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**Mini-Workshop:  
History of Mathematics in Germany, 1920 - 1960**

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ABSTRACT. The Mini-Workshop dealt with the history of mathematics in Germany between 1920 and 1960, with a particular focus on the social history of mathematics. For the period under discussion research in the history of mathematics is faced with some fundamental problems, which cannot be addressed by individuals. Consequently the Mini-Workshop's aim was to develop future perspectives and methods for research and ways to organise new research projects. Among the topics addressed during the Mini-Workshop were the international relations of mathematicians in Germany before, during and after World War II; the prosopography of mathematicians in Germany from before 1933 into the 1950s; the role of mathematics as a key technology in World War II; and the professional policies from the 1920s to the 1950s.

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**Introduction by the Organisers**

The theme of this Mini-Workshop was the social history of mathematics in Germany between – roughly – the end of World War I and 1960. The aim of the workshop was to review previous research in this field and to discuss the perspectives and desiderata of future research on the issues involved. Particular attention was given to the development of mathematics in National Socialism, including the transitions from Weimar Germany to National Socialism and the implications of this period for mathematics in the two German states after 1945. A number of earlier studies (including, in particular, Reinhard Siegmund-Schultze's *Mathematicians Fleeing from Nazi Germany*, Princeton University Press 2009, in German: 1998, and the monograph by Sanford Segal: *Mathematicians under the Nazis*,

Princeton University Press 2003) have been first steps, but much remains to be done to reach a full historical understanding of the period.

As the social and political history of science in Germany has been the focus of several major research enterprises (a research programme of the Max Planck Society on the history of its predecessor, the Kaiser Wilhelm Society, in National Socialism; a research project on the history of the German Science Foundation DFG, RFR; and a *Schwerpunktprogramm* on science, politics and society in Germany in the late 19th and 20th centuries, funded by the DFG, SPP 1143; also, to a certain extent and limited to a disciplinary basis, the research project of the German Physicists' Association (DPG) on the history of physics during the Nazi period), an effort was made to bring in expertise from these related projects. Throughout the workshop it proved very helpful to be able to compare the research problems at hand with the experiences made in other research programmes of a similar nature.

The discussions during the week were structured according to the following themes.

- A prosopography of mathematicians in Germany, and the structural implications of emigration.
- The role of mathematics as a key technology in World War II.
- International relations of mathematicians and their changes.
- The professional politics of mathematicians.

A list of historical questions for the various themes had been provided to the participants before the mini workshop.

### *A prosopography of mathematicians in Germany*

Prosopography – i.e., the systematic collection of standardised basic biographical data about a defined sample of persons – appears to be a suitable method to investigate crucial structural changes in the personnel of German mathematics across the political changes 1933 and 1945. While the emigration of mathematicians from Germany has been carefully studied, esp. by Siegmund-Schultze, the implications of this discontinuity for the community of mathematicians in National Socialism and thereafter are not very well known. Who took over the positions of those who were forced to leave the country? In whose hands were professional functions such as editorships, leading roles in societies, etc. after 1933? At present, our knowledge about such issues is more episodic than systematic. By proper prosopographical research it will become possible to raise further questions about the long-term implications of the changes after 1933. Which career patterns after 1945 emerge for those who entered the professional system of mathematics between 1933 and 1945? Which new groups came in during the early years of the *Bundesrepublik* and the *Deutsche Demokratische Republik*? Which professional networks were established, and what was their role after the war?

A crucial issue in systematic prosopography is the construction of a questionnaire about the relevant sample of persons that is (a) sufficiently informative for answering the historical questions raised and that can (b) be answered for each individual with reasonable effort. During the workshop, a considerable amount of time was used for such a discussion. One of the results of the workshop has been a preliminary version of such a questionnaire, and a feature list for a database that might be used to make available the results of such a prosopographical survey. – It is worth stressing that systematic research of this kind has not been done, so far, for a single scientific discipline in Germany.

### *Mathematics as a key technology in World War II*

Despite several contributions by Mehrtens, Siegmund-Schultze, Epple and Remmert, the various roles of mathematics in the German war effort have been studied only very superficially to date. The prosopographical project outlined above can provide certain basic data also in this domain, but much further work needs to be done on the actual research in various technological, scientific, medical and administrative fields. Besides aviation and various branches of ballistics, the fields of electrical engineering and radio technology merit particular attention. In all these fields, applied mathematics and what was termed *Praktische Mathematik* played a considerable role as is documented for instance in the corresponding volumes of the FIAT reviews. Crucial institutions were involved (Alwin Walther, Darmstadt; Robert Sauer, Aachen) that continued to play an important role after 1945.

During the discussions in the workshop it turned out that particular attention might be given to the area reaching from applied statistics to basic research in probability theory. This seems to be a particularly interesting area in which theoretical developments, applications in engineering and economics, and highly politicised special developments in areas such as medical and racial statistics can be traced which are revealing for the general role of mathematics in National Socialism.

### *International relations of German mathematicians before, in, and after World War II*

After the end of World War I, an international isolation of German mathematicians – imposed by foreign science policies but also partially endorsed from within – became a crucial problem for many mathematicians in Germany. The problem was aggravated after 1933 when isolation was increasingly forced by the German side, and international contacts were severed as a consequence of emigration. On the other hand, at least some international contacts were quickly sought after the end of World War II.

During the workshop, the changing patterns of international relations of German mathematicians were taken as a means to analyse certain important features of mathematical culture in the period under discussion. Which international relations were discontinued as a consequence of emigration? Which international relations could be continued after 1933, and which were first created under National Socialism? The last topic requires, in particular, a study of scientific relations with occupied countries during the war, a study that has barely begun and requires the cooperation with historians of mathematics from the countries involved.

For the period following World War II the question of renewed contacts to those that had left Germany was discussed, as were the few cases of a successful remigration. For those mathematical fields that, in Germany, had been largely abandoned during the Nazi period, such contacts turned out to be decisive for taking up a new research activity. Moreover, it turns out that an important and historically interesting site for studying the international relations of German mathematicians is the *Mathematisches Forschungsinstitut Oberwolfach*. In particular, contacts between French and German mathematicians were organised there that helped to reintegrate mathematical research in Germany. Of particular interest was the reception of Bourbaki in Germany, where Oberwolfach functioned as a catalyst. The present digitisation project of guest books and proceedings (*Vortragsbücher, Tagungsberichte*) was intensely discussed during the meeting; it promises interesting new insights into these developments (*Oberwolfach Digital Archive*, sponsored by the German Science Foundation).

### *Professional policies*

A further area that can also be analysed in more detail on the basis of the prosopographical research sketched above are the changing patterns of professional politics of mathematicians. Which groups of mathematicians were pursuing which agendas, and in which networks and institutions? While the history of the German Mathematical Society (DMV) has been studied in some detail (Schapacher/Kneser, Remmert), further aspects such as the role of the GAMM or of mathematical policies in the hybrid research settings of German warfare remain to be investigated. As in all other topical areas of our discussion, it turns out that essential features of the post-war situation have been determined at least partially by the developments before 1945. Of course, an important aspect of professional politics after 1945 was the ‘politics of the past’ (*Vergangenheitspolitik*), i.e., the specific ways of representing, exploiting, or downplaying the involvement of German mathematicians in the Nazi state and in German warfare.

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## Abstracts

### **War-related mathematics in National Socialism – An invitation to further research**

MORITZ EPPLE

By comparing an earlier account [1] with the present state of knowledge about mathematics in National Socialism, the talk reviewed the main desiderata for further historical research. In a first step it was pointed out that we still lack an overall analysis of the structural history of mathematics in Nazi Germany, despite various recent efforts to understand the ruptures after the Nazi take-over in 1933, in particular, the emigration of mathematicians [2] and its effects on mathematical culture [3], the history of the German mathematical society [4], and various crucial biographies.

In such a structural history, the involvement of mathematicians with war-related research enterprises will necessarily form a cornerstone. For all we know, the number of mathematicians remaining in Germany who entered configurations of military research between 1933 and 1945 is very high (see [1], [5], [6]). Moreover, the amount of printed and archival material that would allow a historical investigation of war-related mathematics is abundant.

However, any such investigation has to be aware of certain complexities which require to go beyond a narrow disciplinary perspective. A key point is the insight that war-related work in mathematics was done in hybrid configurations of scientific and technological research in which mathematics was integrated. This was illustrated in the talk with reference to aerodynamic (and, more generally, aviation) research (see e.g. [7]). Moreover, several institutional levels of war related research have to be distinguished:

- (1) Research in major extra-universitary institutions that were tied into national programmes of military research and development;
- (2) research in (more or less) private companies working in the military sector (such as in aviation, radio technology, or weapons production);
- (3) contract research in universities for institutions of type (1) or (2);
- (4) ‘self-mobilised’ research at universities that was financed on the initiative of the researchers but without a contract of type (3) or done without special funding.

We lack a detailed quantitative analysis of research activities in these four categories but it is safe to assume that research of types (1-3) is by far all other research work in mathematics done during World War II, including (4).

None of the levels (1-4) have been sufficiently studied. While university archives and archives of extra-universitary research institutions would allow substantial research on (1) and (3), in particular, mathematical research in private companies (2) is harder to investigate due to the partial inaccessibility of research reports and archival material.

Within any of these institutional settings, future historical research will have to address several layers of questions. The specific role of mathematical knowledge in the relevant military technologies needs to be understood, in particular, where and if new mathematical knowledge was required for technological development. This holds for ballistics, aerodynamics and radio technology, but for many other fields as well. Moreover, the role of mathematics and of mathematicians in conceiving and organising numerical analysis and actual calculation needs to be studied (every major military research institution had its team of human computers; mathematicians played the role of programmers for them). The importance of mathematicians in negotiating the political support of military research will have to be assessed. Finally, one may ask whether (and which) contemporary developments in pure mathematics were directly or indirectly coupled with specific developments in applied mathematics required for military purposes.

To undertake such historical research is demanding in several respects (this may also explain why we are still at the beginnings). However, no adequate history of mathematics in National Socialism will be possible without it.

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**Aerodynamics and Flutter Research at the Nationaal  
Luchtvaartlaboratorium (NLL) in Amsterdam under Nazi Occupation  
(1940-1944)**

FLORIAN SCHMALTZ

While historians of science and technology investigated the development of military related research during the Nazi era in the past decade in detail, hardly any attention has been paid so far to the question how sciences developed in Western and Eastern Europe under German occupation during World War II. The talk presented a case study about the development of aerodynamic research in the largest aeronautical research establishment of the Netherlands, the Nationaal Luchtvaartlaboratorium (NLL) in Amsterdam. Aerodynamic research establishments are hybrid organizations. They combine heterogenic material cultures and skills of experimenters, engineers, mathematicians, physicists, technicians, mechanics, science-managers etc. in a productive setting around certain experimental systems, like wind tunnels. After Hitler came to power in 1933, Germany violated the Treaty of Versailles by an enforced rearmament policy and the formation of the German Air Force under Hermann Göring as Reich Air Minister. Aeronautical research establishments highly benefited from this rearmament boom and were able to expand their budgets and staff. One of them was the Aerodynamische Versuchsanstalt (AVA) in Göttingen, a successor institution of the Modellversuchsanstalt Göttingen founded in 1907. Nazi occupation of foreign countries opened up new perspectives for German scientists and enabled the AVA to establish a widespread network of satellite institutes. In France the Institute Aérotechnique de Saint-Cyr and the wind tunnels of Hispano Suiza (Paris) were among the institutes seized after the German invasion of Western Europe. From summer 1940 onwards a satellite institute for icing experiments existed in Prague. In 1941 the AVA built facilities in the mountains at Kufstein in Austria to test the destruction of propellers through steel cables. In the same year the AVA established an open-air test unit for de-icing experiments at Finse in Norway. After the invasion of the Wehrmacht in Eastern Europe the Aerodynamic Institute of the Technical University Charkov came under the control of the AVA in November 1941 and was used for theoretical and experimental studies of cavitation. In Latvia an outpost of the AVA was established near Riga, where aerodynamic experiments were conducted to improve the design of snowmobiles for winter warfare. One month after the invasion of German troops in Western Europe in May 1940 the AVA Göttingen took over the administrative control of the NLL Amsterdam by order of the German Air Ministry. How did the occupation policy affect the economic development of the NLL, its staff and scientific research itself? As the example of the NLL Amsterdam shows, Dutch scientists were able to maintain their institutions and continue aerodynamic research. In order to benefit immediately from the scientific resources, Nazi occupation authorities introduced a form of indirect rule in summer 1940 that enabled German aeronautical industry and research establishments to give research orders to Dutch scientists. Paying the regular price for research contracts, the Germans took advantage of the fact that the Dutch

side continued to finance the general expenses for infrastructure and staff of the NLL. In sharp contrast to the devastating economic and financial plundering of the Netherlands during the German occupation, the microeconomic business of the NLL was booming. NLL's budget more than doubled between 1940 and 1944. By accepting the supervision by German authorities in principle, the directorate of the NLL was not only able to protect its staff from being laid-off but also to expand. Its staff increased from 86 employees in 1940 to 114 in 1941 and thereby raised by almost 50 percent. About two thirds of the research contracts of the NLL came from Nazi Germany.

The AVA Göttingen used two large and modern wind tunnels of the NLL Amsterdam and thereby reduced its work load in Göttingen. In contrast to German and Dutch claims during and after the war, secrecy measures did not prevent military research projects. An example for such a project was the examination of the well-known Junkers Ju 52 aircraft. This plane, planned by Junkers in 1929, was designed as a dual use product for civil and military transportation and as a bomber right from the start. At higher speeds the aerodynamic design of the aircraft caused aeroelastic problems of wing flutter. This problem became obvious during the Spanish Civil War when the plane became an easy target due to its slow speed. Therefore, from May 1937 onwards, the German Air Force used the Ju 52 exclusively for military transportation and no longer as a bomber. Between 1937 and 1939 Junkers conducted a series of ground oscillation experiments and flight tests with the Ju 52 in cooperation with the Deutsche Versuchsanstalt für Luftfahrt (DVL) in order to find ways to improve the flight performance. In July 1941 the NLL received a contract to study aeroelastic properties of the Ju 52 by evaluating mathematically the results of the experiments by Junkers and the DVL. German scientists camouflaged the information about the wing types tested at the NLL without harming the research results. The NLL already had experience in numerical studies of flutter, i.e. self-exciting-oscillations caused by aerodynamic forces that may lead to destructive vibrations and dangerous structural damages of an aircraft during flight. A Dutch report finished in October 1942 stated that the mathematical evaluation led to the conclusion that flutter-theory indeed approved the results of the experimental data at least in a qualitative way [1].

Apart from the Ju 52 research project, a second example of a military relevant research project shows that clearly no security measures were taken to keep the foreign researchers ignorant of the type of wings tested. The identity of the military aircraft Messerschmitt Bf 109 for example was not always hidden. In May 1941 the AVA ordered the NLL to calculate the average properties for the whole wing of the Bf 109 and to develop a simple method to analyze systematic stiffness experiments. Stiffness was a crucial factor to determine the critical speed for specific wings. The aim of the experiments was to develop a method of mathematical calculation that would give data about the torsion stiffness of wings to calculate flutter. The idea was to compare the experimental results with those achieved through calculation. The NLL report was finished in August 1942 and delivered specific data about the stiffness of the Bf 109 wing [3].

As the flutter research projects show, direct war relevant research was conducted by the NLL. In addition, research projects that were not obviously connected with military research reduced the workload at the AVA and thereby made additional resources available for military research. In return, this scientific collaboration caused a remarkable increase in staff, budget and income from external research orders for the NLL. With reference to the German research contracts and their war importance, employees of the NLL could be protected from recruitment as forced labourers to the German Reich.

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**“Certainly not by Logic!” Hans Peter, the Image of Mathematics, and the Self-Examination of Economics during the 1930ies**

ANDREA ALBRECHT

Within the *History of Mathematics in Germany from 1920 to 1960* the economist and statistician Hans Peter (1898-1959)[1, 2, 3, 4] is a hybrid, multifaceted figure in at least three ways: *First*, Peter’s work is interdisciplinary and provides insights into important fields of mathematical applications. He was not a professional mathematician, but having studied mathematics, philosophy and economics during his university education in the 1920ies, he imported mathematical and econometric methods (statistical methods, systems of differential equations, the method of mathematical modelling of, for example, economic cycles) to economics and thus helped develop it into a modern discipline with a broad repertoire of elaborated theories and effective applications. *Second*, Peter’s writings transcend the economic and the mathematical realm by linking both with cultural and ideological questions. In this respect, his case is an example for the interference of the (internal) development of science and its (internally and externally influenced) “image” [5, 6]. *Third*, Peter also put his economic and mathematical skills to practical use. After the beginning of World War II he became a member of the “Arbeitswissenschaftliche Institut” of the “Deutsche Arbeitsfront”, an influential but often underestimated brain-trust of the Third Reich administration, which worked out important parts of the National Socialists’ social policies and their so-called “Generalplan Ost”. Working for this institution from 1940 to 1944, Peter established statistical and mathematical methods as key technologies of economic

rationalization and planning [3, 7], a fact that also raises questions about the relation between scientific theory and political practice.

Hence, using Hans Peter's career as an example we gain insight into the premises, conditions, and implications of the production and legitimization of economic knowledge under the totalitarian rule of National Socialism – and beyond, since Peter's career did not end with the war. Without resorting to a constructivist approach towards the history of economics [8] the case study tries to show how the political transformations influenced the images of economics (and vice versa) and allowed some German economists to make the transition through the historic ruptures of 1933 and 1945.

Here, I can only give a rough outline of one concrete aspect: Peter was involved in a highly controversial debate on the suitability or unsuitability of mathematical methods for economics. The discussion was instigated by Hans Frank, at that time president of the "Akademie für Deutsches Recht" and a confidant of Hitler, who, in 1934, called on the economists to end their theoretical discords and to bethink themselves of the essence of 'Germaness' [9]. According to most of the national socialist ideologues the German "Volkswirtschaft" could not be properly described by abstract mathematical models, so the economists obediently started to discuss the "elimination of the exact theory of economics" alleging that "the majority of economists who still commit themselves to the exact theory are in opposition to the new German spirit of science." [10] In an article published in 1935 in the economic journal *Finanzarchiv* and a few succeeding articles Klaus Wilhelm Rath led an attack on Hans Peter, accusing him of an un-German, Jewish approach to economic research and arguing that Peter's "formalistic methodology" which "ego-maniacally overrides life" must be overcome. Rath insisted that the validity of theoretical propositions were affected by transformations of the real world, but "certainly not by logic", because logic itself was, like mathematics, a method of liberal thinking.[11]

Knowing that he could also count on strong allies, that for example the Nazis Theodor Vahlen and Dietrich Klagges believed in the necessity and usefulness of mathematical methods in the economics [12], Peter responded to Rath's pamphlet with a brave and scathing criticism in which he demonstrated that Rath's statements suffered from a number of philosophical and methodological shortcomings. He countered Rath's anti-mathematical and anti-theoretical resentments and pleaded for a strict separation of a value-free and rational theory of economics on the one hand and a normative approach to economy on the other hand, with only the latter being subject to ideological loyalty. [13]

After the debate had escalated into a many-voiced controversy on the status and cogency of mathematical knowledge, on the distinction between objectivity and truth, and on the relation of scientific models and reality, Rath appeared to prevail over Peter. In 1938 Rath became professor of economics in Göttingen where he started to bring the faculty of economics into accordance with the political order, while Peter, as a consequence of his recalcitrant behavior, lost his position in Tübingen and had to abandon his academic career [2, 4]. But the situation

changed soon enough: Striving for a rationalized and efficient war economy the Nazis recognized the relevance of mathematics in non-mathematical fields of research and practice, and started to make use of Peter and his formerly denounced theoretical knowledge [3]. Working for the “Deutsche Arbeitsfront”, Peter continued his research on the theory of economic cycles, but was now also eager to prove that his theoretical knowledge concurred with the political and economic aims of the National Socialists [14]. In contrast to his earlier statements he now insisted that the economic theoretician has to take the political norms into account: “The decision to realize the ‘Volksgemeinschaft’ defines the condition of the theoretical question.” [15]

After the war, Peter could resume his endeavor to develop effective tools for the organization of a planned economy [16]. Although he had been part of the technocratic and functional elites of the National Socialist system, he was granted the status of a “victim” of National Socialism and became a protagonist of post war German economics [1]. He pursued his work in a position at the University of Tübingen and as an advisor to economic institutions and politicians of the young Federal Republic. This continuity might be the major reason why he, revisiting the *Wandlungen in der Wirtschaftsauffassung* (1949) during the past decade, could envision the system of National Socialism as a grotesque play that is over now, without mentioning his personal participation: “From time to time we fought against each other in an ugly way. [...] The play became a grotesque entirely when half-educated ‘politicians’, who seized the power apparatus of the state, entertained themselves with the idea that shallowness serves the state and simultaneously declared everything they could not understand as seditious. As soon as this episode is overcome, the foolishness needs only to be noted; the scientific development might be slowed down by such silliness but the core of science cannot be touched.” [17]

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## The statistician Siegfried Koller

NORBERT SCHAPPACHER

Elaborating somewhat on [1] and [2], Siegfried Koller’s first career was sketched, which led him from a thesis under Felix Bernstein in Göttingen, via a second Ph.D. in Medicine at Gießen, and thanks to politically well-tuned publications, to a professorship at Berlin University and directorship of a newly founded biostatistical institute. But the Berlin appointment took place only shortly before the end of WW II. (After a number of years in prison, Koller’s second career then made him a very influential statistician of the Federal Republic of Germany.)

There were various reasons for recalling this career in the context of the mini-workshop: (1) It illustrates very well the general pattern of “science and politics as resources for one another” (to quote Mitchell Ash’s well-known and apposite formula). (2) It shows the complexity of a hybrid discipline: After the emigration of all experts of mathematical statistics in influential academic positions, Koller went through the medical network in order to consolidate his career, thus changing also, for instance, the journals in which he tried to publish. (3) Pauline Mazumdar’s thesis about different styles in genetic research in the 1930s (Mendelian algebra like in Felix Bernstein’s research on blood groups, vs. pedigree models as practised by Ernst Rüdin) remains open to further research; the works by Koller and Kranz are situated at the borderline of both models.

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**Lecture books, guest books and workshop reports: about sources  
documenting the early history of the MFO (Mathematisches  
Forschungsinstitut Oberwolfach), 1944-1962**

MARIA REMÉNYI

In 1944 a “Reichsinstitut für Mathematik” was founded in Germany as a result of the administrative, organizational, and political skills of Wilhelm Süss (1895-1958). It was located in a black forrest hunting lodge named Lorenzenhof. After remarkably few years this “Reichsinstitut” became an international center for mathematical research, today wellknown by mathematicians all over the world as “Mathematisches Forschungsinstitut Oberwolfach” (MFO). This development is to a great extent documented by the following sources.

- 1) “Vortragsbücher” (lecture books): since September 1944 lecturers have been invited to document their talks by an abstract in the so called “Vortragsbuch”.
- 2) “Tagungsberichte”(workshop reports): for the years 1955-1962 there are some short workshop reports. But according to the lecture books a lot more workshops were held than documented by reports.
- 3) “Gästebücher” (guest books): these books contain helpful informations for reconstructing lists of participants of the workshops and interesting personal comments shedding a light on the special atmosphere at the Oberwolfach Institute.

In terms of a project granted by the DFG (Deutsche Forschungsgemeinschaft), the documents have been scanned. The image files are now being prepared for presenting them finally on a website called Oberwolfach Digital Archive (ODA). The talk showed in detail how the sources will be made accessible for potential users of ODA. First, it will be made possible to search for relevant data. Second, there will be provided biographical links and informations. Last but not least, commentary texts will integrate the activities at the MFO into a broader historical context. The Oberwolfach documents can be quite helpful to answer several questions related to the development and the social history of mathematics in Germany after WW II.

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## **Mathematical publishing, professional policies and the first years of Oberwolfach**

VOLKER REMMERT

### *Mathematical publishing and professional policies*

This first part summarized results from a joint research project with Ute Schneider (Mainz, book history), which focused on the relationship between the development of a specific academic discipline, mathematics, and the system of mathematical publishing in Germany between 1871 and 1949.

From the last third of the 19th century, when the technical universities emerged in Germany, mathematics more and more grew into a double role, both as an academic discipline in its own right and as a transdisciplinary resource in the technical universities, e.g. architecture and engineering, as well as in the sciences, e.g. physics and chemistry. This double role was and still is, of course, fundamental for mathematics' extensive institutional basis in the academic system. From the perspective of publishing history, it is important to notice, that mathematics had two markets: that of mathematics as an academic discipline, and that of mathematics as a transdisciplinary resource.

The example of mathematical publishing underlines a point made by the sociologist Richard Whitley, namely that the importance of a system of scientific publishing goes well beyond the mere aspect of communication of knowledge, but that it is to be perceived of as an instrument of control and power – within the discipline and beyond. Indeed, the example of mathematics shows that a publishing system which works efficiently and smoothly, which in itself is not natural, is indispensable for the stability and the expansion of the discipline: first of all as a system of internal communication for mathematics and also, secondly, in order to structure the discipline in all respects including the social system of mathematics. Thirdly, it is a means to maintain a dominant position in the volatile hierarchy of academic disciplines. And, finally, it is a basis to claim both cultural authority and to secure material resources from the government and from society. All these aspects are crucial for the development of a discipline. Thus it is in the interest of mathematicians that the system of mathematical publishing is highly professionalized and that mathematicians have at least some influence over it.

The fact that the system of mathematical publishing can be understood as an instrument of power explains why professional policy makers, as e.g. representatives of the German Mathematical Society (Deutsche Mathematiker-Vereinigung, DMV) during the Nazi period, had a strong interest in mathematical publishing – prominently with respect to mathematics important to the war effort.



*Mathematical publishing, Oberwolfach and professional policies (1942-1945 and 1945-1949)*

WWII brought about a very important and long-lasting institutional development for mathematics and mathematicians in Germany, namely the foundation of the Mathematical Research Institute Oberwolfach. The Institute was founded in late 1944 with a clear war research agenda in mind, which could not, however, be realized at that late stage of Nazi Germany. Its founding director, Wilhelm Süss, quickly cast the Institute in a new light after the war – a light of pure mathematical research. This reorientation, which was at the same time part of reshaping his own past, allowed Süss to save the Institute from being closed down in the unstable period of the late 1940s and early 1950s. Moreover, with the support of French and Swiss colleagues he succeeded in laying the foundations of an international conference and research centre for mathematics. In this process mathematical publishing had an important role.

Since he had become president of the German Mathematical Society in 1937 (until 1945, 1940-1945 rector of Freiburg university) Süss repeatedly tried to gain influence in the realm of mathematical publishing (e.g. his efforts concerning the fusion of the review journals “Jahrbuch über die Fortschritte der Mathematik” and “Zentralblatt für Mathematik und ihre Grenzgebiete” in 1939, and his attempts to reorganize the system of mathematical journals in Germany in 1940). However, his professional policies with respect to mathematical publishing only came to fruition in 1942. In late 1941 the physicist Dr. Johannes Rasch sent two memoranda to the *Reich Research Council (Reichsforschungsrat)*. Rasch, who worked as an engineer with the *Siemens & Halske* company, deplored the lack of mathematical reference-works for the use of physicists and engineers in industry. Rasch explicitly pointed to the better situation in other countries, especially in the United States. By early 1942 Rasch’s memoranda triggered a program by the *Reich Research Council* to procure important mathematical reference-works and literature to the parties interested. Most of these works were to be specially commissioned to mathematicians and the publication program was entrusted to Süss. Among the projects he developed were the following:

*Entwicklungen nach reellen Funktionen* by Erhard Schmidt and Georg Feigl (Berlin), *Funktionentheoretische Grundlagen der modernen Analysis nebst Anwendungen* by Heinrich Behnke and Adolf Kratzer (Münster), *Elliptische Funktionen* by Maximilian Krafft (Marburg, on the basis of Tricomi’s book), *Theorie und Praxis der konformen Abbildungen* by Friedrich Lösch (Rostock), *Theorie und Praxis der Grenzsichthelehre* by Henry Görtler and Werner Mangler (Göttingen), *Praxis der Eigenwertprobleme* by Lothar Collatz (Hannover), *Lineare Integralgleichungen* by Werner Schmeidler (Berlin), *Partielle Differentialgleichungen* by Erich Kamke (Tübingen), *Hypergeometrische Differentialgleichungen* by Herbert Seifert and William Threlfall (Braunschweig). In November 1944 the list had grown to 32

projects. Even though only a few of the books were published during the war (Kamke: *Differentialgleichungen, Lösungsmethoden und Lösungen*, 1942/1944; Collatz: *Eigenwertprobleme und ihre numerische Behandlung*, 1945), this program was essential in Süss' strategies to found the Mathematical Research Institute Oberwolfach. After 1945 Süss participated in several projects in mathematical publishing, e.g. the book new series *Studia mathematica* (1948) and the new journal *Archiv der Mathematik* (1948). It can be shown that they had key roles in Süss' professional policies and that they played important parts in keeping the Oberwolfach Institute from being closed down.

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### L’Evangile selon Saint Nicolas. Some evidence for Bourbaki’s influence in postwar German mathematics

RALF KRÖMER

In the talk I tried to determine the sources and the existing historical work useful for an investigation of Bourbaki’s influence in postwar German mathematics, and the directions such an investigation could take. I first recalled the main features of the phenomenon Bourbaki, in particular the biographies of some of the founding members and their contacts to German mathematics before the war. As a research question, I then suggested to submit the folklore to a critical scrutiny by inspecting various topoi which are uttered again and again in this context. These topoi are, in my opinion, on the one hand Bourbaki as a model of mathematical presentation and teaching (the Bourbak projekt as a continuation of the project “Moderne Algebra”; the “new math” movement in secondary school didactics), on the other hand the conceptual innovations authored by Bourbaki and his members, strongly influencing further research in the fields concerned, like Weil’s approach to integration theory or Schwartz’ distributions and so on.

As a central source, I inspected the Gäste- and Vortragsbücher of the MFO. In each case, a considerable number of relevant entries can be found. A particularly important event in this context is the deutsch-französische Arbeitstagung in August 1949, where for instance Jean Dieudonné presented the Bourbaki project (9-8-1949, “Exposé du but, de la méthode et du plan des ‘Eléments de Mathématique’ de N. Bourbaki”). In his talk, he presented in some detail the plan of *Éléments de Mathématique* (then still largely to be written), and in fact this plan resembles closely the one discussed during an internal meeting of the group in February 1949

(see the document nbt019 of the online Bourbaki archives). The other French contributions to this MFO meeting show clear thematic and stylistic differences with respect to the German contributions (and to other French contributions from the early time at the MFO by authors not related to the Bourbaki project).

It is desirable to include other sources in this investigation. Liliane Beaulieu extensively interviewed Henri Cartan in the late 1980s and early 1990s; in these (unfortunately so far unpublished) interviews, Cartan's role for a renewal of contacts to German mathematics after the war is discussed in detail. The Seifert-Threlfall diary contains, as far as it is accessible online, only a few hints relevant to our question. The most promising source, however, is certainly the internal Bourbaki correspondence from the immediate postwar years; unfortunately again, this correspondence's archival accessibility is pending for the moment. Another useful source would be the lists of contributions to the Bourbaki seminar at the time.

A valuable study concerning Bourbaki's influence on the mathematical content of the work done in postwar German mathematics could be done in connection with the establishment of sheaf theory in Germany. It is true that sheaf theory was first developed by Jean Leray, a French mathematician but not a Bourbaki member, but the theory's scope and methods were strongly enhanced by the Bourbaki members Cartan, Serre, Godement and Grothendieck. In Germany, these contributions were received by Hirzebruch, Remmert and Grauert. The German authors at first even didn't have a German word for the French "faisceau" at their disposal; see [2], for example. A comparison of the terminology, definitions and methods used by German and French authors respectively would certainly be useful in order to trace the reception of French mathematics in German mathematics of the time.

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### **Post-war-migrations healing a partial breakdown in communication: influences of American and Soviet mathematicians in Germany after 1945**

REINHARD SIEGMUND-SCHULTZE

The conditions for German mathematicians to take part in international mathematical communication had deteriorated under the Nazi regime, both with respect

to the available literature and to oral communication, in particular the participation in conferences. The resulting partial breakdown in communication was palpable on both sides, that means also foreign mathematicians became less aware of the mathematics produced in Germany between 1933 and 1945. In particular, there was less international awareness of German results due to politically tainted publication outlets such as “Deutsche Mathematik” (which incidentally contained some very valuable research articles, for instance by Oswald Teichmüller on quasi-conformal mappings) and, finally, due to secrecy regulations during the war.

After the war there started a two-fold process of migration, first, of further emigration, particularly towards the United States, and second – to a much smaller extent – of re-migration to Germany of former refugees from Nazi Germany. The further emigration was strongly influenced by the precarious economic situation of scientists in Germany after the war. It brought knowledge particularly in applied disciplines, such as aerodynamics and ballistics (Adolf Busemann), to the United States. Also some younger and promising mathematicians in purer domains such as Hans Zassenhaus and Wilhelm Magnus left Germany. The re-migration was, above all, resulting from failed accommodation of some former refugees from the Nazis to the science systems of the host countries, particularly to the strong component of elementary teaching there. Basically five research mathematicians came back to Germany, and all went to the Western zones (another one, Hermann Weyl, went back to Switzerland):

- algebraist Emil Artin (1898-1962), 1958 to Hamburg, coming back from US
- algebraist Reinhold Baer (1902-1979) going 1956 to Frankfurt/Main, coming back from US
- analyst Hans Hamburger (1889-1956), going 1953 to Cologne (Köln), coming back from England/Turkey
- analyst Friedrich Levi (1888-1966), going 1952 to West-Berlin (1959 to Freiburg), coming back from India
- Carl Siegel (1896- 1981), going 1951 to Göttingen, coming back from US

Of all the five mentioned Baer was youngest, and he built in Frankfurt “one of the liveliest schools of algebra in Europe” ([7], p. 343).

In the last months of the war not only German mathematicians from those universities which were to be integrated into the territories of the victorious nations (Königsberg, Breslau, Strassburg, Prag) fled, and this mainly to the Western part of Germany. Also the Eastern part of Germany, since 1949 the German Democratic Republic, was already then and during the political turn after 1945 deserted by leading mathematicians (F. Rellich, G. Bol, R. König, F. K. Schmidt, F. Lösch, O. Furch, van der Waerden). Several of these scholars, and, in addition, mathematicians who had been temporarily dismissed for political reasons in the Western zones, found a first place of refuge in Oberwolfach, which had been founded as a Reichsinstitut for Mathematics under the Nazis in 1944.

There were a few former refugees from the Nazis who went to East Germany after the war, but mainly for political reasons (L. Boll, W. Hauser, L.A. Kalužnin);

none of them was outstanding as a researcher. Very few mathematicians (A. Klose, H. Reichardt) from the Eastern part of Germany were sent to the Soviet Union as so-called “specialists”. This is a so far little researched process which was probably alleviated by favorable material conditions for the mathematicians in the severe post-war years and by prospects for influential positions after their return.

Both in the West and in the East mathematical communication with the mathematicians of their respectively responsible occupying powers (U.S. and Soviet Union) proved crucial for healing the partial communication break-down in mathematics. Students from both West-Germany and East-Germany went to the universities of their respective allies who happened to be (partly due to previous emigration in the case of America) world powers in mathematics. The re-migrants to the Western zones, such as Baer and later Artin, visitors to the West such as O. Taussky-Todd, R. Courant, and J. Dieudonné, and guest professors from the Soviet Union (L.A. Kalužnin, B. Gnedenko) in the East provided education for young German mathematicians and partly mathematical re-education for the older ones. In some respect foreigners and re-migrants brought ideas back to Germany which had once been blossoming there (Modern Algebra and Topology) and had meanwhile borne fruit abroad (for instance Bourbaki).

The process of further emigration and remigration after 1945 was strongly influenced by political factors, misunderstanding between former refugees and mathematicians who had remained in Germany, bureaucratic handling by the authorities of recompensation claims, a general failure of the political “coping with the Nazi past” (“Vergangenheitsbewältigung”), new political pressure from Communist East etc. A systematic historical discussion of these processes, which shaped international relations between East and West in the decades to come, is still a desideratum.

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## Computers for Science: Scientific Computing and Practical Mathematics in Germany 1874–1958

ULF HASHAGEN

This lecture aimed at giving a ‘longue durée’ survey of the development of ‘scientific computing’ and ‘practical mathematics’ in a national system of science and innovation from 1874 to 1958. The beginning of this study is marked by the first (and failed) attempt of a small group of astronomers in Berlin to establish a new ‘cross-section-discipline’ of ‘scientific computing’ in German universities in 1874, its end is marked by the beginning of the extensive provision of West German universities with electronic computers in 1958. This spread of computers resulted in the West Germany in an extraordinary fast adoption of methods of scientific computing in almost all parts of the sciences and engineering sciences, and at the same time a process started which resulted in the institutionalization of the new ‘basic-discipline’ “Informatik” [1].

One of the most striking aspects of my investigation is the way in which new historiographical methods are used in order to describe and analyze this highly complex interdisciplinary historical process. Contrary to the established historiography in the history of science—and especially in the history of mathematics and computing—the historical argumentation is not focused on discipline-specific scientific results *per se*, but on the scientific practises and ‘cultures’ of ‘scientific computing’ or ‘practical mathematics’ in different disciplinary contexts [2]. Therefore in this investigation the (mechanical) calculating machines and mathematical instruments as well as the punch-card machines are not interpreted as the ancestors of the modern electronic computer and the history of these machines is not interpreted as a prehistory of computing. Instead, the modern electronic computer as well as the numerical and graphical methods and the (mechanical) mathematical instruments and machines are seen as a partly interconnected ‘apparatus’ which is used in the sciences and in engineering as a specific sort of ‘research technology’ [4]. As a consequence the users of mathematical methods, of mathematical instruments and mathematical machines are seen as import actors in this process (using a historiographic approach from the history of technology [3]).

The overall picture shows that historical processes can only be understood by analyzing different ‘disciplinary histories’, which were connected through institutions such as universities, scientific societies, ministries and research funding organizations as well as through negotiations in the national science system as a

whole. The main issue under discussion is how national or disciplinary ideologies as well as the institutional structures of the national science systems influenced the usage and the development of the methods and instruments of scientific computing and practical mathematics.

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### Mathematical Logic in National Socialism

VOLKER PECKHAUS

Mathematical logic in Germany could take decisive steps towards an institutionalization during the Third Reich, although, as an abstract discipline, it stood in opposition to national socialist ideology. Anticipated by Leibniz and pursued in his rationalistic succession, the philosophical discussion of formal logic suffered from a drawback after Kant and Hegel. Philosophers of the time working on the relation between sciences and philosophy were primarily interested in epistemology and methodological questions, not in problems of formal logic. In the second half of the 19th century the logical discussion was revived by mathematicians, provoked by foundational problems in mathematical practise (algebra, geometry). These developments were largely independent from the philosophical discussions on logic.

In the 1930s mathematical logic was in a very dynamical process of development. Logical centers in German speaking countries were Göttingen, Vienna viz. Berlin, and Münster. David Hilbert in Göttingen and his school (“Hilbert-Schule”) started with logical studies of their own in 1905. These studies were part of their efforts to realize the axiomatic programme. After the debates with L.E.J. Brouwer on intuitionism questions of proof theory moved into the focus of work. In the centers of logical empiricism in Vienna (Vienna Circle with Rudolf Carnap) and Berlin (Hans Reichenbach’s Berlin Society for Scientific Philosophy) logic was used to provide the syntax of a scientific universal language. The problems in modeling physical laws led to the development of inductive and probabilistic logics. In Münster Heinrich Scholz gathered the group of Münster, working in the history of logic, proof theory according to the Hilbertian model, and semantics.

Most of the members of logical empiricism emigrated. Rudolf Carnap and Hans Reichenbach, e.g., played important roles in the emergence of analytical philosophy in USA. Kurt Grelling, however, who tried to continue the work of the Berlin Society after Reichenbach’s departure to Turkey, was murdered in Auschwitz. The

Hilbert's School in Göttingen was the target of ideological hostilities, when Ludwig Bieberbach took the quarrel between Hilbert and Brouwer as an example for the application of an antisemitic variation of integration typology, first suggested by the Marburg psychologist Erich Rudolf Jaensch, to mathematics. When Gerhard Gentzen was enrolled to military service research on logic and foundations in Göttingen was disrupted. The group of Münster was heavily attacked by Max Steck when he propagated his special kind of German Mathematics. Nevertheless, Scholz was successful in institutionalizing mathematical logic by rededicating his chair of philosophy to a chair of mathematical logic and foundations (1938). He used arguments standing close to the national socialist self-image. He stressed that mathematical logic was of German origin (Leibniz, Frege, Hilbert) and emphasized that Germany fell behind other countries like, e.g., Poland in respect to the institutionalization of the subject on university chairs. Münster became the most influential logical center in Germany. After the war the Institute for Mathematical Logic and Foundational Research was founded in Münster in 1950. It was the first institution of this kind in Germany. The logicians of the school of Münster became decisively involved in the reconstruction of mathematical logic in the Federal Republic of Germany and in the German Democratic Republic.

### **The journal “Deutsche Mathematik” (1936-1942/44)**

PHILIPP KRANZ

As in other sciences, there was also in mathematics a “German” movement in the Nazi era in Germany [1, 2]. This led to the founding of a new mathematical journal, the “Deutsche Mathematik” (DM, “German mathematics”) which was published in seven volumes between 1936 and 1944. The talk, which was based on the speaker's master thesis [3], considered certain relevant aspects about this journal: the prehistory of the founding, the financial support by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) and the mathematical and political contents of the journal.

The most prominent Nazi mathematician, namely Ludwig Bieberbach, played a decisive role in the founding of the DM. In October 1934, he applied for funding from the DFG in order to launch a “German journal for mathematics”. Bieberbach's justification for such a new journal was the lack of a periodical which could represent the “German” mathematics and mathematicians. His further aim was to integrate and legitimize mathematics in the Nazi ideology. In this context, the participation of students and young scientists in the journal was very important in Bieberbach's eyes.

After the “Gleichschaltung” of the DFG under its Nazi president Johannes Stark in 1934, it supported the project emphatically and conceded extensive financial support [4]. After one year of correspondence between Bieberbach, the DFG and several publishing companies, the journal was then officially published by S. Hirzel on behalf of the DFG, which paid all printing and other costs as well as an enormous extra honorarium for the editors, Bieberbach and Theodor Vahlen.



The first issue appeared in January 1936 in a run of 6000 copies. The production of the journal was technically very sophisticated, format and amount were both high whereas the selling price was very low. The consequence was an explosion of the costs in the first year in such a way that the DFG under their new president Rudolf Mentzel reduced the financial support in 1937. But nevertheless, in the following years three supplements to the DM were even published. Additionally, the new series “Forschungen zur Logik und zur Grundlegung der exakten Wissenschaften” (Research in logic and foundations of the exact sciences) was released in eight issues from 1937 to 1943 in the scope of the DM. The philosopher Heinrich Scholz from Münster University played an important role in the founding of this scientific journal, which was the first one about research in foundations of mathematics to appear in Germany. An earlier attempt to found a periodical in this area of mathematical research failed in 1908 [5].

The DM was initially divided into two main categories: “work” (“Arbeit”) and “research” (“Forschung”). An own category for articles in the history of mathematics was created later. In addition, every issue contained reviews about mathematical publications in very variable number and length.

In the research part of the journal, you can find articles from various disciplines of mathematics (e.g. analysis, geometry, algebra, statistics). Compared to other mathematical journals (Crelles Journal, Mathematische Zeitschrift, Mathematische Annalen) geometry and statistics were disproportionately high represented in the DM. These were the disciplines that could most easily become connected with ideology. The most prominent author was the young Nazi student Oswald Teichmüller, who is well known for his contributions to the theory of conformal mappings. He published 21 research articles in the journal.

In the so called “work” part, alongside articles about questions of education of mathematics on school and university many articles with political/ideological contents were placed. Most of these papers were written by students, who reported on the mathematical camps (“mathematische Arbeitslager”) which were conducted at many universities at that time (e.g. Berlin, Bonn, Gießen, Heidelberg). These camps were part of the ideological education of the students, its aim was the building of a feeling of community between academics and students (in the sense of the “Volksgemeinschaft” ideology).

In the DM, all in all 200 authors published more than 500 articles. Almost one quarter of the authors came from the circle about Bieberbach in Berlin. In other university towns in Germany, there was often a group of young mathematicians around one professor who became authors of the journal which is one reason why the rate of young mathematicians involved in the DM was very high. For those young academics, the cooperation was a good possibility to start or climb in their scientific career.

The DM was definitely an ideological project, started by Bieberbach and maintained by the regime through the DFG. Many pro-Nazi mathematicians made use of the chance to admit to the political regime by collaborating with the journal. But already since the second volume the obvious ideological articles became more

and more unimportant. In a censored republication of the seven volumes in 1966 by Swets & Zeitlinger, these texts were mostly replaced by blank pages. For a deeper understanding of the movement “Deutsche Mathematik” and the correspondent journal, you have to consider the prehistory and biography of the involved actors in connection with the general history of the Nazi period in Germany. A closer regard to the further biography of the involved mathematicians after WW II would certainly be interesting.

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### **The concept of autarky and Nazi expansion policy to the East. Agricultural Research in Kaiser Wilhelm Institutes and the role of mathematics**

SUSANNE HEIM

Germany’s serious food shortages during the First World War in retrospect were seen as one of the main reasons for the country’s defeat. As a consequence after WWI self-sufficiency was propagated with particular emphasis, from the 1930ies also in the context of preparation of war – aiming to make Germany “blockade safe”. The attempts to raise agricultural production and to substitute imports was combined with a strict regulation of consumption.[1]

The decisive figure to realize this policy in Nazi Germany was Herbert Backe, throughout many years he was Secretary of State in the Reich Ministry for Food and Agriculture. Backe was far more influential than the actual Minister of Food and Agriculture, Richard Walter Darré and went on to have a decisive influence on wartime nutrition and food rationing in Germany, as well as on starvation policy in the Soviet Union. ([2], pp. 49-68) Backe belonged to the Senate of the Kaiser Wilhelm Society (KWS) since 1937, and became its vice president in 1941. Due to his influence agricultural research received generous funding.

Three fields of research which can be seen as the cornerstone of Backes concept.

- (1) The attempts to enlarge productivity by scientific means;
- (2) research efforts to optimize consumption of agricultural products;
- (3) the restructuring of agricultural economy in a continental dimension.

In all these fields it was war, or to be more precise: expansion policy, which shaped the development of science. The most important institutes for the increase of agricultural productivity were the KWI for plant breeding and the KWI for research on animal breeding. The main objectives of research in this field were:

- (1) to breed plants with high percentage of fats and proteins.
- (2) to create food and fodder crops that were as resistant as possible to pests, diseases, drought and frost.
- (3) Breeding animals that would provide more meat, milk or wool even if only fed with only comparatively small amount of fodder and especially only the with domestic fodder plants. ([1], pp. 35-46)

When the war started, the scientific horizons shifted. Researchers now had an opportunity to increase agricultural production in the occupied and dependent territories, in accordance with Backe's plan for a European food economy. In respect of the occupied territories of the Soviet Union, researchers felt that their task was twofold: on the one hand, they should breed plants that would be particularly well suited to local climate and soil conditions, and on the other, they should use the plant genetic resources in the conquered eastern territories (the famous Vavilov institutes) to 'improve' native German crops. ([3], p. 66)

The research on the relationship between diet and performance conducted in the animal breeding research institute had its parallel in research on human beings in the KWI for Work Physiology. There researchers studied calorie usage and performance in Soviet prisoners of war and Italian military internees. They found that 'only the calories supplied over and above those needed to cover resting metabolism could be utilized for performing physical work'. ([4]; [1], pp. 78-91) They came to the conclusion that 'insufficient food does not merely [result in] lower production; in fact it actually entails a waste of food'. [5] If the RMEL was unable to increase rations for foreigners, Heinrich Kraut, head of the nutritional research department argued, it would make no sense to bring more forced labourers to Germany. The problem could be evaded if the foreign workers stayed in their home countries and thus would not have to be fed out of the reserves available to the German people.' [5]

The policy of expansion did more than provide new material advantages for science. The concept of autarky provided scientists of various disciplines with an increase of prestige and particularly in agrarian research an enormous increase of fundings.

Most of the results of the research were not limited to the conditions of a self-sufficient continental-scale economy, and much of what had been achieved by agricultural research between 1933 and 1945 was still usable after the war. For animal breeding, agricultural ergonomics and nutritional research, the collection

of comprehensive statistical material, among other approaches, laid the foundations for scientific analysis of performance. ([6]<sup>1</sup>, p. 92) Regardless of plans for a continental economy, animal and plant breeders were always interested in the hereditary nature of performance. Findings on the links between diet and performance were still in demand in post-war Germany, and were later applied to the famine regions of the ‘Third World’. The artificial insemination of cattle, tested at the KWI in the 1940s, is now an essential part of livestock farming. German wartime expansion policy left its marks on diverse scientific fields, contributing to an expansion of scientific knowledge and advances in a variety of disciplines.

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### **Towards a prosopography: Mathematicians in Germany 1919-1961 – first considerations**

BIRGIT BERGMANN

“[Prosopography] is an attempt to bring together all relevant biographical data of groups of persons in a systematic and stereotypical way. As such it is a system for organizing mostly scarce data in such a way that they acquire additional significance by revealing connections and patterns influencing historical processes.” ([1], p. 37)

The aim of this talk was to evaluate whether prosopography is an adequate method to investigate the careers or the professional lives of mathematicians in Germany from 1920 to 1960. The focus of such an approach would be to trace

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<sup>1</sup>[6] works on the assumption that while methods of statistical data-collection for animal breeding during the Nazi period left a little to be desired, the ‘considerable amount of data’ was of great assistance to the debate about breeding targets and strategies, formed the basis for successful scientific innovation and led to the rapid increase of animal production and also to the rapid reduction of costs.

patterns and characteristics resulting from National Socialism and the emigration of mathematicians.

Two examples of recent prosopographical research [2]<sup>1</sup> demonstrated practical problems and methodological difficulties with this approach.

The first step of a prosopography is to define the group of people one wants to observe. The criteria that determine whether a person is part of the group need to be clear and explicit. Thus the group of people is constructed more or less artificially. This is an important fact to keep in mind, when the collected data is interpreted in the end. The sources providing the data for a prosopography need to be reliable, significant and available, of course. The next step of a prosopography would be to design a kind of questionnaire for all the people of the group. The hypothesis or research interests determine which questions are asked. But as the sources provide the material for the answers one has to evaluate between what one wants to know and what is possible to know. The collected data has to be verifiable. Every prosopography needs interpretation. A simple collection of data is of no use for historical research. The analysis of the collected data depends on the research interests and on the questions asked in the beginning.

To summarize: “The efficiency of prosopography depends on the general research objectives and the specific questionnaire on the one hand and on the available sources of literature on the other. The research objectives determine whether or not a prosopographical approach is methodologically advisable; the source material determines whether or not such an approach is possible; the relevant general historical and theoretical literature is needed to enable results to be put in a more general context.” ([1], p. 69)

A lively and fruitful discussion on the opportunities and difficulties of a prosopography on mathematicians in Germany from 1920 to 1960 focussed on the following issues. For a prosopographical investigation it might be advisable to distinguish between mathematicians working at universities and those working at non-university institutions. As far as the years of the Weimar Republic and National Socialism are concerned the source material is considered to be sufficient for a prosopography. The careers of mathematicians in Germany after the Second World War are much harder to trace and further sources are needed to investigate this period. Another problem discussed was how personal relations between mathematicians or international contacts could be registered.

A prosopography might be a useful tool for investigating the history of mathematics in Germany between 1920 and 1960 but further discussion and consideration is needed.

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<sup>1</sup>The other example was based on a prosopographical approach to applied mathematics in Germany during the 1920 which forms part of Birgit Bergmann’s dissertation and is not yet published.

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