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A Military Revolution?

Prussian Military Reforms before the Wars of German Unification

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Introduction: The military revolution

When Prussia won the wars against Austria in 1866 and France in 1870–71, she surprised the world. An army that had not fought a major war since Waterloo (and had been a minor ally even then), an army that was much more renowned for its pedantic drill and its obsession with drums and bugles than for its fighting prowess had overthrown the two leading military powers of continental Europe.¹ A hectic search for explanations began to preoccupy the military leadership not only of the defeated nations, but of all the powers. Prussia's army became the envy of the world; it seemed to hold the master key for victory. Soon the other armed forces began to imitate every detail of its army structure that seemed characteristically Prussian in nature, hoping to acquire that master key.² Universal conscription along Prussian lines was introduced in Austria, France, Italy, Russia and many other countries – among them Norway in 1876. General staffs were reorganized in order to conform to the Prussian blueprint, the bureaucratic organization that had so brilliantly led King William's armies to victory under Helmuth von Moltke. Parliaments approved of the enormous expenditure necessary to provide hundreds of thousands of infantrymen with rapid-firing breechloaders like the Prussian needle-gun or the even more dreadful chassepot the French army had introduced after Prussia's victory in 1866.³ National military traditions counted for nothing against the desire to make armies look as Prussian as possible. In 1881, the United States even equipped its soldiers with the *Pickelhaube* (the spiked helmet).⁴

For decades Europe had been used to disregard Prussia's army as a second-rate force commanded by Frederician septuagenarians and hampered by financial restraints. It sure did look beautiful on the parade-ground and if other armies had doubts about details of formal drill or uniform design, they confidently turned to Prussia for advice.⁵ As a fighting force, however, the Army of Frederick William III and IV

was held in low esteem. When it went to war in June 1866 one of the finest military writers of the time, Friedrich Engels, predicted a crushing defeat at the hands of Austria's whitecoats. He dismissed the Prussian army's organization, its tactics and its leadership as clearly inferior. Engels also ridiculed Prussia's war plan as a guarantee to fail in any officers exam.⁶ That war plan, of course, was devised by Helmuth von Moltke, and was soon after described as the work of a genius.

When Prussia's bluecoats crushed the largest and finest army the Habsburg empire had ever fielded within six weeks, Engels had a difficult time explaining why they had fought so well. So had others who had predicted defeat. Either everyone who had looked down upon Prussia's peacetime army since 1815 had been awfully wrong all the time—or some change had gone unnoticed, most likely shortly before the war. Then something came to mind: Had not the Prussian minister of war, Albrecht von Roon, been fighting a liberal parliament over army reform for the last six years? Had not the conservative Junker Otto von Bismarck been brought to the helm in order to squeeze the funds for that reform out of the representatives? Did not King William deem that very measure so terribly important that he had rather accepted the deadlock of the political system (which history now knows as the "constitutional conflict") than give way to the opposition's critics?⁷ Could not the one have something to do with the other, army reform in 1860 and victory in 1866? It was possible, nay: it was obvious. The explanation was found.

This explanation suited also Prussia's political and military leadership. The liberal opposition had always doubted that the reorganization of the army was worth the nine million Thaler increase in annual military spending Roon had devised. However, this reorganized army had defeated Prussia's old German rival with astonishing success. How easy now to bypass the opposition's stronghold! Not only had the liberals tried to withhold from Prussia's victorious army the money it had needed so dearly. The triumph of the army also seemed to prove

without the slightest doubt that the reorganization had been a necessity. History itself had defeated the opposition. The stubborn king's refusal to compromise was re-styled as admirable steadfastness that had saved the country from disaster.⁸ The new twist in military politics met with considerable success. Shortly after the war the constitutional conflict was settled and army expenditure of the last six years belatedly approved by parliament.

The army reform of 1860 went down in history as a secular break, as a "glorious restoration of the army."⁹ For the Wilhelminians that was enough of an explanation. 20th century historiography, however, did not accept so easily that 30-odd additional regiments and some shifting of age cohorts (for this is what the "reorganization" was all about) had made William's army next to invincible. There had to be something more, and it was found. Since the Second Empire passed away, military historians have increasingly assumed that a whole cluster of reform measures was implemented in Prussia in the few years before the war of 1866, of which the reorganization was only the core element. The rise of Moltke's general staff, the introduction of the needle-gun, the beginning of the military use of railways and telegraphs, reforms in military education, in strategy and tactics and many a thing more were newly interpreted as constituent parts of a great push in military innovation.¹⁰ At least one writer insists that what happened in Prussia between 1858 and 1866 was nothing less than a full-scale military revolution.¹¹

This article seeks to explore the validity of this concept of a military revolution. I investigate the specific speed of military innovation in Prussia between the great army reforms of 1807 to 1813 and the immediate aftermath of the Franco-German War, that is, the 1870s. First I turn to the organizational aspects of the military system, i.e. universal conscription and army organization. Second I look at the general staff, third, the use the army made of technical innovations such as the railway and the needle gun (to which I turn in part IV), and, fifth, at tactical reforms. After a short conclusion, I will offer

some hypotheses on the recurrent myths about Prussia's "military revolution."

1. Universal conscription and the conflict over the *Landwehr*

The army that Frederick William III had inherited from his great uncle, Frederick II, was composed half of foreign mercenaries and half of conscripted East Elbian peasants. In 1806/1807, it crumbled under the onslaughts of Napoleon's *grande armée*. 51 of the 60 regiments of infantry, most of which had looked back on a continuous existence of over a century, dissolved or went into captivity, never again to be rebuilt. The king had to accept a humiliating peace treaty and was turned into a French satellite. Burdened by astronomical contributions to France, its territory reduced by half, Prussia had to start from scratch. The army reformers, Gerhard von Scharnhorst and August Graf Neidhart von Gneisenau, managed not only to rebuild a small part of the old army on a national basis, that is: minus the foreigners. Against the opposition of many conservative politicians and with the lukewarm support of the king, they also established the principle that every citizen was liable for compulsory military service. Artisans, merchants, teachers, university students, and town-dwellers in general, who had hitherto been exempted from military service, now were called to the colours where they merged with the East Elbian serfs they used to despise. A national army of universal conscription was born. In the wars of 1813-14, six per cent of Prussia's population fought for liberation, a remarkably high proportion even by 19th century standards.¹²

Yet the king's advisors thought they had to offer the bourgeois something for his compliance to serve. While the dust settled on the battlefields of Northern France in 1814, a new service law was passed that upheld the principle of universal conscription. But it contained a loophole for the wealthy citizen's sons. Not only had they to serve only

one year instead of the usual three and were hence called *Einjährig-Freiwillige* ("one-year volunteers"). Moreover, the king placed a full half of the field army, the bulk of the older age cohorts, under bourgeois officers. Under the service law of 1814, the ordinary recruit spent three years with the colours and two more with the reserve. For the rest of his 19-year service period, he belonged to the *Landwehr* (literally "country defence", usually translated as "militia"). The *Landwehr* was to be officered primarily by the *Einjährig-Freiwilligen*, but was placed under inspectors who were regular officers. It was concentrated for four weeks a year in peacetime. In war, field brigades were formed from a regular and a *Landwehr* regiment each.¹³

The system thus established was based on the idea of "separate, but equal." In fact, the *Landwehr* was more a war-time reserve of the standing army than a true militia. On paper, it was constructed as a parallel universe for the bourgeois officer, where he might enjoy nearly the same privileges as his aristocratic colleague in the standing army. The rationale was to draw the citizens closer to the army of universal conscription, yet not so close that they might feel unduly constricted. Meanwhile the regular army was supposed to be kept an intact pillar of the throne as in Frederick's times, untampered by liberal thoughts of social reform.

The scheme did not work out the way it was intended. The regular officers kept looking down upon their *Landwehr* colleagues as inferiors both in terms of their social background and their lack of proper military training. The one-year volunteers, in turn, were unable to acquire much actual social emancipation through their service as *Landwehr* officers. Soon the supply of officer candidates could no longer keep up with the demand. Regulars had to be seconded to the *Landwehr* in order to fill vacancies, in turn dangerously weakening the line itself.

For most officers of the standing army the *Landwehr* was a nuisance. It lacked everything necessary for proper military training, most of all professional officers and regular soldiers who could act as a

skeleton for the masses of half-civilian reservists. Yet Prussia could not do without the *Landwehr*. For forty years after Waterloo, the Hohenzollern state was overburdened by the enormous debts accumulated during the French occupation and the Wars of Liberation. Replacing 176,000 *Landwehr* men with regulars would have meant more than doubling the line, necessitating an expenditure on officers, barracks and equipment Prussia could not even dream of. Abolishing the *Landwehr* and making do with the 140,000 troops of the line would have been synonymous to abandoning Prussia's great power status. Thus the *Landwehr* was indispensable for the time being.

Most officers of the line, however, were not convinced of the need to uphold the character of the *Landwehr* as a parallel universe. Their credo was breaking its autonomous structure and bringing it under closer control of the standing army already in peacetime. Still, money was the central problem. On the one hand, the *Landwehr* was continually weakened due to financial restraints. In the permanent competition for funds the line was always the winner, and the *Landwehr* deteriorated due to ever shrinking training periods. The exercises for the so-called second levy, the oldest age-group, were abolished altogether. On the other hand, the desolate state of Prussia's finances was the strongest protection for the *Landwehr*, since any drastic reform of the system would have required a considerable increase in military spending.

Accordingly, it took over 40 years to bring the *Landwehr* under full control of the line. In 1819, its peacetime structure was beheaded when it lost its autonomous inspectors in favour of brigade commanders who were placed under the command of the line divisions. During the 1830s, the line's grip on the *Landwehr* was fastened when more regular officers were seconded to the *Landwehr*, while *Landwehr* officers were called to the colours of the line regiments for exercises. The *Landwehr* brigades were abolished in 1852. Now a line and a *Landwehr* regiment formed a brigade already in peacetime. Simultaneously, the last *Landwehr* company commanders were replaced by

regulars. The *Landwehr* cavalry was completely integrated into the line. When the first plans for the so-called reform of 1859/60 were drafted, the parallel universe had long since disappeared. The *Landwehr* in all but its name had become the wartime reserve of the standing army.¹⁴

Yet numerically nothing had changed. If Prussia's army should ever take the field, half of the infantry would still be composed of *Landwehr* men, veterans who had lived a civilian life for anything between two and nine years. But in the late 1850s this was no longer a fact to be accepted with bad grace. After three decades, Prussia had finally been able to throw off the strangling grip of its national debts. While the successful customs union with most of northern Germany yielded a growing income from customs duties, the beginning of the industrial take-off filled the treasury with ever increasing indirect taxes. Finally, Prussia could do without the *Landwehr*. During 1857 and 1858, the war ministry worked out the plans. All *Landwehr* infantry regiments were to be replaced by new regiments of the line. *Landwehr* cavalry was to be completely disbanded. Annual recruiting was to rise from 40,000 to 63,000. In future, Prussia's field army would be composed entirely of regulars. The *Landwehr* would be used for garrison duty only.¹⁵

The liberals bitterly resented that prospect. Their leaders confessed to be "attached to the *Landwehr* with religious fanaticism"¹⁶ and that fanaticism fuelled the constitutional conflict.¹⁷ They need not have worried. Modern warfare had already outrun Prussia's desire to carefully select whom to put in the field in case of war. The mid-19th century was the dawn of the age of mass armies, and war departments had to make count every man who could fire a rifle. King William's armies numbered 660,000 in 1866 and 1.2 Million in 1870, a far cry from the 300,000 the combined line and *Landwehr* had counted in the 1850s.¹⁸ But reserve and *Landwehr* fought side by side with the regulars in both wars. The so-called reform had hardly changed the character and composition of the army; instead it had nearly doubled its

size. Little Prussia now could play in the champion's league among the great powers. That was the historic significance of 1860.

In the long run, however, Prussia had opened a Pandora's box. In order to field armies approximately the size as those of her neighbours, she had to recruit a full 40 per cent of all men of military age when the other powers were content with about 25 per cent. What should keep them from doing the same in order to outnumber Prussia-Germany again? Nothing did, and thus the age of arms races had begun.¹⁹

2. The emergence of a general staff

When the Prussian army set off for Bohemia in June 1866, King William issued an order that was to make history. It decreed that "from now on my orders concerning the operational movements of the concentrated army and its individual parts shall be communicated to the commands through the chief of the general staff of the army."²⁰ For the first time, a bureaucratic organization headed by a comparatively low-ranking officer²¹ was officially authorized to issue binding orders to army and corps commanders in the king's stead. As a practical fact this was unique. Yet, as a concept, it was not entirely new.

The shortest description of a modern general staff is to liken it to the brains and nerves of an army. The raw material of a general staff's work is information, the machinery is bureaucratic procedures, and the purpose is command and control.²² To grow from a bunch of inconspicuous traditions into the blueprint for a fine-tuned machinery, however, the concept of the modern general staff needed time. In Prussia, it did have that time. The general staff that led King William's armies to victory in 1866 and 1870/71 had perfected its skills and its procedures over more than 60 years.

It is often assumed that Napoleon invented the general staff as such, but as a bureaucratic institution it was first established in Prussia around 1800. After the defeat of 1806/07, Scharnhorst transformed the embryonic organization into the first general staff along modern lines.²³

Every component later found to be characteristic of the concept was already there when the general staff was first put to the test in 1813. Scharnhorst's staff consisted of a central organization, the Great General Staff, and the so-called Troop General Staff with the corps and divisions. So did Moltke's. Scharnhorst's staff was responsible for higher officer's training and for the Berlin War School, as Moltke's was for the War Academy which sprang from the latter. General staff officers in the Wars of Liberation were subordinate to their chief as well as to their respective commanders with the troops. That Sonderdienstweg (literally "special chain of command", probably better translated as "general staff channels") was also to assure Moltke's grip on the armies and corps in 1866 and 1870/71.

The list could be continued almost endlessly. Many of the less conspicuous occupations and working techniques of the general staff were introduced during the first two decades of the 19th century. The general staff produced military maps, it wrote military history and published military journals. It trained officers through general staff rides and *Kriegsspiel* (war game). It gathered information on foreign countries and armies. It prepared contingency war plans. It also cultivated a unique leadership technique called *Führung durch Direktiven* (directive command) or more colloquially *Auftragstaktik*. Until the mid-century, four successive chiefs of staff by the names of Grolman, Müffling, Krauseneck, and Reyher worked on improving and refining the general staff's skills and methods within all those fields of action. Their achievement was not only to have produced a generation of staff officers who knew their profession inside out, among them Helmuth von Moltke, who joined the staff in 1832. Scharnhorst's disciples had also imbued an army which had hitherto been dominated by die-hard warriors of Marshal Blücher's kind with an understanding and respect for the bureaucratic planning and rational decision-making processes represented in the general staff.²⁴

Two things were new in the mid-century. Well into the 1850s, the general staff had not been concerned with mobilizing, concentrating

and deploying the army. These tasks had been performed by the war department. With the arrival of the railway, however, the time lag between mobilization order and completion of deployment shrank from 2–3 months to 2–3 weeks. Armies now could gain a crucial advantage over the enemy by being the first to be ready. Consequently, mobilization and deployment became more and more inseparable from the war plan. They passed from the sphere of army administration to the sphere of operational planning. Moreover, since the general staff was traditionally responsible for the evaluation of technical innovations, railways and telegraphs were its natural competence. It was in the logic of things that the general staff gradually assumed control over mobilization and deployment in the 1850s.²⁵

And finally the historic order of 2 June 1866. On the one hand, it was revolutionary. On the other, it was overdue. Since the Wars of Liberation, general staff officers with armies, corps, and divisions had been authorized, nay obliged, to issue orders in the name of their respective commanders. Every single one of them was expected to be the eyes and ears, the mouth and the right hand of the man in charge in order to relieve him from everything save the most fundamental decisions.²⁶ Yet the position of their chief was more humble. For one thing, he was not the only military advisor to the king; he shared that burden with the minister of war and the chief of the military cabinet. For another, his superior was not just some general, but the supreme commander-in-chief, the royal warlord bound to his army by mystic pre-modern ties, a mutual relationship so perfectly embodied in the king's title *Oberster Kriegsherr* that the latter defies translation.²⁷ When King William entrusted Moltke with the same authority that his subordinates had held at the corps and division levels for decades, he accepted the fact that in a modern war even Prussia's soldier king could not do without professional support. For an officer who knew war only from behind a desk, the way was now free to rise to the "greatest captain of his age."²⁸

For most of the 19th century, Prussia's general staff was without

peer. Before the Wars of German Unification, no other country had anything resembling the central bureaucratic institution Scharnhorst had created. The other powers either relied on staff corps which in case of war seconded aids to the commanders in the field but lacked any permanent central organization (France),²⁹ or buried their main staffs beneath the bureaucratic jungles of Byzantine war departments (Austria, Russia),³⁰ or had no staff at all (Great Britain, USA).³¹ As the wars of 1866 and 1870/71 were to show, a modern general staff was no guarantee for prudent war plans and smooth operations, yet it facilitated them a lot. Prussia's army had an in-built advantage and it was to make the most of it.

3. Railways and the military

When the plans for the Potsdam to Berlin railway were drafted in the 1830s, Frederick William IV moaned that he could see no real advantage in arriving at his capital an hour earlier. His general staff, however, could. On an autumn day in 1839, 8,000 soldiers travelled from the Potsdam manoeuvre grounds to the Berlin garrisons on this very railway. And that was only the beginning. Thirty years later, in August 1870, the Northern German Federation deployed an army 1.2 million strong at the Rhine within eleven days. That achievement was possible only through systematic use of the available railways.

Admittedly, the general staff did not welcome the first railways with genuine enthusiasm. Considering the poor engines and tiny coaches of the 1830s, it was all too obvious that the railway would not be able to carry significant numbers of troops over considerable distances in the near future. So the general staff pushed the expansion of the all-weather-road network while carefully monitoring the potential of the new means of transportation. By the late 1840s, however, it was clear that the railway was no longer in its infancy. Troop transports became a common sight during the revolution of 1848/49 and were also employed for the mobilization of 1850. Yet, military use of the railway

was still a gigantic improvisation which consisted of little more than putting troops on regular trains running in accordance with the civilian schedule. It was a bare impossibility to move all of Prussia's nine army corps at one time this way and consequently Moltke's predecessor as chief of staff, Carl von Reyher, still regarded the railway as a mere substitute for foot marches – admittedly welcome, but not to be relied upon.

This judgement, however, kept neither the war department nor the general staff from working out the procedures that the army would need if it ever was to use the railway seriously. Regulations for military transports were issued. The war department kept statistics on the capacities of existing railways which were updated annually. It was decreed that all freight cars had to be fitted with the installations necessary for the transport of troops and horses. Army officers were trained in railway matters and troop transports became requisite elements of staff rides and corps manoeuvres. In co-operation with the department of commerce, which was responsible for the railways, the employment of trains for mobilization transports was planned in advance. Precautions were taken for the establishment of joint commissions of the two departments that were to administer the individual railway lines in war. By the 1850s, it became even a standing procedure that the chief of the general staff was consulted before any new line was approved of. This was to ensure that it fitted the needs of the army.³² Actually, Reyher seldom objected and Moltke almost never. He thought that any new railway would automatically serve the needs of the army. Railway lines were inevitably built along the main axes of existing traffic, which by virtue of topographical facts were also the most likely routes of operations.³³

The days were already dawning when the railway section would form the nerve centre of the Great General Staff and the meticulous drawing up of tight-knit transport schedules would appear as the very essence of staff work. But that was still only partially obvious when the army's railway complex was first put to the test in the Wars of Unification.

To be sure, its achievements were way ahead of those of its adversaries. Neither Austria nor France could even dream of deploying mass armies at their borders within days. France took pride in her closely-knit railway network, which was among the finest in the world, far superior to Prussia's,³⁴ but had failed to take any precautions for its military use. The result was a veritable disaster during the mobilization of 1870.³⁵ Austria's preparations, in turn, had been exemplary, but of little use on a railway network which was so sparse that it featured only one single-track line into Bohemia by 1866.³⁶

Prussia had the right mix of careful preparation and a decent railway network. In the wars of 1866 and 1870, she was able to deploy her army with considerable speed. A careful observer, however, would have noticed that the corps which set out for Paris on 3 August 1870 consisted entirely of combat troops. For the sake of speed, all supply elements had been left behind to catch up with the fighting force as best as they could during the advance. That hope was of course illusory, as was the idea that the army would be able to make use of the French railway network for their supply. The task was beyond reach in 1870 as it would be in 1914. Once deployed, the army had to abandon the railway for good. Soldiers were to march and to live off the land as they had done from time immemorial and would continue to do so until the arrival of the combustion engine.³⁷

4. Dreyse's gift: the needle gun

When the Prussian army first took an interest in Johann Dreyse's famous needle gun in the early 1830s, the reason was neither that it was rifled nor that it was breechloading. Instead, Frederick William III and his generals were most impressed with the percussion lock, which made the gun much more reliable than its flintlock predecessors, especially in rainy weather. When the king ordered the first Dreyse guns for his army in 1839, he chose an earlier model, a muzzleloading smoothbore. In the following year, however, the war department could

convince the new king, Frederick William IV, of the extraordinary qualities the rifled breechloader had shown in the trials. Not only did rifling triple the effective range of the weapon. Due to its breechloading mechanism, it could also deliver five to seven shots a minute compared with the smoothbore's two. On the offensive, Dreyse's breechloader would dramatically increase the firepower of the infantry. On the defensive, however, due to the fact that it could discharge ten times as much lead on the attacker as the musket, it would be almost invincible.

Yet the young king who ordered 60,000 breechloaders to be purchased over the next six years in 1840 was an ailing old man when finally all of his infantry was carrying needle guns in 1859. It took Prussia's army two decades to get rid of the old musket. A whole number of reasons were responsible for that delay. First of all, Dreyse's small factory was not able to deliver the gun in large numbers. The obvious solution would have been to expand the factory, if necessary with government aid, or to employ additional production sites. But Frederick William regarded the needle gun as a secret shock weapon and consequently confined its production to the tiny Thuringian factory that was both inconspicuous and easy to control. For the same reason, the initial 60,000 guns were stored in the Berlin arsenal. Only in 1848, they were issued to the troops in considerable numbers, and only in the 1850s, the production was increased by opening up additional factories.

Another delaying factor was that the Dreyse gun was far from perfect. Many smaller teething troubles could be overcome over the years, but some major flaws remained. The fragile percussion needle was easily damaged which rendered the gun temporarily useless. The breechblock was leaking gas, which was not only dangerous for the shooter but also reduced the muzzle velocity. That in turn resulted in decreased range and in a high trajectory that complicated aiming. A veteran from the Franco-German war later reported that in one case in order to hit enemy infantry at the edge of a forest 600 meters away his

platoon was ordered to point their guns three meters over the tree-tops.³⁸

Neither problem occurred with the modern muzzle loading rifles which were introduced in the French army at the same time, most notably the famous Minié gun. Due to their high muzzle velocity and resulting flat trajectory their effective range was over 700 meters. Their simple, sturdy construction made them a good deal more reliable than the comparatively complex needle gun. And best of all: while the Dreyse gun was expensive, the Minié was not. The old musket could even be converted to the Minié system and rifled without much trouble. In view of Prussia's financial restraints, the comparatively low cost of the Minié was one of the main reasons for the delayed universal introduction of the needle gun. As late as the Crimean War, Frederick William IV and his generals seriously considered making the Minié the standard infantry weapon instead of the needle gun.³⁹

Paradoxically, the most important reason for the reluctant adoption of Dreyse's breechloader was the ease with which it could be discharged up to seven times a minute. Later a weapon's effectiveness would be measured above all by the amount of lead that could be poured on the enemy during a given time. Yet the early 19th century had different standards. A not too small fraction of Frederick William's officer corps regarded a rapid-firing gun as dangerous nonsense. For one thing, it was feared that the fire frequency of the needle gun would encourage the waste of ammunition. In fact, with the needle gun, 60 rounds, the regular personal allowance of each rifleman, could be discharged within less than 15 minutes, thus rendering – so the dreaded vision – whole battalions useless or even inducing them to flee in panic.

Furthermore, the early 19th century witnessed the final clash of two radically different tactical concepts, namely firepower versus shock. Since the revolutionary and Napoleonic armies had begun to win battles by hurling densely packed masses of infantry at the enemy's lines without much firing, the bayonet charge was widely regarded not only

as heroic, but also as the only decisive solution of any engagement. Firepower, on the other hand, was looked upon as a non-decisive, protracted way of fighting, worthless as anything more than a mere prelude to the final push. And that prelude was the task of light troops, skirmishers and sharpshooters, not of regular infantry.⁴⁰

From that point of view, arming musketeers, the heavy infantry of the line, with an expensive breechloading rifle was not only unnecessary but even dangerous. If the soldier would come to rely on the fire of his gun, he might be reluctant to attack with cold steel and might thus endanger the concept of tactical shock. Sharpshooters, on the other hand, had even less need for a rapid-firing gun. They needed a precision weapon with superior range, and the needle gun was neither. That left the skirmishers, who were neither required to aim carefully, nor to charge with the bayonet (or so at least the theory ran). Every Prussian infantry regiment had one battalion of so-called Füsiliere, which were considered as light infantry. They were the first to receive needle guns in 1848.

Only when the street fighting of the revolution and the war in Southwest Germany in 1849 publicly revealed the brutal power of the rapid fire the needle gun could deliver, it was made official policy to provide the whole infantry with it. The production was increased during the 1850s, yet it took another decade until finally the last Minié gun was sorted out. By that time, most other armies had come to adopt rifles, yet only Prussia had breechloaders. The war of 1866 was the final test. Already after the first battles at the Bohemian border it was all too obvious that Prussia's war department had backed the right horse when ordering the Dreyse gun. Austria's brave whitecoats fell in heaps under its rapid fire.

At the same time, Prussia had also forfeited most of the advantage an earlier broad-scale adoption of Dreyse's then revolutionary design would have provided. In 1850, a Prussian army carrying needle guns would have made Frederick William IV master of Europe. In 1866, however, it was no longer a secret how to construct an effective

breechloader. Most armies had tested one model or another during the preceding years. Now they knew what to do, and the rest was only a question of time and money. The needle gun had given Prussia a considerable advantage in just one war. When the bluecoats took the field again four years later, their 20 year old rifle was no longer a match for the modern chassepot the French army had meanwhile ordered.⁴¹ Now they had to show that even a superior rifle did not automatically win a war.⁴²

5. Infantry tactics unchanged

Until well into the 19th century, infantry tactics were uniformly based on very dense formations. In Frederick's times the rationale had been to compensate for the notorious inaccuracy of the flintlock musket by delivering a concentrated hail of bullets. Since Napoleon, the idea was to provide the bayonet charge with the irresistible power of a densely packed crowd of bodies. In the middle of the 19th century, however, things began to change. The rifle raised the distance an attacker had to cross to come to grips with the defender from a few dozen to several hundred meters. Breechloaders tripled the amount of lead poured on the enemy during a given time. The higher muzzle velocity of the new rifles meant that its bullets caused more severe injuries than before. Furthermore, the artillery likewise increased its range by introducing rifles and its firepower in general with new grenades, shrapnel, and fuses. In other words: The chances any man standing upright had of surviving in the close combat zone of a battlefield were sharply dropping.⁴³

The consequences were obvious. Away with the shoulder-to-shoulder formations which were such gorgeous targets. The troops had to disperse, they had to take cover, maybe even entrench. That almost completely ruled out the bayonet charge so favoured by the contemporaries; instead, firepower had to gain in importance. Rapid-firing rifles required nothing less than a revolution in tactics.

After 1807, tactical reforms were top priority in the Prussian army. The Frederician firing line had been defeated by the Napoleonic combination of skirmisher action and bayonet charge. Accordingly, the army reformers made the densely packed battalion column the new standard attack formation of the infantry and added one *Füsilier* (skirmisher) battalion to every regiment. Furthermore, the third rank of each musketeer (regular) battalion was also trained as skirmishers. They could be employed to prepare the bayonet charge with softening fire, although that was optional.⁴⁴

These tactics were appropriate for the age of the flintlock musket and enabled Prussia to meet the French army on equal terms in 1813–14, unlike in 1806/07. In the age of rifles, however, using close-order formations like the battalion column was synonymous with inviting disaster. Yet for the rest of the 19th century, the Prussian army never really managed to get rid of the legacy of 1813. The introduction of skirmishers was of course a step in the right direction. But instead of making light infantry tactics obligatory for the whole infantry, the *Füsiliere* were long regarded as special troops at best and as an anomaly at worst.

Sometimes it is claimed that Prussia's infantry abandoned close order tactics with the infantry regulations of 1847. That is a gross misunderstanding. To be sure, the regulations of 1847 allowed the formation of company instead of battalion columns, and that chapter of the regulations was titled *zerstreutes Gefecht*, meaning open order.⁴⁵ Yet one should be careful not to let oneself be fooled by terms. A Prussian company on war footing was 250 heads strong, rather the size of a small battalion for most other armies.⁴⁶ In other words, it was a most clumsy thing and still a genuine mass target. The use of skirmishers remained optional.⁴⁷ Nobody even dared to think of field fortifications.

Only in the 1850s, the first regulations for something resembling open order were passed.⁴⁸ At the same time it became obvious to many officers that not all formations used on the parade ground would be

also useful in battle. It was difficult to imagine that a battalion in the field would ever employ the *Achsschwenkung*, a rotation of an extended line around its centre, like the vanes of a windmill,⁴⁹ or other meticulously drafted formations. Consequently, tactics by the book and “realistic” tactics began to drift apart.⁵⁰ In the Franco–German War, the elaborate succession of individual skirmishers, skirmisher groups, skirmisher platoons, and company columns in reserve (in order from front to rear) began to melt away under the realities of modern combat. Increasingly, the close order formations in the rear, which were originally kept in reserve to execute the final push with the bayonet, were merely feeding the firing line with more and more skirmishers.⁵¹

Many battles of the wars of 1866 and 1870/71, however, were also prime examples of tactics that had remained unchanged since 1813. At Gravelotte–St. Privat for instance, on 18 August 1870, the Prussian Guard charged uphill over open ground against fortified positions in perfect close order formations as if on parade. It lost 8,000 men out of 28,000, or 29 per cent of its strength.⁵² The fight was stuff for legends and it contributed to winning the battle. But like many other similar attacks during both wars, it was primarily evidence for the fact that Prussia’s army had still one foot in the Napoleonic Wars.⁵³

Yet so had other armies. The reasons why until well into the 1880s no great army could adapt its tactics to the age of rifles were the same within all military establishments of the time. It was commonplace that decisiveness was assured by the concentration of force, so to the minds of contemporaries dispersion meant sacrificing one’s ability to strike a decisive blow. Dispersion also signified loss of control, yet control was necessary to upholding discipline and co–coordinated action. Not least, dispersion required doing without the neatly arranged lines and columns of infantry, masses of cavalry, and rows of guns which altogether so perfectly embodied the might and glory of Europe’s great powers. In other words: dispersion meant war without show. And that was bitter for the proud aristocratic officers of the 19th century. They all would have to learn their lesson the hard way in autumn 1914.

Conclusion: The military revolution reconsidered

Before I sum up, I must briefly mention some developments in other fields of military innovation. Prussia employed the telegraph in the field, but as late as the war of 1870 it did not work very well and certainly not better than in most other armies.⁵⁴ The introduction of rifled cannon was even slower than that of rifled small arms, and this in spite of the fact that Krupp, the leading manufacturer of rifled steel barrels, was a Prussian citizen. The Prussian artillery went to war in 1866 with badly inferior equipment. To be sure, they learned their lesson and managed to catch up with the other powers until 1870.⁵⁵ Cavalry tactics were as anachronistic in the Prussian army as in any other. Until 1914 the cavalry relied on the shock effect of massed charges, which was already as hopeless against breechloading rifles as it would later be against machine guns.⁵⁶

After the disaster of 1806/07, the promotion of officers on the bases of knowledge and performance rather than of aristocratic birth was established. The educational requirements for officer candidates were raised every few years. Since 1844, the entrance qualification for the Prima, the last two years of the Gymnasium, was necessary to be allowed to the first exams. For the admittance to the final exams, two years at officer school or the entrance qualification for the university were required. There remained loopholes, however. Cadets were allowed to take the exams without formal qualification. Royal favour could also earn commissions. Not least, further promotion of officers was not subject to proof of any achievements. On average, however, Prussian officers were probably better educated than their foreign colleagues. Whether that made them better tacticians or leaders is hard to decide.⁵⁷

To sum up, there was no military revolution in Prussia before the Wars of Unification. The so–called reform of 1859/60 was primarily an attempt at closing the gap between the Prussian and the larger continental armies through an increase in annual recruiting. With regard to

the *Landwehr*, the reform was only the final step of a transformation process that had begun in 1819. Nothing could have been less revolutionary. The general staff of 1866 and 1870/71 looked back upon two generations of steady and professional improvement. Moltke was much less the shaper than a product of the system. Railways were monitored and employed in accordance with their increasing capabilities for military use. The professionalization of the officer corps had been a continuous process that began in 1807. In the fields of weaponry and tactics, however, the Prussian army was a slow learner. It failed to make early use of the gift the Dreyse gun could have been and turned to Krupp cannon much later than necessary. Its tactics were never really adapted to the age of rifles. All in all, any improvement that occurred between the Wars of Liberation and the Wars of Unification took the shape of continuous progress, not of dramatic punctual changes.

Compared with its potential adversaries, the Prussian army had managed to keep pace on most fields and to gain certain advantages on some. Does that suffice to explain its victory in the Wars of Unification? Hardly, I think. I will for a moment forget the inconvenient fact that the outcome of any major war between powers of comparable military strength is by definition subject to the combined influence of hundreds of different factors and a good deal of contingency. Rather, I will look into some of the fields of military innovation mentioned in this article.

The high recruiting quota introduced in 1860 did nothing more than allow Prussia to play the game at all. It did not provide William's armies with any numerical superiority to which victory could be attributed.⁵⁸ The needle gun was not alone responsible for victory in 1866, or else France should have won in 1870. The firepower of the Dreyse did, however, increase the Austrian casualties in a way as to be absolutely detrimental to the whitecoats' morale. Still they fought on. The tactics of the Prussian army were hardly any better than those of the Austrian and French empires, and they were somehow inferior to

the tactics of the French republic in the winter of 1870/71. The soldiers of the republic were better at employing artillery barrages and open order.

The obvious Prussian advantages were the effective use of railways for mobilization and above all a professional general staff. Even that did not save William's generals from committing grave operational mistakes. Yet where Prussian commanders made mistakes, French and Austrian commanders were frequently responsible for outright blunder. In the end, however, both the war of 1866 and that of 1870/71 were decided by moral and political factors. Due to internal problems, Austria admitted defeat after the battle of Sadova. At that time, its field army was still intact, if shaken.⁵⁹ The late French empire, on the other hand, was increasingly unpopular and therefore unable to command the unbroken loyalty of its soldiers. Consequently, there were first signs of dissolution already after the battles at the borders. The armies of the republic were no real match even for Prussia's young conscripts, since they lacked decent training. As the war dragged on in winter 1870/71, war-weariness overwhelmed most of them and finally the field forces of the republic disintegrated.⁶⁰ In many a sense it will therefore be fair to admit that Prussia did not win the Wars of Unification, but much rather her enemies lost them.

The recurrent myth – some hypotheses

In spite of all the facts presented in this article, the myth of Prussia's military revolution could arise. One need not wonder that it is still alive. The political history of the pre-unification era has always taken the military "facts" for granted, and German military historians have up to now not concerned themselves with this period. Everything seemed just so plainly obvious. Yet, as we have seen, it was not.

Myths do not simply arise without function. They are constructed to serve a certain purpose. As a conclusion, I will offer some hypotheses on the function of the myths around the army reform of 1859/60.

First. As I have tried to show at the start, Prussia's victory in 1866 came as a surprise to most contemporaries and caused a search for explanations. Declaring the reorganization to have been the prime reason for victory was convenient for everyone, but especially for William, Bismarck, and Roon, who could use this simple argument to outmanoeuvre the opposition. The second victory in 1871, though not nearly as surprising as the first, further substantiated that convenient theory.

Second. The dramatic conflict that the so-called reform had triggered made the latter look much more significant in retrospect than it had originally been. After six years of bitter fighting the technical details had become dogma anyway. It appeared now, that without doubt the reform must have been a vital question for the state or how else could the protracted deadlock of the political system be justified? Moreover, the bitter debates on constitutional matters during the conflict had direct repercussions on many central aspects of the constitution of the Northern German Federation (1867) and the Second Empire (1871). The compromise that had solved the conflict had likewise largely anticipated the political balance of power of the new empire.⁶¹ That the confusing twists and turns of the pre-unification years had finally resulted in two glorious victories and national unification attached prime importance to them. In retrospect, the historical sequence of events that had led to 1871 became the only possible and legitimate way German history could have taken. Accordingly, every event on this way acquired the character of a symbol carved in stone. And army reform was a central event in this historical sequence.

Third. The Second Empire was not so stable and uniform a state as it appeared on the map. On the contrary, unification had concealed many internal conflicts as well as social and regional cleavages instead of solving them. The new empire was also a stumbling stone for the concert of European powers. In order to underpin its stability and legitimacy, it needed integrative symbols and legends.

Fortunately, the leadership of the empire contained some figures

who qualified more or less as heroic symbols of victorious internal and external battles. With the exception of Helmuth von Moltke, who advanced to become "the greatest captain of his age," they had all been protagonists of army reform and constitutional conflict. William I, now Emperor, had initiated the military reorganization and had triggered the conflict through his stubborn refusal to compromise. Roon had drafted the plans and defended the reform before the legislature. Bismarck, the "iron chancellor," had built his political career on defending the king's will to the last. Now these three men became the father figures of the new nation state. Roon died already in 1879, but William lived on until 1888, when he died at the age of 90, a beloved old man with a magnificent white beard. Finally there was Bismarck, who stood at the helm of the new empire for almost 20 years. When he died in 1898 at the age of 83, he was widely (though not generally) regarded as almost superhuman, a man who seemed too large even for his dramatic time. Once these men were styled the heroes of the Second Empire, their biographies became automatically historically sacrosanct. Whatever they had done, especially in the period immediately before unification, must by definition have been not only legitimate, but necessary.

Fourth. In order to emphasise the immense importance of the events that had led to unification and the great service the aforementioned heroes had rendered their country, it was necessary to paint the period before as gloomily as possible. The timing was no problem. William had become acting representative of his ailing brother in 1857, regent in 1858 and king in 1861. He had appointed Moltke in 1858, Roon in 1859, and Bismarck in 1862. It was easy to construct Prussian history until 1857 as a period of weak foreign policy, permanent crisis and above all neglect of the army, even more since it featured the embarrassing events of the revolution in 1848 and the diplomatic defeat at the hands of Austria in 1850. From this dark background, the heroes of the unification period could rise like shimmering stars. They had saved the country from its mediocre existence and made it a great power again.⁶²

The myth of military revolution was thus a necessary function of the attempt to effectively contrast a gloomy past with a shining present during the Second Empire. Accordingly, the period between 1813 and 1857 was constructed as a time of permanent neglect of the army. That is how the reorganization of 1859/60 became "the glorious restoration of the army" and was merged with several other factors into one secular break, a true military revolution.⁶³

Notes

¹As overview see Thomas Nipperdey, *Deutsche Geschichte 1800–1866: Bürgerwelt und starker Staat* (Munich 1983), 784–6, and Hans-Ulrich Wehler, *Deutsche Gesellschaftsgeschichte*, 3 vols. (Munich 1987–95), III: 293–7.

²Jay Luvaas, "The Influence of the German Wars of Unification on the United States," in Stig Förster and Jörg Nagler (eds.), *On the Road to Total War: The American Civil War and the German Wars of Unification, 1861–1871* (Cambridge 1997), 597–8; Stig Förster, "Militär und staatsbürgerliche Partizipation. Die allgemeine Wehrpflicht im Deutschen Kaiserreich 1871–1914," in Roland G. Foerster (ed.), *Die Wehrpflicht: Entstehung, Erscheinungsformen und politisch-militärische Wirkung* (Munich 1994), 61.

³As overview see on army reforms in Austria: Walter Wagner, "Die k. (u.) k. Armee: Gliederung und Aufgabenstellung," in Adam Wandruszka and Peter Urbanitsch (eds.), *Die Habsburgermonarchie 1848–1918*, 6 vols. (Wien 1973–93), V: 142–633; in France: Max Jähns, *Das französische Heer von der großen Revolution bis zur Gegenwart: Eine kulturhistorische Studie* (Leipzig 1873), 440–800; Michael Howard, *The Franco-Prussian War: The German Invasion of France, 1870–1871*, 3rd ed. (London 1962), 29–39; in Italy: Giorgio Rochat and Giulio Massobuo, *Breve Storia dell'esercito Italiano dal 1861 al 1943* (Torino 1978), 15–98; in Russia: Bruce W. Menning, *Bayonets Before Bullets: The Imperial Russian Army, 1861–1914* (Bloomington, Ind., 1992), 6–85.

⁴Richard Knötel, *Handbuch der Uniformkunde: Die militärische Tracht in ihrer Entwicklung bis zur Gegenwart*, rev. ed. (Hamburg 1937), 400.

⁵That is true especially for the Southern German states. See for example Hauptstaatsarchiv Munich, Gesandtschaft Berlin, file 857: Organisation des

preußischen Heeres 1800–1864; Hauptstaatsarchiv Stuttgart, RG E 40/72: Ministerium für auswärtige Angelegenheiten/Kriegssachen und Militärangelegenheiten, files 151 and 175, and Generallandesarchiv Karlsruhe, RG 233: Staatsministerium, files 4239–40: Erhebung von Schriften bei auswärtigen Staaten 1856–1864.

⁶Friedrich Engels, "Betrachtungen über den Krieg in Deutschland," in Karl Marx/Friedrich Engels, *Werke*, ed. Institut für Marxismus-Leninismus beim Zentralkomitee der SED, 41 vols. (Berlin 1956–71), XVI: 169–73, 182–4.

⁷On army reform and constitutional conflict in Prussia see mainly Ernst Rudolf Huber, *Deutsche Verfassungsgeschichte seit 1789*, 8 vols., 3rd ed. (Stuttgart 1957–90), III: 275–353; Karl-Heinz Börner, *Die Krise der preußischen Monarchie von 1858 bis 1862* (Berlin 1976), 42–220; Lothar Gall, *Bismarck: Der weiße Revolutionär*, rev. paperback ed. (Frankfurt am Main 1993), 201–5; Wehler, *Gesellschaftsgeschichte*, III: 253–331; Nipperdey, *Deutsche Geschichte 1800–1866*, 749–68; Wolfgang J. Mommsen, *Das Ringen um den nationalen Staat: Die Gründung und der innere Ausbau des Deutschen Reiches unter Otto von Bismarck 1850–1890* (Berlin 1993), 121–38.

⁸See ch. 2 of my Ph. D. thesis, *Preußische Heeresreformen 1807–1870*.

⁹Curt Jany, *Geschichte der Preußischen Armee vom 15. Jahrhundert bis 1914*, ed. Eberhard Jany, 4 vols., 2nd ed. (Osnabrück 1967), IV: 230.

¹⁰For example Manfred Messerschmidt, "The Prussian Army from Reform to War," in Förster and Nagler, *Road to Total War*, 268–73; Hajo Holborn, "The Prusso-German School: Moltke and the Rise of the General Staff," in Peter Paret (ed.), *Makers of Modern Strategy from Machiavelli to the Nuclear Age* (Princeton, N. J., 1986), 281; Brian Bond, *War and Society in Europe 1870–1970* (Leicester 1983), 16–20; Nipperdey, *Deutsche Geschichte 1800–1866*, 785–6; Arden Bucholz, *Moltke, Schlieffen, and Prussian War Planning* (New York 1991), 47.

¹¹Paul Kennedy, *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000* (London 1988), 184.

¹²On the army reforms of 1807–13 see primarily Rainer Wohlfeil, *Vom stehenden Heer des Absolutismus zur Allgemeinen Wehrpflicht (1789–1814)*, in Hans Meier-Welcker et al. (eds.), *Handbuch zur deutschen Militärgeschichte 1648–1939*, 6 vols. (Munich 1964–81), I/2: 81–183; also Huber, *Verfassungsgeschichte*, I: 95–313; still indispensable are Max Lehmann, *Scharnhorst*, 2 vols. (Leipzig 1886–7), and Friedrich Meinecke, *Das Leben des Generalfeldmarschalls Hermann von Boyen*, 2 vols. (Stutt-

gart 1896–9); useful also William O. Shanahan, *Prussian Military Reforms 1786–1813* (New York 1945).

¹³The *Wehrgesetz* (service law) of 3 September 1814 and the *Landwehrverordnung* (Landwehr ordinance) of 21 November 1815 are printed in Eugen von Frauenholz, *Das Heerwesen des XIX. Jahrhunderts* (Munich 1941), 181–6.

¹⁴On the development of the Landwehr from 1815 to 1859 see Dorothea Schmidt, *Die preußische Landwehr: Ein Beitrag zur Geschichte der allgemeinen Wehrpflicht in Preußen zwischen 1813 und 1830* (Berlin 1981), 94–156; [R. de l'Homme de Courbière], *Die Preußische Landwehr in ihrer Entwicklung von 1815 bis zur Reorganisation von 1859: Nach amtlichen Quellen bearbeitet* (Berlin 1867); Meinecke, *Leben des Generalfeldmarschalls Hermann von Boyen*, II: 75–270, 538–568. See also my Ph. D. thesis, *Preußische Heeresreformen 1807–1870*, ch. 6.

¹⁵Most of the consecutive plans for the reorganization of 1859/60 are printed in Königlich Preußisches Kriegsministerium (ed.), *Militärische Schriften weiland Kaiser Wilhelms des Großen Majestät*, 2 vols. (Berlin 1897), II: 296–460.

¹⁶“Wir hängen an der Landwehr mit religiösem Fanatismus.” Quoted from Wehler, *Gesellschaftsgeschichte*, III: 256.

¹⁷Most enlightening is Egmont Zechlin, *Bismarck und die Grundlegung der deutschen Großmacht* (Stuttgart 1930), 173–82.

¹⁸Hermann Rahne, *Mobilmachung: Militärische Mobilmachungsplanung und -technik in Preußen und im Deutschen Reich von Mitte des 19. Jahrhunderts bis zum Zweiten Weltkrieg* (Berlin 1983), 51.

¹⁹See ch. 8 of my Ph. D. thesis, *Preußische Heeresreformen 1807–1870*. Also Michael Howard, *War in European History* (Oxford 1976), 99–100; Michael Geyer, *Deutsche Rüstungspolitik 1860–1980* (Frankfurt am Main 1984), 23–5.

²⁰Printed in Großer Generalstab, Abtheilung für Kriegsgeschichte (ed.), *Moltkes Militärische Werke I: Moltkes Militärische Korrespondenz*, 4 vols. (Berlin 1892–1902), II: 195.

²¹Moltke was a lieutenant general in 1866.

²²See Bucholz, *Moltke*, 12–16; T[revor] N. Dupuy, *A Genius for War: The German Army and General Staff, 1807–1945* (London 1977), 46–9, 302–6.

²³Historische Abteilung des Generalstabs (ed.), *Die Reorganisation der Preußischen Armee nach dem Tilsiter Frieden*, 2 vols. (Berlin 1862–6), I: 224–317, is still the best account on the early history of the general staff.

Walter Görnitz, *Der deutsche Generalstab: Geschichte und Gestalt 1657–1945*, is not entirely reliable, but more easily available (also in an English translation, New York 1953).

²⁴Overviews on the development of the general staff from early to mid–19th century are Bucholz, Moltke, 18–57; Martin van Creveld, *Command in War* (Cambridge, Mass., 1985), 103–12; not fully reliable, but still useful is Dupuy, *Genius for War*, 44–57.

²⁵Rahne, *Mobilmachung*, 7–66.

²⁶Hubert von Boehn, *Generalstabsgeschäfte: Ein Handbuch für Offiziere aller Waffen* (Potsdam 1862), 267–70; [Paul] Bronsart von Schellendorf, *Der Dienst des Generalstabes*, 2 vols. (Berlin 1875), 64–237.

²⁷The usual translation “commander-in-chief” falls far short of the mark, since even the civilian president of a republic can hold that title. “(All-)highest warlord” is a literal translation, but in fact nonsense. On the organization of the Prussian high command see Eckart Busch, *Der Oberbefehl: Seine rechtliche Struktur in Preußen und Deutschland seit 1848* (Boppard am Rhein 1967), 2–5; Friedrich Hossbach, *Die Entwicklung des Oberbefehls über das Heer in Brandenburg, Preußen und im Deutschen Reich von 1655–1945: Ein kurzer Überblick* (Würzburg 1957), 1–29.

²⁸Quote from Siegfried Fiedler, *Kriegswesen und Kriegführung im Zeitalter der Einigungskriege* (Bonn 1991), 231. The best biography on Moltke is Eberhard Kessel, *Moltke* (Stuttgart 1957).

²⁹Richard Holmes, *The Road to Sedan: The French Army 1866–70* (London 1984).

³⁰Austria: Wagner, “k. (u.) k. Armee,” 158–167, 373–389; Russia: Menning, *Bayonets before Bullets*, 15–18.

³¹Great Britain: Hew Strachan, *Wellington's legacy: The Reform of the British Army 1830–54* (Manchester 1984), 146–75; USA: Russell F. Weigley, *History of the United States Army*, 2nd ed. (Bloomington, Ind., 1984), 239–44; Herman M. Hattaway and Archer Jones, *How the North Won: A Military History of the Civil War* (Urbana, Ill., 1991), 101–7.

³²Dennis E. Showalter, *Railroads and Rifles: Soldiers, Technology, and the Unification of Germany* (Hamden, Conn., 1975), 19–72; “Die Entwicklung des Militäreisenbahnwesens vor Moltke,” in *Militärwochenblatt*, Beiheft 1902; Rahne, *Mobilmachung*, 23–8.

³³Kessel, *Moltke*, 165–79, 239–40; Michael Salewski, “Moltke, Schlieffen und die Eisenbahn,” in Roland G. Foerster (ed.), *Generalfeldmarschall von Moltke: Bedeutung und Wirkung* (Munich 1991), 90–2.

³⁴Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge 1980, Reprint 1992), 86–7.

³⁵Holmes, *Road to Sedan*, 176–8; Edwin A. Pratt, *The Rise of Rail–Power in War and Conquest 1833–1914* (London 1915), 138–48.

³⁶Burkhard Köster, *Militär und Eisenbahn in der Habsburgermonarchie 1825–1859* (München 1999); Wagner, “k. (u.) k. Armee,” 162–3, 468–9; Joachim Niemeyer, *Das österreichische Militärwesen im Umbruch: Untersuchungen zum Kriegsbild zwischen 1830 und 1866* (Osnabrück 1979), 159–164.

³⁷Van Creveld, *Supplying War*, 82–108; Showalter, *Railroads and Rifles*, 56–69.

³⁸Frank Kühlich, *Die deutschen Soldaten im Krieg von 1870/71: Eine Darstellung der Situation und der Erfahrungen der deutschen Soldaten im Deutsch–Französischen Krieg* (Frankfurt am Main 1995), 327.

³⁹See the documents printed in *Militärische Schriften weiland Kaiser Wilhelms des Großen*, II: 80–107.

⁴⁰Heinz Helmert, *Militärsystem und Streitkräfte im Deutschen Bund am Vorabend des Preußisch–Österreichischen Krieges von 1866* (Berlin 1964), 110–20; Volkmar Régling, “Grundzüge der militärischen Kriegführung zur Zeit des Absolutismus und im 19. Jahrhundert,” in Meier–Welcker, *Handbuch zur deutschen Militärgeschichte*, V: 328f.; W. von Scherff, *Studien zur neuen Infanterie–Taktik*, 2nd ed. (Berlin 1876), 20–1; Hew Strachan, *From Waterloo to Balaclava: Tactics, Technology, and the British Army, 1815–1854* (Cambridge 1985), 27–47; Paddy Griffith, *Forward into Battle: Fighting Tactics from Waterloo to Vietnam* (Strettington 1981), 54–64.

⁴¹Holmes, *Road to Sedan*, 201–3; Kühlich, *Die deutschen Soldaten*, 325–9.

⁴²Showalter, *Railroads and Rifles*, 77–139, is the best comprehensive account on the introduction of the needle gun. See also Meinecke, *Leben des Generalfeldmarschalls Hermann von Boyen*, II: 527–29; Königlich Preußisches Kriegsministerium (ed.), *Das Königl. Preußische Kriegsministerium 1809 – 1. März – 1909* (Berlin 1909), 162–9.

⁴³For this process, see the vivid account of Colmar Freiherr von der Goltz, *Das Volk in Waffen: Ein Buch über Heerwesen und Kriegführung in unserer Zeit* (Berlin 1883), 332–3.

⁴⁴Reinhard Sautermeister, *Die taktische Reform der preußischen Armee nach 1806*, [Ph. D. thesis, Tübingen 1935], is the best summary.

⁴⁵*Exerzir–Reglement für die Infanterie der Königlich Preußischen Armee*

(Berlin 1847), §§ 80, 84, 85, 91; A. von Witzleben, *Heerwesen und Infanteriedienst der Königlich Preußischen Armee*, 7th ed. (Berlin 1861), 504.

⁴⁶W[ilhelm] Rüstow, *Allgemeine Taktik, nach dem gegenwärtigen Standpunkt der Kriegskunst bearbeitet*, (Zurich 1858), 23.

⁴⁷*Exerzir–Reglement für die Infanterie*, §§ 36, 56.

⁴⁸See the documents printed in *Militärische Schriften weiland Kaiser Wilhelms des Großen*, II: 196–248.

⁴⁹*Exerzir–Reglement für die Infanterie*, § 54.

⁵⁰See primarily Colmar Freiherr von der Goltz, *Kriegsgeschichte Deutschlands im Neunzehnten Jahrhundert*, 2 vols. (Berlin 1910–14), II: 151–2, 200–6.

⁵¹Kühlich, *Die deutschen Soldaten*, 348–9; Joachim Hoffmann, “Wandlungen im Kriegsbild der preußischen Armee zur Zeit den nationalen Einigungskriege,” in *Militärgeschichtliche Mitteilungen* 1/1968, 18, and “Die Kriegslehre des Generals von Schlichting,” *ibid.* 1/1969, 5.

⁵²Kriegsgeschichtliche Abtheilung des Großen Generalstabes (ed.), *Der deutsch–französische Krieg 1870–71*, 5 vols. (Berlin 1874–81), II: 848–94; Michael Howard, *The Franco–Prussian War: The German Invasion of France, 1870–1871*, 3rd ed. (London 1962), 174–5.

⁵³On tactics in the war of 1870–1 see A. von Boguslawski, *Taktische Folgerungen aus dem Kriege von 1870–1871* (Berlin 1872), 69–82; also his *Die Entwicklung der Taktik seit dem Kriege von 1870/71*, 3 vols. (Berlin 1877–8), vol. 1.

⁵⁴See for example Stefan Kaufmann, *Kommunikationstechnik und Kriegführung 1815–1945: Stufen telemedialer Rüstung*, (Munich 1996), 69–129; van Creveld, *Command in War*, 107–9.

⁵⁵Showalter, *Railroads and Rifles*, 143–221.

⁵⁶See for example Dennis E. Showalter, “Prussian Cavalry 1806–1871: The Search for Roles,” in *Militärgeschichtliche Mitteilungen* 1/1976, 7–22.

⁵⁷See ch. 11 of my Ph. D. thesis, *Preußische Heeresreformen 1807–1870*. A summary of most of these processes is found in Manfred Messerschmidt, “Die preußische Armee,” in Meier–Welcker, *Handbuch zur deutschen Militärgeschichte*, IV/2: 10–121.

⁵⁸Kriegsgeschichtliche Abtheilung des großen Generalstabes (ed.), *Der Feldzug von 1866 in Deutschland* (Berlin 1867), 45–8; Eberhard Kaulbach, “Der Feldzug 1870 bis zum Fall von Sedan: Zur deutschen militärischen Führung in heutiger Sicht,” in Wolfgang von Groote and Ursula von

Gersdorff (eds.), *Entscheidung 1870: Der deutsch-französische Krieg* (Stuttgart 1970), 91.

⁵⁹Heinrich Friedjung, *Der Kampf um die Vorherrschaft in Deutschland 1859-1866*, 2 vols., 9th ed. (Stuttgart 1912-3), vol. 2.

⁶⁰Howard, *Franco-Prussian War*, 183-200; Hans Meier-Welcker, "Der Kampf mit der Republik," in Groote and Gersdorff, *Entscheidung 1870*, 105-164; Stéphane Audoin-Rouzeau, "French Public Opinion in 1870-71 and the Emergence of Total War," in Förster and Nagler, *Road to Total War*, 405-409.

⁶¹See Wolfgang J. Mommsen, "Das deutsche Kaiserreich als System umgangener Entscheidungen" and "Die Verfassung des Deutschen Reiches von 1871 als dilatorischer Herrschaftskompromiß," in id., *Der autoritäre Nationalstaat: Verfassung, Gesellschaft und Kultur des deutschen Kaiserreiches* (Frankfurt am Main 1990), 11-65.

⁶²These observations are all too obvious from the entire national-liberal historiography of the Second Empire.

⁶³See again my Ph. D. thesis, *Preußische Heeresreformen 1807-1870*.

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