The firepower revolution

General Tactical Review - Fire

Colonel (er) Michel GOYA

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Tactique générale

The space in which armies have evolved has for a long time remained very small because of the short range of weapons - a few hundred metres at most, the low mobility of troops, limited to marching or horse transport, but also the command procedures. The same was true of limited transport and logistics capabilities. Until the middle of the 19th century, it was almost always possible to see the enemy before suffering the effects of his weapons and thus always possible to manoeuvre and organize before combat. The latter was concentrated on a specific point so as to remain within the "command radius", which corresponds roughly to the space where a round trip of information (reports, decisions, orders) circulates faster than men. Thus we find the Grande Armée on 18 June 1815 at Waterloo with six army corps, twenty-one divisions, a hundred or so infantry regiments (of around 1,000 men each) and cavalry regiments (400 men) distributed over a rectangle of three kilometres of front and two kilometres deep. The industrial military revolution that began in the middle of the 19th century and lasted a century overturned this layout.

The Industrial Military Revolution

This industrial military revolution is first and foremost one of firepower. The flintlock rifle was the basic weapon of the European infantry for two centuries until it was replaced from the first half of the 19th century by the modern rifle, which includes several inventions of the time : breech loading, primer cartridge and rifled barrel. The "industrial infantryman" can thus fire faster, much further and with greater accuracy than all his predecessors. This modern rifle is further improved with the more powerful and smokeless ammunition powders or the loader blades allowing automatic loading by simply operating a lever. In the second half of the 19th century, machine guns also appeared and developed. By 1914, the main armies all had models capable of firing 500

rounds per minute.

In 1815, an infantry battalion could fire 2,000 rounds at a depth of 100 metres in one minute; in 1850, equipped with rifled rifles armed with breeches, it could fire 4,000 rounds at a depth of 400 metres; in 1915, the number increased to 21,000 rounds over 600 metres.[1]. But, between these dates, artillery also evolved considerably, adopting more or less the same principles as rifles (rifled cores, breech loading, automatic firing) in steel barrels. In 1914, a single battery of four 75 mm guns could fire 80 shells per minute up to four kilometres. The result was an increasingly dense and deep wall of fire in front of the combat units, while battlefield mobility, protection and command had not changed since Waterloo.

In Race to the Swift, Richard Simpkin evokes the notion of truly usable force (RUF) in a given space. The RUF corresponds to an optimal density in contact with the enemy. Below this RUF, the control of space and the effects on the enemy become too weak.[2]. Beyond the RUF, the use of additional forces increases the losses more than the results. Attacks beyond 2 to 1 are thus historically rare and do not yield superior results. This actually usable force evolved greatly during the century of the industrial military revolution. Faced with the new fire densities, it was no longer possible to maintain the same force densities, on pain of massacres as in the Battle of Shiloh in the United States on April 6 and 7, 1862, where more American soldiers fell in two days than in the entire War of 1812-1814 against England. Dispersal was necessary. In 1815, the Grande Armée lined up six corps along three kilometres; a century later, only one division was placed there.

At the same time, the number of combat units continues to increase due to population growth, universal conscription and the ability of modern economies to sustain huge armies. With universal conscription the cost of military labour is reduced and the number of soldiers is increased. The cost of Technical Capital (equipment) is also not very important, at least in the land forces which in 1914 consisted of almost 70% infantrymen armed with rifles and bayonets. During the Great War, France was thus able to set up an infantry division for 350 000 inhabitants. The combination of the lower density on the front and the increase in their total number mechanically led to an increase in the width of the fronts.

One can defeat on the battlefield in a limited way, inflicting more casualties on the enemy than one suffers oneself while both armies remain coherent and organized. One can also win decisively by dislocating the enemy's apparatus and making it impossible for the enemy to fight in an organized manner. The casualty ratio is then generally much more unbalanced in favor of the attacker by the presence of many enemy prisoners. However, to dislocate, it is necessary either to penetrate the enemy's device or to encircle it. The first possibility is made very difficult by the sudden growth of firepower which creates a strong "anti-access" barrier.

It is made even more difficult because it is now impossible for a commander to see the enemy army before the encounter. Not only does he no longer see the enemy, but most of his troops escape him as well. The messengers on horseback, too vulnerable, disappear from the landscape, replaced by runners on foot, which further slows down the

flow of information. The modern firepower by its power, its range and the dispersion it imposes slow down the flow of information between the summit and the units. In order to be able to function anyway, there is no other solution than to decentralize the design of orders. As the arrangements became more diluted, the lower echelons - right down to section chiefs at the beginning of the First World War - became more autonomous. A 1914 lieutenant had the same responsibility as a battalion commander under Napoleon. All of this led to a proportional effort to train officers.

The troops were difficult to command and had the greatest difficulty penetrating enemy installations. Fighting thus becomes more indecisive. At the same time, thanks to the railway and the telegraph, a general doctrine and modern staffs, it became possible to handle several armies at a distance before arriving on the battlefields. The campaigns at the end of the 19th century were large and consisted mainly of battles that were series of blows. All the art then consists in encircling the enemy by a manoeuvre of external lines, like the Prussians locking the French armies in Metz and Sedan in 1870 after several sequences of confused fights aiming especially at pushing the enemy inwards. With the increase in the volume of forces at the turn of the century, the battlefields expanded to cover tens of thousands of square kilometres and could last for weeks, as in East Prussia and France in August-September 1914. They even end up forming continuous fronts that surround entire nations and prevent even these great maneuvers. The need to penetrate deeply into the enemy's apparatus could no longer be avoided.

Fireworks: The Great War

Not only do the defensive fires, especially those from machine guns, present a wall of projectiles that are difficult to get through, but they are also enhanced by the entrenchments that protect them. Penetrating an enemy device consists of crossing a tormented terrain, through barbed wire networks under the fire of a chessboard of machine gun nests and under artillery barrage, a difficult exercise for soldiers hardly different from those of the Second Empire.

The solution still lay in the combination of fire and shock, but on a scale that was not suspected. The neutralisation of the defence, beforehand or by marching (roadblocks), was primarily the work of the heavy artillery, the great French creation of the Great War, with more than 4,000 pieces in 1918 and 1,500 observation aircraft. The infantry was also equipped with a whole range of weapons "between rifle and cannon". The heaviest weapons, machine guns, mortars and light cannons, were grouped together in new cells known as "support" or "support" cells, a new version of the "projectile" infantry which, since antiquity, had been preparing and accompanying combat with the shock infantry. In 1917, the infantry section became the basic tactical unit that combined the action of several combat groups. The command is decentralized up to this level of about ten men, which integrates several different weapons, light machine gun, light machine gun, light machine gun, light machine gun, light machine gun, light machine gun, light machine gun, light machine gun, light machine gun, light machine gun.The command was decentralized up to this level of about ten men, which integrated several different weapons, light machine gun or machine gun, grenade launcher, sometimes precision rifle, hand grenade, rifle and bayonet, where in 1914 there were only the last two. The 1914 regulations no longer called for fighting in line at intervals of one step, but in small autonomous cells adapted to the terrain, which made it possible to fight in a more

efficient way.This largely supports the problem of the arbitration between the need for control and the necessary dispersion that had been the subject of debate since the middle of the previous century. The modern combat configuration of small infantry units was born.

The two traditional cavalry, heavy and light, are thus reconstituted with the use of the combustion engine. The heavy cavalry are the tanks, of which the first French unit was formed at the end of 1916.

These were unreliable, slow and rarely more than a day's use. They were used to accompany the infantry and their role was essential in the final months of the war. The light cavalry was made up of hundreds of self-propelled machine guns, but above all of the multitude of aircraft that appeared, some of which were intended forThe light cavalry is a bit like the hundreds of self-propelled machine guns that are born, but above all the multitude of aircraft that appear and some of which are intended for ground attack, beyond the artillery in missions of interdiction, or, in 1918 in front of the troops by supporting them with the machine gun. All the modern functions of aviation and helicopters, reconnaissance, hunting, ground support, interdiction, long-range bombing, transport, were then in place.

During the Great War, the RUF on 3 km of front is then the infantry division. In 1914, this division could deploy up to twelve battalions in contact. In 1918, it has only nine and a smaller number, but each of them has 120 collective weapons (compared to 2 in 1914) and is supported by an average of 21 guns and mortars (compared to 3) and even six aircraft and three light tanks, things impossible four years earlier. In theory, if the 1918 battalion had to fight the 1914 battalion, it would win overwhelmingly. Theoretically only, because in order to function effectively, the 1918 battalion would also require a much greater capital of skills than was necessary in 1914. It was obliged to reform an apprenticeship structure, camps and training centres behind the front line. The coordination costs required to manage the means increased exponentially with their diversity. This was met by also densifying and diversifying the information circulation network (typewriters, TSF, telephone, pennants, rockets, etc.). More than half of the aircraft used are only used to transmit information (intelligence, fire control, transmission of orders, troop guidance). Staffs were increased, personnel better trained and procedures improved down to the lowest levels. Logistical requirements are also exploding. An infantry division in combat consumes seven times more resources in 1918 than in 1914, mainly because of the volume of ammunition now required. The new logistics further increased the complexity of command.

In the last year of the war, it was possible to go beyond the battle of attrition and regain a capacity for dislocation, but on a space still very limited by the speed of movement and the range of the shells. One can destroy regiments, but simply force the divisions of the front to be withdrawn from the front and drive back the armies. To penetrate deeper, breakthrough innovations were needed.

Carrying fire faster and farther

These innovations do not come from the arming of the troops on the ground, which is

reaching its limits. Alongside rifles, which evolved little apart from fully automatic firing, we saw the development of machine pistols and especially machine guns, around which infantry combat was organized. At the end of the Second World War, the realization that ground combat rarely exceeded 400 metres made it possible to envisage the use of less powerful ammunition and the invention of weapons called assault rifles that could fire in single shots or bursts up to this practical range. The configuration of infantry "on the ground" was then established, except for missiles. The best-equipped sections of 1945 could stand up to contemporary infantry sections, at least in daylight, and would crush those of 1870, evidence of a phase of diminishing firepower output.

In order to obtain more power, it was necessary to use motor vehicles alone to carry heavier firepower and above all to manoeuvre in and out of the enemy's position. In the air, the sky cavalry was in place. It is improving very quickly. On the ground, mechanical progress (engines, transmissions, suspension) made it possible to create a wide variety of machines, motorcycles and side-cars, cars, half-tracks, caterpillars, light tanks, and so on.cars, half-tracks, tracks, light, medium and heavy vehicles, self-propelled tanks, assault cannons, anti-tank or anti-aircraft parts, towed or carried, self-propelled cannons. Even more than in the air, these machines can carry heavy weapons, machine guns, 30-50 mm high velocity cannons designed to pierce veehicules, large-calibre cannons, first at short range to fight against infantry, then at long range and versatile on "battle tanks" such as the T-34 or the Sherman. Apart from this long tank gun whose calibre, range and accuracy will continue to grow until the 1980s, the great novelty of the armament is the multipurpose machine gun that can be found on many platforms. To this diversity of machines corresponds a new diversity of motorized units, tank regiments or brigades, motorized or mechanized infantry on half-tracks, reconnaissance, anti-tank, anti-aircraft and engineer units. However, these new units can only function through the technical development of means of communication, the TSF in the first place, which is being modernised, miniaturised and "democratised" to the point of appearing in most combat vehicles, air or ground, and even in infantry sections during the war.

The superiority of these new units over the pre-motorized generation is very clear. Defensively, it is easier to escape fire by greater dispersion knowing that it is possible to reconfigure quickly for attack. During the Second World War, a motorized force of 100,000 men occupied on average twelve times more space than in 1918 for the same volume. However, a reserve unit behind the device would take half as long to reach any point in the area of action.[3]. Offensively, it is inversely easier also to concentrate to attack, with increased protection. The probability of getting the surprise increases, further increasing the shock power. A motorized division in attack progresses twice as fast in the adverse device in 1945 than in 1918 and the loss ratio also tends to tip much more clearly in favor of the attacker, a sign that the point of dislocation is much more often reached with motorized units than with those that are not motorized.[4].

The success of the tank units at the beginning of the Second World War was such that it provoked reactions and adaptations. A whole anti-vehicle arsenal was developed, with more efficient anti-tank parts, individual rocket launchers, mines and attack aircraft, which once again reinforced the "anti-access" defence and slowed down operations in the second half of the war. In order to solve the problem, it once again appears necessary to have significant support, artillery in particular is regaining importance, and shock power must again be increased, which requires inter-service cooperation.[5]. At the end of the Second World War, the US Armyset the new model of the modern, fully motorized army,

with organized divisions.At the end of the Second World War, the US Army established the new model of the modern, fully motorized army, with divisions organized into two or three brigade-level Joint Battle Groups, themselves subdivided into battalion-level sub-groups, cooperating with rapidly available attack aviation on demand.

Basically, things have not changed since then except, in part, in the skies with a series of attempts at air-land hybridization: British Chindits airlifted into Burma and supported by air, parachute units and then air-mobile units. In 1965, with 15,800 men and 450 helicopters of all types, more than all the French army had in Algeria, the 1st US Cavalry Division was the first large heliborne unit to be engaged in combat. However, American airborne units are still mainly light infantry units that can jump from point to point, but move on foot once on the ground. They were overtaken in the 1970s by the Soviet air-mechanized units, armoured-mechanized units that can be dropped to the ground by heavy aircraft or helicopters. At the same time, the development of missiles allowed for the development of particularly formidable anti-tank helicopters. Specific units, battalions/regiments and brigades of attack helicopters were therefore developed. In the late 1980s, all possible uses of aircraft for air-land combat were conceptualized, and the equipment, structures and skills needed to implement them were put in place.

The Cost of Capital Problem

The military industrial revolution thus found its limits in the 1970s. Since then, we have been subjected to the phenomenon of diminishing returns from industrial armies. Motorized armies at the end of the Second World War deployed far fewer combat units than premotorized or mixed armies. The technical capital of a 1944 armoured or mechanised infantry division is infinitely greater than that of an infantry division barely thirty years earlier and its replacement by more modern means is at least twice as costly. Unless parallel resources are injected, the number of units available mechanically will therefore tend to decrease, all the more so as their "cost of employment", through logistics and maintenance, also continues to grow.

A good attempt was made in the 1950s to breathe new life into atomic artillery. In the space of a few years, thanks to the miniaturisation of nuclear warheads, the Americans and Soviets have deployed thousands of atomic munitions for the Americans and the Allies.s, the Honest-John, capable of sending a Hiroshima-class munition 48 km away to the M-28 Davy Crockett rockets launched two kilometres away, and even the Special Atomic Demolition Munition portable in a backpack . It was madness, the firepower of the "atomic battlefield" would have ravaged Europe, but was probably uncontrollable. Nuclear weapons from the battlefield were gradually withdrawn after having cost a lot of money.

The use of new information technology was another way of increasing firepower, through more accurate firing, from tank guns to long-range rocket launchers, and more efficient use of resources. The result of this gamble, which was expected to be a new revolution, was mixed, however, as the efficiency gains were offset by high costs and did not counterbalance the two pillars that made the model sustainable: conscription, which reduced operating costs, and the economic growth of the Glorious Thirty that made spending sustainable. At the very least, the tension of the threat could prompt a special

effort.

At the end of the Cold War, all these elements disappeared, and the industrial model gradually collapsed. The French Army is therefore still overwhelmingly equipped to confront the Soviet Union thirty years after its disappearance, as if it was still equipped in 1944 as it was in 1914. At the same time, the finances granted if they allowed a partial modernization were insufficient to prevent the loss of mass. Never before has it been possible to fire with such precision, but never before has it been possible to fire so little. If the army of 2020, strengthened by its reserves, were aligned on a large firing range with its machines really in working order, it would undoubtedly fire two to four fewer shots in one hour than the army of 1990. Faced with armies that have continued to modernize, this loss of power can be advantageously compensated for by the increased quality. Faced with armed organizations that are equipped with pre-1990 equipment, this is perhaps a disadvantage. Quantity is also quality.

To sum up, at the end of this evolution The modern style of combat has produced ever fewer units, but ever more mobile and powerful. The reduction in the density of forces has also made it necessary to integrate the various weapons at an ever lower level. Where a division was placed in 1918, a brigade/regiment was placed in 1945 and now a joint battle group. This JBG is the pawn of battle leadership. It has a tactical, but now also operational and strategic weight far more important than a battalion of the Grande Armée could have. There are now battles that are fought with only one battle group and complete campaigns with three or four. In the words of General de Gaulle, "the sword of France is very short", too short certainly.

1 Christian P. Potholm, Winning at War, Rowman & Littlefield Publishers, 2010, p. 41.

2 Richard Simpkin, Race to the Swift, Potomac Books Inc, 1985.

3 Major William G. Stewart, "Interaction of Firepower, Mobility and Dispersion," Military Review, Vol XL, No. 3, No. 12, March 1960.

4 Christian P. Potholm, Winning at War, Rowman & Littlefield Publishers, 2010, p. 169.

5 Bruce I. Gudmundsson, On Armor, Chapter 10 Breakthrough, Praeger, 2004.

Title : Colonel (er) Michel GOYA

Author (s) : Colonel (er) Michel GOYA

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