On the Way to War: The Role of German Railways in Military Strategic Planning, 1830 to 1914

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The formation of the world before 1914 was the logistical consequence of the European expansion which was made possible by transport networks – i. e. steam shipping and railways that had been invented around 1800 – and based on that fact global settlement. Indeed, mobility achieved a new level. Never before one had colonised on the size the Europeans did in one hundred years after the congress of Vienna. With the help of ideas, trade, money, migrants and of course technology not only a few dreamt of a world that could become one human community hold together by strong shipping lines and railway networks which would promote a culture of universalism whose center was confidently localized in Europe. This vision failed although it was very popular.

When the discussion on railways swapped over from Great Britain to Germany in the mid 1820s and when the railways enthusiasts became aware that it would be necessary to feet the public debate with ideas and visions for raising acceptance and for attracting investors for this unknown but costly transport infrastructure, at this time a lot of memoranda including chapters exclusively on the topic of consequences of this facility and on the role railways might play in future. In this context a lot was written about economic, social, political and even cultural effects railways would have and there was already a particular debate on its military functions. In this debate not only a few shared the conviction railways would make wars impossible. In 1833 one of the most famous German railway enthusiast, Friedrich List argued: „How would it be possible in future, that civilised nations would start wars when the majority of educated persons will be friends" and he continued „how fast will civilised nations replace prejudices, national hate and selfish national interests by better knowledge and sym-

pathies when the individuals of different nations will be bound together by thousand connections of science and art, trade and industry, friendship and family relationships."[1] Therefore he was convinced that railways "would free the nations from the plague of war".[2]

This became a very popular argument among liberals for sense and necessity of railway connections all over Europe. It was also shared by economic scientiests and even conservative politicians.[3] In 1909 when the Minister for Public Works (*Minister für öffentliche Arbeiten*) Paul Justin von Breitenbach opened a sea ferry line on the Baltic Sea to Sweden he argued in the same way as List did seven decades before: Transport and Traffic would be a „pillar of peace among the nations, a mighty supporter of the idea of peace. The livelier the exchange between the nations, the greater and visionary the institutions and systems for this exchange would be the more powerful and more resistant will be the peaceful connections which should entwine (*umschlingen*) the nations."[4] This was only five years before the global conflagration. Obviously, the idea of railways as peacemaker was pure ideology. It was not only a deceptive appearance but also the opposite of the relationship between railways and war. This raises the question how railways impacted to the outbreak of World War One. I will try to answer this on the example of the German Railways.

Naturally, the background of the outbreak of the Great War is complex and multidimensional, but most important is that this period did not gave birth to a much evoked transnational union which worked on mutuality and a common good will of all peoples – as many railway memoranda had described the future of the railway age in the 1830s – but supported strong national states and empires and contributed to the processes of decrease and increase of powers inside Europe and there were shifts of power from Europe to the United States in the transatlantic region.[5] This was why the trend directed unequivocally to a reallocation of power relations. But demonstration of power and exercises of power required the immediate ability to surmount geographical spaces and therefore most rapid and efficient means of transport and communication logistics for military use.

Therefore, the Germans List and von Breitenbach (and many others) were wrong when they trust of the ties of communication technology for maintaining peace. But the question is why? Transport and communication worked not only in the sense of

linkages, exchange, and of spatial, economic, social, mental, and cultural convergence but also in the sense of deception, irritation and destruction. It depends on how they were used for which purpose.

Railways are an impressive proof of this thesis, because actually hopes of an end of all wars were destroyed right in the beginning of the so called railway age. Already in the first memoranda – from which we have quoted – we find solid arguments for a military meaning of railways. Ludwig Newhouse, one of the promoters of railways in the Southwest of Germany, pointed to the first English experiments of a military use of railways in 1833: "a whole regiment of infantry had been moved from Manchester to Liverpool in two hours."[6] There were not only a few of memoranda that openly demanded railways which should remove slowness of the German military compared with that of France.[7]

Indeed, the skepticism of militaries disappeared at the end of the 1830s.[8] At a time when the railway lines in Germany did not exceed some hundred kilometres the Saxonian officer Karl Eduard Pönitz and the young Prussian general Helmuth von Moltke published examinations about the military possibilities of the new transport facility. Especially the accounts of Pönitz „Die Eisenbahnen als militärische Operationslinien (Railways as lines of military operation)" and „Die Vertheidigung von Süddeutschland gegen die Franzosen (The defence of Southern Germany against France)" influenced the debate on the military-strategic role of railways.[9] On the background of his analysis he drew the conclusion: "Although railways original was seen as a new type of artificial roads which allowed essential acceleration of trade and transport soon the possibility was recognised to use them as military lines of operation."[10] Same or similar discussions were conducted in France at the same time or even some years before.[11]

It did not last very long when first practical experiments were carried out and above all the Revolution of 1848 and 1849 gave proof to all theories and experiments done so far. The Sardinian general Giovanni Durando pre-empted the army of Field Marshal Joseph Wenzel Anton Franz Karl Graf Radetzky von Radetz in the surrounding of Vicenza, thereby he moved his troops by rail. And also Russia supported the suppression of upheavals in Hungary by the transport of 18,000 soldiers from Krakow to Moravia.[12] Prussia and other German states lined up to this series.

In the declining phase of the revolution when the conservative powers prevailed and the courts and general staffs of Austria and Prussia took over the initiative again then railways were used in campaigns against popular uprisings on a greater extent. This was evident in the so called "*Reichsverfassungskampagne*", the campaign for the introduction of the first national constitution by all German states. I will not go too much into details but present only some few remarks.

From Northern Germany the "*Reichstruppen*", the allied forces of several German states, mainly Prussia, started a military build up against the rebellious regions which despite its huge dimension was organised in many parts on railway transport. The troops were moved via railway into the Rhenish region and Saxony in May 1849.[13] In Cologne the soldiers entered steamboats to Mainz were they stayed at the fortress of the German Union (Deutscher Bund). From there they travelled by rail to Frankfurt where they arrived end of May and entered the trains of the Main-Neckar Railway to Darmstadt.[14] The terminal of Darmstadt worked so to speak as transit camp of the allied military forces (Reichstruppen). From Darmstadt they marched against the people militia of Palatine and the army of Baden which had turned over before to the rebellious forces. Then they fought intensively for the possession of railway lines and above all of railway stations.

The insurgents did not manage to hold the sovereignty over these transport routes. They had to give way to the pressure of the rapidly input of masses of troops and to the flexibility as consequence of their railway mobility. At the end the rebellions were enclosed in the fortress of Rastatt where the uprising found its dramatic end.[15] In this way modern transport technology contributed to the defeat of the revolution and helped the conservative Prussian elite to survive. However, this success inspired those who had fought for a close relationship of railways and military.

One could not deny technical and infrastructural innovations had serious conse-quences for the military strategic in the second half of the 19th century. Railways (and tralegraph) made possible precise military build ups to focus important masses of troops at the border in a fraction of the time necessary before. Prussia and Austria achieved the ability for the transport of a whole army already around 1850. This was why in many European countries investments in railway lines were not only effected by economic reason. How far these measurements were right in time demonstrated only a few years later the armed conflicts in Northern Italy in 1859 when the French

army successfully shifted half a million soldiers to the battlefields within only a few weeks. Also the Austrians managed to transport military forces to Italy about four times the speed as it would have been possible by feet.[16] The warfare of 1859 was after 1849 the next example how both sides made use of railways for their strategic military build up to a large extent, and it was the first war where railways gained operative and even tactical importance. Now it was possible to direct whole armies over great distances in a speed which exceeded several times what had been imagined before. But this afforded a precise planning and organisation and a close cooperation between military headquarters and civil railway boards, a collaboration that had to be trained in times of peace.[17] At the latest by the combats of 1859 the world was made aware that concentration of larger masses of troops on a crucial focus could be calculated on an hourly precision and it was confirmed what the significant military advantage of the railways was, i. e. the possibility of a quick opening of warfare which secured the aggressor a crucial starting point. But as Klaus-Jürgen Bremm in his marvelous study on military strategies in Prussia has convincingly shown: "Based on the possibilities of railways there developed a trend to expand military planning to the whole course of a war and therefore achieved an apparent precision", which could not exist in a war with railways.[18] This believing became fatal for the German army leadership in World War One.

From the end of the 1850s on railways played a leading role in all further conflicts and wars in the Western World of the 19th century. Just to mention only a few without going too much into details one should take into consideration the Civil War in the United States where railways enabled warfare in extended regions because they made superfluous to accumulate large stocks of food supply and ammunition in magazines. It was now possible to transport the demands of an army direct from places of production to the nearest railway terminal of the front. The whole hinterland became a magazine and railway tracks formed supply lines.[19]

As next example one could mention the most efficient use of railways by the Prussian army in the war against Austria of 1866. At this time the above mentioned Helmuth von Moltke stood at the top of the general staff of Prussia. Under his leadership the general staff had formed an own railway section in 1864. This railway section developed detailed calculated time schedules for railway transport into their military-build-up planning which were permanent adapted according to the political-strategic situa-

tion. Also the railway network and organisational improvements inside the army steadily had made possible a reduction of time between the beginning of the mobilization and operational readiness of the troops – all in all from seven weeks to three and a half week. The better logistic benefited Prussia in the war against Austria in 1866 and enabled the victory at Königsgrätz.[20]

But two things are of particular interest. At first pressure of the timetable won a decisive weight and insofar prevailed over political considerations. This became obvious in a struggle between Prussian's King Wilhelm Frederic IV and the head of the Prussian Army Hellmut von Moltke whose angrily statement on the Kings hesitation to open the war again Austria was: "If we mobilize we do not have to shy away the accusation of aggression. Any hesitation critically exacerbates the situation."[21] Here the first time an automatism came to light which hardly left over any scope for political leaders in the period between mobilization and beginning of war. The movement of troops which worked like a clockwork was not allowed to stop without confusing the whole planning and causing time losses that could not caught up again.[22] At second the quick victory veiled the fact that the Prussian railway system did not work perfect. The precise planned military build up run smoothly but the supply of the front-line troops collapsed at times – as it did seven years before in the French-Austrian war – when without planning and central directives in masses food and other goods were forwarded and blocked the stations.

Also the war between Germany and France that followed in the years 1870 and 1871 was characterised by railways. In opposite to Prussia France did not only fail to manage supply and replenishment but also did not get a grip on the military build up by railways. The result was confusion and this was one of the major causes for the collapse of the per se excellent army of Napoleon III.[23] Railways significantly formed a long series of further wars in South-east Europe, the Russian-Ottoman war of 1877 and 1878, the Boer war between 1899 and 1902 and also the Russian-Japanese war of 1904 and 1905.[24]

But nowhere railways achieved such a central importance as in the centre of Europe where the railway networks were very dense above all in France, Belgium and Germany. The German Empire was founded in Versailles. Elsaß-Lothringen became a part of Germany and France was pondering about revenge for four decades.[25] It forged together with Russia that was annoyed by the German tariff policy the entente

and it prepared itself for a new war. This was the background for the German-French „railway rivalry" that has been researched by Allan Mitchell in his study „The Great Train Race. Railways and the Franco-German Rivalry" several years ago.[26] He compared the railway systems of France and Germany and described their extension as kind of race to achieve the most efficient and with the greatest economic and military resources provided system.[27] He therefore, provided a clear answer of the question „Who won the Great Train Race?": „By almost any standard the answer is certainly Germany".[28] The irony of World War One was later the fact that this result with the help of the allies of France was turned into its contrary. The economic and infrastructural triumph of the German railways over the French ones proved to be a Pyrrhic victory.

There are some hints that the understanding of the inner logic of transport systems and their impact on society included some failures which contributed to the defeat of Germany in 1918. The German reflections about the fundamental principles of a military strategy against powers in the West circled around the dense railway networks in the region between France and Germany. The result was the so called "Schlieffen-plan". Alfred Graf von Schlieffen was the chief of the general staff between 1891 and 1905. He combined the problem of a threatening two-front war with the ideas of Helmuth von Moltke who was convinced that the most successful principle of warfare was the military build up based on railways and offensive aggression rapidly directed forward to a decisive battle. This led to the Schlieffenplan. The idea was to transport first the majority of the German forces to the West to roll up France from its flanks in a gigantic sickle cut via Belgium and to overwhelm it as fast as possible. Then military capacity would be set free for the war in the east against Russia. Precondition for that was the assumption that mobilization and military build up of Russia would afford pretty much more time that the Germans need to defeat France. This plan was a unique race against the clock. Therefore all up to the smallest detail had to be prepared in advance. Railways original seen as an instrument for more flexibility in strategy and operation now pressed military leadership in a corset of minute by minute meticulous pre-programmed schedule. Railways had become the most formative factor of this planning.[29]

But despite of all precision including the calculated break of Belgium's neutrality the reality of war did not behave as foreseen in the plan. Around 1900 the railway net-

works were rather extended – nevertheless a good deal of the infrastructural preconditions for the Schlieffenplan was still missing. However, at this time fear increased the others, i. e. Russia, would be able to catch up. Indeed with French help or better with investments by bank houses as Brother Pereire or the French branche of the Rothschild family the Russian empire extended its railway system substantially since the 1870s. As a consequence they supported the efforts of Russia to accelerate drastically the time of mobilization.[30] Therefore the German general staff demanded a gigantic multiplication of the army and carried this through in December 1912.[31] But this accelerated only the arms race between all great powers in Europe and the believe war could not be avoided increased.[32]

In the context described above the crisis in July 1914 as result of the assassination on the throne successor of the Habsburg empire unfold its fatal effects because now the short but very advantageous head starts in the mobilization process set diplomacy very narrow margins. According to the inner logic of military strategy and their fundamental believing the German army leadership had to respond immediately to the mobilization of Russia, if they want to make use of the 2 to 3 weeks time advantage for its fundamental planning of warfare.[33] Mobilization – in former time only a gradual increase in diplomatic crisis management, so to speak a threatening gesture – now fell de facto together with the beginning of the war.[34] Moreover the very fixed system of alliances between the triple entente and the axis forces (Achsenmächte) triggered a domino effect that then tore whole Europe into war within days. War then was the railway war par excellence.

When war broke out in August 1914, it took less than two weeks from the first day of mobilization (2 August 1914) to the start of fights alongside the whole front in the West (14 August 1914). The system of alliances worked and thanks to the modern transport infrastructure of railways everything went very quickly. Alone the military build up of the German army afforded 31.900 trains that moved 5.2 million soldiers and nearly one million horses to the front.[35] Each day additional 215 trains transported more troops to the front or shifted troops from one partition of the front to another one. Furthermore railways supplied the armies and transported weapons and ammunition, reserve contingents of soldiers and wounded, soldiers on leave and prisoners of war, they delivered the post and supplied whole cities inside the battle-

fields while they had to surmount ever longer distances passing through destroyed enemy territories.[36]

The military build up of the French which had been prepared similar thoroughly ran off with same precision and speed, and even Russia – thanks to their improvements in railway construction and logistical abilities – forwarded pretty much earlier combat-ready units to the battlefields than contemporaries had awaited.[37] This was why in the very first beginning of the war essential preconditions of the Schlieffenplan failed to happen. The fundamental principle that the majority of the German forces in the West would have enough time to enforce a lightning-like decision against France did not work. The German army had to fight on two fronts from the beginning on. More-over despite of all precision of the "Blitzkrieg" against France the invasion suffered delays. For example the advance stopped in Belgium at the fortresses of Liege which blocked the decisive railway knot (16 August). But the greatest weakness of the Schlieffenplan was however, that the armies of the right wing should march forward in a speed that railways could not follow, because, railway troops first had to repair the infrastructure that had been destroyed by enemy forces. The forward-marching German armies suffered on insufficient supply – as in 1866 and 1870 – while the re-treating French troops could made fully use of the railway network controlled by them. This was why in this moment railways unilaterally favoured the defensive forces – an estimation that was discussed in the very beginning of the railway age in the 1830s and 1840s. In 1843 Hansemann for example wrote in one of his studies: "railways are eminently qualified to improve the defence of a country and to help to conserve the interior order while they speedily could carry masses of troops, ammu-nition and food supply."[38]

The Schlieffenplan definitely failed in the battle at river Marne from 5 to 12 Septem-ber 1914. Afterwards the war froze into a war of attrition. Railways ended up being a decisive facility for operative flexibility and mobility. They supplied millions of soldiers at the front enabled the continuation of the war and became as Junkelmann wrote: "to a dull-reliable supplier of mass extinction".[39]

This stagnation based on railways (and of course on steamshipping) carried through two subversive innovations: the automobile and the airplane. Both would be the deci-sive facilities for the transport revolution of the 20th century and both impacted on the war as for example demonstrated in figure 13. British airplanes are attacking a Ger-

man Zeppelin as examples for a new mobility above the front. For another kind of mobility apart from railways stood the lorry. During the 1916 dreadful battle of Verdun, the road between Bar le Duc and Verdun which the 3000 (other sources mention 9000) supply vehicles used daily to transport troops, arms, munitions and food. This transport chain came to be known as "the Sacred Road", an indication of how important this corps was.

However, the war brought to light that above all improvements of the established transport networks it could not be prevented that crew up new systems with totally new possibilities for the transport of people, goods and news.[40] They too were greatly praised as bearer of peace, freedom and democracy even they got their consecration as efficient tools in the core of World War One.

What can we learn from the German lesson? 1. A far reaching engineerial invention not only effected on the whole society in economic, social and political respect but also had consequences for the warfare. 2. The relationship of railways and war is not a static one. It depends on experience and rationalisation of these experiences. 3. These remodeling of theory of warfare in military leadership had had a life of its own and had retroactive effects on foreign policy and the whole sphere of diplomacy. In the German case the advantages of a speedy warfare turned back to a lack of time for a prudent and judiciously foreign policy.

References

1.   Friedrich List, Das deutsche National-Transport-System in volks- und staats-wirtschaftlicher Beziehung. Leipzig 1838. ND. Berlin 1988, 11.
2.   List, Das deutsche National-Transport-System, 6.
3.   Sartorius von Waltershausen, Das volkswirtschaftliche System der Kapitalanlage im Auslande, Berlin 1907, 421f.
4.   „Die Eröffnung des Trajektverkehrs Sanitz–Trelleborg", Archiv Stadt Sassnitz, Teilchronik 4/1909. See also Jünemann u. a., Die Rügenschen Kleinbahnen, 8.
5.   See William Woodruff, Die Entstehung einer internationalen Wirtschaft 1700–1914, in: Carlo M. Cipolla, Europäische Wirtschaftsgeschichte, 5 Bde., Stuttgart 198, Bd.4, 471–472, and Paul Kennedy, Aufstieg und Fall der großen Mächte. Ökonomischer Wandel und militärischer Konflikt von 1500 bis 2000. Frankfurt am Main 1989.
6.   „Ein ganzes Infanterie-Regiment ist auf der Eisenbahn von Manchester nach Liverpool in zwei Stunden gefahren worden." Ludwig Newhouse, Vorschlag zur Herstellung einer Eisenbahn im Großherzogtum Baden von Mannheim bis Basel und an den Bodensee. Karlsruhe 1833, 85.
7.   Friedrich Harkort, Die Eisenbahn von Minden nach Cöln. Ed. and introduced by Wolfgang Köllmann. ND Hagen 1961, 26. See also Wilhelm Roscher, Nationalökonomik des Handels und Gewerbefleisses, 4th ed., Stuttgart 1883, 378, David Hansemann, Über die Ausführungen des preußischen Eisenbahn-Systems. Berlin 1843, 6, and Maximilian Arzberger, Eisenbahnen als Staats- und als Gesellschaftsunternehmungen. Mit Hinblick auf die Gesammt- und Sonderinteressen von Deutschland und Thüringen, Frankfurt und Leipzig. Hamburg und Gotha 1842, 67.
8.   See Marcus Jungelmann, Die Eisenbahn im Krieg. Militärische Theorie und Kriegsgeschehen bis zum Ausbruch des Ersten Weltkriegs, in: Zug der Zeit – Zeit dr Züge. Hrsg. v. Eisenbahnjahr Ausstellungsgesellschaft. Nürnberg 1985, 233-245, here 233.
9.   Karl Eduard Pönitz, Die Eisenbahnen als militärische Operationslinien betrachtet und durch Beispiele erläutert. Nebst Entwurf zu einem militärischen Eisenbahnnetz in Deutschland. Adorf 1842, Karl Eduard Pönitz, Die Vertheidigung von Süddeutschland gegen die Franzosen, mit Zuziehung der Eisenbahnen, unter Berücksichtigung der verschiedenen Spurweite. Eine strategische Skizze. Stuttgart und Tübingen 1844, and Helmuth von Moltke, Welche Rücksichten kommen bei der Wahl der Richtung von Eisenbahnen in Betracht, abgedruckt in: Gesammelte Schriften und Denkwürdigkeiten des General-Feldmarschalls Grafen Helmuth von Moltke. Bd. 2. Berlin 1892, 235–274.
10. „Obgleich die Eisenbahnen ursprünglich nur als eine, den Handel und Verkehr wesentlich be-schleunigende, neue Gattung von Kunststraßen angesehen wurden, erkannte man doch bald die Möglichkeit, sie auch als militärische Operationslinien in Anwendung zu bringen." Die Eisenbahn als militärische Operationslinien, 28. Pönitz merciless dressed-down the visions of peace mentioned above: Some maintain, he wrote at the beginning of his remarks, "that in future warfare would not be possible anymore, and already swayed cozy in dreams of everlasting peace (dass in Zukunft das Kriegführen gar nicht mehr möglich sei, und wiegten sich schon behaglich in ihren Träumen vom ewigen Frieden)." Pönitz, Die Eisenbahn als militärische Operationslinien, 29. These dreams he prepared a quick end by his comprehensive observations on the tactical and strategic applications of railways in wartime. Although there had to be done some precautions until railways would step into life for military use but then one could attract with great easiness considerable masses of troops from remote areas by the use of railways. Ibid. IV, 184 and 227. He listed how many locomotives and wagon would be needed for transporting a regiment, an infantry-brigade or even a whole corps that consisted of 80.000 men at this time. Ibid. 41, 47 and 83. Moreover he was enthusiastic of the possibility to shift news in one fifth of the time that couriers needed, to strength weak position or threatened fortresses, to defence rivers, to concentrate masses of troops or to carry away sick persons and wounded or prisoners, and procure ammunition and food. He shrewdly recognised the possibility of a "Blitzkrieg" when combined railways with telegraphs hardly the first lines in England and Germany were set into business. Ibid. 110, 125. See also ibid. 253f.
11. See Pascal Puig, Jean-Jaques Pelet, un visionaire de l'emploi militaire des chemins de fer, in: Revue d'Histoire des Chemins de Fer 15, 1996, 37–49, and André Martel, Armées et chemins de fer en France de 1830 à 1918: pensée stratégique et emploi des forces armées, in: ibid. 209–224.
12. See Wernekke, Die Mitwirkung der Eisenbahnen an den Kriegen in Mitteleuropa, in: Archiv für Eisenbahnwesen 35, 1912, 930–958, here 930–931.

[13] This military build up was intensively obeyed: „Hier passieren seit mehreren Nächten preußische Truppen auf der Eisenbahn durch, deren Bestimmung Westphalen und die Rheinlande sind." Frankfurter Journal of 18 May 1849.

[14] „Die uns seit länger als 14 Tagen verkündeten norddeutschen Truppenzüge fangen jetzt an, sich zu verwirklichen. Gestern früh 7 Uhr passirten unsere Stadt eine Abtheilung mecklenburgische Schützen." Frankfurter Journal of 30 Mai 1849.

[15] See Heinz Sturm, Die pfälzische Eisenbahnen. Speyer 1967, 105–106. On the historical background and development in total see Lothar Gall und Ralf Roth, Die Eisenbahn und die Revolution 1848. Berlin 1999.

[16] See Marcus Jungelmann, Die Eisenbahn im Krieg. Militärische Theorie und Kriegsgeschehen bis zum Ausbruch des Ersten Weltkriegs, in: Zug der Zeit – Zeit dr Züge. Hrsg. v. Eisenbahnjahr Ausstellungsgesellschaft. Nürnberg 1985, 233–245, hier 233f.

[17] Jungelmann, Die Eisenbahn im Krieg, 234f.

[18] Aus diesen Möglichkeiten der Eisenbahnen entwickelte sich jedoch die Tendenz, die militärischen Planungen schon im voraus auf den gesamten Verlauf eines Krieges auszudehnen, und damit eine vermeintliche Präzision zu erreichen", die es so auch in einem Krieg mit Eisenbahnen nicht geben konnte. Klaus-Jürgen Bremm, Von der Chaussee zur Schiene. Militärstrategie und Eisenbahnen in Preußen von 1833 bis zum Feldzug von 1866. München 2005, 235.

[19] See Jay Luvaas, The Military Legacy of the Civil War. The European Inheritance, Chicago, III, 1959, Martin van Crefeld, Supplying War. Logistics from Wallenstein to Patton. Cambridge 1977, and Rudolf von Caemmerer, Die Entwicklung der strategischen Wissenschaft im 19. Jahrhundert, Berlin 1904, 120–135. The Prussian headquarter regarded this war intensively and drew consequences for the establishment of own railway troops. See Abhandlung über die Thätigkeit der amerikanischen Feldeisenbahn-Abteilungen der Nordstaaten; bei den Directionen der Staatseisenbahnen. Durch das Königl. Ministerium in Circulation gesetzt. Berlin 1866. The crucial strategic importance of railways led inevitably to the fact that important lines, railway knots and stations became primarily objects of warfare. This is testified by heavy fighting around cities such as Chattanooga, Atlanta and Petersburg. When a railway line could not be hold the combatants switched over to systematic destruction that developed to a very particular kind of warfare in the course of the war, but even the art of repairing the damages within short time. The predominance of the Northern states in the railway sector paved the way for their predominance in the whole war. See Jungelmann, Die Eisenbahn im Krieg, 235.

[20] See Hermann Rahne, Die militärische Mobilmachungsplanung und -technik in Preußen und im Deutschen Reich. Leipzig 1972, and Jungelmann, Die Eisenbahn im Krieg, 236f.

[21] „Nur dürfen wir, wenn wir einmal mobil machen, den Vorwurf der Aggression nicht scheuen. Jedes Zuwarten verschlimmert unsere Lage ganz entschieden." Moltkes Militärische Korrespondenz. Aus den Dienstschriften des Krieges 1866. Hrsg. vom Großen Generalstab. Berlin 1896, 128.

[22] See Junkelmann, Die Eisenbahn im Krieg, 238.

[23] Vgl. Francois Jacquim, Les chemins de fer francais pendant la guerre de 1870-1871. Paris 1872, 118f., Thomas James Adriance, The Mobilization and Concentration of the French Army in 1870. PhD. Ann Arbor, MI 1969, und Junkelmann, Die Eisenbahn im Krieg, 239.

[24] Junkelmann, Die Eisenbahn im Krieg, 240–242, and for France André Martel, Armées et chemins de fer en France de 1830 à 1918. The relationship also appeared in the European colonies and the construction of railways for war purposes there. In colonial wars railways did not bear any decisive military build ups but served as transport facility that made possible to undertake troop movements, even under unfavourable conditions across vast geographic distances. Diane Drummond, Britische Erzählungen über den imperialen Fortschritt durch den Eisenbahnbau und die Reaktionen der Völker in Indien und Afrika darauf (1850 bis 1939), in: Zeitschrift für Weltgeschichte 12, 2, 2011, (107–140.

[25] Heinrich August Winkler, Geschichte des Westens. Bd. 1: Von den Anfängen in der Antike bis zum 20. Jahrhundert. München 2009, 852f.

[26] Allan Mitchell, The Great Train Race. Railways and the Franco-German Rivalry, 1815–1914. New York/Oxford 2000. See also André Martel, Armées et chemins de fer en France de 1830 à 1918: pensée stratégique et emploi des forces armées, in: Revue d'Histoire des Chemins de Fer 15, 1996, 209–224, here 217–219.

[27] He analysed three levels: administrative structure, economic strength and military-strategic importance of railways. Above all he was interested in the decades between 1890 and 1914 when the railways achieved their largest extension and their overriding social, political and military importance. Although the railways consisted in France of six great private companies while we

found in Germany and its states a mixture of public and private companies Mitchell de-covered a series of astonishing parallels. Both developed before the outbreak of the war mostly regional administered systems. Both shared also the fact of an early discussion about the military importance of railways. After the war of 1870 and 1871 the distinctions between the French and German railways system increased. France had to manage the problems of war destructions and of a shrinking economy and experienced a period of stagnation while the German states nationalised the railways established so called "Länderbahnen" with decentralised administration on the level of each German state. This kind of nationalisation ended up in a significant plus of efficiency. Mitchel called it a "railway revolution". He argued: "A stronger German economy was much better served by its railway system". Mitchell, Great Train Race, 256–257f.

[28] Mitchell, Great Train Race, 269.

[29] See Junkelmann, Die Eisenbahn im Krieg, S. 242. On the Schlieffenplan see Stig Förster, Der deutsche Generalstab und die Illusion des kurzen Krieges, 1871–1914. Metakritik eines Mythos, in: Militärgeschichtliche Mitteilungen 54 (1995), 61–95, Hans Ehlert, Michael Epkenhans, Gerhard P. Groß (Hg.), Der Schlieffenplan. Analysen und Dokumente. Paderborn 2006, Annika Mombauer, Helmuth von Moltke and the Origins of the First World War, Cambridge 2001, Annika Mombauer, Of War Plans and War Guilt. The Debate Surrounding the Schlieffen Plan, in: Journal of Strategic Studies 28/2005, S. 857–885; Gerhard Ritter, Der Schlieffenplan. Kritik eines Mythos. Mit erstmaliger Veröffentlichung der Texte. München 1956, and Terence Zuber: Inventing the Schlieffen Plan. German War Planning 1871–1914, Oxford et al. 2002.

[30] See Ralf Roth, Eisenbahn, in: Dan Diner, Markus Kirchhoff (Hrsg.), Europäische Traditionen – Enzyklopädie jüdischer Geschichte und Kultur, Band 2 (Co–Ha), J. B. Metzler, Stuttgart und Weimar 2011, 195–201.

[31] By the way at the expense of the fleet. See Helmut Altrichter, Walther L. Bernecker, Geschichte Europas im 20. Jahrhundert. Stuttgart 2004, 25–27, and Sönke Neitzel, Kriegsausbruch. Deutschlands Weg in die Katastrophe 1900–1914. München et al. 2002. Another failure of the Schlieffenplan was its blindness against the real system of alliances. There were not only two unfriendly powers but three in the direct neighbourhood of German – thanks to a less capable foreign policy.

[32] See Altrichter, Bernecker, Geschichte Europas, 25–27.

[33] See Harold James, Geschichte Europas im 20. Jahrhundert. Fall und Aufstieg 1914–2001. München 2004, S. 41.

[34] See James, Geschichte Europas, S. 41.

[35] In the third week of the war the German Emperor Wilhelm II. sent a telegram to the railway administration: „Mit beispielloser Sicherheit und Pünktlichkeit haben die deutschen Eisenbahnen die gewaltige Transportbewegung ausgeführt. Dankbar gedenke Ich zunächst der Männer, die sei 1870/71 in stiller Arbeit eine Organisation geschaffen haben, die nunmehr ihre ernste Probe glänzend bestanden hat. Allen denen aber, die Meinem Rufe folgend mitgewirkt haben, das deutsche Volk in Waffen auf den Schienenwegen den Feinden entgegenzuwerfen, insbesondere den Linienkommandanturen und Bahnbevollmächtigten sowie den deutschen Eisenbahnverwaltungen vom ersten Beamten bis zum letzten Arbeiter spreche Ich für ihre treue Hingabe und Pflichterfüllung Meinen Kaiserlichen Dank aus." Kabinettsorder v. 22. August 1914. Geh. Staatsarchiv. Rep. (neu) 15583.

[36] On the burdens of railways in wartime and in the Republic of Weimar see Adolf Sarter, Die deutschen Eisenbahnen im Kriege. Berlin 1926, 276ff. and Junkelmann, Die Eisenbahn im Krieg, 241–243.

[37] See Pascal Puig, Le Meusien: utilisation d'une voie métrique par l'Armée francaise, 1914–1919, in: Revue d'Histoire des Chemins de Fer 15, 1996, 88–116, here 91–99.

[38] Die Landesvertheidigung zu befördern und die gesetzliche Ordnung im Innern in vorkommenden Fällen bewahren zu helfen, sind die Eisenbahnen vorzüglich geeignet, indem auf ihren Truppenmassen, Munition und Proviant schnell transportiert werden können." David Hansemann, Über die Ausführungen des preußischen Eisenbahn-Systems. Berlin 1843, 6.

[39] Junkelmann, Die Eisenbahn im Krieg, 242–244.

[40] See Christoph Maria Merki, Verkehrsgeschichte und Mobilität. Stuttgart 2008, 50 and 54, and Matthew Smith Anderson, The Ascendancy of Europe. Aspects of. European. History, 1815–1914, ND London 2003 (orig. 1972), 128.