

“Scientific Control” in Mathematical Reviewing and German–U.S.-American Relations between the Two World Wars

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Reflections of American mathematicians on the German leadership in mathematical reviewing between the two World Wars reveal one aspect of the rise of American mathematics to worldwide importance. Singular political events such as the mass exodus of German mathematicians and the interference in the work of the then dominant German *Zentralblatt* led to the foundation of the American *Mathematical Reviews* in 1940. A look at German national competition in mathematical reviewing during the 1930s (*Jahrbuch* and *Zentralblatt*), however, reveals deeper disciplinary as well as ideological and political roots of the “control function” of scientific reviewing that are not necessarily connected to international competition. © 1994 Academic Press, Inc.

Razmyshleniya amerikanskikh matematikov v dvadtsatikh i tridsatikh godakh XX v.o rukovodstve nemetskogo sistema matematicheskogo referirovaniya otrazhayut odin aspekt razvitiia globalnoi vazhnosti matematiki S. Sh. A. Politicheskie proisshestviya kak massovaya emigratsiya nemetskikh matematikov i narushenie raboty nemetskogo *Tsentralblatta* priveli k osnovaniyu amerikanskikh *Matematikal Revyus* v 1940 g. Vnutrinemetskoe sopernichestvo v tridsatikh godakh XX v. za rukovodstvo v nemetskoj sisteme matematicheskogo referirovaniya (*Yarbuch*, *Tsentralblatt*) otkryvaet slozhnye distsiplinnye, ideologicheskie i politicheskie korni “kontrolnoi funktsii” nauchnogo referirovaniya, chastichno nezavisimye ot mezhdunarodnogo matematicheskogo sorevnovaniya. © 1994 Academic Press, Inc.

Reflektionen amerikanischer Mathematiker über die Führung Deutschlands im mathematischen Referatwesen zwischen den Weltkriegen widerspiegeln einen Aspekt des Aufstiegs der U.S.A. zu einer mathematischen Weltmacht. Politische Ereignisse wie die Massenvertreibungen deutscher Mathematiker und Einmischung in die Arbeit des damals herrschenden *Zentralblatts* führten zur Gründung der *Mathematical Reviews* im Jahre 1940. Innerdeutsche Auseinandersetzungen um die Führung im mathematischen Referatwesen in den 1930er Jahren (*Jahrbuch*, *Zentralblatt*) zeigen, daß die “Kontrollfunktion” des Referatwesens tiefere disziplinäre, ideologische und politische Wurzeln hat, die nicht notwendig mit dem internationalen Wettbewerb in Verbindung stehen. © 1994 Academic Press, Inc.

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INTRODUCTION

Shortly before the end of World War I the journal *Science* published an article by the American mathematician Edwin B. Wilson entitled “Insidious Scientific Control.” Repeating a statement of the American Association of University Professors, Wilson pointed to the “danger that we may win the war in the military sense,

only to find ourselves dominated by German knowledge and German science” [41, 491]. Wilson considered scientific publications, and especially reviewing, to be a pivotal element reinforcing Germany’s strength in science:

It seems to me that the German advances in science are not themselves alone responsible . . . for our past devotion to Germany. . . . It is impossible for a mathematician to work to advantage without being able to consult the *Jahrbuch für Mathematik*. [41, 492]

This article argues that scientific—in particular mathematical—reviewing in this century cannot be considered merely as a tool for research or historical documentation, isolated from prevailing political and social conditions. While two fundamental requirements for scientific reviewing—namely “objectivity” and “modernity” (to be explained below)—are necessary for the usefulness of reviewing under any political and social conditions, it is the “control function” of scientific reviewing which relates it to the power structures within science and society and to the competition of different social and national groups. “Control” in scientific communication is not restricted to reviewing. It is probably even more manifest in the policies of core refereed journals. There as well as in the case of scientific reviewing, the “control function” can be partly interpreted in terms of Polanyi’s “hardly codified” beliefs, which are “tacitly implied in the traditional pursuit of scientific inquiry” [26, 64]. “Authority” Polanyi argued, “is [partly—R.S.] enforced . . . in the control exercised by scientists over the channels through which contributions are submitted to all other scientists” [26, 64].

In particular, this article intends to contribute to the historiography of German–U.S.-American mathematical relations in this century, a topic that has not been seriously approached as yet in spite of its obvious importance for the understanding of the course of contemporary mathematics.¹ To be sure, the single most important historical issue in German–American mathematical relations of that time is the exodus of many prominent German mathematicians after 1933 due to Nazi policies. But the shift of the center of gravity in mathematics from Europe to the United States is a much broader phenomenon with mathematical reviewing being among the more subtle components. This article will investigate how much the disciplinary “control function” of reviewing has historically been reflected in the interests of the national scientific communities. The documentary evidence given in this article authorizes conclusions concerning the value that some German and American mathematicians between the World Wars placed on adequate national representation in abstract journals;² on the other hand, it also reveals the fears that some of these mathematicians harbored against journals which were led by foreigners. Although the factual basis for overt allegations of biased review-

¹ The author is currently writing a book on the whole complex of German–U.S.-American mathematical relations between the two World Wars. The period of German–American mathematical relations before World War I is covered in [25].

² Abstract journals (sometimes “abstracting journals”) publish abstracts of scientific articles and books. In mathematics, at least, abstracts are usually not longer than 10 sentences. A longer abstract (possibly some pages) would be called a review instead. Reviews are never written by the actual author of the paper, but abstracts sometimes are (“author abstracts”).

ing seems to have been weak for the most part, international scientific competition in the case of abstract journals, as well as elsewhere, undoubtedly exceeded the usual internal disciplinary competition. In this context nationalism in the scientific community can be (partially) understood as the expression of both fear of and desire for “scientific control.”

At the same time, however, one has to bear in mind that mathematical reviewing was always but one part of the “mathematical culture” as a whole. This let the very research-oriented young American mathematical community in the 1920s carefully weigh the advantages and disadvantages of founding an abstract journal of their own and finally convinced them to put off this project. Thus, one also recognizes limits of the explanatory power of the “control” concept, at least if it is restricted to just one part of the scientific culture. The evidence also shows that, for a variety of historical reasons, German–American scientific relations, at least in the 1920s, were not burdened by the fierce and open nationalism often typical of scientific relations within Europe. This was due partly to the fact that “nationalism” in science was always tempered, sometimes even superseded, by “internationalism” as a requirement for science. It was the interference of the criminal political regime in Nazi Germany into mathematical reviewing which let leading German mathematicians fully forget about their dependence on internationalism in science and which, on the other hand, made the American *Mathematical Reviews* (founded 1940) the true defender of internationalism in mathematics.

A brief discussion of the decline of the *Jahrbuch über die Fortschritte der Mathematik*, which held a near-monopoly on mathematical reviewing until 1931,³ shows that the “control function” of reviewing is not necessarily connected to any international competition but has disciplinary and ideological roots of rather different origins as well.

First, however, I will make some preliminary remarks, in order to set this historical investigation against the background of the current situation in mathematical and scientific communication.

In recent years informal and semiformal methods of communication (electronic mail, oral communication, preprints) have grown in importance. Still, the various abstract journals have retained an important place within the overall system of scientific communication,⁴ although they are currently being transformed by the influence of electronic data processing.

In mathematics, the three leading abstract journals that cover the entire span

³ Except for the less important Dutch *Revue semestrielle des publications mathématiques*. Many of the following remarks, as far as they are related to the *Jahrbuch*, are based on [36].

⁴ With respect to the importance of abstract journals the situation today does not seem to differ significantly from that of 1965, when a leading American mathematician wrote of the American *Mathematical Reviews*:

This provides for all the Western countries a reasonably careful and current critical check on all mathematical research activity; it inevitably gives a first measure and emphasis on quality. Publication of *Mathematical Reviews* is now possible only through Federal subsidy. Its presence in the country is a vital element in American leadership in this field of science. [20, 195]

of the discipline, namely the American *Mathematical Reviews* (founded 1940), the Russian *Referativnyi Zhurnal* (1953) and the German *Zentralblatt für Mathematik* (1931), are organized on a national base to this day. As recently as 1987, yet another attempt to prevent unnecessary duplication in the reviewing done by *Zentralblatt* and the *Reviews* failed, not to mention the defeat of a proposed fusion of the two journals. In these negotiations, problems of national prestige and the interests of publishers were of no minor importance.⁵

If today, as suggested here, after half a century of cultural exchanges and political alliances between the United States and West Germany, traces of scientific nationalism, on both sides, still impede collaboration, then it is safe to assume that much greater discrepancies were present in the 1920s and 1930s, when political and language-related barriers created additional problems.

To put it another way: The present situation in German–American scientific relations can be better appreciated against the background of history. In some respects the situation has been reversed since the cessation of German complacency in science.⁶ The German mathematician and refugee to the U.S., Hans Lewy, remarked in 1985 that “[m]any American mathematicians now think that their values are the right ones and should be accepted by everyone. True, mathematics is here very well developed, but still these beliefs are really due to the fact that we are more powerful politically” [1, 189].

THREE REQUIREMENTS FOR SCIENTIFIC REVIEWING: OBJECTIVITY, MODERNITY, AND CONTROL

The main goal of abstract journals has always been to enable scientists to keep abreast of the growing literature by concentrating its main results in one place. In order to do this, abstract journals had to meet certain requirements which have been changing throughout history:

(1) The first requirement for an abstract journal to be useful is its “*objectivity*,” that is, abstracts are supposed to be written by scientifically competent reviewers who give no gross misrepresentation of the papers under review.

(2) The second, equally important, requirement is “*modernity*,” that is, the journal is supposed to meet the contemporary needs of mathematical communica-

⁵ From [7, 85]. However, agreement has been reached in the meantime on the classification index to be used by both journals. Close collaboration between the Western and Soviet abstract journals was doomed to failure in the past for political reasons of a different nature. Even negotiations between the Soviet Academy and the East Berlin Academy of Sciences, which published the *Zentralblatt* together with West German mathematicians until the 1970s, led to nothing [ABAS, *Reine Mathematik* 1a, C 821 *Zentralblatt* 1953–1968].

⁶ This is, of course, not at all to equate the nationalist attitudes of Germans, especially of the Nazi period, with some feelings of scientific and social self-sufficiency on the part of some Americans today (which, incidentally, may be changing, given the current tight economic situation in American academia). These attitudes are morally and historically incomparable. I leave the term “values” in the following quote unexplained as Lewy does. However, it would certainly have to include much of the social environment of research such as ideological and political positions, publication habits, and “hardly codified beliefs” in Polanyi’s sense.

tion as to “comprehensiveness,” rapidity of publication, the classification and the languages used, etc.

(3) Third, the “*control function*” exercised by scientific reviewing over research and its results is already a part of any scientific discipline (and, as such, not necessarily connected to the problem of international scientific relations). For all the resentment an individual scientist may feel about the evaluation of his or her work, scientific control, as exerted in reviewing, serves the “interests” (this term, of course, already reflects a certain power-structure within the discipline) of the scientific community as a whole, since it makes selections from an otherwise unordered mass of information.

While “objectivity” is least connected⁷ to the “control function” of reviewing, “modernity” is to a considerable degree. As a matter of fact, a first and principal means of control is the selection of the papers to be included in an abstract journal. Here, problems of language have historically played a major role. Because of the quick obsolescence of new results, the rapidity of reviewing has been a particularly important feature of the scientific control exerted by abstract journals. Historically, completeness of coverage (connected to “selection”) and rapidity of reviewing have always stood in contradiction to each other. This occurred especially in the case of the *Jahrbuch über die Fortschritte der Mathematik*, which was traditionally bound to stiff editorial principles.⁸

To be sure, the careful, year-by-year reviewing of the *Jahrbuch* determined the value of this periodical as a mirror of the history of mathematics.⁹ But scientific reviewing has been of even greater importance as a tool for research, at least since the late 19th century. With the growth of mathematical production, the delay in publication of the *Jahrbuch* had become a scandal by the 1920s at the latest. Thus, the requirement of “modernity” became increasingly violated.

REORGANIZATION OF MATHEMATICAL REVIEWING AFTER WORLD WAR I IN GERMANY AND FAILED AMERICAN ATTEMPTS TO FOUND A NATIONAL REVIEWING JOURNAL

Thus, it was quite accurately that an internal report, delivered on April 24, 1920, by the Committee on Bibliography (founded in December 1918) of the American Mathematical Society (AMS), criticized the *Jahrbuch*’s “long delay in

⁷ But there has been some influence of the surrounding culture and language even on the “requirement of objectivity” (see below). Historically, there has been a long discussion of the extent to which the reviewer is supposed to reveal his own scientific standpoint. From the outset, the American *Mathematical Reviews* included some longer, critical abstracts, i.e., “reviews” [36, 27–29].

⁸ The main editorial principle is expressed by the very name *Jahrbuch* (Yearbook). Since the mathematical literature of a calendar year was to be reviewed systematically and with utmost completeness, the publication of the first abstracts could not begin before the following year. Personal and financial problems and—last but not least—wars added to these problems, and there was sometimes a delay of up to seven years in the publication of abstracts.

⁹ This has also been acknowledged by American historians and mathematicians (see [18], [9], and [23]). The reviews of a given mathematical paper can be found very easily. Since the advent of electronic data bases, the search for abstracts is no longer a problem in *Zentralblatt* and *Reviews*.

publication, usually amounting to about three years” [AAMS2, p. 3]. A previous report of the same committee stated that “[a] number of prominent American mathematicians expressed themselves strongly in favor of publication in the English language of an equivalent of the *Jahrbuch*” [AAMS1, p. 1.].

In mathematics, the dependence on German reviewing was particularly striking because of the absence of an English-language equivalent to the *Jahrbuch*. In the case of physics and chemistry, scientists could at least partly rely on *Science Abstracts* (England, since 1898) and *Chemical Abstracts* (U.S.A., since 1907).¹⁰

Although the AMS committee campaigned for the creation of an independent American abstract journal by bringing forth arguments of rapidity and language of review, the political situation was undoubtedly the main cause of its crusade. After emphasizing the dangers that a dominance of the German language would entail, Wilson, in his article in *Science*, argued that

This sort of scientific control is subtle, and if turned to bad uses, may become insidious. . . . That the government of Germany was alive to the possibility of this control seems patent; and that they expected their insidious control to be serviceable to them in swaying opinion in this country in their favor during this war is equally manifest from many points of view. [41, 492]

To be sure, the adjective “insidious” in Wilson’s article is attributed merely to the political leaders in Germany rather than to individual scientists.¹¹

It was also beyond nationalistic disputes that Wilson emphasized the factual advantages of the English language. He claimed that German was much more difficult to learn for foreigners than English, adding, “[t]he number of English speaking people [is] much greater than the number of those who speak German as a native language” [41, 493]. Still, there is no doubt that scientists such as Wilson considered the establishment of English as the prevailing scientific language to be an important lever to create, in the U.S., a scientific culture of international standing that would correspond to the country’s new political role since World War I. After the war, when nationalist emotions had led to the suppression of German language instruction at American schools and universities [31], the problem of language was likely to win over American politicians as well as taxpayers. The Committee on Bibliography of the AMS, which probably did not have the unanimous support of American mathematicians,¹² was therefore hoping for federal

¹⁰ Nevertheless, even in physics, Americans deplored a “lack of an adequate literature in English” as late as 1928, as [40, 200] reports.

¹¹ However, some incidental remarks against Einstein’s “press agents” and relativity (*Bulletin AMS* 37 (1931), 413) and the fact that Wilson was one of few American members to leave the German Mathematical Association in the 1920s may suggest that he harbored stronger feelings, directed also against German (and presumably Jewish) scientists themselves. In a letter to AMS secretary R. G. D. Richardson, dated October 19, 1926, Wilson spoke of the “so completely Jewish atmosphere as now prevails in Göttingen, particularly in mathematics.” [RRP1]

¹² Especially the more research-oriented mathematicians at Harvard University, like William F. Osgood, William C. Graustein, and George D. Birkhoff, were skeptical. As early as January 20, 1919, then Harvard Chair Osgood opposed the creation of an American *Jahrbuch* in a letter to Harris Hancock of the American Association of University Professors, stressing that “it would mean that the few mathematicians of this country who are really able to do some research work would turn their attention toward reporting on the papers of no value to them in their research” [HDM1]. Cf. also note 31.

funds, to be used for the formation of a “great series of Year Books published through the Smithsonian Institution” [AAMS1, p. 4].

Under heated political circumstances, it is only a short step from emphasizing the national interest of science to practicing *nationalism* in science, which projects a negative image upon the scientific “foe.” The interwar history of German–American mathematical relations reveals at least latent nationalism on both sides, although it did not surface as blatantly as in the relations between German and French mathematicians, for instance.¹³ That this nationalism would be rather moderate does not come as a surprise, in view of the emotional ties that older American mathematicians had to Germany. Moreover, the absence of past political confrontations and the increasing political isolationism of the United States in the 1920s also dampened nationalistic feelings.¹⁴

Thus, some conflicts between American and German mathematicians, which nevertheless occurred, can be traced to causes that are not strictly nationalistic. In fact, nationalism in science often reinforces (by political factors) conflicts which already exist on the level of the discipline. Scientists, indeed, experience a permanent dichotomy that sets their curiosity about other scientific points of view against the fear of devaluation of their own results and disciplinary interests. That is, the feeling of control exercised over national science by foreign papers and journals is, in the first place, a reflection of the normal scientific function of these publications.

For this very reason, it is problematic and often demagogical to accuse scientists of foreign nations of “insidious” intentions. In Wilson’s article concrete allegations in this respect are missing, but the unpublished report of April 24, 1920, of the Committee on Bibliography of the AMS goes a step further: the greatest shortcoming of the *Jahrbuch* (even more serious than its slowness) was identified as “its heavy emphasis on all things German,—American entries would have been twice as numerous if they had been chosen on the same basis” [AAMS2, p. 4]. This reproach, however, is not substantiated in the report, and it is doubtful that there existed any clear-cut evidence to support such an allegation.¹⁵

An article by the American group theorist, George A. Miller, published in the *Bulletin of the AMS* (1921), attempted to specify further the accusations against the *Jahrbuch*. Miller first alluded to “a few erroneous statements found in a recent volume of the *Jahrbuch über die Fortschritte der Mathematik*” [23, 459]. Without mentioning the names of the reviewer (Ludwig Bieberbach) and of the author of the reviewed paper (the British mathematician, William Burnside), Miller identified a number of mathematical mistakes in the review, which, in Miller’s opinion, were likely to affect the reception of Burnside’s work on groups of prime power order.

¹³ Cf. [32], [15], [11], and [10].

¹⁴ The U.S. was not a member of the League of Nations. Germany joined the League only temporarily in 1926 and left it after Hitler’s seizure of power.

¹⁵ The historian Judith Grabiner uses the abstracts of the *Jahrbuch* to establish a gradual recognition of American mathematics in those years: “By the end of the nineteenth century, the work of Americans was known and respected throughout the mathematical world” [18, 10].

Miller did not, however, accuse Bieberbach of national prejudice.¹⁶ He did make a more direct accusation against the German mathematician, Eugen Netto, who was already deceased at the time of Miller's article. Netto, in Miller's opinion, had unjustly attributed results of the Norwegian, Peter L. M. Sylow, to German mathematicians. But even in the case of Netto, Miller denied "insidiousness" on the part of the reviewer and pointed to the inevitable influence of the surrounding culture:

In view of the fact that most of the reviewers for the *Jahrbuch* have been more familiar with the work of German authors than with that of authors of other lands, it is only natural that one sometimes finds undue credit given to the former. This does not imply that these reviewers were conscious¹⁷ of any unfairness in giving credit. [23, 462].

Similar reservations had been directed against German mathematical reviewing by several American mathematicians.¹⁸ Especially in politically heated times, such accusations were connected with nationalist feelings. But even in such cases, there seem always to have been counterbalancing forces within the American mathematical community that prevented such unproven, and unprovable, allegations from being published and thus determining the opinion of the majority. When around 1938–1939 voices were raised in the AMS that cast doubts on the objectivity of the abstracts in *Zentralblatt*, the mathematician Arthur B. Coble wrote in a letter of January 16, 1939, to G. D. Birkhoff:

Unless it would appear in the future that the reviews in the *Zentralblatt* are biased, I can see no reason why the Society should take any steps in the matter . . . I might add that the only recent criticism of a *Zentralblatt* review which I have heard was from an American author who complained that the American referee had completely missed the point of his article. In other words, even under the most favorable circumstances the abstract journal will sometimes be at fault. [BP, box 2, folder Jan.–May 1939]

Even when, in the 1930s and 1940s, the *Jahrbuch* fell under the political and financial influence of the Nazis, the abstracts of this journal could not easily be dismissed as biased (see below). The "first requirement" for scientific reviewing, namely "objectivity," was generally observed.

In contrast to other sciences, no one really attempted to challenge the universal and international validity of mathematical results. Even the leading Nazi among

¹⁶ Moreover, since the opposite page of the same issue of the *Jahrbuch* (44 (1913), 165) contains an abstract by Bieberbach of a paper of Miller's, one is rather inclined to assume that Miller's criticism reflected some personal misgivings. In fact, Bieberbach's abstract of Miller's paper includes the judgment, "The deeper and more important properties of these groups though, seem to escape his method."

¹⁷ Here, once again, the "tacit dimension" of science in Polanyi's sense is entering the scene.

¹⁸ For instance, MacLane [21, 218] remarked that the leading German geometer, Wilhelm Blaschke, in a review of 1915, did not realize the pioneering importance of the American James W. Alexander's topological duality theorem. Compare also some vague accusations cited in [27, 328]. Jacob D. Tamarkin wrote on August 17, 1942 to Richardson: "I certainly do not belong to an European Citaten-Verein which finds especial pleasure in omitting names of American mathematicians and in not giving them due recognition" [RRP2].

German mathematicians, Bieberbach, attacked only the “style” of “alien” mathematics, when he delivered his racist speeches after 1933.¹⁹ Moreover, at least in German–American mathematical relations, even questions related to mathematical “styles” did not arise from discussions about reviewing. For instance, when David R. Curtiss gave a talk on “Fashions in Mathematics” in 1937, he based his analysis on the evolution of the classification of mathematics within the *Jahrbuch* and considered “fashions” to be international tendencies rather than national ones.²⁰

So, by and large, the American attitude toward mathematical reviewing, around 1920 and later, was much more “pro-American” than “anti-German.” From the outset, American mathematicians pursued their own national goals and some of them tended to look at possible international collaboration (even with their allies of the war) with reservation: “An attempt to improve existing publications, by more extensive international cooperation on the part of Americans, seemed neither feasible nor desirable” [AAMS2, p. 5].

In spite of the temporary support that some Americans brought to the International Research Council (IRC)²¹ founded in Europe following the Versailles treaty of 1919 and excluding the former Axis powers, American mathematicians, in general, did not endorse the “boycott of German science” organized by the IRC. In fact, the decision to exclude all Germans prompted the AMS to resolve not to host the International Congress of Mathematicians in 1924.²² When the Congress met that year in Toronto, the AMS called for a cancellation of the discriminatory paragraph, which had led to the exclusion of Germany and its former allies from the International Union of Mathematicians of the IRC [12, 3].

The controversies in Europe, however, were carried on with strong emotions, at least until the mid-1920s. The IRC, among other things, demanded the

exclusion of Germany from the international bibliographies and the establishment of international reviewing organs which are intended to drive out the German review journals, which

¹⁹ On Bieberbach, compare [22]. The acceptance of the “universality of science” by German scientists of the 1920s is established in [15, 156].

²⁰ I follow Gombrich’s use of the terms “style” and “fashion” in art history. “Fashion” is a temporarily preferred “style” which carries social prestige [17, 353]. The only topic Curtiss saw a special American attachment to was projective differential geometry (E. J. Wilczynski) [9, 564]. The introduction to Curtiss’ article, where he polemicized against Bieberbach’s Nazi journal *Deutsche Mathematik*, shows that Curtiss did not ignore the political control of science in Hitler’s Germany.

²¹ The astrophysicist George E. Hale was one of the initiators of the IRC. Cf. [19], especially the chapter “Cold War in Science,” pp. 139–154. The librarian of the AMS, Raymond C. Archibald, was a member of the International Commission on Mathematical Bibliography of the International Union of Mathematicians, which was affiliated with the IRC. But there is no indication that either Hale or Archibald was a proponent of tough boycott policies against Germany. The attitudes of American governments and of the American scientists toward the IRC seem to have been conflicting. While the Wilson administration did not officially recognize the IRC [19, 153–154], in later years, at least, American mathematicians seem to have been more critical of the IRC than the government.

²² This follows from the files of the AMS in the John Hay Library in Providence, RI, and will be investigated in the work mentioned in note 1 above.

“through cooperation and cooptation, have monopolized the entire scientific production of the world.”²³

In Berlin, countermeasures to the decisions of the IRC were initiated.²⁴ The Prussian Academy of Sciences, especially its secretary Max Planck, supported the establishment in 1920 of a National Office for Scientific Documentation, the *Reichszentrale für naturwissenschaftliche Berichterstattung*, chaired by the federal official Karl Kerkhof (cf. also [28, 404]). The *Reichszentrale* not only coordinated the publication of all German abstract journals, but also introduced an internationally unprecedented photocopy service that provided scientists with copies from journals that were inaccessible to them. The *Reichszentrale* also served as a clearinghouse for information concerning the “boycott of German science” and, especially after 1925, it promoted and perpetuated nationalism on the German side, for example, by publishing pamphlets of a political nature.

With respect to German mathematical reviewing, the *Reichszentrale* did not achieve much more than insurance of its financial survival. In particular, there was no change in the old-fashioned editorial principles of the *Jahrbuch* at that time in the 1920s, whereas the *Fortschritte der Physik* were continued in the form of the more modern *Physikalische Berichte* after 1920. Still, a look at the visit, in 1925, of a leading American librarian to the *Reichszentrale* gives a good impression of the political environment of German–American relations in scientific reviewing at large.

In 1925, Ernest C. Richardson of Princeton, the chair of the Committee on Bibliography of the American Library Association,²⁵ visited the *Reichszentrale* in Berlin and was obviously impressed with the copy service. After his visit Richardson wrote to Kerkhof and admitted that “German learning has just cause for resentment over the course of various allied individuals and associations” [BAP1. fol. 25].

According to a talk he gave in 1926, Richardson—contrary, so it seems, to more sober American mathematicians—did try to reorganize the system of international scientific reviewing with the help of the International Bibliographical Institute in Brussels. He called bibliography the “real foundation of all intellectual co-operation and progress in civilization” [29, 4/5]. Richardson wanted to involve the Germans in this enterprise—he had contacted Kerkhof in Berlin for this purpose—and tried to exclude nationalist emotions from the undertaking. Since all European countries were in a state of economic depression and longing for Ameri-

²³ This (translated) quotation, which contains the quotation of an IRC document, is from a report of Kerkhof and Planck given to the corporation of German academies in 1919 [ABAS II–XIV, 37, fol. 29]. For the original German version, see [36, 35].

²⁴ For the following remarks, see the details presented in [36, 45f].

²⁵ Richardson was not a mathematician and should not be confused with the secretary of the AMS, Roland G. D. Richardson.

can support,²⁶ the U.S., although not a member of the League of Nations (to which the Brussels Institute was loosely attached), would have presumably played a leading role in any system of reviewing so organized.

All these efforts came to nothing, however, not least due to the aftereffects of nationalist controversies in Europe.²⁷ Richardson may have felt the insurmountable political problems when, in his 1926 talk, he gave a rationale for a possible retreat to national concerns. Richardson first remarked disapprovingly that “it is the tendency even of the League of Nations and the modern philosophers of international relations to stress the right and duty of nations to jointly interfere with the affairs of other nations” [29, 11]. He then continued saying that “the best contribution that a nation or a library . . . can make to international co-operation is to do its own work well.”

Owing to the efforts of the *Reichszentrale*, to the strong tradition of scientific publishing in Germany²⁸ and, above all, due to the still considerable strength of German science, all attempts to “break the German monopoly on reviewing” failed.²⁹ But a truly impartial and international collaboration failed as well, and isolation and a retreat to national concerns finally prevailed on all sides.

For their part, the Americans did not succeed in founding a mathematical abstract journal in the 1920s, although, in many respects, an “American mathematical culture” made considerable progress during that period.³⁰ It was during this period, after all, that a new generation came to power within the American Mathematical Society, a generation of mathematicians, such as George David Birkhoff (1884–1944), and Oswald Veblen (1880–1960), who had not studied in Germany, where the majority of the older generation of influential American mathematicians had gotten their training. As for mathematical reviewing, however, it seems as though the Americans did not really try to found a journal of their own, once the

²⁶ Richardson said in his talk that he was authorized by the American Library Association to enquire in Brussels “whether matters had been so reorganized as to insure effective cooperation, to such degree that it [the A.L.A.] could afford to endorse the applications being made to the Carnegie and Rockefeller endowments by the Institute for financial aid” [29, 6].

²⁷ As [15, 179] reports, a project aiming at the unification of English, French, and German physical abstract journals failed around 1925 due to German opposition. As early as 1920, the “International Catalogue of Scientific Literature” (London) had ceased publication due to the discontinuance of the German contributions [32, 238]. The historian of science, George Sarton, gave the following interpretation: “The gigantic undertaking was a victim of the World War and of the national selfishness and loss of idealism which the war induced” [30, 59].

²⁸ The Springer publishing house, which founded the *Mathematische Zeitschrift* in 1918 and took over the *Mathematische Annalen* from Teubner that same year, became the world’s leading scientific publisher in the 1920s and 1930s.

²⁹ Schröder-Gudehus remarks in this respect: “In the field of scientific reviewing the aspirations of the IRC proved to be least successful” [32, 120, translation by the author].

³⁰ Following upon initiatives of Veblen, and with the support of the National Research Council (NRC), a “revolving fund” for the printing of mathematical monographs was established. Beginning in 1924 mathematicians were included in the fellowship program of the NRC. The year 1932 saw the foundation of the Institute for Advanced Study in Princeton with a strong School of Mathematics. Cf. [2, 198].

nationalist mood during the aftermath of the war was gone. There are even indications that some Americans morally and financially supported the German *Jahrbuch*.³¹

A reason for the failure to found an American reviewing journal in mathematics may partly have been the lack of funds. However, there were other, possibly more important reasons, as indicated by the *Report on the Present Status of Publication in the Mathematical Field*, submitted in 1929 by the AMS to the Rockefeller Foundation in a request for financial support [RF1]. In this report, the AMS was rather cautious with respect to the question of an abstract journal, which appeared only as one among a number of "other important extensions of activity which may be attempted when men and money are available" [RF1, 6]. The AMS report addressed "Participation in the publication of an international Mathematical Abstract Journal. Such an undertaking would need many men and much money. Some day the Society must embark on some such project" [RF1, 7]. When in 1938 the foundation of the "Mathematical Reviews" was imminent, Veblen put it most clearly:

It will be recalled that about 15 years ago there was a movement toward the foundation of an international abstract journal in the United States. This was given up because it was felt that our mathematical community was not yet strong enough to carry the load without too much of a strain on its creative elements. [OVPI]

Veblen stressed that American mathematicians did not feel ready in the 1920s to "embark on such a project" as a mathematical abstract journal. The German mathematical culture was still stronger and, above all, it was far more versatile than the American one, as it included many fields of applied mathematics which were underdeveloped in the United States. This much was conceded in a report of Birkhoff on his trip to Europe in 1926 on behalf of Rockefeller's International Education Board.³²

ZENTRALBLATT AND JAHRBUCH IN THE 1930s: STRUGGLE WITHIN GERMANY FOR CONTROL

Nevertheless, the international situation in mathematical reviewing changed radically in 1931. That year the *Zentralblatt für Mathematik und ihre Grenzgebiete*³³ was founded by the Springer publishing firm in Germany. Originally, some mathematicians abroad were puzzled by the emergence of a second German abstract journal. Harvard mathematician, Oliver D. Kellogg, wrote on November 17, 1930 to Richard Courant in Göttingen, who was among the promoters of the *Zentralblatt*:

³¹ Graustein, at a meeting of the Harvard Division of Mathematics on January 9, 1922, read the letter by an official of an American "organization for the assistance of German and Austrian science" (probably the "Emergency Society for German and Austrian Science and Art), asking for advice as to possible support for the *Jahrbuch*. The division voted that it "unqualifiedly endorses any endeavor to help it survive" [HDM2]. Cf. also note 12 and Kellogg's opinion, quoted below.

³² Cf. the work in progress, cited in note 1 above.

³³ *Central Journal for Mathematics and its Bordering Subjects*.

It is hard enough to get competent men to work on these reviews—it is hard to support them financially, and I feel that all efforts ought to be united in bringing the *Fortschritte* [i.e., the *Jahrbuch über die Fortschritte der Mathematik*] up to date and keeping it there. . . . I believe, in the present state of my information, that I should have difficulty in persuading many of my acquaintances to take part in refereeing for a competing journal. [RCPP]

Some Americans took the confusing situation in Germany as another incentive to go forward with plans for an American journal. The managing editor of the *Zentralblatt*, Otto Neugebauer from Göttingen, announced, in a letter to Courant dated March 3, 1931, “new plans for the foundation of an American abstract journal.” But, in the same letter, Neugebauer expressed his confidence in his ability to convince the Americans of the *Zentralblatt*’s qualities and in their willingness to collaborate: “Veblen is going to come to Germany and will try to reach an agreement with us. Personally I am very much in favor of the idea of an American branch of the *Zentralblatt*” [RCPP, translation by the author]. In fact, American doubts vanished very soon, when the new qualities of the *Zentralblatt* became apparent. Its promoters took into account the two fundamental criticisms of the *Jahrbuch*; as a result, many of the abstracts appeared in foreign languages (mostly English), and, above all, they were published immediately upon reaching the editor. “Modernity” in mathematical reviewing had finally been reestablished.

From the outset, foreigners, among them Americans (O. D. Kellogg, Jacob D. Tamarkin, and Veblen beginning in 1936), were nominated, at least symbolically, as co-editors. When Veblen first refused to act as co-editor, he did so not for political reasons but rather because he felt uneasy with the formal character of the duty.³⁴ In fact, the degree of internationality then attained by the *Zentralblatt* was unprecedented in mathematical reviewing and probably in scientific reviewing as a whole. A solution had been found, which, in retrospect, seems even better than the post-war situation in mathematical reviewing.³⁵ The bulk of the reviewing, however, and, above all, the editorial work still remained in German hands, and so did the prestige.³⁶ This ambiguity between internationality and German dominance in the *Zentralblatt*’s character is nicely expressed in a letter Veblen wrote to Warren Weaver of the Rockefeller Foundation on May 10, 1938. Reporting

³⁴ In an internal report of May 16, 1938, Warren Weaver, the mathematician in charge of the Rockefeller program in the sciences, wrote: “V[eb]len refused editorship when the journal was founded, because he ‘avoids stuffed-shirt jobs,’ but accepted editorship last year at N[eugebauer]’s warm urging because V.’s relations with all the German mathematicians are very good” [RF2]. The Rockefeller Foundation also paid a part of Neugebauer’s salary at the University of Copenhagen.

³⁵ It is against this background that the reluctance of some Americans in the late 1930s to found an American abstract journal is to be judged. It is also in this connection that one has to be careful not to fall into the trap of a simplistic, progressivist notion of “internationalization” in mathematics and not to underestimate the damaging effects of the Nazi era and World War II on international scientific communication.

³⁶ In a letter to Veblen, dated December 10, 1938, Neugebauer wrote that out of 300 referees only 60 came from Germany [OVP4]. Still, browsing through the volumes of *Zentralblatt* of these years, one gets the impression that at least the *number* of German reviews was still the biggest single number. Out of 12 editors of *Zentralblatt* of 1938, 5 were German, in addition to the emigrés Neugebauer and Fenchel in Copenhagen.

that Pavel Aleksandrov and other Soviet collaborators were withdrawing from the *Zentralblatt*, Veblen commented, “[w]hether this is because they regard it as being too German or too international I do not know” [RF2].

Meanwhile other circles in Germany had become increasingly afraid of losing control, namely, those who were interested in the continuance of the *Jahrbuch über die Fortschritte der Mathematik*. As a matter of fact, since 1931 it had become more difficult to use “national” arguments to support the continuation of the *Jahrbuch*, given that another German abstract journal existed. These tactics had still been possible in 1927, when the Berlin mathematicians Bieberbach and Erhard Schmidt warned against the danger that “German science might lose the glory of maintaining this unique organ” [ABAS II—VII, 26, fol. 6]. But other interests were at stake in 1931.³⁷

The *Jahrbuch*’s publisher, Walther de Gruyter, found his business strategies thwarted. An abstract journal, it is true, was not profitable financially, and de Gruyter was eager to secure matching funds from the Prussian government through the Berlin Academy of Sciences. Abstract journals, however, served (and still serve) the prestige of scientific publishers, as they advertised their other products and helped them make contacts with scientific authors. Also, the Berlin Academy, which had been the corporate editor of the *Jahrbuch* since 1928, was interested in its continuance as well. Since the Academy did not have scientific institutes of its own, the *Jahrbuch* was one of its few enterprises in the exact sciences and reinforced therefore the Academy’s legitimation. Furthermore, some Berlin mathematicians considered the foundation of the *Zentralblatt*, which was chiefly supported by mathematicians from Göttingen, to be a continuation of the old institutional competition between the two German mathematical centers.

These institutional frictions were further aggravated by ideological problems. Many German mathematicians of the older generation considered the *Jahrbuch* a part of the venerable German mathematical tradition, which had to be saved at all costs. To them the rapidity and internationality of the *Zentralblatt* were signs not of progress but primarily of the decline of German mathematical culture. There was much discussion, around 1930, of the new abstract axiomatic methods. This discussion of axiomatics, which was often accused of generating a disturbing abundance of “meaningless” mathematical publications, was not restricted to Germany. In Germany, however, this discussion was influenced by the shaky state of the university system (characterized by an overabundance of students, and lack of career opportunities for *Privatdozenten*) as well as by the peculiarly pessimistic and partly nationalistic mood especially in academia in the Republic of Weimar. This fostered some skepticism among mathematicians such as Max Dehn, Issai Schur, Erhard Schmidt, and Bieberbach, especially with regard to new organizational measures which might lead to further unpleasant “modernizations” in mathematics. That is to say, disciplinary as well as more

³⁷ For the following remarks cf. [36, 104ff.].

general ideological positions were involved. In this matter, one of the most skeptical mathematicians was Bieberbach, who had decisive influence on the editing of the *Jahrbuch* in Berlin [22]. In a talk delivered to the plenary session of the Berlin Academy in January 1930,³⁸ that is, before he learned of the *Zentralblatt* plans, Bieberbach outlined his conception of the future of the *Jahrbuch*. He downplayed the new demands of scientific reviewing (rapidity, foreign languages, new foreign reviewers) and emphasized the old advantages of the *Jahrbuch* in an one-sided manner. Bieberbach, so it seems, wanted to control the development of mathematics by perpetuating conservative principles in mathematical reviewing.³⁹ Undoubtedly, the *Jahrbuch* maintained some advantages over the *Zentralblatt*; it is the one-sidedness and dogmatism of Bieberbach's position that became problematic.

The real problems in Bieberbach's position, however, became more obvious in 1933, soon after the Nazis' rise to power. To the surprise of almost all of his colleagues, Bieberbach then became an ardent Nazi, and again he tried, this time by political means, to secure the existence of the *Jahrbuch* and to influence the work of its managing editor.⁴⁰ Bieberbach's racist speeches and prejudiced publications revealed his resentment of the internationalization of mathematics, and the connection he saw between this internationalization and some of the intellectual developments within the discipline.⁴¹

The competition between the *Jahrbuch* and the *Zentralblatt* in Hitler's Germany was bound to have political overtones, in view of the semigovernmental character of the *Jahrbuch* (through the Prussian Academy) and due to the fact that the *Zentralblatt*'s managing editor, the renowned historian of ancient mathematics, Otto Neugebauer, fled to Copenhagen, where he continued to direct this journal. Seeing that duplicate reviewing was deplored by many mathematicians as a waste of manpower and that the *Jahrbuch* still garnered strong support within the German mathematical community, the chair of the German Mathematicians' Association, Oskar Perron, put forward an initiative aimed at abolishing the *Zentralblatt* in 1933. Although Perron was known to oppose National Socialism as an ideology, he nevertheless used a slogan frequently uttered by the Nazis, namely, that "common benefit precedes

³⁸ [3], reprinted in [36, 212–214].

³⁹ I have argued in [36, 91–97] that Bieberbach suggested in his talk a subliminal connection between the systematic, collecting function of the *Jahrbuch* and the foundational, rigor-providing function of mathematical axiomatics. Bieberbach approved of the latter function of axiomatics, but he was suspicious of the creative, expansive functions of axiomatics as well as of uncontrolled and unsystematic mathematical reviewing.

⁴⁰ I have argued in [36] that, paradoxically, it was the (politically enforced) *continuance* of the *Jahrbuch* in the 1930s that was a sign of the decline of German mathematics in that period. The *discontinuance* of that journal at the end of the war, however, was scientifically overdue.

⁴¹ Compare note 39 above. For instance, Bieberbach opposed "international formalism" in mathematics, thus revealing his opinion on the connections between the two levels—mathematics and its sociology. For more details, see [22], and [35].

individual benefit" (*Gemeinnutz geht vor Eigennutz*)⁴² in a letter to Springer dated October 24, 1933.

All attempts by Bieberbach and other German mathematicians to force Springer to give up the *Zentralblatt* failed. Although they were called upon for their support by the *Jahrbuch* followers, political authorities in Nazi Germany did not interfere, as scientific reviewing was not a political priority.⁴³

More "successful" was Bieberbach's control over the work of the *Jahrbuch* itself. He ordered the dismissal of Jewish reviewers, although the managing editor, Helmut Grunsky, succeeded in resisting and delayed this measure for almost five years. Likewise, the change in the fields under review in the *Jahrbuch*, which brought about the renunciation of a section on mathematical physics in 1936, is at least partly due to the racist attacks of *Deutsche Physik* on theoretical and mathematical physics [36, 117–118]. However, given these political restrictions which affected the selection of papers under review (and thus the journal's "modernity"), the *Jahrbuch* remained unbiased in its individual abstracts and met at least this first requirement for scientific reviewing, namely, objectivity (in the sense outlined above). Thus, the German emigré and world-class mathematician, Hermann Weyl, could say in 1948: "It is true that even during the war the *Jahrbuch* continued reviewing the papers of foreign and Jewish mathematicians in an objective and decent manner" [RCP]. Thus, several American reviewers continued to collaborate with the *Jahrbuch* until the early 1940s, obviously ignoring the gradual exclusion of Jewish reviewers from its staff. The leading role in mathematical reviewing, however, had passed to the *Zentralblatt* by the early 1930s.

ON THE EVE OF WORLD WAR II: THE AMERICANS—WITH SOME HESITATION—TAKE CONTROL

In the first years of Hitler's rule, the *Zentralblatt* could still be considered a truly international journal, not least due to the emigration of Neugebauer to Copenhagen. When Veblen, in a letter of August 4, 1933, to AMS secretary Roland G. D. Richardson, ventured "to import Neugebauer," he got a skeptical reply five days later: "I know that these things take a great deal of time and money so I am not enthusiastic about transferring the *Zentralblatt* to America. It would seem to me . . . that the disadvantages would outweigh the advantages" [RRP3]. Richardson, once again, stressed the priority of research over reviewing, when, in another letter (dated August 23), he said that "the money involved would support two or three good mathematicians" [RRP3].

⁴² See [36, 215–216], where Perron's letter is reproduced. Neugebauer tried, somewhat naively, to use the protests of American mathematicians against a possible abolition of the *Zentralblatt* as a propagandistic tool in Germany in favor of his own abstract journal. Neugebauer was undoubtedly rather exceptional among mathematicians of his time in his rejection of any nationalist prejudice. Cf. [37].

⁴³ Even the *Reichsschrifttumskammer*, which had the power to ban the *Zentralblatt*, did not interfere, although it was asked to do so by the Nazi mathematician, Theodor Vahlen, who was president of the Berlin Academy after 1938 [36, 218–219]. On Vahlen, see [33].

The political situation, shortly before the war and around 1938, however, eroded the international standing of the *Zentralblatt* as well. German mathematicians, such as Wilhelm Blaschke from Hamburg, became increasingly and openly nationalistic at that time. On March 14, 1938, Blaschke wrote in a letter to the managing editor Neugebauer in Copenhagen that “[i]t seems that the number of German collaborators, and even the role of the German language in the *Zentralblatt* is constantly diminishing. If this continues, the publisher is going to face difficulties sooner or later” [OVP2, translation by the author]. Neugebauer replied angrily that “[i]f in fact the role of the English language may have increased in time, then this is easy enough to explain. You know that in America especially mathematical production has increased considerably in the recent past” [OVP2, March 19, 1938, translation by the author].

American mathematicians, who, up to that time, had been rather satisfied with the *Zentralblatt*⁴⁴ and who somehow sustained the fiction of an “unpolitical science”⁴⁵ were finally scandalized by the dismissal of the Jewish co-editor of the *Zentralblatt*, the Italian Tullio Levi-Civita, in October 1938. A letter from Helmut Hasse of Göttingen addressed to the American Marshall H. Stone had a devastating and disillusioning effect on the American mathematical community. Hasse defended the dismissal of Levi-Civita and Springer’s new policies to bar “emigrés” [of course, a code for “Jews”] from reviewing mathematical papers written by Germans.⁴⁶ Thus, Hasse’s letter moved the American community toward what one American historian called “possibly the most important mathematical event in this country between the two World Wars”: the foundation of the *Mathematical Reviews*.⁴⁷

In December 1938, nearly 300 members of the AMS petitioned the Society to launch an abstract journal [27, 328]. At that time, AMS secretary Richardson, who had been reluctant to “import” Neugebauer’s journal in the years before, could point to the fact that “a majority of the referees of the *Zentralblatt* are residents of North America” [RRP4]. After American reviewers had resigned from their collaboration with the *Zentralblatt*, Stone, in a letter to Hasse, dated May 2, 1939, saw in the possible foundation of the *Reviews* an expression of “the desire to assume for the future of mathematical abstracting a responsibility commensurate with America’s great and growing mathematical importance” [27,

⁴⁴ As seen above in the contacts between Veblen and Weaver in May 1938; cf. note 34.

⁴⁵ G. D. Birkhoff said in a talk immediately after the successful International Congress of Mathematicians in Oslo 1936: “Mathematicians are realizing for the first time today what a great blessing it is to be regarded as innocuous and unimportant” [BP, box 1, file: personal (1936)].

⁴⁶ In his letter of March 15, 1939, Hasse claimed there was a “state of war between the Germans and the Jews” and considered the separation of both parties in mathematical reviewing a “truly impartial and hence genuinely international course” [BAP2, fol. 414]. In reaction to this letter Veblen insisted “that there is a war by the Germans against *civilization*” [BP, box 2, file Jan.–May 1939]. Some other abstract journals of Springer’s, especially in medicine, were also affected by antisemitic policies.

⁴⁷ See [8, 45]. Views of the story of the foundation of “Reviews” are given in [27, 327–333] and [37, 145–151]. A more detailed investigation is being undertaken by Liliane Beaulieu.

332]. Now, indeed, the Americans had every reason to believe that German control of mathematical reviewing was damaging international communication and that the foundation of an American-led journal was in the best interest of world mathematics. Still, the opinion in the AMS on founding the *Reviews* was not unanimous even as late as May 1939. The threat of war in Europe with its consequences for international collaboration and traces of a “loyalty to German science” on the part of some older mathematicians prevented nationalist euphoria. Fears that gains in one field of “American mathematical culture” (reviewing) might lead to losses in others (international communication, research) were, once again, articulated.⁴⁸ Some mathematicians may have felt the dangers of an “overkill” of European mathematics for the future of world mathematics.⁴⁹

In spite of these hesitations, the decision to found *Mathematical Reviews* was both an expression of the feeling of responsibility for world mathematics and inevitable in view of recent political developments. Some Americans considered the assumption of international responsibility in scientific reviewing to be a particularly important step toward world leadership in science as a whole. It was from this point of view that the Rockefeller Foundation discussed the finally successful application of the AMS for financial support of the *Reviews*. The Rockefeller Foundation’s Warren Weaver commented on the AMS proposal in a memo of February 23, 1939 and pointed to the specific controlling function of scientific reviewing:

The possible transfer of the ‘*Zentralblatt*’ or its equivalent to this country is one instance of a general situation of considerable importance and interest,—namely, the transference to this country of responsibility for the maintenance and protection of certain cultural values which historically have been chiefly located in Europe. This journal, moreover, is more accurately viewed as an international coordinating and synthesizing influence in mathematics than as a mere mechanical bibliographical aid. [RF4]

While Weaver was still reluctant to support an abstract journal (since mathematics was no longer one of the foundation’s principal fields of interest), the president of the Rockefeller Foundation, Raymond B. Fosdick, decided in favor of this journal and granted \$12,000 for its publication [16, 121].

In the process of founding *Mathematical Reviews*, some of the old and latent nationalist feelings resurfaced, although none of these can be compared morally or in their intensity to the outrageous positions on the German side. Some of these feelings had been fueled by the social implications of European immigration to the United States.⁵⁰ On the one hand, Americans were interested in using the

⁴⁸ The Harvard mathematicians Birkhoff and Graustein were concerned that the founding of the *Reviews* might endanger the venue of the International Congress of Mathematicians (to be held at Cambridge, Massachusetts, in 1940, but later postponed until 1950 because of the outbreak of the war). Some mathematicians still had doubts whether the American mathematical community was now strong enough to shoulder the burden of an abstract journal without succumbing to a lessened research productivity [27, 328].

⁴⁹ So, in retrospect, the younger Birkhoff [5, 77].

⁵⁰ Examples of academic antisemitism and xenophobia in the United States of the 1930s (with respect to mathematics) are given in [27] and [24]. Cf. also note 11.

experience and manpower of refugee mathematicians for the new American abstract journal, and they relied particularly on the work of Neugebauer and of Willy Feller (another immigrant from Europe), who were appointed at Brown University in Providence. On the other hand, some Americans harbored fears that they would be subjected, once again, to the control of a foreign mathematical culture, if foreigners became too influential. Princeton mathematician Marston Morse, for instance,⁵¹ wrote in a letter to AMS secretary Richardson on July 5, 1939,

You will remember my opposition to the appointment of Feller as assistant on the grounds that the American sentiment would not approve. The Editors, together with Feller, make a group that is not near enough to the American background. . . . This feeling is shared by those in Princeton who are most conversant with these things. [RF3]

At this time the German mathematicians still underestimated the determination and capability of Americans to found an abstract journal of their own.⁵² As late as November 1939, Blaschke, who, from his experience as a visiting lecturer of the AMS and from other visits to America around 1930 [6], thought he had first-hand acquaintance with American science, did not believe in the imminent founding of the *Reviews*. He remarked with German nationalistic arrogance that he knew “his Americans” [GHP]. When, by the end of 1939, the launching of the *Reviews* became indisputable, a nationalist solidarization of German mathematicians, promoted by the outbreak of the war, led to some agreement between the two German abstract journals. The document which establishes this agreement [36, 224–226] acknowledges the seriousness of the American competition. The new general editor (*Generalredakteur*) of the two German journals, Harald Geppert, anxious to preserve his contacts with American mathematics, asked the AMS (in a letter dated March 20, 1940) to maintain his membership even though he was unable to pay his fees because of restrictions of foreign currency in Germany.⁵³

Even after the United States entered the war in December 1941, some Germans still maintained the illusion that the U.S. would not interfere in Europe and in European science. A document from the German Ministry of Education of March 1942 suggested “that after this war world science is likely to fall apart into a science of the European continent and a science of the Americas” [34, 10]. German mathematicians themselves offered their abstract journals as a tool for the Nazi strategies of “reorganizing European science.” Because of their relations with foreign reviewers, the German abstract journals were, as Geppert put it, a means to involve French mathematicians, among others, in “scientific practical work in Germany” [BAP3, fol. 29]. Furthermore, an intensified “collaboration” of this kind would prevent French mathematicians from moving to the *Mathematical Reviews*.⁵⁴ At the same time, the organization of the German abstract journals could serve as a kind of nucleus for a new European mathematical system under

⁵¹ It seems doubtful, though, that Morse’s opinion was representative of the feelings of the very internationalist Princeton mathematicians.

⁵² Not quite gratuitously, as G. D. Birkhoff’s reservations have shown.

⁵³ The request was granted; [AAMS3].

⁵⁴ In fact, French prisoners of war, such as Ch. Pauc and F. Roger, came to Berlin to work for the *Jahrbuch* in 1942 [36, 188].

German rule. In other words, mathematical reviewing, which had been of scarcely any interest to Nazi officials before, was then recommended as a means of scientific and political control.

But the military collapse of Germany put an end to all these aspirations.⁵⁵ Thus vanished the last traces of that German arrogance in science, which G. D. Birkhoff's son, Garrett, later deplored so vividly [4, 75]. After the war, a second wave of German emigré mathematicians sought the better living and working conditions in the U.S.

Among others, Oswald Veblen strongly supported a revitalization of German-American mathematical relations. After some initial hesitation, he even advocated the reestablishment of the *Zentralblatt*. Since the *Mathematical Reviews* were, in his opinion, the true heir of the *Zentralblatt*, however, Veblen advised that the *Zentralblatt* adopt some of the editorial principles of the old *Jahrbuch*. He remarked, in 1951, that the *Jahrbuch*'s thorough and systematic reviewing "might really be worthwhile in the rather hectic period of science through which we are passing" [OVP3]. The *Zentralblatt*, however, did not follow Veblen's advice, as it would have poorly served the interests of the publishing house, Springer.

It was Veblen, again, who suggested in 1946 that much of the nationalism of scientists in the past was related to their desire to catch up with the world standards in their profession. In his obituary of G. D. Birkhoff, the very patriotic dean of American mathematicians of the 1920s and 1930s (who, incidentally, had played a rather retarding role in the efforts for an American reviewing journal), Veblen wrote that "[a] sort of religious devotion to American mathematics as a 'cause' was characteristic to a good many of his predecessors and contemporaries. It undoubtedly helped the growth of the science during this period. By now, mathematics is perhaps strong enough in the United States to be less nationalistic" [39, xx].

CONCLUSION

Many instances in the history of mathematical reviewing in the 20th century reveal the strong influence of social and political conditions on mathematical reviewing, mainly due to the "control function" characteristic of such a publication. Even under extreme political conditions such as in Hitler's Germany, the first requirement for mathematical reviewing, its objectivity, had not significantly collided with its control function. Although modernity has been in partial conflict with the control function (as in the case of the conservative *Jahrbuch*), the situation was such that mathematicians were not left without a modern counterpart, namely, the *Zentralblatt für Mathematik*.

The initial call for an independent American abstract journal around 1920, the creation of the *Reichszentrale* in Berlin, and the maintenance of the obsolete *Jahrbuch* in the 1930s and 1940s were all (albeit in very different respects) at least partly related to the desire of scientific and national groups to control mathematical

⁵⁵ In 1945, in view of the German defeat, Geppert, together with his family, committed suicide.

communication. The political “coordination” of the *Zentralblatt* in Hitler’s Germany in 1938, however, was not primarily connected to its control function, but was facilitated by the political behavior of some German mathematicians who were fearful of losing scientific control.

American mathematicians’ ambitions to found a mathematical abstract journal of their own had been in existence since World War I, but were repeatedly set aside due to concern for other priorities of American mathematics, especially research, and because of the overruling needs of international communication. Finally, the foundation, in 1940, of the American *Mathematical Reviews* was an inevitable consequence of the political coordination of the *Zentralblatt*, and, at the same time, a sign of the growing strength and independence of American mathematics.

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- RCP Richard Courant Papers, New York University, Courant Institute, file: H. Weyl, Weyl to L. Ahlfors, January 14, 1948.
- RCPP Richard Courant Private Papers, in the possession of his son, Ernest Courant, Bayport, NY.
- RF Rockefeller Archives Center, Tarrytown, NY, Rockefeller Foundation, RF 1.1., series 200 D, boxes 125–126.
- RF1 RF, box 125, folder 1541, Report on the Present Status of Publication in the Mathematical Field, February 20, 1929, 7 pp.
- RF2 RF, box 125, folder 1549.
- RF3 RF, box 126, folder 1552.
- RF4 RF, box 125, folder 1550.
- RRP Roland G. D. Richardson Papers, Brown University Archives, John Hay Library, Providence, RI, correspondence.
- RRP1 RRP, folder: E. B. Wilson (1926–1930).
- RRP2 RRP, folder: J. D. Tamarkin (1940–1942).
- RRP3 RRP, separate box: correspondence 1933 (German–Jewish situation), file: O. Veblen.
- RRP4 RRP, folder: O. Neugebauer (1940–1942), Richardson to Neugebauer, December 20, 1938.

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