

DAVID AUBIN and CATHERINE GOLDSTEIN (eds.), *The War of Guns and Mathematics: Mathematical Practice and Communities in France and Its Western Allies around World War I*. Providence, RI: American Mathematical Society, 2014. Pp. xviii + 391. ISBN 978-1-4704-1469-6. \$126.00 (hardback).

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Historians of science have described the First World War as the war of the chemists, and the Second World War as the war of physicists and mathematicians. If the intersection of mathematics and the Great War is discussed, it has often, in particular in French historiography of mathematics, been in the spirit of a founding myth of the Bourbaki group of mathematicians. They would argue that the sole effect of the First World War on mathematics was to erase an entire promising generation of mathematicians, leaving a vacuum, which the Bourbakists strove to fill.

This impressive volume corrects and nuances these myths while providing a rich collection of detailed analyses of the impact of the First World War on mathematics in the Allied countries. The authors do so by analysing the mobilization of mathematicians, the development of mathematics required for war, and the intellectual and social implications of the war on post-war mathematics.

The anthology, edited by David Aubin and Catherine Goldstein, is a product of a decade-long, international research project into the impact of war on mathematics in the first half of the twentieth century. Central to the ambitions of the volume is not only to present the intersection of war and mathematics as a series of implications for individual mathematicians, but also to integrate the institutional, professional and scientific/cognitive dimensions into the analysis. Thus individuals serve in large part as the means for the analyses, rather than as the goals. This structure provides interesting new perspectives, as these collective dimensions of the problem are not yet as well understood. It also shows that while individual choices and fates can be quite context-specific, a complex set of questions can be addressed on a comparative, structural level.

The volume opens with a theme-setting and historiographical introduction by Aubin and Goldstein and proceeds to present seven papers by leading experts on the French, British, Italian and US mathematical communities and on war-related mathematical research. The seven chapters are divided into three parts by a rough chronological division of the perspectives of Allied mathematicians into ‘Starting up’, ‘Joining in’, and ‘Moving on’. Here, I cannot do justice to all the aspects of this rich volume; instead, I provide a thematic impression while not adhering to the chronological structure.

Individual and local contexts varied considerably at the advent of one of the most formative, global experiences of the twentieth century. This variation is clearly illustrated in the Italian context in a chapter by Pietro Nastasi and Rossana Tazzioli in which they analyse the debates among mathematicians with different political and institutional contexts over Italian intervention. This can be compared to two of the other chapters, where June Barrow-Green analyses the local responses of Cambridge mathematicians to the outbreak of war, and the two editors and H el ene Gispert treat the complex Parisian context. Together these chapters forcefully show the diversity of reactions ranging from pacifist positions to active engagement with the war effort for personal, institutional or professional motives.

In the chapter by Aubin, Gispert and Goldstein, the efforts to position mathematics and the various Parisian institutions such as the Ecole polytechnique and the Acad emie des sciences reveal how the advent of war played into existing power positioning in the local context. In another chapter, Jean-Luc Chabert and Christian Gilain address the discussions about the role of mathematics in the training of (military) engineers at the Ecole polytechnique, showing how institutional visions and politics intermingled. Similarly, Laurent Rollet and Philippe Nabonnand show in their chapter how efforts to cultivate aerodynamics in Nancy faltered as perspectives shifted immediately after the Great War.

Looking to the Second World War, historians of mathematics have shown how key cognitive advances in mathematics originated in the war efforts to break encryption, optimize logistics or process and manage information. The impact of the Great War on such ‘internal’ aspects in mathematics is less obvious, but, repeatedly, the chapters emphasize the operation of artillery as a military and scientific problem. During the war, mathematicians played roles in enabling the technological advances of sound ranging, aeronautics and ballistics since these were known to depend on mathematical and computational skills, as well as on technological innovation, for improvement.

Therefore the proving grounds at Gâvre in France, at the Anti-aircraft Experimental Section in Britain at Aberdeen, and the Ordnance Department in the United States became venues where different perspectives on mathematics met: military and academic, technological and more scientific, national and international. Chapters by Aubin on Gâvre; Tom Archibald, Della Dumbaugh and Deborah Kent on the United States; and Barrow-Green on Britain each situate these meetings and conflicts in their local contexts, introducing a fascinating range of individual careers to make a general claim: considerable mathematical research – in an extended, non-academic setting – emerged from the technological, military challenges of precisely firing artillery on targets that were either moving or out of sight. Moreover, these military institutions also became hybrids where knowledge and relations were built that would later shape the academic milieu in the Allied countries. Key players of post-war academia, such as Oswald Veblen, would have formative experiences and build networks through the war effort.

Thus the volume presents a wealth of information and perspectives on a topic that has received little attention in the history of mathematics but which can – and will – be of great interest not only to historians of mathematics, but also to historians of science more generally. It shows how structural grounds for comparison can emerge from careful case studies, of which more have subsequently been published from the research project.

For good reasons of focus and delineation, the present emphasis is on the Allied side, but more research should benefit from even more explicit comparative analyses of the material presented here, from comparison with similar analyses of the Axis powers, and from integrating even more with existing research into issues such as the internationalization of mathematics and the institution-building efforts of the post-war period.

The chapters are comprehensive, expertly researched and clearly presented. They make available in the English language existing, vernacular knowledge and new archival research by leading experts who contextualize developments in both local and thematic contexts. The volume is enriched by well-curated photographs and quotations, which help authentically situate mathematics within the catastrophe of the Great War. It is strongly recommended to all historians of science in the twentieth century.

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HERMIONE GIFFARD, *Making Jet Engines in World War II: Britain, Germany, and the United States*. Chicago: The University of Chicago Press, 2016. Pp. 349. ISBN 978-0-226-38859-5. \$45.00 (cloth).

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In 1937, the German Otto von Ohain ran a jet engine he designed and later that year British Frank Whittle did the same. The British government, however, did not capitalize on Whittle’s genius, and so Germany came to outproduce Britain in jet fighters during the Second World War. The United States, meanwhile, failed to produce their own jet engines and had to purchase British designs. With such a well-established story, it is not immediately clear why anyone should delve again into this familiar moment of aviation history. But, as *Making Jet Engines in World War II*