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Military Modernization 1789-1918

Industrialization and War

The landscape of the western front in 1918 would have looked familiar to soldiers of the late twentieth century. Scarred and fissured by war, its features, or rather the lack of them, bore testimony to the destructiveness of modern military technology. Tanks, heavy artillery, machine-guns, flame-throwers, gas, ground-attack aircraft, long-range bombers—all had reached a level of high performance and remarkably robust reliability within a few years. Their effect was to clear the surface of the battlefield, at least by day: men dug deep or flew overhead, but only pressing necessity caused them to stride over that pockmarked ground.

The same comparison could not be made between the soldiers of 1918 and those of the battle of Valmy in 1792, or even of Waterloo in 1815. The weaponry with which the latter fought, and its effects, would have seemed extraordinarily primitive to their successors. Indeed the smooth-bore flintlock musket, the grapeshot, and canister of the artillery had evolved little during the twenty years of the Revolutionary and Napoleonic wars; they had not even changed much since the wars of Louis XIV. For all their destructive impact, their limited accuracy, short range, and slow rate of fire did not compel dispersion for the sake of survival. The battlefield was not empty but congested; men and horses were tightly packed and clearly visible to their foes. Nothing symbolized more succinctly the contrast between the warfare of the French Revolution and that of the First World War than the change in dress. The scarlet- or blue-coated infantrymen of Napoleon's age, advancing into action with colours streaming and bands playing, were popinjays, at least in outward form; the combatants of 1918, clad in khaki or field grey, their faces obscured by steel helmets and gas masks, had lost their humanity and their individualities to the self-protective necessities of industrialized warfare.

The dramatic and rapid nature of the change in the contours and characteristics of warfare in Europe can clearly be linked, in the first place, to national economic development, and in the second to its concomitant, technological innovation. Between 1815 and 1914, to take the most dramatic example, Germany's production of coal increased two hundred fold and of pig-iron eighteen times. From these raw materials were fashioned the steel and then the guns and rifles whose quantity and quality effected a revolution in fire-power. The broad equation between Europe's industrialization and its military modernization seems to provide a simple explanation for change, a linking of cause and result which is hard to resist. But such determinism must be rejected. The story is more complicated. In particular, it must make greater allowance for the role of ideas.

Economics and War

A history of Europe's military modernization which is shaped by technological and economic development leaves far too much out of account. Comparative advantage in the process of industrialization did not necessarily transfer into comparative advantage on the battlefield. During the Napoleonic wars the trend-setter in military affairs on the continent was France. And yet Britain, not France, led the way in the process of economic growth.

A similar point could be made of the next major European conflict, the First World War. The machinery of war stood at an apex of technological development; it required the mobilization of all a nation's resources. At the war's hub stood Britain's successor as Europe's industrial leader, Germany. But the capacity to sustain continued fighting in 1914–18 was not confined to the economic giants of Europe. Russia, the most backward of the great powers in 1914, maintained the war on one of its major land fronts for three years. Furthermore she did so singlehandedly, and without ever fully mobilizing the manpower she had available. Bulgaria did not enter the war until September 1915, but, like Russia, also fought on for three years. And, most remarkable of all, the Ottoman empire, whose demise as a European power in the two Balkan wars of 1912 and 1913 had been a precipitant of the First World War, maintained activity on three and sometimes four fronts between 1914 and 1918. Thus, just as economic forwardness had not been translated into conventional military superiority in the case of Britain a hundred years earlier, so in the Great War backwardness did not necessarily correlate with military ineffectiveness.

States still had choices to make in terms of military priorities. In the eighteenth century, Frederick the Great's Prussia had ‘punched above its weight’ by giving priority to the army and its organization. By the twentieth century, economic development made it harder for the backward nation to counter the more advanced. But it was not impossible. Resource allocations were the products of political decisions. In 1914 Russia and Italy were appropriating, respectively, 35 per cent and 30 per cent of total government expenditure for military needs: despite smaller gross national products and smaller taxable bases, they opted to spend proportionately more on defence than more advanced nations. In gross terms Britain, although now ranking third in the world behind the United States and Germany as an industrial power, still disbursed more on her armed services than either of them. Between 1900 and 1913 average defence spending in Britain was £2.04 per head per year, as opposed to £0.77 in Germany and £0.85 in France. But her outlay did not translate into military hegemony on the continent. The strategic priorities which confronted Britain were those of maritime power and of imperial defence: by European standards her army remained diminutive.

So topsy-turvy was the logic imposed by the cost of war and of preparing for it that many observers before 1914 concluded that economic sophistication—rather than advancing

military effectiveness—was contributing to the inutility of war as an instrument of policy. I. S. Bloch, a Polish banker, whose six-volume study of future war, published in 1898, rested on a careful examination of its technology as well as its financing, contended that war might become impossible. Production depended on an urban workforce and international credit; the onset of war in Europe would therefore halt industry by drawing off its manpower and by disrupting normal financial relations. On this basis the more advanced the economy became, the more difficult was the waging of war. The corollary of such arguments was that economic backwardness could be an advantage. In 1914, some Russians reckoned that their agrarian economy and its relative lack of dependence on trade would make them more resilient in protracted warfare. For all the impressiveness of new technology, the prime resource required by armies in the First World War remained, as in the Napoleonic wars, manpower. The Balkan states were able to fight so continuously, and so ferociously, between 1912 and 1918, partly because they had men in abundance, not yet absorbed by the demands of industry.

So the significance of national economic development for the making of war was confused. The picture is little clearer with regard to technological innovation.

Technology and the Arms Race

Neither of the industrial leaders cited above, Britain nor Germany, enjoyed any decisive technical superiority in weaponry as a consequence of its forwardness. In the main, armies in Europe, regardless of the economic development of their parent nations, were comparably equipped. Backward states put a premium on competing with the standards set by those with more sophisticated technologies. The magazine-fed, breech-loading rifle, firing smokeless powder, was adopted by Germany in 1884, France in 1886, Austria-Hungary and Britain in 1889, and Russia in 1891. Thus lags in the procurement of new weaponry tended to be short lived. Even if this was not the case, an inadequacy in one weapons system might well be compensated for by a superiority in another.

Therefore, surprisingly few explanations for ultimate victory rest, in the years between 1789 and 1918, on a marginal technological advantage. Prussia's defeat of Austria at Königgrätz in 1866 was popularly attributed to the Dreyse needle-gun, the first breech-loading rifle in regular military use. But the Dreyse, although pioneering in its day, was hardly a revolutionary weapon by 1866; it was adopted in 1840, and issued on a regular basis in 1851; its principles had been examined and rejected (principally because of the delicacy of the needle-fire mechanism and the escape of gas at the breech) by a number of European armies; and the Austrians enjoyed a superiority in artillery sufficient it seemed to compensate for any inferiority in small arms. Four years later at Sedan, the Prussians' victory over the French was ascribed to the steel breech-loading guns which they had adopted in the intervening period. But in 1870, as in 1866, the sources of triumph could be more satisfactorily sought in explanations that were operational and organizational than tactical or technological. Inferior tactics based on the poor application of new technology did not prevent their practitioners from achieving victory—as the Prussians found at Gravelotte-St Privat in 1870 and as the French showed when themselves defeating the Austrians at Solferino in 1859.

In two major areas only did European practice in war in the nineteenth century not display this ambiguity concerning the relationship between technological innovation and battlefield success. But both concerned war on the periphery of Europe, and not at its core.

First, Europe's domination of the world through the growth of empire reflected the ability of sophisticated technology and advanced techniques to overcome the inherent advantages of native populations. The latter were inured to the climate and its diseases, knew the terrain, and were masters of the local logistical infrastructure. But the gap between local technologies and those of Europe widened in the second half of the nineteenth century. The machine-gun was only the most concrete military expression of the tactical superiority enjoyed by European armies in Africa or Asia. As important were improvements in cartography and in medicine. But, since the latter were not military in any narrow definition of the term, they helped confuse the significance for war in Europe of war in the colonies. Britain was only the most obvious of the European powers in the frequency of her wars beyond the continent: France and Russia, and latterly Germany, Belgium, Italy, and Portugal, also gained more regular—if less intense—direct experience of war overseas than they did closer to their own European frontiers. But the very technological inferiority of the enemy made it hard to see what was relevant in a European context and what was not. Even Britain, the power best poised to cull tactical benefits from hard-won conquests in India or South Africa, remained in the thrall of France or Germany, and looked to the continental precepts of those nations' armies rather than to her own firsthand knowledge.

The second arena in which technological advantage proved less ambiguous was also one in which Britain played a major part. War at sea required a navy to master not only the technology that would enable its ships to survive in a hostile environment. The move from sail and wooden ships to steam and iron integrated for the sailor both the complexities of navigation and the necessities of combat. One interacted with the other. But naval battle was rare. The world's pre-eminent navy, Britain's, did not fight a fleet action against a comparable opponent between 1805, the battle of Trafalgar, and 1916, the battle of Jutland. Ironically, the former was the more decisive, although only in the latter was significant new technology employed. Jutland was as sure an illustration as were the land battles on the western front that comparable levels of enhanced technological sophistication cancelled each other out. But, in the years before Jutland, Europe's navies had had a forceful and recent prod to innovation. At Tsushima in 1905 a marginal technological advantage had enabled the Japanese navy to send the bulk of the Russian Baltic fleet to the bottom. Arms races, particularly those between Britain and France in the middle years of the nineteenth century, and between Britain and Germany in the decade before the First World War, were contested with far more urgency at sea than on land.

The response to Tsushima reflected its scarcity value. The last major fleet action between European navies, Austria's defeat of the Italian navy at Lissa, had been fought in 1866. In the Crimean war the Russian navy had deemed discretion the better part of valour and had not come out to face the British and French fleets. Thus the period of most sustained industrial and technological advance, and the period in which those developments were applied to warfare—the forty years between the end of the Franco-Prussian war and the outbreak of the First World War—remained remarkably devoid of battles. Without combat, fleets were deprived of the best laboratory for assessing the tactical impact of the devices with which they were equipped. The point was just as true for land forces as for navies. With colonial wars at a discount, and with continental wars confined to the Balkans, armies could not readily take on board the full implications of industrialization for the business of fighting.

The Military Theorists

The contrast with the preceding two hundred years is striking. Since the Thirty Years' War, European armies had fought each other with a regularity bordering on obsessiveness. But at least until 1850 the changes in weaponry were small, gradual, and incremental. It was during those two centuries, however, that standing armies were shaped; it was during the course of them that officers acquired professional self-regard, and it was as a consequence of these institutional developments that military academies were established. The groundwork of military doctrine was therefore done during the course of the eighteenth century, not during that of the nineteenth: it was the fruit of the age of the Enlightenment, not of that of industrialization. Military theorists, like Turpin de Crissé or the comte de Guibert, responded to the influences of the philosophes: they believed that in war, as in other human activities, durable principles of universal application could be formulated. Technology did not for them represent a variable which would challenge military thought with constantly shifting foundations.

For the military theorists of the eighteenth century Frederick the Great represented the embodiment of the art of war. Indeed Frederick, like other eighteenth-century despots, himself made significant contributions to theory through his own writings. For the writers of the nineteenth century, however, Frederick's throne was usurped by Napoleon. Unlike Frederick, Napoleon did not expatiate on his own experiences; his achievements as a practitioner of war were never balanced by his own contributions to its understanding. What he had wrought was therefore left to the interpretations of others. Napoleonic warfare became the repository of the universal principles of war, but what constituted Napoleonic warfare was itself never capable of succinct definition. Both the principal interpreters of modern war, Antoine Henri Jomini and Carl von Clausewitz, based their analyses on their experiences in Napoleonic warfare. From them flowed most of the leading ideas associated with the conduct of war; for neither was economic development nor technological innovation an important consideration.

The differences of opinion over the nature of war between Jomini and Clausewitz (prompted by the acerbic and in many respects unwarranted attacks of the latter in On War (1832)) reflected in part the fact that warfare did not remain constant and unchanged between 1792 and 1815. Napoleon himself, for all his obscuring of his intellectual origins, had almost certainly drunk at the well of three far-sighted, eighteenth-century French writers—not only Guibert, the prophet of the citizen army, but also Pierre de Bourcet, who described how to manœuvre a large force in separate components, and J. P. du Teil, who advocated the mobility and concentration of artillery. Napoleon's early campaigns, in Italy in 1796 and 1797, were compatible with much that was Frederickian. His armies were small, never more than 30,000: this was traditional. His ability to dispense with supply arrangements—which seemed more novel—was fortuitous, depending in part on the fertility and wealth of Lombardy. The interaction of these phenomena created the opportunity to manœuvre with speed. When Jomini began writing his Traité des grandes operations militaires (the first volume was published in 1804), it was Napoleon's ability to fuse mobility with battle—so clearly expressed not only in his first Italian campaign but also at Marengo in 1800—which preoccupied him. Jomini had been deeply impressed by Frederick's defeat of the Austrians at the battle of Leuthen in 1757. In the course of that action Frederick, who was outnumbered almost two to one by the Austrians, had managed, through marching in echelon against the Austrian flank, to bring his main concentration against the decisive point. Jomini's study of Napoleon elevated the direction of masses on the decisive point to a universal principle in operations: his claim to have subsumed Frederick and Napoleon within one tradition was not totally at variance with the truth.

For Clausewitz, the dominant experiences of Napoleonic war were very different, principally because they were later. He was a member of the Prussian army smashed on the same day in 1806 at Jena and Auerstadt. The trauma of that event confirmed the irrelevance to the Prussian army of its past. He fought with the Russian army in the 1812 campaign, and was restored to the Prussian army for Waterloo. The forces engaged in these later Napoleonic battles were massive: at Leipzig in 1813, Napoleon deployed 195,000 men, but he was none the less outnumbered by the three allies opposing him (Russia, Austria, and Prussia) who fielded 365,000. Battles could still be decisive, but the interaction of manœuvre with combat was less evident. Indeed Napoleon's operational superiority in the campaigns of both 1814 and 1815 did not lead to victory. What struck Clausewitz more forcefully than Jomini was the nature of fighting—continuous, bloody, confused, and fearful.

Clausewitz is best remembered today for his formulation that war is an instrument of politics. In attacking Jomini for endeavouring to establish the principles of war, Clausewitz was therefore being less than fair. The German was not opposing all principles: he wished in fact to elevate one principle above all others, because he belatedly recognized that only thus could he give his writings on war a universal validity that extended beyond the ambit of his own experiences of Napoleonic warfare. The fact that his central idea is only fully incorporated in two out of the eight books of On War, means that the dominant considerations of the text as a whole remain the late Napoleonic battle and its nature. For many of his nineteenth-century readers what he had to say about war and politics was either a statement of the obvious or out of date. At many points in his writings Clausewitz is a romantic, a child of the era of revolution and nationalism. But in his formulation of the relationship between war and politics he is a rationalist, a disciple of the Enlightenment. Napoleon had united supreme political and military control but so too had many eighteenth-century monarchs. During the nineteenth century their separation and even antagonism became more obvious than their coordination. Even in Prussia and then (after 1871) in Germany, where the king remained the nominal supreme commander, political and military direction divided. In 1870–1 Bismarck, as Minister President of Prussia, had to struggle to subordinate Helmuth von Moltke, the chief of the general staff, to his political objectives; in 1916–17 his successor as Chancellor of Germany, Theobald von Bethmann Hollweg, lost the fight to Hindenburg and Ludendorff. The First World War seemed only fitfully to be fulfilling the needs of policy. Clausewitz's universal principle was an ideal: it was what should happen, not a description of what always happened. War frequently followed its own grammar, not its own logic. Clausewitz's analyses of Napoleonic battles were more recognizable to nineteenth-century generals than his account of the relationship between war and politics.

For principles of operational utility they turned to Jomini. Jomini was not as prescriptive as his detractors, or as his diagrams in Pr&eacutecis de Part de la guerre (1838) suggested. Like Clausewitz, Jomini recognized that the conduct of war should be subordinate to the objective to be achieved through war; unlike Clausewitz, Jomini did not elevate this to the status of a pervasive theme. Operations were therefore treated separately, and this gave his account a thrust more akin to the actual experience of most commanders. Again like Clausewitz, Jomini appreciated that war was ‘a terrible and impassioned drama’, which was ‘dependent upon a number of moral and physical complications’. Clausewitz elevated these themes to the level of abstraction, describing the inbuilt tendency of war to drive towards extremes, to ‘absolute war’—a drift moderated in practice only by the inherent difficulties of conducting war, what he called ‘friction’. By contrast, Jomini emphasized—in accordance with his own experience as a staff officer—the ability of the commander to master and direct war for the achievement of clear operational ends. Jomini's immediate

influence cannot be exaggerated; Clausewitz's can. Jomini gave his contemporaries the intellectual tools with which to understand what they took to be Napoleon's art of war—the importance of the line of communications, the need to protect one's own, the aim of mastering the enemy's, and so forcing him to battle. When Jomini's own texts were not read, they were assimilated in the plagiarisms, adaptations, reinterpretations, and popularizations of others, through men such as W. von Willisen in Germany and E. B. Hamley in Britain.

Jomini's focus was on operations or 'grand tactics'. He said little about what we would now call grand strategy, the level at which the relationship between war and politics assumed greatest relevance; he also wrote only briefly on tactics, on the business of fighting at lower unit levels. In this he faithfully reflected Napoleon's own strengths and innovations. The emperor's forte was the ability to see a theatre of operations as a whole, and to combine the conduct of marches within that theatre in order to achieve decisive success on the battlefield. This—an idealized concept of Napoleonic warfare—became itself the ideal form of war.

The Impact of the Railway

Attention to the operational level of war, embodied in Napoleon, interpreted by Jomini, and perpetuated by general staffs until 1914, put the weight of military theory firmly on the influence of ideas, not of technology. Tactics were shaped and challenged far more profoundly by technology than were operations. But if the focus of operations lay in communications, in the organization of marches, and in the concentration of masses on the decisive point, they could not fail to be influenced by one major innovation, the railway. Under the guidance of Alfred von Schlieffen, the chief of the general staff from 1891 to 1905, railway planning became the prime motor of Germany's military preparations for war. Its chosen theatre of operations, northwest Europe, possessed the greatest concentration of track in the world. The task of the German military travel plan in 1914 was to move over 3 million men and 600,000 horses in 11,000 trains during a period of 312 hours.

During the period 1914–18 the railway contributed to the indecisiveness of war. It enabled large armies to be moved rapidly across great distances. But beyond the railhead, the supply of such large armies slowed to the pace of the slowest horse and of the marching man. Ease of communication to the rear made for abundance, and therefore for congestion at the front. Operationally, the railway probably conveyed greater advantages to the defence than to the attack. Rapid reinforcement of potential weakness prevented the exploitation of offensive opportunities.

But this was not the view prevalent before 1914. In two European wars in the nineteenth century, the railway played a dominant operational role. In 1866, Prussia defeated Austria by using five available railway lines, so concentrating its armies from convergent directions on the battlefield itself. In 1870, speed of mobilization and superior exploitation of the available track again paid dividends in Prussia's defeat of France. The popular conclusion, therefore, was that the railway had made the Napoleonic ideal more achievable, not less. The prime architect of the Prussian victories, Helmuth yon Moltke, was not so carried away by his own success. He appreciated that strategy must be flexible and adaptable; in his old age he anticipated that the next European war would last seven or even thirty years. But his successors in office pushed aside such forebodings. Professional pride and political necessity meant that the ideal remained the short campaign crowned with total

victory on the battlefield; for this, manœuvre, an operational concept, was the key, fighting the mere instrument.

The Rise of the General Staff

The combination of Jominian principles and railway planning produced systematization. Foreign observers in the wars of German unification were impressed by the role of the Prussian general staff. All armies had staff officers serving with troops in the field, but in 1866 Prussia was the only major power in Europe to possess a central general staff, entrusted with the development of war plans in time of peace. It also had responsibility for doctrine, whose implementation relied on the staff officers serving with troops in the field, and with corps and divisional commanders. After the Prussian victories, these two aspects of command and staff work were emulated elsewhere. Austria-Hungary reformed its staff organization in 1871 and 1881; France opened its staff corps to rotation with line officers in 1883 and appointed its first chief of the general staff in 1890; Britain created a general staff in 1906. Without these bodies, the armies of the First World War could never have been deployed or controlled. But they created a sense that war was a matter of management. Attention to the railway as the linchpin of operations put the weight on timetabling and routine. A perceptive and important British observer, Frederick Maurice, writing in 1891, reckoned that the great change in modern war was the perfection of army organization. British soldiers tended to attribute the misfortunes of the Crimean war to administrative incompetence; the Prussian victories were thus the reverse of the same coin.

Nor did the First World War demolish the ideal as conclusively as the clichés of attrition and stalemate might suggest. The opening campaign in the west embodied all the hallmarks of Napoleonic operations. Conceived on a grand scale, embracing an entire theatre of operations, its sweeping movements gave it a unity and comprehensibility absent from subsequent battles in France and Flanders. Moreover, its denouement was a decisive battle, albeit not in the sense envisaged by the German general staff. The French and British victory on the Marne in September 1914 destroyed Germany's hopes of rapid victory. The expectation that such manœuvres could be repeated, if not on the western front itself, then at least elsewhere, thus found some reinforcement from the campaign of the Marne. It could find even more in East Prussia, where operational manœuvre produced a great German victory over the Russians at Tannenberg by the end of August 1914. The authors of that triumph—or at least its putative authors, as claims to its paternity continue to multiply—were Hindenburg and Ludendorff. For the next two years on the eastern front, they would conduct campaigns characterized by manœuvre and mobility—even if the expectations generated in their planning exceeded their execution. Under other commanders, the German army in 1915 and 1916 overran Poland, Serbia, and Romania: the Napoleonic concept of rapid wars culminating in decisive victories continued to find confirmation within the First World War itself.

But planning and system had put a blight on imagination. Significantly, Tannenberg was a victory that was improvised out of desperation, not one that was programmed. The perpetuation of the Napoleonic ideal through Moltke's victories (if not teaching) and through Schlieffen's teaching (if not victories) had shut out the consideration of wars which did not fit the accepted model. Soldiers throughout Europe in 1914 aimed to fight a broadly similar sort of war; different general staffs did not formulate radically different conclusions; they were imitative; and the war could become protracted and indecisive partly because the ideas that governed its operational conduct were not sufficiently distinct to prevent congruence.

Siege Warfare

When observing the failure to anticipate the true nature of the First World War, critics comment on the reluctance to derive lessons from the American Civil War. This was a long war, which drew on the total resources of both belligerents, and deployed at least some advanced technology. But the neglect of the American Civil War seems comprehensible when it is recognized that the contending armies were characterized by a lack of professionalism and a tendency themselves to want to emulate European practice. Furthermore, the dazzling German victories came after the end of the American Civil War, and naturally, therefore, seemed more relevant to the immediate issues of the conduct of war in Europe. More surprising than the neglect of a war outside Europe was the selective appreciation and analysis of wars within Europe.

Napoleon's campaigns had been rapid partly because he had eschewed the business of sieges. His eighteenth-century predecessors, tied by the exigencies of supply to set lines of communication, were deemed to have become fixated on fortifications. The fashion after 1815 was to condemn the technicalities of Vauban and his successors as self-important and deliberate mystifications. Military engineers continued to develop systems of attack and defence, conditioned in part by the progress and development of artillery. Here was an area of war clearly determined by technological progress, as masonry gave way to reinforced concrete, and as longer-range heavy artillery forced the defence to create detached forts at some distance outside the perimeter to be held. But siege warfare became detached from the mainstream of operational thought. The great commander concerned himself with manœuvre and battle, not with the sedentary and slow processes of sapping and mining.

The result was an extraordinary blindness to a potentially dominant form of war. In 1849 Colonel T. P. Thompson told the British House of Commons ‘of the superannuated notions of the effect of fortifications, which the experience of modern wars had entirely exploded’. But the first major conflict to erupt in north-west Europe after 1815, the Belgian war of independence of 1830–2, pivoted around the bombardment and siege of Antwerp. Five years after Thompson gave vent to his feelings, the British army, in conjunction with the French, laid siege to Sebastopol, the site of the Russian naval installations in the Black Sea. Posterity has chosen to remember the battles of the Alma, Balaclava, and Inkerman, the charge of the Light Brigade, and the thin red line; it has neglected the conditioning characteristic of the Crimean war as a whole. The siege of Sebastopol lasted eleven months, and drained the Russian army of its strength. But for many observers the siege was evidence of the war's irrelevance to the theory of war, of the failure of its participating armies to reform, not of its modernity.

Two factors made the science of fortification and of its suppression by heavy artillery increasingly important. The first, evident at Sebastopol, and also at Plevna in the Russian invasion of Ottoman Bulgaria in 1877, was tactical. To dig trenches and to erect field defences was a logical response to the growth in fire-power in the second half of the nineteenth century. An attacking army insufficiently endowed with artillery and failing to anticipate protracted operations would find itself considerably embarrassed. The Russians were held at Plevna for five months.

The second was strategic. Napoleonic warfare still assumed, as eighteenth-century commanders had been able to assume, that the principal focus of a nation's wealth and identity was its army: if the army was defeated in the field, then political consequences followed. But the growth of the nation-state, the integration of a nation's resources with

its military effort, meant that the defeat of the national army in the field might not in itself prove decisive. The capture of the capital was required in order to master the nation's administrative and industrial life, the fountain-head of its army.

This was not the lesson which was drawn from the wars of German unification, but it might have been. In 1866, the Austrian army was defeated at Königgrätz, but not routed. The fact that the Prussian army did not then advance and lay siege to Vienna was a product not of the military circumstances but of political intervention—of Bismarck's anxiety to conciliate rather than to humiliate the Habsburg monarchy. In 1870 Bismarck's attitude to the French was more bellicose, and the French response proved equally disobliging. The defeat of the French army in the field, at Sedan on 1 September, was far more comprehensive than that inflicted on the Austrians. But a popular uprising in Paris, a city ringed with fortifications, compelled the Germans to lay siege to the French capital until January 1871. A six weeks' war lasted six months.

The immediate response of the Third Republic to its experience of the Franco-Prussian war was to create a new system of fortifications for the defence of its frontiers. Between 1874 and 1884 Séré de Rivières masterminded the construction of 166 forts, 43 secondary works, and 250 batteries at a cost of 660 million francs. Typically the forts were six kilometres apart, designed to give each other supporting fire and to catch an enemy attack in enfilade; the French were ready to check the next German attack with defence in depth and with indirect artillery fire. So robust did this defence look, Schlieffen eschewed all thought of confronting it, and instead planned to direct Germany's armies through the Low Countries, thereby outflanking it in its entirety. Thus he embraced operational manœuvre, on Napoleonic lines, rather than the tactical conundrums of modern war. Indeed, to justify his plan for envelopment he cited historical examples that were tactical rather than operational in design, and whose outcomes had depended on weaponry totally different from that in use by 1900. The importance for Schlieffen's thought of Leuthen and of Hannibal's victory over the Romans at Cannae in 216 bc shows how much more significant in shaping military attitudes were continuously operating concepts than ever-shifting technology.

But what was even more surprising than Schlieffen's dodging of the issue of fortification was France's effective abandonment of its own strengths. The development of a delayed action fuse in 1885–6 meant that artillery shells penetrated masonry before exploding. Thus, almost as soon as they had been completed, Séré de Rivières's forts had to be remodelled. They were brought closer to the ground, and the concrete was reinforced with steel. But the expense was dispiriting and the overall conception was lost. France increasingly put its weight into men, not material. It abandoned the idea of a defensive strategy, followed by a counter-attack, in favour of an initial offensive designed to deprive Germany of the initiative. Although forts and field fortifications played a not inconsiderable role in slowing the German advance in 1914, their importance was still not recognized. The German army on the Marne was weakened by its need to detach two corps to cover Antwerp and one for Maubeuge. The drama of the battle itself pivoted around Paris; but these manœuvres were themselves contingent on the French armies holding steady along a fortified line from Verdun to Belfort, through Toul, Nancy, and Epinal. Thus both Séré de Rivières's conception and his achievements played a vital role in saving France. But the orthodoxy that downgraded fortification persisted. In 1915 the French army concluded that it would not hold Verdun, a network of twenty major forts, in the event of its being attacked; by October forty-three heavy batteries and eleven field batteries had been moved out of that sector of the front. But when the Germans did attack in February 1916, it was the forts which provided the spine as well as the soul of the French defence.

The Professionalization of Warfare

Equally important in the German intellectual suppression of the second phase of the Franco-Prussian war was its denial of the levée en masse and of the nation in arms. After the fall of the Second Empire in 1870, Léon Gambetta masterminded a campaign of national resistance of which the defence of Paris was but a part. The operations of francs tireurs on the Germans' rear and communications confronted Moltke's armies with guerrilla warfare—a style of fighting for which operational manœuvres and decisive battles were inappropriate concepts. The Germans' reply was terror. Confronted with the unfamiliar, they responded with the unreasonable. Determination to avoid a repeat of this experience was evident in 1914, when the German army displayed a harshness towards the civilian populations of Belgium and north-east France that was far more brutal than anything meted out to the soldiers of the opposing armies: international law was used as an edifice to demarcate and render as self-contained the conventional operations of professional armies.

The Germans' reaction, at least at an intellectual level, was not atypical. Guerrilla warfare was seen as the resort of the weak, not an alternative strategy possessed of its own strength and validity. The word ‘guerrilla’ itself derived from the Spanish response to Napoleon's invasion of the peninsula in 1807. But the clothing of popular passions and, at worst, of brigandage in the vocabulary of national resistance was not something that came naturally to the Spanish government or to its British allies. Spain only embraced guerrilla war in the face of its army's continuing incompetence in conventional operations. The French, dispersed in order to feed, became vulnerable to attack by the guerrillas; thus the ability of their army to concentrate became weakened by the need to protect their lines of communications. In battle, the British met portions of the French army rather than its entirety. But neither Wellington nor William Napier, the first and most important (for British military thought) historian of the Peninsular war, acknowledged the importance of the guerrillas. Their neglect was not simply a national prejudice, a way of elevating Britain's own achievements; it was also the standard response of the professional soldier. Jomini too expressed in graphic phrases his own distaste for what had happened.

In the aftermath of Waterloo it was the small professional army, its soldiers committed to relatively long periods of service, which prevailed as the norm. The notion of a people in arms carried a double indemnity: first, it smacked of democracy or even of revolution, and secondly it betokened a form of war that in its frenzy would become unlimited both in its methods and in its length. By belittling the efforts of Gambetta and the francs tireurs, Moltke ensured that the conventional pattern of military organization remained unchallenged. In 1870 Prussia conscripted men for a shorter period, and rotated them into a more effective reserve, but the dominant ethos was royal, regimental, and professional.

So powerful was this idea that not even the necessities generated by successive manpower crises in 1917–18 could shift the attitudes of the German high command. Before the outbreak of the First World War, Germany called up 57 per cent of its available adult males; it could therefore spurn urban and industrial workers, possibly tainted with socialism, in favour of its preferred recruits, those from agricultural and rural backgrounds. By January 1918, however, known socialists and radical trade unionists were being drafted; the army as a whole was described by its commanders as little better than a ‘militia’. But their solution was to continue to inculcate the old values, not reshape the army in the light of its changed composition. Amidst the preparations for the March 1918 offensives, the Germans still found time to consider giving instruction in the goose step.

The crowning evidence of this continuing commitment to the prevailing patterns of organization and consequently also of fighting came in October 1918. The allied counter-offensives, begun in mid-July 1918, were running out of steam; their communications were lengthening; the roads were turning to mud as winter approached. Walther Rathenau, a German businessman on the fringes of government, proposed the initiation of a levée en masse. Citing the example of Gambetta, he wanted a defence minister with far-reaching powers. A number of soldiers were supportive: with good defensive positions, Germany could hold out some months longer, and so force the entente to accept a negotiated settlement. But Ludendorff's opposition was categorical. He preferred to precipitate Germany headlong into an armistice that amounted to total defeat, rather than preside over a revolution in the character and ethos of the army.

The ideas which were most powerful were those hallowed by success: weaker powers tried to catch up with stronger powers by competing in the same terms rather than by exploiting new methods. Thus the Germans' victories in 1866 and 1870 reaped dividends long after their immediate objectives had been achieved. For by handing them the palm of military superiority, other nations condemned themselves to continuing inferiority, preferring to dog the Germans' footsteps rather than branch out on their own. In 1918 this success rebounded, for by then the Germans were inferior, but they also were too wedded to their own conventions to be able to change.

The British pulled off a comparable trick at sea. In this they relied not only on the precepts of their own history, but also on the writings of Alfred Thayer Mahan, and especially his book, The Influence of Sea Power on History (1890).

Mahan's writings constituted a case for the possession of a fleet of battleships. Maritime power might be exercised through trade and commerce, and through the control of the ‘narrow’ seas. But ultimately suzerainty would be achieved through the clash of navies in fleet actions. As on land, the evidence for these propositions was historical—and reliant on the wars of the eighteenth century and of the French Revolution. In the years between 1871 and 1918 both Britain's major challengers at sea, Wrst France and then Germany, preferred in the last resort to follow the British (and Mahanian) example rather than try a different solution.

The Challenge to the Battleship

France came closest to the adoption of a radical alternative. In 1878–9 the naval commission of the chamber of deputies cast doubts on the wisdom of pursuing the expensive solution of battleship construction, when battleships might prove vulnerable to torpedoes. By the early 1880s the so-called jeune école had rejected a balance between torpedo boats for coastal defence and battleships for offensive action in favour of something more extreme. It advocated a guerre de course, which Mahan was to condemn as the weaker form of naval war. A war fought without restrictions against merchant vessels, and eschewing fleet action, was the maritime equivalent of a guerrilla campaign or a levée en masse. But in this case the concept rested on more than an idea; it depended also on new technology—on the torpedo, and in due course on the submarine.

After 1905 and Tsushima, the ideas of the jeune école fell into decline. Moreover, the ship of the line restated its ability to counter the torpedo boat or destroyer. The big guns of the Dreadnought, ranging 20,000 yards, and her speed of 24 knots, enabled her to stay beyond torpedo range, and to outmanœuvre her smaller opponents. The French 1912 naval law set a target of constructing 2.5 capital ships each year until 1920.

The elevation of the attack on merchant shipping to the prime role for navies was shelved amidst cold war notions of conventional naval equivalence. Such policies played into British hands. Provided the Royal Navy maintained its own technical lead and its rate of building, British maritime hegemony was assured. Britain's vulnerability at sea lay along her trade routes and in her possession of the world's largest single merchant marine. If her opponents built only battle fleets, they disqualified themselves from exploiting their one possible advantage in a war at sea.

The Germans before 1914 never even seriously entertained alternatives to the battleship. The Kaiser briefly argued the case for a fleet of ocean-going cruisers, but Tirpitz, the secretary of state for the naval armaments office, concentrated on matching British warship construction with capital ships designed specifically for battle in the North Sea. On the outbreak of war, Germany had too few submarines for their effects to be of any consequence. Moreover, like the British, the Germans considered the submarine in the context of fleet action and not in that of economic warfare. In reality, after some early and well-publicized successes against British warships which were being negligent in adopting precautionary routines, the U-boats posed only minor threats to warships. However, when they adopted the philosophy of the jeune école—when, in other words, they were directed against weaker targets and specifically against merchant vessels—they achieved dramatic successes. It was ironic indeed that in February 1917, Germany, the major land power of the continent, embraced a maritime method of achieving all-out victory—unrestricted U-boat warfare. She did so belatedly—and not just because of diplomatic fears of repercussions in the United States. Naval attitudes had produced an over-investment in the wrong types of vessels. As a result, Germany did not have sufficient submarines for a major U-boat campaign until 1917. Moreover, handing responsibility down the chain of command to junior submarine captains carried profound implications for a conventional naval hierarchy based on a large surface fleet. Thus, to enable the exploitation of new technology, changed concepts were required. Similar points could be made about the Allied response. In this struggle, the Dreadnoughts of the British Grand Fleet proved redundant. The ultimate response to the U-boat rested not on any technical innovation but on organizational change—the adoption of the convoy.

The Origins of Change

Therefore, even in the First World War itself, what mattered as much as new technology were new ideas to enable the effective exploitation of the technology already available. Of course new weapons systems were evolved between 1914 and 1918, especially in land warfare. The tank was developed ab initio under the pressure of the trenches; the fixed-wing aircraft, although its military applications had been glimpsed before 1914, moved from infancy to maturity within the war itself. But the dominant arm of the war was artillery, and the next most important the machine-gun. Neither was novel in 1914. What changed was their application, and above all the methods by which they achieved effective co-ordination with the infantry. Demand-led technical improvements played their part in the evolution of this relationship: sound-ranging, flashspotting, and aerial reconnaissance all enabled guns to fire from the map with greater accuracy and without preliminary registration. But even here the idea—the notion of what was militarily desirable in order to improve battlefield performance—proved a more fertile agent of change than undirected scientific progress.

The great tactical conundrum of the First World War was the reintegration of fire and movement. The tendency to rain down a preliminary bombardment, for the artillery then to stop, and for the infantry to advance across no man's land, split fire and movement into

two successive phases. In March 1918 the Germans showed that it was possible to reintegrate the two, to use fire to enable movement, and to move the better to deliver fire. To achieve this they kept the artillery bombardment short, they had the infantry moving close to its protective curtain, and they gave the infantry its own fire-power in the shape of mortars, light machine-guns, and flame-throwers. But, although the Germans seemed to have solved the tactical difficulties of trench war, the advance had no strategic outcome. In order to enable the momentum of the attack to be sustained, command was delegated forward—direction came from the front. But the effect was to carry the attack where the tactical opportunities arose rather than where the strategic advantage lay.

The Rise of the Mass Army

What the ultimate failure of the 1918 offensives demonstrated was that the cause of the stalemate on the western front was not primarily the consequence of technological dominance, of a fireswept no man's land. Again and again, the battles of the First World War showed that fire-power could be as powerful an aid to the offensive as to the defensive. The problem was one of command, and of the difficulty of effective leadership in a mass army.

The determining characteristic of land warfare in the period from 1789 to 1918 was the growth in the size of armies without a comparable increment in the means of directing those armies. When Revolutionary France set about the re-creation of the French army in 1790 and 1791 her instincts were not particularly radical; her tendency was to call for volunteers. However, the failure of sufficient men to come forward and the transformation in the power of the state through the Revolution made conscription both a practical necessity and a legitimate tool. In the 1790s the French revolutionary armies were not individually particularly big, but they could fight more battles successively than their opponents. By the closing stages of the Napoleonic war, France fielded individually big armies. In 1812 Napoleon led 614,000 men into Russia. The problem of gigantism was coordination. How could one man deploy and direct armies whose component corps were a day's march or more from each other?

The development of doctrine and of general staffs was a partial solution to this problem. But they created the means to manage the mass army, not the methods by which to lead it. Both Wellington and Napoleon, despite the growth in the size of armies, were visible on the battlefield itself. For supreme command in the First World War forward presence was incompatible with rational direction. But the heroic expectations of the leader persisted. They were met by junior officers. So management and command became divorced, without anybody fully appreciating what was happening. Tactics in the First World War were developed at lower unit levels, and became separated from the operational thinking of general headquarters. The two could only be harmonized when operational direction shaped itself according to tactical practicalities. But to do this was to risk abdicating operational direction itself.

The problem became one of ideas and attitudes. Senior commanders needed to recognize that practical leadership had to be exercised at lower levels, that aspects of the battle were now beyond their control. But the fact that tactics did assume their own momentum was at least in part the consequence of technological change. And thus the domination of ideas in effecting military change was being undermined. Moreover, the solution to the problem of operational command and the reintegration of the vertical lines of communication through the command hierarchy were both dependent on technological innovation. With the advent of the man-portable radio on the battlefield the divide

between tactics and operations would be bridged, and the harmonization of ideas and technology rendered more realizable.

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