

In conclusion, the author states that "the profession of arms must not stand apart from the stream of current thought and every day life. The soldier should not be divorced from the civilian. The soldier should not be a foreigner to any of the general interests of the State. The soldier and the civilian have the same interests at stake. Both are of one soil; to both the flag is the symbol of home."

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**EMPLOYMENT OF AN ARMY CORPS**

Extracted from a French article by Colonel Nuyton. --*Bulletin Belge des Sciences Militaires*, February, 1923, p. 137. Translated at the General Service Schools. Instructor's File No. 1200CC.

The author undertakes to illustrate how the instructions laid down by Napoleon for the employment of army corps should form the basis to define the role of a Belgian army corps.

Historical examples from the World War and from the Napoleonic wars are quoted to show where the violation of certain well known Napoleonic principles has led to disaster. Emphasis is laid on the principle that division commanders should not undertake semi-independent operations that are not in consonance with the mission of the army corps, of which they are a part.

The principle of keeping concentrated the divisions of a corps requires that any division of the corps be supported within one or two hours, depending upon whether or not the division has an offensive or defensive mission. The author comes to the following conclusions:

a. When first line divisions are moved for a decisive attack, an army corps commander should have one or more second line divisions at approximately five kilometers (three