

Joint or All-Arms Warfare on the Western Front, 1918¹

David Stevenson

The Western Front in 1918 witnessed two outstanding developments. The first was that the Allied and American forces gained superiority over Germany. But the second was a return to relative mobility, after three years of military stalemate. Both sides contributed to this transformation, which the British historian Jonathan Bailey has described as ‘the birth of the modern style of warfare.’² He suggests that a military revolution took place between 1914 and 1918, pioneering new techniques for co-operation between infantry, artillery, aircraft, and armoured vehicles, and foreshadowing later operations ranging from Blitzkrieg in 1940 to Desert Storm in 1991. All-arms co-operation was not new: nineteenth-century armies had included infantry, artillery, and cavalry branches. But on the Western Front the cavalry largely disappeared from the battlefield while aerial reconnaissance and armour took over its traditional functions; and both the artillery and the infantry became far more specialized and differentiated.

What follows will investigate Bailey’s thesis in the context of the Western Front campaigning during its final months. Part of the explanation for the Allies’ victory was their practice of *combined* (i.e. coalition, or inter-Allied) operations, but in addition they used *joint* or *inter-service* operations (entailing co-operation between the army and air force on land and between the navy and air force at sea) as well most particularly as *all-arms* operations (entailing co-operation between different section of the land armed services, including armour, artillery, infantry, and logistics), and it is widely recognized that new forms of joint and all-arms operations contributed to the Allies’ success. They were not the only reason for that success, however, and this presentation will try to place the Allied achievement in context. It will do so by analysing first the situation before 1918; then the German offensives from March to July of that year; and finally the Allied counter-offensives from July to November.

— I — 1914-1917

The dominating feature of the Western Front between autumn 1914 and autumn 1917 was its immobility. Except for the Germans’ tactical withdrawal in March 1917 to their specially prepared new position, the *Siegfried Stellung* or ‘Hindenburg Line,’ the maximum advance achieved by sides was about six miles. The key military elements in this stalemate were as follows:

(i) trenches protected by barbed wire. Trenches replaced the breastworks that were the

¹ This paper draws on my book, *With Our Backs to the Wall: Victory and Defeat in 1918* (London, 2011). I am indebted to Professor Tom Ishizu and to Colonel Kazuhiko Murakami for their assistance.

² J. Bailey. *The First World War and the Birth of the Modern Style of Warfare* (Strategic and Combat Studies Institute Occasional Paper No. 22, Camberley, 1996).

characteristic field fortification in the nineteenth century. They had already been used in the Russo-Japanese and Balkan wars. Fixed fortifications played much less of a role (with the partial exception of during the Battle of Verdun);

(ii) defensive firepower: the magazine rifle and the machine gun, but above all the quick-firing field gun developed in the 1890s that could fire up to twenty rounds per minute of shrapnel or high explosive. Artillery fire is estimated to have caused some 60% of the Western Front fatalities;

(iii) high force to space ratios. The Western Front extended over 450 miles, reaching from the Belgian coast to the Swiss border, but the opposing armies were much larger than ever before (comprising millions of men compared with hundreds of thousands in the 1870-71 Franco-Prussian War), and equipped with much greater firepower. Moreover, despite the war's huge casualty lists, deaths from disease were proportionately much lower than in previous conflicts, and most of the wounded eventually returned to active service;

(iv) logistical support. The Western Front was located in a region that was densely criss-crossed by railways, and both the Germans and the Allies relied on trunk lines running parallel to the front line. Both sides also used hundreds of thousands of horses for transport beyond the railheads. Not only did both need millions of shells, but also innovations such as tinned food made it possible to keep armies in the field throughout the year, instead of having to retreat into winter quarters.

Against this combination of factors, new technologies were ineffective:

(i) the Germans introduced poison gas at the Second Battle of Ypres in April 1915 and the British at the Battle of Loos in September, but the quantities were small, it was released from canisters and conveyed on the wind (if blowing in the right direction), and reasonably efficient gas masks were quickly developed;

(ii) mining was also used, notably at the Battle of Messines in June 1917. But mine shafts were slow, dangerous, and expensive to prepare, and by 1917 had become easier to detect. As a consequence their use was discontinued;

(iii) tanks were developed mainly by Britain and France and deployed on the Somme in September 1916 and at Arras and on the Chemin des Dames in April 1917, but they were slow and vulnerable and used only in small numbers;

(iv) aircraft were of little value for ground attack, but important for observation. Their main value was in conjunction with medium and heavy artillery (calibres of over 100 millimetres), which, when firing high explosive (rather than shrapnel) shells, proved to be the best means of overcoming trench defences. Aircraft could communicate with gun batteries by radio, but

usually not with the infantry. But heavy guns were much harder to mass-produce than were field guns, and it took a long time to train up their crews. At least until 1916 their numbers were small and the quality of their munitions was often poor. They were able to destroy first-line enemy positions, but not to break up defences that had been prepared in depth.

Although the Western Front remained static in 1915-17, it would be wrong to assume that tactical procedures failed to adapt to the new conditions, despite the stereotyped view that attacking forces simply went on repeating the same mistakes. On the contrary, we can see an evolution towards better co-ordinated combined operations. In September 1915 and April 1917 the British and French armies on the Western Front attempted sequenced offensives, a preliminary blow drawing off the German reserves before the main attack came in a different sector. At the Chantilly conferences of December 1915 and November 1916 the Allies adopted even more ambitious plans for synchronized offensives in summer 1916 and spring 1917 respectively. The summer 1916 schedule of attacks (Russia's 'Brusilov offensive' in June 1916; the Anglo-French Somme offensive starting in July; Romania joining the Allies in August; and Italy's capture of Gorizia in the same month) placed the Central Powers under great pressure, and the Allies agreed to follow it up with still more powerful synchronized attacks in the following spring, until the March 1917 revolution in Russia disrupted this scheme. In summer 1917 the British planned to combine an inland advance from the Ypres salient with an ambitious amphibious landing on the Flanders coast in order to capture the ports of Ostend and Zeebrugge (which the Germans were using as destroyer and submarine bases), although this project failed to get beyond the first phase.

At the tactical level, moreover, the Allies were improving their capacity for all-arms operations. They developed more sophisticated air reconnaissance and photography, and began locating enemy artillery by flash-spotting and sound-ranging. First the French and then the British experimented with the 'creeping barrage': a protective curtain of field-gun fire running just ahead of the attacking infantry, which if correctly timed would force the defenders to keep their heads down until the attackers were virtually upon them.

But the Germans (who by and large were on the defensive on the Western Front) meanwhile evolved new counter-techniques of defensive warfare, particularly after Paul von Hindenburg and Erich Ludendorff took over the German Army High Command (*Oberste Heeresleitung*—OHL) in August 1916. These techniques included building ever more elaborate trench fortifications, which by 1917 might comprise five successive defensive systems, each consisting of three principal trench lines plus communication trenches and including deep dugouts—or continuous trenches might be abandoned in favour of mutually supporting and camouflaged concrete strongpoints. But in addition, the Germans concentrated fewer troops in the first line (where they were most vulnerable) and held them further back for prompt counter-attacks, while their artillery lay further back still and mostly survived Allied bombardments. These methods worked well against the French Chemin des Dames offensive in April 1917 and against the British Third Ypres offensive during August. More generally, the German army had a strong tradition of systematic and self-critical learning from experience and regular revision of doctrine. Not only was it developing new *defensive*

tactics but it was also developing new *offensive* ones: particularly the Bruchmüller artillery system and the ‘stormtroop’ (*Stosstruppen*) tactics for infantry, which will be discussed further in the next section. These methods can be seen developing from the Battle of Verdun in 1916, via the operations in Galicia (July 1917), at Riga (September 1917), and at Caporetto (October 1917). The Battle of Cambrai in November 1917 encapsulated the new developments. The initial British attack there used 476 tanks and a surprise artillery bombardment and air strike, before the infantry broke through the German lines. But a German counter-attack two weeks later, delivered by specialized assault troops who also achieved surprise, recaptured much of the lost ground. At this stage the two new systems seemed more or less to cancel each other out.

— II — March-July 1918

Between March and July 1918 the German army launched five major Western Front attacks (commonly referred to as the ‘Ludendorff offensives’):

Somme Offensive (codename ‘Michael’), 21 March-5 April

Lys Offensive (codename ‘Georgette’), 9-29 April

Aisne Offensive (codename ‘Blücher-Yorck’), 27 May-4 June

Matz Offensive (codename ‘Gneisenau’), 9-12 June

Champagne-Marne Offensive (codename ‘Friedenssturm’), 15-18 July

The advances became shorter and less successful as time went on, but the first three progressed by up to eighty kilometres, menacing the key railway junctions at Amiens and Hazebrouck and the approaches to Paris. No movements on this scale had been seen since 1914. In 1918 *both* sides therefore found means of breaking the earlier stalemate, and both to some extent used all-arms operations, although the methods differed in detail.

The German successes rested on two bases:³

(i) artillery—the Bruchmüller-Pulkowsky system. One key was the partial restoration of surprise. The Germans achieved it against the southern part of the British line on 21 March; against the Portuguese on 9 April; and against the French on 27 May. By means of the ‘Pulkowsky method’ they could test the characteristics of each artillery piece by trials conducted behind the line and then train it onto its target without the need for ‘registration’ (ranging shots). Colonel Georg Bruchmüller, who had served on the Eastern Front but was brought to the Western Front to direct the artillery in the 1918 offensives, believed in positioning the guns

³ On German tactics see T. T. Lupfer, *The Dynamics of Doctrine: the Changes in German Tactical Doctrine during the First World War* (Fort Leavenworth paper, Fort Leavenworth, Kan., 1981); B. I. Gudmundsson, *Stormtroop Tactics; Innovation in the German Army, 1914-1918* (Westport, Conn./London, 1989); J. Duppler and G. P. Groß, (eds), *Kriegsende 1918: Ereignis, Wirkung, Nachwirkung* (Munich, 1994); D. T. Zabecki, *Steel Wind: Colonel Georg Bruchmüller and the Birth of Modern Artillery* (Westport, Conn., 1994); D. T. Zabecki, *The German 1918 Offensives: a Case Study in the Operational Level of War* (New York/London, 2006).

as far forward as possible and under a single command with a centralized fire plan; the guns would be concealed as much as possible (e.g. by being moved up at night), and would deliver as great a volume of shell in a few hours as the Allies had done in days-long bombardments during 1916 and 1917. The aim, however, was to ‘neutralize’ the enemy defences rather than to destroy them. Hence the targets (identified by aerial reconnaissance and prisoner reports and fired on in sequence) were first the enemy’s command and control system, then the artillery (silenced primarily by gas shells)⁴, and finally the front-line defences. Once the infantry moved forward, a *Feuerwalze* (‘fire roller’: similar to the Allies’ creeping barrage) would move ahead of them to give protection, though in practice it tended to advance too rapidly;

(ii) infiltration tactics. German infantry doctrine was developed by several writers, but representative of the new approach was Hermann Geyer, whose guidelines on ‘The Attack in Positional Warfare’ were approved by the OHL. Attacks would be conducted not in waves but by small platoon-sized groups of specialists, armed with rifle grenades, flamethrowers, and portable light machine guns, who would follow the barrage and infiltrate the Allied positions, by-passing strongpoints and leaving them to be dealt with by follow-on forces. They must move as speedily and uninterruptedly as possible. Before offensives the youngest and fittest men were selected for four weeks of special training (accompanied by better food and rest) to prepare them for this role (while older men and troops returning from Russia replaced them in quieter sectors), but for the sake of speed the advance units would not be relieved but would be simply expected to keep moving forward until they became casualties. This was a ruthless method, and a recipe for destroying the cream of the German army; especially as the assault waves would have little support. The Germans had developed special detachments (*Schlachtstaffeln*) of armoured ground-attack aircraft, which they used in March and April; but bad weather hindered them. They had no tanks, except for a handful of captured British models (their own prototype, the A7V, was almost useless). They had only a tenth of the Allies’ number of lorries, and suffered from a disastrous scarcity of horses. While the new tactics were sufficient to overwhelm the enemy front lines, therefore, the Germans lacked the means to sustain their progress after the first few days, and their advances were partly halted by breakdowns in food and shell supply. Moreover, the German infantry grew tired and increasingly demoralized once the first two offensives failed to bring decisive victories, and became more careless about making preparations. The French gained advance warning of the 9 June and 15 July attacks, and had counter-strokes ready against them.

⁴ By 1918 gas was mainly delivered not from canisters but in shells, and in much greater quantity and more variety than in 1915. Phosgene was the principal gas used in attack; mustard gas for defence. The British had special gas units that fired gas canisters from Livens projectors (a type of light mortar), that gave virtually no warning. Generally see L. F. Haber, *The Poisonous Cloud: Chemical Warfare in the First World War* (Oxford, 1986); O. Lepick, *La Grande Guerre chimique: 1914-1918* (Paris, 1998); A. Palazzo, *Seeking Victory on the Western Front: the British Army and Chemical Warfare in World War I* (Lincoln, Nebr./London, 2000).

— III — July-November 1918

The second half of 1918 was a period of almost uninterrupted Allied advances. German offensives ceased, except for localized counter-attacks. The Allies were able not only to halt the all-out German attacks of March-July 1918, but also to advance up to 100 miles by the time of the ceasefire, and to do so all along the line. The Germans could neither win the war by attacking nor any longer could they hold the Allies defensively. Part of this reversal of fortune was due to German weaknesses. The German army had sufficient basic infantry weapons until the very end, although its gas masks deteriorated because of shortages of rubber, and lack of fuel restricted its aircraft. But the more important vulnerabilities were in manpower and morale. Despite signing a separate peace with Bolshevik Russia in March 1918, the Germans kept a million men in the east (diminishing to half a million by the end of the year). Their army suffered approximately one million casualties during the five Ludendorff offensives, and its total numbers dwindled from 5.1 to 4.2 million. Conversely, the United States stepped up its trans-Atlantic troop shipments drastically, and American personnel in France rose from 220,000 in March to over two million in November, thus tilting the numerical balance in the Allies' favour. Moreover, the German army had already suffered from indiscipline in 1917, which had temporarily diminished due to hopes that the spring offensive would end the war. Once these hopes were disappointed, demoralization spread rapidly. From August onwards the numbers surrendering to the Allies on the Western Front rose sharply (the British estimated that 359,000 surrendered during the year as a whole), and even larger numbers deserted behind the lines or failed to return from home leave. In short, the German army was no longer the same formidable antagonist as it had been previously.

German weaknesses enabled the Allies to capitalize on their own strengths. On the one hand, they had improved their *combined* operations ability. In November 1917 they had created the Supreme War Council, which comprised regular (monthly) meetings of their heads of government (with a US observer) and a joint planning staff located at Versailles. More important was the appointment in March-April 1918 of Ferdinand Foch as Allied General-in-Chief on the Western and Italian Fronts, first with a co-ordinating and then a command role. Foch had authority over the disposition of the British, French, and American reserves, which during the defensive phase before July he committed with extreme care. He then led in devising the strategy shaping the Allied offensives. Initially more limited operations during July and August cleared the Allies' coalfields and trunk railway lines, before a co-ordinated sequence of assaults at the end of September broke through the Hindenburg Line and threatened the Germans' trunk railway, forcing them to accelerate their retreat.

The Allied armies had also improved their all-arms co-operation. Historians have given considerable attention to this development, particularly with reference to the British

Empire⁵, but also more recently with reference also to the French and the Americans.⁶ The starting point was intelligence: Allied agents in Belgium and Luxemburg reported on German troop train movements in the rear, and (along with traffic analysis of signals intelligence) helped the Allied staffs to reconstruct the enemy order of battle. Prisoner interrogation was invaluable for gaining warning of German attacks and for monitoring German morale, while aerial photography located the enemy guns, which the Allied heavy artillery silenced by similar methods to Bruchmüller, also achieving surprise and using gas shells.⁷ The Allied heavy artillery, however, was not so centralized as the German one, and did not need to be, as it was more numerous and the Allies did not move it as a single 'siege train' from one sector to the next. Instead they could start up attacks at several points in quick succession or even sustain them simultaneously. Like the Germans, however, once the attack had started, the Allied field guns protected the advancing infantry with a covering barrage, and by 1918 British and French infantry, too, were no longer attacking in waves but instead advancing in small groups. It was also beginning to be possible for front-line units to communicate by radio with the gunners behind them, although aerial observation remained the principal method of monitoring battlefield developments.

Heavy artillery supported by accurate intelligence and firing a mixture of high explosive with gas shells became the key weapons system for enabling the Allied infantry to overrun successive German positions. Although the British attempted strategic bombing against the Rhineland in 1917-18 (as did the Germans against London), most of the British and French air forces were intended to work closely with their armies and control the air space above them. Aircraft were used more than previously for direct ground support, though still with limited effectiveness—for example, the Royal Air Force failed in its attempt to cut off the Germans' retreat after the 8 August Battle of Amiens by bombing the Somme bridges.⁸ Overflights were also used to drown the engine noise from tanks moving up by night into their jumping-off positions. In 1918 tanks were used more than previously, but their value remains disputed, and in general their role was useful but ancillary. The British Mark V heavy tank was much superior to the 1916 Mark I; the French built hundreds of Renault light tanks, and also supplied them to the Americans. But even the Renault could manage barely five miles per hour in battlefield conditions, and the Mark V was slower still. World War I tanks were too vulnerable

⁵ R. Prior and T. Wilson, *Command on the Western Front: the Military Career of Sir Henry Rawlinson, 1914-1918* (Oxford, 1992); T. Travers, *How the War Was Won: Command and Technology in the British Army on the Western Front, 1917-1918* (London/New York, 1992); P. Griffith, *Battle Tactics on the Western Front: the British Army's Art of Attack, 1916-1918* (New Haven, Conn./London, 1994); P. Griffith (ed), *British Fighting Methods in the Great War* (London/Portland, Ore., 1996); G. D. Sheffield, *Forgotten Victory. The First World War: Myths and Realities* (London, 2001); S. Schreiber, *Shock Army of the British Empire: the Canadian Corps in the Last 100 Days of the Great War* (St. Catharines, Ont., 2004).

⁶ M. Goya, *La Chair et l'acier: l'invention de la guerre moderne, (1914-1918)* (Paris, 2004); M. E. Grotelueschen, *The AEF Way of War: the American Army and Combat in World War I* (Cambridge, 2007).

⁷ On intelligence, see especially J. Beach, *Haig's Intelligence; GHQ and the German Army, 1916-1918* (Cambridge, 2013).

⁸ On air power, J. F. Wise, *Civilian Airmen and the First World War; the Official History of the Royal Canadian Air Force*, Vol. I (Toronto, 1980), is broader than its title suggests: see also P. Lissarague, *A History of French Military Aviation* (transl., Washington DC, 1986).

to artillery fire to be used as ‘landships’ roving independently in the enemy rear (as theorists such as Colonel J. F. C. Fuller had envisaged), and their primary role was as infantry support—though they conversely needed infantry protection against the enemy guns. If used carefully they could reduce infantry casualties and help gain surprise by dispensing with the need for a preliminary bombardment. They were deployed en masse for the 18 July counter-attack at the Second Battle of the Marne and for the 8 August Battle of Amiens (when 453 took part), but these events were atypical, and tanks remained an occasional feature of Allied tactics.⁹ For their assault on the Hindenburg Line, for example, on 29 September, the British relied primarily on an initial bombardment of 3/4 million shells over three days: tanks would have been of little value against such elaborate positions. The British did conduct a type of amphibious warfare, however, in that at the centre of the enemy defences lay the 100-foot wide Saint-Quentin canal, which was secured (after an exceptionally intense and accurate bombardment) by ordinary infantry using collapsible boats, lifebelts, and scaling ladders. Partly because they provided obstacles against tanks, watercourses were often central to 1918 battles, whereas in 1915-17 the Allies had generally been struggling up hills.

Behind the tremendous Allied bombardments lay a flexible system of logistics. The German army in 1918 still moved primarily by rail and horse; but its railways were overstrained and its horses too few. The Allies benefited from the excellent French rail network, which was also under pressure, but helped by injections of British and American coal, personnel and rolling stock. In addition the Allies increasingly used road transport, as the French did during the defensive battles of March-July to rush men where most needed, drawing on oil stockpiled beforehand after being shipped from the US. The Allied advance of July-November included frequent pauses, but it was remarkably rapid and sustained by World War I standards, and in November its momentum increased. As the railways that the retreating Germans left behind them were often smashed and booby trapped, the Allies again used road transport to supplement rail. By November their supply chain was certainly under strain, but far less than its German counterpart. In fact paralysis of communications was a major reason why the German High Command decided first to request a ceasefire and then to accept the Allies’ stringent conditions for an armistice.¹⁰

— IV — Conclusion

Less has been written about the final phase of the First World War than about the failure of the opening war plans and about the attrition battles in the middle years of the conflict. This balance needs to be redressed if the war is to be understood as a whole. Although the present discussion has centred on the Western Front, similar techniques were used in other theatres of war—particularly by the British against the Turks at the September 1918 battle of Megiddo—but in general with smaller concentrations of the most modern weaponry. (Tanks,

⁹ For contrasting view on tanks, Travers, *How the War Was Won* and D. J. Childs, *A Peripheral Weapon? The Production and Employment of British Tanks in the First World War* (Westport, Conn./London, 1999).

¹⁰ I. M. Brown, *British Logistics on the Western Front, 1914-1919* (Westport, Conn./London, 1998). New research is in progress on this topic.

for example, were used only on the Western Front and in Palestine.) Italy's successes against the Austrians (the Battle of the Piave in June 1918 and the Battle of Vittorio Veneto in October), and the Allies' defeat of Bulgaria in September, relied more on the methods of 1915-16 though were also much assisted by their opponents' demoralization. On the other hand, Allied efforts in all these theatres depended on command of the Atlantic and the Mediterranean sea-lanes, and here a different pattern of combined and joint operations was developed in the struggle to defeat the U-Boats.¹¹ The British and American navies worked together to plan and escort the North Atlantic convoys; the British, French, Italians, and Japanese (who supplied cruisers and destroyers) co-operated in the Mediterranean. Navies also had to work in conjunction with mercantile marines, grouping cargo ships by speed, gathering information (notably from intercepted wireless messages) about U-Boat locations, and re-routing convoys away from danger. By 1918 also, aerial surveillance, at least over British coastal waters, also played a role. Command of the seas was essential for the Allies to benefit from the economic and manpower resources of their far-flung colonies and from the Americas. These resources gave them the edge over a German army that almost to the end remained superior to them unit for unit in military efficiency. Although all-arms operations were an essential component in the Allied triumph, they therefore need to be considered against a much broader backdrop.

¹¹ On the war at sea, Stevenson, *With Our Backs to the Wall*, ch. 5; P G. Halpern, *A Naval History of World War I* (London, 1994); J. Terraine, *Business in Great Waters: the U-Boat Wars, 1916-1945* (Ware, 1999).

