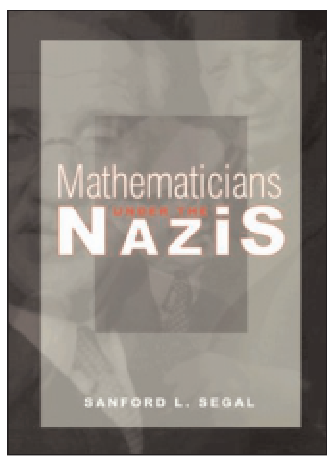
Mathematicians under the Nazis

Reviewed by Jochen Brüning

Mathematicians under the Nazis
Sanford L. Segal
Princeton University Press, 2003
Hardcover, $85.00
ISBN 0-691-00451-X



Imagine an eminent scientist whose work impresses by its depth, by its impact, and by its beauty. It has become a cornerstone of research and education alike and provides strong inspiration and encouragement for younger scientists to tackle difficult problems of similar potential. Now one of the disciples discovers the fact, not usually mentioned in a scientific context, that this scientist supported a totalitarian regime while producing his celebrated work and, even worse, used his scientific abilities in a nontrivial, albeit not outright criminal, way to promote political causes of malignant forces. Such a discovery may well undermine the value system that supports total dedication to science and lead to disquieting questions: How is this possible? Will not the clarity of mind so essential to major scientific progress prevent such political blindness? If not, what does this say about the cultural dependence of science and the meaning of scientific achievements?

Stable scientific communities seem to protect themselves quite effectively against such poisonous thoughts, which may nevertheless affect individual members. A likely first reaction would be to study biographical material and historical accounts of the period in question. Scientists generally dislike unproven assertions and unjustified generalizations, which are difficult to avoid in historiographic writing. Thus a scientist initiating such a study would likely want to examine the extant original documents and other available testimony. Given the right circumstances, the study could develop into a full-fledged research project.

It is tempting to speculate that the author of the book under review found himself at some point in his career in the situation just described, his field being mathematics, in particular number theory, and his "fallen hero" being the German mathematician Ludwig Bieberbach. At any rate, Bieberbach would satisfy the criteria of scientific brilliance and active political support of the Nazi movement, and he is the character most carefully and completely described in this book. As he mentions in the introduction, the author developed over a period of years an increasing curiosity about and knowledge of German mathematicians under the Nazis. In the end, he designed a research project that met with the support of the Humboldt

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Foundation, thus allowing him to spend a fruitful period in Germany, filled with the searching of archives and the interviewing of surviving witnesses. In this way, the material basis for this book was collected. Naturally, his inquiry expanded beyond the original motivations to include other matters, such as the origin of the public image of mathematicians as "disembodied intellects" and the resulting contempt so often experienced by the mathematical community in confronting the political world. The mathematician-turned-historian then faces a dilemma: on the one hand, the motivation to carry out a historical study often has its roots in personal experiences asking for explanations, which the scholar may hope to find by uncovering hidden mechanisms of history; the need for proof, on the other hand, forbids speculation, even when plausible, and asks for ever more facts until, eventually, the "laws of history" emerge as self-evident. Historical methodology was developed exactly to avoid these two impossible extremes.

Sanford Segal explains his strategy for avoiding the obvious pitfalls. His basic credo says that "history is made by people", by individuals, or, more often, by groups of individuals connected by sufficiently intense communication and equipped with a sufficiently large common basis of codes and values. He views German mathematicians in the period between 1918 and 1945 as such a group, and he proposes to study this group in its entirety as an interacting body encompassing all professional mathematicians, not only those who made it into the textbooks. One expects that all possible ways of reacting to and coping with the Nazi administration would appear within any such group, but the probability distribution may vary with the social status of that group and possibly other parameters.

Segal sees his study as being of interest even to those with little mathematical knowledge, because the mathematical method of axiomatic thinking and deductive reasoning, commonly believed to be of universal validity, was severely tested by the Nazi "axiom of racial compatibility", which had to be applied to everything in life, in particular to thinking. This axiom was happily embraced by some mathematicians, like Bieberbach and Teichmüller, tolerated by many others, and ignored by the rest. However, at that time the issue of whether or not there were decisive "racial"—or rather cultural—differences in mathematical theory and proof could hardly be avoided by anyone taking the mathematical profession seriously. There is the hope, already mentioned above, that intellectual training in mathematics would immunize against demagogy, giving one the means to detect the hidden interests embedded in flawed argumentation and to unmask their innumerable disguises and dissimulations. The contrary has also been argued, that the abstractness of mathematical thinking creates a state of alienation from practical life ("Weltfremdheit" in German), which produces a certain naiveté or even blindness in judging political promises and intentions. Taken as a whole, the development of the German mathematical community in the time span from 1918 to 1945 should, according to Segal's main thesis, tell us something significant, independent of our special interest or qualification in mathematics.

To convince his readers, Segal expands his material over eight chapters totaling 508 pages. After explaining in Chapter 1 his working principles, as briefly summarized above, he proceeds to discuss in the next two chapters the academic crisis in Germany during the Weimar Republic and the so-called "Grundlagenkrise" in mathematics, both epiphenomena of the great social and cultural restructurings leading into the First World War. This part of the book builds largely on existing material. With these preliminaries at his disposal, Segal presents in the next chapter three carefully chosen case studies. They are meant to illustrate the strong competition for funds and prestige not only among individual mathematicians but also among various agencies of the Nazi administration, an at first unintended but then highly welcome consequence of the ominous "Führerprinzip": Hitler saw the Nazi elite arise as survivors from a continuous struggle for power. While part of the material in this chapter is new and sharpens the profile of some characters involved, the structural defects of the administration, as well as the personal shortcomings of some administrators, are already well known.

Chapter 5 provides us with a fairly complete view of the professional life of mathematicians with academic degrees, again forged from a number of interesting case studies, based on original documents and a careful evaluation of existing work. The next chapter is entitled "Mathematical Institutions" and presents another twelve case studies that belong under this heading only if we give the word "institution" its most general meaning. Nevertheless, we find here a lot of interesting and little-known material. The events described vary greatly in significance, ranging from the rather marginal "Lambert project" to the efforts to found the Oberwolfach Institute and the organization of mathematical "working groups" at two concentration camps, a phenomenon whose significance up to now has been perhaps undervalued. We get a vivid impression of the burden the Nazi administration and the war put on the mathematical community: the elimination of Jewish (or Jewish-related) colleagues painfully questioned its solidarity and even its definition, while drafting and diversion of research power for military purposes emptied the ranks and considerably weakened scientific output.

The latter point, in particular the total contribution of mathematicians to the war effort, is still somewhat unclear in its quantitative and qualitative dimensions and thus might have been given more attention by the author. At the time, it was still possible to acquire new funds by emphasizing the importance of concentrated research in wartime. Such arguments made possible the establishment of the Oberwolfach Mathematical Research Institute, which took place officially with the appointment of Wilhelm Süss as director on January 3, 1945. This achievement required the special skills and connections of Süss, who may well be called the leader of German mathematics during the Nazi period. He was involved in practically every major decision within the mathematical community and was directing this community in many ways, e.g., by serving as president of the German Mathematical Society (Deutsche Mathematiker Vereinigung (DMV)) from 1937 till 1945 and as rector of the Universität Freiburg from 1940 till 1945.

The next chapter deals with Ludwig Bieberbach, the suspected fallen hero, whose eccentric and puzzling personality may have been what caught the author's attention in the first place. In this chapter we find the most complete account of Bieberbach's thoughts and deeds to date, again based on many primary and secondary sources. Bieberbach was one of the most brilliant mathematicians of his generation but was never really satisfied with his place in life. His philosophical interests and his mathematical experience led him to conceive a "racial theory of mathematics" that fit perfectly—and hardly by accident—with the Nazi ideology. Anyone hearing about Bieberbach's "conversion" from moderate German nationalist to ardent Nazi defender between 1932 and 1934 has wondered about the reason for this striking change, which certainly was not forced upon him. Segal suggests "personal self-aggrandizement as a governing theme in Bieberbach's professional life and his lack of deeply held beliefs," a plausible but somewhat shallow explanation. More enlightening is Segal's excursion into the development of "typological psychology" and its applications to racial theories, which Bieberbach adapted to his own mathematical typology, thus forming some sort of intellectual basis for his attempts at imposing Nazi ideology on the German mathematical community. The outright failure of these attempts attests to the stability of this community, but also to its relative unimportance for the goals of Nazi ideology.

The last chapter, entitled "Germans and Jews", could be expected to present a culmination and at the same time some sort of summary after the reader has absorbed an occasionally overwhelming amount of facts. This is not so, at least not in terms of the chosen format: Again we find a sequence of case studies that examine the fate of Nazi victims, like Hausdorff and Landau, but also of some Nazi sympathizers or at least ardent German nationalists, like Teichmüller, Witt, and Kähler. Other accounts in this chapter try to evaluate the extent to which the better-known protagonists featured in the preceding chapters helped colleagues endangered by the Nazi regime. The picture is rounded off by presenting some lesser-known cases, like the fate of the mentally ill but ingenious logician Gentzen and the difficulties the statistician Riebesell experienced after having positively reviewed a mathematical book written by a Jewish author. The idea is clearly to document the most "characteristic" patterns of behavior that were experienced or displayed by mathematicians during the Nazi regime while carefully elaborating the special individual aspects of each case.

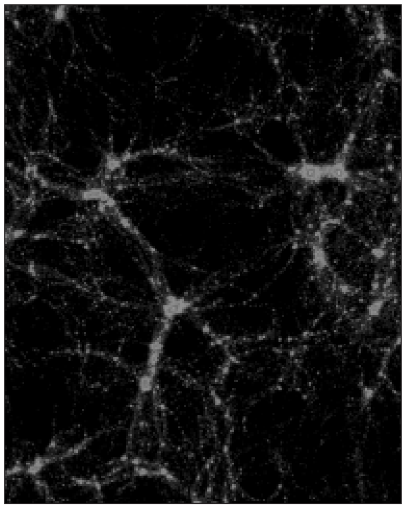
Among those who were not victims of the Nazi terror, we do not discover real heroes, nor do we find serious wrongdoers, but we learn a lot about the art of dissimulation. One has to keep in mind that the community of mathematicians by no means represents the social structure of German society; in fact, we are looking at a rather privileged group of people here. Of course, those who held offices of some importance, notably Süss, were in a more difficult position than the average mathematician: they could not achieve anything without a certain amount of collaboration with Nazi authorities. One handicap Segal had in writing about Süss and his activities is that the archive of the DMV was not yet open to him when he was doing his research. New material emerged after this archive was incorporated in 1996 into the Universitätsarchiv at Freiburg, particularly concerning Süss's treatment of the Jewish (or Jewish-related) DMV members who were excluded from membership after January 1939. This material recently caused some serious criticism among historians of Süss's behavior. Segal, on the other hand, collects a lot of evidence in his favor. It is notoriously difficult to reach a fair moral judgment of people like Süss. The more recent past of Germany and of other nations provides us with many such cases to be decided by historians of future generations.

As a mathematician, and in particular one of German origin, I found reading this book to be a most rewarding experience. The stunning amount of carefully researched details and the unusual selection of characters, if seen together, provide a rich picture of the (academic) mathematical community in Germany between 1918 and 1945, at least for someone already familiar with the Nazi era and the recent history of mathematics in Germany, and one can even sense its traces in the decades that followed, since Segal's interviews were all conducted after 1980. This is certainly a great achievement for an author who grew up in a very different cultural environment. Another impressive aspect of the book is Segal's extreme care in avoiding unwarranted or a priori biased judgments; as Segal puts it: "When evil is present, it is tempting to see things only in starkly contrasted black and white...the purpose of this book is neither to wash dirty linen publicly and assign assessments of guilt, nor to fit the events described into some preconceived social structure of mathematics or science. Rather, it is to describe the historical situation and development of the mathematics profession in Nazi Germany and its interactions with the state, allowing conclusions to emerge therefrom." Such conclusions, however, are never stated. To me at least, the most fascinating aspect of Segal's work is that it gives another, very detailed, illustration of what has been called the "banality of evil", i.e., the apparent impossibility of deducing the unimaginable atrocities of the Nazis merely from the criminal energy of individuals. It seems that very common weaknesses and vices may add up to monstrous deeds if only the "right conditions" are given—a rather disquieting thought.

From its dedication to detail and the habit of splitting almost all the important chapters of the book into sequences of case studies stems what is in my view the weakness of this book. There is no impression—and probably no intention—of comprehensiveness, and the events described do not connect to convincing larger structures, since there is so much focus on individuals. One is reminded of the geographers described by Borges, who ultimately set out to create a map of their country of scale one to one. The moving forces of history are of course only visible in events, in the historical details, but these cannot be understood in themselves; they need a perspective. Refusing to provide perspectives may be honest but renders the book much less valuable to the general reader. Thus, I think that Segal does not achieve what he was attempting, which is to write a social history of German mathematics in the first half of the twentieth century that would be interesting and informative enough to teach something to the general public. Those who are genuinely interested, though, will be rewarded by the contents, including a sizeable (if somewhat selective) bibliography and a substantial index.

About the Cover

This month's cover was produced by Joerg Colberg of the Virgo Consortium (`http://www.mpa-garching.mpg.de/Virgo/`). He writes:



"The image shows a slice through a simulation of N-body structure formation in a cosmological volume done by our group. Matter is represented by millions of computer particles subject to their mutual gravity. Calculating the gravitational forces between N particles is an $O(N^2)$ problem, which becomes computationally too expensive unless sophisticated algorithms are used. The total force acting on a particle is split into long-range and short-range components. The former can be computed using very fast Fourier transformations. The latter remains an $O(N^2)$ problem, albeit one of much reduced scale. Simulations with large particle numbers are typically quite slow, since cosmologists are interested in resolving smaller and smaller scales while keeping the size of the simulation box large enough to contain a cosmologically representative volume. In other words, while programmers try to keep the N^2 direct force calculations small, the requirements of cosmologists ensure they're always as close to the computer's limits as possible.

Despite the vast improvements in efficiency gained from advanced algorithms for the force calculation, the simulation still took about a month of computer time on a 128-processor Cray T3E parallel supercomputer at the Max Planck Society's Computer Center in Garching, Germany.

Simulations of N-body behaviour have become invaluable tools of cosmologists since the early 1970s. Every decade, N has increased by about two orders of magnitude, with the latest biggest computational effort, also done by the Virgo Consortium, exceeding ten billion particles. While the earliest N-body simulations were mainly concerned with testing the different models available, cosmology has since then become a precision science where a canonical model is investigated in as much detail as possible. Computer simulations have played an important role in this development and, along with better observations, we hope they will lead us to an understanding of the Holy Grail of cosmology, the formation of galaxies and structure from the uniform initial distribution of gas in the very early universe."

—Bill Casselman, Graphics Editor
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