The Historical Origins of Electronic Warfare

1/2 – BRENNUS 4.0

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What is the point of looking back, in the age of info-valorisation and cyber, at a time when science and technology are still in their infancy? Is it the threat brandished by a Thucydides [1] of a "history that is only an eternal beginning" or the prospective vision of an Einstein [2] who claimed in his time : "I don't know what the weapons of the next world war will be, but those of the next one will be axes of stone", which can justify the interest of a glance in the rear-view mirror?

Given that one of the objectives of land forces is to prepare for the war of tomorrow, it seems legitimate in any case to ask what the modus operandi of the future conflict might be. After having had the war of the chemists (First World War), because mustard gas and chlorine were used there for the first time, then the war of the physicists (Second World War), because of the atomic bomb explosion, to what extent could a future conflict not consecrate the mathematicians? Indeed, according to specialists in the art of warfare, one of the military challenges of the future could be to penetrate the enemy command and, taking it by storm, have the ability to anticipate its tactical decisions. Perhaps because history is about human actions, the "military issue" in question is not really new.

Thus, for thousands of years, kings, queens and generals have had effective means of communication to govern their countries or command their armies. At the same time, fundamental imperatives have emerged that must be respected and that result from the very nature of their missions. The first is speed, so that the responsible leader can decide and order in a timely manner. The second is security, which implies the certainty that the recipient of an information or order is aware of it and which opens the way to the dangers of intrusion and disinformation. The third is discretion, which requires that the content of communications be protected against possible leakage. While, as can be seen, communication needs and requirements can be traced practically back to Homo erectus,[3] the proposed study is intended to demonstrate that in the area of communications, the need for discretion is not only a matter of discretion, but also a

matter of discretion.3], the purpose of the proposed study is to demonstrate that, from the 20th century to the present day, the main focus has been on modernizing methods of action drawn from a sometimes very distant past.

"Lost battles can be summed up in two words: too late. Douglas MacArthur

The existence of remote communication methods has been proven since antiquity, but they are few in number. Among the latter are the riders, the most famous of which is of course Phidippides [4], the mounted riders deThe most famous of them are Phidippides [4], the mounted horsemen mentioned by Livy [5], the light signals cited by Homer [6], which announce the approach of the enemy fleet in the Iliad. According to Caesar [7], the Gauls also had a system of fast long-distance connections, with lights lit on high points. This resource lasted over the centuries. All armies used systems of towers or posts that could exchange signals. As for the animals, they are not to be outdone: pigeons have been used since the earliest times in the history of mankind. In the absence of other technical means, the transmission of orders is often limited to the visual and auditory capacities of those receiving them. On a mid-19th century battlefield, obscured by the smoke of gunpowder and the deafening din of artillery and musketry, transmissions are bound to be very limited. The officer giving orders to his troop had to keep them within earshot. Transmitting instructions and information up the chain of command required the use of mounted dispatchers, carrying oral or written instructions. Transmission by visual signals is still in use, but its use remains random, depending on the configuration of the terrain and visibility.

However, the development of communications took a decisive leap forward in 1794 and was of French origin. Claude Chappe[8], a scientist of the Enlightenment, built the first line of optical aerial telegraphs that allowed the rapid transmission of long-distance messages[9]. The system in question is the first organized and permanent telecommunications network. The telegraph line consists of two terminal stations linked by intermediate stations. At the top of towers, large levers rise and fall, spelling out messages in various positions. 196 symbols are possible. Each stationary station reads, with the aid of a telescope, the message transmitted by the previous tower and forwards it to the next. In fog, rain, snow or at night, the system is not operational and its heavy structure makes it fragile. Thus, it was of no military use in France during the campaign of 1814, being partially destroyed by the coalition.

With the invention of electricity, Morse [10] invented the electric telegraph in 1832 and an alphabet that bears his name. Thanks to a succession of dots and lines, which travel on conducting wires, information is transmitted over long distances with celerity. On the battlefield, the telegraph opened up immense possibilities for the commander-in-chief, who was now able to collect "information".He can now gather "information", bring in reinforcements, redeploy forces and coordinate the movements of units far apart, all with a speed never before possible. In short, it significantly improves command performance. For example, in 1864, during the Civil War, Grant [11], although separated from Sherman [12] by more than 2,500 kilometers, had his situation before his eyes on a daily basis. It is the same year (1864) that James Maxwell [13] proves the existence of electromagnetic waves which travel at the speed of light and thus opens the door to the emission of radio waves. A few years later, in 1876, Bell [14] invented the telephone.

Since the Transvaal war (1899-1902), the English army has been largely equipped with wired telephone equipment. But it is the Russo-Japanese war (1904-1905), which shows

the military utility of the telephone. Not only was it used in Manchuria to provide links between the staffs (one or two posts at brigade or division level), but it was also used between the staffs and the troops. For example, one infantry regiment has four. Each post is delivered with 5 to 6 km of wire. From then on, Austria, Japan, Russia and several other nations massively developed light telephone equipment.

The First World War led to a real technological revolution in communications. For its part, France entered the war in 1914 with less equipment than its allies but also, more seriously, less than its opponents across the Rhine. In 1914, communication technologies were still highly dependent on climatic conditions and poorly adapted to operations. The French telegraph sappers perform feats on the front in August 1914. They unrolled the cable lines on the roads of Alsace, Lorraine and Belgium, in order to deliver telephone and telegraphic communications. The evolution of the conflict towards positional warfare made the deployment and maintenance of communication lines more and more difficult. The cables were hit hard by the effects of enemy artillery. Repairs are often carried out under a deluge of fire. It appears necessary to develop new means of communication.

Part of the answer lies in the development of wireless telegraphy (WFT) for radio links and ground telegraphy (GTT). As early as 1898, a Frenchman, Eugène Ducretet [15], made the first wireless link between the Eiffel Tower and the Pantheon, 4 kilometers apart. While the French Navy quickly grasped the interest of the TPS, the Army, which only set up a "wireless" system in 1911, did not.The French Navy quickly grasped the interest of the TSF, but the Army, which only set up a "higher electricity school" in 1911 to train the officers of the Signals Service, was in its infancy. It was the industrialisation of the production of radio sets and the massive equipping of the units, efforts that we owe to Colonel Ferrié[16] , that will facilitate the resumption of the war of movement in 1918. Indeed, this equipment of the troops allowed the development of new combat procedures. Thus, for the first time, a link could be ensured with the tanks. The air force also benefited from these developments. From now on, transmitters installed on board observation aircraft transmitted troop movements and guided artillery fire. Although there were only 12,000 telegraph sappers during the mobilization, in 1918, no less than 55,000 men were employed, showing the growing need for communication technology for the command.

"All transmission systems... are vulnerable... ». ATT 150, Title VIII, Communications

Liaison," says the Tactical Use of Large Units training, "allows the chief to ensure the necessary contact at all levels for the proper execution of his decisions. To this end, the commanding officer of a large unit must maintain constant contact with the higher authority, with subordinates and with subordinate authorities.The commander of a large unit must be in constant contact with the higher authority, with his subordinates and with the lateral authorities", recalls Lieutenant-Colonel Thierry d'Argenlieu in a military history course given to a class of officers studying at the Ecole de Guerre in 1936[17]. 17] One can indeed, without too much risk, affirm that without signals, an army is deaf. To convince oneself of the consequences then generated, it is enough to read Bernard's book "The 1815 campaign in Belgium or the failure of liaison and signals" [18]. It is therefore not surprising that the warlords sought to surround themselves with all available means.

Indeed, it can be observed that in the field of communication, modern procedures, stemming from new technologies, do not put an end to the means developed previously; the same is true of the different techniques such as geological layers, stacked one on top

of the other and which reappear in the light of successive conflicts [19]. Thus, in 1914 Joffre[20], although he had a system of telephone and telegraph links, kept a liaison officer with each army commander. These are, strictly speaking, the emanation of the thought and will of the chief. But the French army also had 73,000 liaison officers on foot, 67,000 cyclists, some of the 15,000 dogs used during the conflict and 30,000 pigeons[21]! 21] During the Second World War, we find exactly "the same actors", who were themselves taken over during the Indochina War and then the Korean War.

The objective of the adversary has therefore always been to intervene in all possible ways between the "sender" and the "receiver" of orders. Indeed, the capture of the adversary's messages, which enables him to anticipate his manoeuvres and reactions, gives him a definite advantage in the conduct of operations. Since its inception, this has made the liaison officer a decisive "pawn" in victory. It is undoubtedly under the First Empire, in the French army, that the latter reached the peak of its art [22]. Indeed, he is not only the voice of the command, but also its eyes. In 1805, alongside the Emperor's cabinet, there were nine aides-de-camp, including a colonel and eight generals. Major Berthier had six at his side. The latter went around the battlefields in all directions, bridle down, carrying the urgent order that would allow the manoeuvre to take place in accordance with the will of the chief.

 This major role makes the "messenger" a sought-after prey. During one of his missions in Spain, Adolphe Marbot [23] was ambushed near the city of Astorga (1809). His escort was massacred. He himself was wounded and taken to the Marquis de La Romana general [24], who was desperate to get information about the French army and the Emperor's plans. Marbot took care to destroy the dispatches and refused to speak. He was loaded with chains, dragged naked for a month through Spain to Cadiz where he was interned on one of the pontoons, from which he eventually escaped (1810). In Spain, from 1808 to 1814, no less than 200 officers of various staffs were caught or killed in the course of their service. Moreover, it is frequent that over the ages, torture was regularly applied against "messengers". Thus, the charter on "the laws and customs of war on land, according to modern international law and the codification of the Hague Conference of 1899"[25],[26] reserves for them a special insert intended to protect them in conflicts.

26] With technological developments, intervention is carried out by listening to enemy transmissions. Among the structures created during the Great War, there is the Sound and Light Tracking Service of each army, which works in permanent connection with aerial observations. The radiotelegraphers were responsible for the empirical birth of the listening sections, which began to take shape in 1915. Indeed, the appearance of a radio network was almost immediately perceived by the enemy operators and, as soon as the lines were stabilized, the telegraph engineers of the few radio stations then operating were able to take advantage of the new network.rantes, realize that they can follow the conversations of their German counterparts in particular before, during and after the Battle of the Marne and at Verdun [44] (on the eastern front, the Germans also follow the Russian networks [27]). Likewise, the reception power makes it possible to assess how far away the enemy transmitting station is. This information makes it possible to reconstruct the German order of battle and to approximately locate its large units. In 1915, the listening of the enemy lines is done in an artisanal way.

At that time, there was only one post per army moving along the front line. Gradually, technicians and interpreters began to arm radio direction-finding teams. Despite rather

derisory means, but thanks to the form taken by warfare (position warfare), command posts rarely changed location and it was therefore relatively easy to locate them by multiplying the "shots" on the same frequency, from different angles and quantifying the reception power. "If the enemy wants to interrupt our radio telegraphic transmissions... he can prohibit them by launching into space, on the wavelength we ourselves use, any emissions as powerful as possible," Colonel Langlois points out. From 1917, with the improvement of the technical performances of the devices (sensitivity, reliability, mobility) and the increase in the number of stations, the direction-finding teams became fully operational and played a significant role in the preparation of operations. In each army, the general architecture of the system is now very close to what it will be throughout the 20th century: a master station controls four to five forward stations that record all intercepted enemy communications, specifying bearing (direction), receiving power and time.

The sword and armour are involved, as are the transmission and the countermeasure to distort it. Thus, very early on, "disinformation" was invited into conflicts. It is an integral part of the ruse of war. Thus, Han-Fei, a Chinese philosopher and thinker of the 3rd century BC, professed a very simple way to get rid of a rival. He recommends to his lord to entrust to some clumsy agent, a false message making believe that the best general, or the most faithful adviser of the enemy sovereign has rallied! Captured and tortured, there is no doubt that the messenger will eventually deliver his secret. "Soon his head (of the best general, or the most faithful adviser) will fly. By this ploy, you will have gotten rid of an adversary. Using the language of "the other" to trick him into a trap is also a crude form of deception. During World War II, ground operators gave false information to pilots in their own language.

It is therefore not surprising that very early on in history a certain mistrust was established: it was a matter of being able to deal with decoys of all kinds. We are in 207 B.C. in the middle of the Punic War. A letter from Hasdrubal [29] to Hannibal [30] is seized on the six horsemen who carry it, just as it is about to reach its addressee. After the Carthaginian messengers had crossed all of Italy without being spotted, they strayed towards Metapontes (southern Italy) and were caught. The Romans interrogate the prisoners (delaying answers), then are threatened with torture (confession of their mission). But the letter could be a forgery, intended to "intoxicate" the Romans. It is therefore not unopened and it is transmitted intact, with the prisoners, so that the Roman intelligence specialists at headquarters authenticate the seal of Hasdrubal. It is then opened and read by a translator. The information is crucial: it shows the place (Umbria), where the two brothers are to make their junction. The war takes a decisive turn... We have just entered Military Intelligence. Already in antiquity, it takes all the forms of modern Intelligence. We're on the same level as the British Intelligence Service . This is indeed a field where things have changed very little since antiquity. With the exception of technological "big ears" and computerized means of sorting intelligence, the ways of finding out about the enemy are much the same today.

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1] Athenian philosopher and politician born in 460 BC and died in 397 BC.

2] Einstein Albert (1879-1955).

3] Standing man, appeared on earth about two million years ago.

4] Greek messenger of the 5th century BC, around whom a legend was built.

5] Historian (59 BC/17 AD).

[6] Greek poet (800 BC / about 740 BC).

7] Julius Caesar (100 BC/44 BC).

8] Claudius Chappa (1763-1805).

9] On the eve of the First Empire, there were already three main lines in France: Paris-Lille, Paris-Strasbourg via Metz and Paris-Brest. This last line belonged to the Minister of the Navy, while the other two were under the authority of the Minister of War. The first transmission dates from 1794. In less than an hour, it made it possible to report to the Convention that the town of Condé-sur-l'Escaut had fallen into Austrian hands.

10] Samuel Morse (1791-1872).

11] Ulysses-Simpson Grant (1822-1885), general commanding the northern armies, then president of the United States.

12] William-Tecumseh Sherman (1820-1891), general who succeeded Grant at the head of the Union Army during the Civil War.

13] James-Clerk Maxwell (1831-1879).

14] Alexander Graham Bell (1847-1922).

15] Eugène-Adrien Ducretet (1844-1915).

16] Gustave-Auguste Ferrié (1868-1932), a future French general and scholar dedicated to the establishment of a powerful and sophisticated wireless telegraphy. He made French military radiotelegraphy the first of the Allied armament during the First World War.

17] Olivier-Charles-Marie Thierry d'Argenlieu (lieutenant-colonel), "Esquisse d'une histoire de l'officier de liaison", 56th class, second year of studies, 1935-1936, ESG, military history course. A future general, he fell to the enemy in 1940.

18] Henri Bernard (colonel), "La campagne de 1815 en Belgique ou la faillite de la liaison et des transmissions," Brussels, 1954. In this work, the author makes Marshal Soult, "makeshift chief of staff," an incompetent officer in his functions. "Not only are his written orders imprecise, but many verbal orders, even very important ones, are not confirmed in writing," the author states.

19] On the other hand, the FT 17, a major machine of the First World War, was not used in 1940.

20] Joseph Joffre (1852-1931), then general and future marshal.

21] Some of these "furry" or "feathered" soldiers remained famous: the pigeon Vaillant (serial number 787-15), the "last fighter" to leave the besieged Fort de Vaux in 1916. Intoxicated by the combat gases, practically at the point of death, he succeeded in transmitting the last SOS from Commander Raynal to Verdun. Cited in the army order, he was decorated with the Legion of Honour. The dog Satan, although wounded by a one-legged bullet, managed to hand over to the besieged French at Thiaumont (Belgium) in 1916, two baskets of pigeons harnessed on his back. The pigeons were sent back to headquarters with the position of the German battery, which assaulted the French positions with its fire. The battery is destroyed.

22] Lieutenant-Colonel Thierry d'Argenlieu claimed that in 1870 the action of staff officers carrying orders was exclusively limited to that of a signalman. Their mission was restricted by the narrowest formalism. The officer was neither responsible for seeing for the chief, nor for providing information on the situation.

23] Antoine-Adolphe-Marcelin Marbot (1781-1844).

24] Pedro Caro y Sureda, Marquis de La Romana (1761-1811).

[25] A. Mérignhac, "Les lois et coutumes de la guerre sur terre, d'après le droit international moderne et la codification de la conférence de La Haye de 1899", Paris, librairie Marescq aîné, 1903.

26] "Couriers and messengers, who do not hide, who ostensibly carry arms and wear the national uniform, must, when caught, be treated as prisoners of war...".

27] Perhaps one of the earliest examples of interception in the modern era is the German listening in plain language to the Russian conversation in late August 1914, which sealed the outcome of the Battle of Tannenberg.

28] Langlois (colonel), "La liaison. The transmissions. Means and Arrangements", Centre for Liaison and Signals Studies, information cycle for general officers and colonels in 1924.

29] Hasdrubal Barca (245 BC/207 BC), Carthaginian general, brother of Hannibal.

30] Hannibal Barca (247 BC / ca 181 BC), Carthaginian general and politician.

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