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MARSHALL STONE AND THE INTERNATIONALIZATION OF THE AMERICAN MATHEMATICAL RESEARCH COMMUNITY

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ABSTRACT. The American mathematical research community celebrated, symbolically at least, its fiftieth anniversary in 1938. Many of those fifty years had marked a period of consolidation and growth at home of programs in mathematics at institutions of higher education supportive of high-level research as well as of a corps of talented researchers capable of making seminal contributions in a variety of mathematical areas. By the middle decades of the twentieth century—the 1930s, 1940s, and 1950s—members of that community, like members of the broader American public, began increasingly to look outward beyond the national boundaries of the United States and toward a larger international arena. This paper explores the contexts within which the American mathematical research community, in general, and the American mathematician Marshall Stone, in particular, deliberately worked in the decades around mid-century to effect the transformation from a *national* community to one actively participating in an *internationalizing* mathematical world.

The year 1938 was one of celebration and self-congratulation within the American mathematical research community. Fifty years earlier, four Columbia graduate students and two Columbia faculty members had met in New York City in order “to establish a mathematical society for the purpose of preserving, supplementing, and utilizing the results of their mathematical studies” [3, p. 4]. Within two decades, this extremely modest, local enterprise had grown into a national organization that supported two publications, its *Bulletin* started in 1891 and its *Transactions* first published in 1900, as well as regional sections in the midwest, on the west coast, and in the southwest [28, pp. 266–268 and 401–415]. By 1938, the leadership of that organization had recognized that the time was ripe both for chronicling its history and for showcasing the contributions to the store of mathematical knowledge made by the members of the vibrant and self-sustaining national community

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of researchers that it defined. To these ends, the Committee on Publications of the American Mathematical Society (AMS) arranged for the publication of both the history of the Society's first fifty years [3] and a volume that aimed—by enlisting some of America's leading mathematicians to tell the tales—“to reveal what has been accomplished in America since the founding of the Society, and . . . to acquaint mathematicians with current problems and research in many fields” [33, preface]. The latter volume, the *Semicentennial Addresses of the American Mathematical Society*, contained topical essays on algebra, algebraic aspects of the theory of differential equations, harmonic analysis, the calculus of variations, geometry, topology, Dirichlet problems in harmonic analysis, and hydrodynamics, all of which emphasized—subtly or not so subtly—American contributions against the backdrop of major achievements in the various fields.

There was, however, nothing subtle about the boosteristic intent of the volume's culminating essay. There, George David Birkhoff, the mid-century doyen of American mathematics, self-consciously took on “Fifty Years of American Mathematics” and told a story of pointedly *American* accomplishments across many mathematical areas, especially, in his view, in his own area of analysis [4].¹ As Birkhoff and his fellow contributors to the semicentennial volume saw it, in fifty years American mathematics had put itself on the map; that is, in fifty years American mathematicians had succeeded in becoming fully competitive with those European counterparts who had for so long been considered the mathematical standard-bearers. An *American* mathematical research community had reached maturity.

In light, then, of the successes so proudly highlighted in 1938, it is perhaps not surprising that some within that mature *national* community sensed that the moment was propitious for fuller American participation in the development of mathematics *internationally*, especially given the influx into the United States of mathematical talent from Europe that had begun in the 1930s.² For these outward-looking American mathematicians, such participation meant not only the continuation and creation of research agendas in which mathematicians from many nations could and would participate from a technical point of view, but also the creation of social and institutional ties that would foster a globalized community of mathematicians united in a common set of values and goals, an *international* mathematical community,³ but the agenda was not purely international. That cadre wanted to establish the United States as a leader in shaping an international—as opposed to a European or a Western or an Eastern—mathematical world. If Europe, and especially Germany, had been the mathematical standard-bearer of the late nineteenth and early twentieth centuries, then the United States was poised, under appropriately talented and energetic activists, to assume that role in the mid-twentieth century. Perhaps chief among those American mathematicians who worked so effectively and so self-consciously toward this end at mid-century was Marshall Harvey Stone.

¹For a discussion of this and the other essays in the *Semicentennial Addresses* in broader historical context, see [26].

²Much has been written on scientific emigration to the United States; see, for example, [9].

³In this paper, I will use the term “international” in this technical, historical sense, that is, as connoting something *shared between* or *among* mathematicians. “Internationalization” will thus refer to the process by which a globalized community of mathematicians, which shares a set of values or goals, develops. For an overview of the historical literature on internationalization, see [12]. On the internationalization of mathematics *per se*, see [27] and [24].

THE MAKING OF AN AMERICAN MATHEMATICAL LEADER

Marshall Stone was born in New York City on 8 April 1903 to Harlan Fiske and Agnes Harvey Stone.⁴ By the time of Marshall's birth, Harlan Stone had not only established himself in the prominent Wall Street law firm of Wilmer and Canfield but had also taken on an adjunct teaching post at his *alma mater*, the Columbia Law School. He juggled these two competing interests until 1905, when the demands of a busy practice forced him to give up teaching. By 1910, however, Columbia had succeeded in calling him back for the influential post of Dean of the Law School, a position he held until 1923 when, tired of academic politics and fed up with administration, he accepted the headship of the litigation department back at his old law firm. He held this post in private practice for only one year. In 1924, he was appointed Attorney General of the United States, then Associate Justice of the U.S. Supreme Court a year later in 1925, and finally Chief Justice of the U.S. Supreme Court in 1941.⁵ Marshall Stone thus grew up in a privileged, educationally minded, and politically extremely well-connected family.

The young Stone progressed rapidly as an intellectual, entering Harvard in 1919 at the young age of sixteen, graduating *summa cum laude* in 1922, and earning his Ph.D. under G. D. Birkhoff in 1926 for a thesis on "Ordinary Linear Homogeneous Differential Equations of Order n and the Related Expansion Problems". A string of positions—at Columbia, Harvard, and Yale—prompted Stone's father to write to him in 1932 that "you . . . are getting to the time in life when you should not be making many more changes, and you will give serious consideration this time to the problem, where you are going to spend the rest of your life".⁶ Apparently taking his father's advice, Stone finally settled again at Harvard in 1933, becoming a full professor there in 1937 and continuing in that position until his move to chair the Department of Mathematics at the University of Chicago in 1946.

Marshall Stone's peripatetic early career in no way affected his ability to generate first-rate mathematical research. His earliest work, like his dissertation, was very much in the Birkhoffian analytic tradition, one focused on orthogonal expansions and especially on expansions in terms of eigenfunctions of linear differential operators. By 1929, however, Stone had moved into the abstract theory of unbounded self-adjoint operators in Hilbert space. This new work culminated in 1932 with the publication by the American Mathematical Society of his massive treatise, *Linear Transformations in Hilbert Space and Their Applications to Analysis* [39], a book that has been deemed "one of the great classics of twentieth-century mathematics" [16, p. 17]. In it, Stone succeeded in extending David Hilbert's spectral theorem from bounded to unbounded operators. As George Mackey put it in his account of Stone's mathematical accomplishments, "[t]his extension was made necessary by the problem of making mathematically coherent sense of the newly discovered refinement of classical mechanics known as quantum mechanics. Here an important part of the problem was discovering the 'correct' definition of self-adjointness for unbounded operators. This correct definition is rather delicate and the extension of the older theory of Hilbert and others was a major task" [16, p. 18]. By the mid-1930s, Stone had shifted areas again to explore Boolean algebras and their links

⁴The overview of Stone's career and activities in this and the next two sections follows that given in [25]. For an assessment of Stone's work, see [16].

⁵For the complete (and fascinating) biography of the elder Stone, see [17].

⁶Harlan Fiske Stone to Marshall and Lauson Stone, 21 December 1932, as quoted in [17, p. 541].

both to topology and to the theory of rings. Again, in Mackey's view, "[t]he discovery of these connections has had significant consequences for all three subjects" [16, p. 19], among them, Stone's proof in 1948 of the so-called Stone-Weierstrass Theorem, which generalized Weierstrass's nineteenth-century result on approximating arbitrary continuous functions on a finite interval uniformly by polynomials [36]. The depth and breadth of Stone's research had already been recognized a decade earlier in 1938 with his election to the National Academy of Sciences at the age of only thirty-five.

Stone's involvement in the American mathematical scene was not limited to his research, however. Like his adviser, he was an active participant in the broader organizational goals of the American mathematical research community.⁷ In particular, Stone served in the 1930s on the editorial boards of the three leading American research journals, the *Transactions of the American Mathematical Society*, the *American Journal of Mathematics*, and the *Annals of Mathematics*. Moreover, from 1936 to 1942 he was an active member of the governing Council of the AMS and from 1936 until 1939 a key member of the organizing committee for what would have been an International Congress of Mathematicians (ICM) in Cambridge, Massachusetts in 1940, the first to have been held in the United States since the official institution of the ICMs in Zürich in 1897.⁸ It was in the latter capacities that Stone began to focus on international relations in mathematics, sparked perhaps by the trips abroad he had taken with his family from the time he was a boy, by his own first-hand experiences as a participant at an international topology conference held in Moscow in 1935 [17, p. 540], and by the larger American debate over isolationism versus internationalism that resumed in earnest in the late 1930s and early 1940s [8].⁹

LOOKING BEYOND THE AMERICAN MATHEMATICAL COMMUNITY

As a member both of the AMS Council and of the ICM organizing committee, Stone increasingly grappled with the exigencies of trying to foster free mathematical interchange in an ever-worsening international political arena. In February of 1940, for example, after it had become clear that plans for the ICM would have to be put on hold for the indefinite future due to the political situation in Europe, Stone drafted a letter to the Council of the AMS that included an "Appeal from the American Mathematical Society to sister scientific organizations in all parts of the world". That appeal asked not only for aid in "the preservation of the cultural values and the effective organs of scientific research throughout the world during these days of destruction" but also for help "especially for those scientists who, by the fortunes of war, may fall prisoner or may come under new flags, to the end that

⁷For an overview, see [23, especially, pp. 133–139].

⁸An international congress, although not one in the official series of ICMs, was held in Chicago in 1893 in conjunction with the World's Columbian Exposition. It has sometimes been called the "zeroeth" International Congress of Mathematicians in the literature [2]. For more on the Chicago Congress, its content and impact, see [28, pp. 295–327].

⁹Stone was well equipped linguistically to embrace an internationalist agenda. In a grant application to the John Simon Guggenheim Foundation in 1930, he characterized his language skills this way: "Russian, Spanish, Italian, German, Latin, French: elementary reading knowledge of the first two, a fairly good reading knowledge of the next three, a good reading and speaking knowledge of French". See Marshall H. Stone Papers, Box 38, Folder 16–17, Brown University Library, Providence, Rhode Island (hereinafter cited as "Stone Papers").

their individual sufferings may be mitigated and their scientific activity continued to the benefit of all men”.¹⁰ The Council voted unanimously to distribute Stone’s appeal and sent it on to some thirty-nine mathematical societies internationally.

By the end of 1940, however, responses had only been received from Germany and Switzerland. Writing on behalf of the Deutsche Mathematiker-Vereinigung, Wilhelm Süss expressed the hope “that despite the emphatic wishes for war of our former enemy, England, the war can soon be brought to an end without too much injury to the scientific standards or to the savants in the war zone”.¹¹ The reply from Switzerland was more pragmatic and more immediate. Sophie Piccard, as a member of both the Swiss and Polish mathematical societies, urged the American mathematical community to do whatever it could to secure entry visas “for the duration of the war” for the two Polish mathematicians, Waclaw Sierpiński and Kazimierz Kuratowski, since “for political reasons, the Swiss authorities do not grant entry visas into Switzerland to Poles except when they have visas for other countries where they are permitted to go and settle”.¹² Of course, as then AMS Secretary Roland G. D. Richardson explained in a reply on 22 November 1940, the American mathematical community was already hard at work trying to place displaced scholars. “[T]here are”, he noted, “approximately seventy-five refugee mathematicians in this country, some of whom perhaps fifty have acquired some sort of permanent position”. Yet, he added, “[w]hile this enriches the culture of this country, it does, as you will readily understand, raise very considerable difficulties. Our young men are not happy over this situation”.¹³

For his part, Stone was clearly frustrated by the underwhelming response to his appeal, an initiative that he viewed as vital for mathematicians internationally. By year’s end, he had sought and received permission from the AMS both to draft a reply to Süss, even though he did “not expect any immediate results from continuing the correspondence”, and to “elicit some response from the London Mathematical Society”. In his view, his “English colleagues ha[d] a definite obligation in that matter and . . . we should expect an acknowledgment at least”.¹⁴

By the summer of 1941 with the United States’s entry into the war and with the efforts of Stone and others, such as AMS President (in 1941 and 1942) Marston Morse, to mobilize the American mathematical community in the service of the country, more broadly international initiatives like the “appeal” were forced to

¹⁰ Marshall Stone writing to the Council of the AMS, 24 February 1940, Stone Papers, Box 41, Folder 9A: American Mathematical Society, Folder 1.

¹¹ “ . . . dass trotz des betonten Kriegswillens unseres letzten Kriegsgegners, England, der Krieg ohne allzu starke Beeinträchtigung der wissenschaftlichen Werte und der Gelehrten im Kriegsgebiet bald beendet werden kann”. Quoted in a letter to “Dear Colleagues” dated 24 October 1940 from the Secretary of the AMS, Roland G. D. Richardson, Stone Papers, Box 41, Folder 9A: American Mathematical Society, Folder 1 (my translation).

¹² “Pour les raisons d’ordre politique, les autorités suisses ne donnent le visa d’entrée en Suisse à des Polonais que lorsque ceux-ci possèdent des visas d’autres pays où il leur est permis d’aller se fixer. Pour sauver d’incalculables valeurs scientifiques, je vous prie, Monsieur le Président et Messieurs, d’avoir l’extrême obligeance d’entreprendre des démarches auprès de votre Gouvernement pour obtenir pour Messieurs Sierpinski et Kuratowski la permission de venir travailler aux Etats-Unis pour la durée de la guerre”. Sophie Piccard to Roland G. D. Richardson, 9 October 1940, Stone Papers, Box 41, Folder 9A: American Mathematical Society, Folder 1 (my translation).

¹³ Roland G. D. Richardson to Sophie Piccard, 22 November 1940, Stone Papers, Box 41, Folder 9A: American Mathematical Society, Folder 1.

¹⁴ Marshall Stone to Roland G. D. Richardson, December 1940, Stone Papers, Box 41, Folder 9A: American Mathematical Society, Folder 1.

take a second seat.¹⁵ Nevertheless, when Stone himself assumed the presidency of the AMS in January of 1943 for the two-calendar-year term from 1943 to 1944, his agenda for the American mathematical community included, not surprisingly, greater visibility for America's mathematicians in the war effort and increased activity in applied mathematics directed toward specific wartime problems, but also the maintenance and enhancement of international mathematical contacts in so far as the war allowed. The latter objective focused—as did American diplomatic efforts of the early 1940s such as the Atlantic Charter signed by Franklin Roosevelt and Winston Churchill in August of 1941 and the Declaration of United Nations signed in January of 1942 by the United States, Great Britain, the USSR, China, and the representatives of some twenty-two other countries—on planning ahead for the postwar world.¹⁶ For Stone, as for the nation at large, Latin America represented an area both ripe for contact and relatively accessible given the wartime theaters of activity in Europe and the Pacific. Moreover, the countries in the Americas had been a focal point of American foreign policy at least since 1933.

THE AMERICAN MATHEMATICAL COMMUNITY AND U.S. FOREIGN POLICY:
MATHEMATICAL GOOD NEIGHBORS IN LATIN AMERICA

When Roosevelt was elected President of the United States in 1932, the country was in the depths of an economic depression. Not surprisingly, the new president devoted almost all of the just-over-1800-word inaugural address he delivered on 4 March 1933 to domestic issues. The fifty-four words of the speech that were not focused inward, however, served to shape the country's foreign policy throughout his unprecedented twelve years in the presidency. Roosevelt pledged that, "[i]n the field of world policy", he would "dedicate this nation to the policy of the good neighbor—the neighbor who resolutely respects himself and, because he does so, respects the rights of others—the neighbor who respects his obligations and respects the sanctity of his agreements in and with a world of neighbors" [32, p. 3]. Just over a month later on 12 April in a speech given before the Pan-American Union, Roosevelt made explicit that among those "good neighbors" would be the countries of Latin America. As he put it, "[y]our Americanism and mine must be a structure built of confidence, cemented by a sympathy which recognizes only equality and fraternity. It finds its source and being in the hearts of men and dwells in the temple of the intellect" [32, pp. 4–5].

The U.S. government made manifest its notion of the "good neighbor" almost immediately through trade, through its policy of non-intervention in Latin American political affairs, and through its promotion of "a common defense against outside threats" to North, Central, and South American interests [32, p. 124]. Concomitantly, some U.S. scientists came to embrace Roosevelt's vision in the form of inter-American intellectual participation and cooperation. With the financial aid and encouragement of private foundations—such as those established by oil magnate John D. Rockefeller and industrialist Simon Guggenheim—as well as with governmental support after the establishment in 1940 of the Office of Inter-American

¹⁵I plan to address some of the activities during World War II of the American Mathematical Society in general and Stone in particular in forthcoming work.

¹⁶The Atlantic Charter proclaimed the ideals of non-aggression, self-determination, lowering of trade barriers, world-wide economic cooperation, and postwar disarmament, among others. For more on this and on the Declaration of United Nations, which also upheld the principles of the Atlantic Charter, see [8, pp. 43–46].

Affairs (OIAA), they actively fostered scientific relations throughout the Americas in the late 1930s and into the 1940s.¹⁷

Among the earliest scientific “good neighbors” were the astronomer Harlow Shapley, the experimental physiologist Walter Cannon, and the mathematician George D. Birkhoff, all of Harvard University [10, especially, pp. 467–522].¹⁸ In particular, Birkhoff explicitly cast his intentions of establishing mathematical liaisons with Latin America in the context of broader American foreign policy. In a letter on 21 January 1941 to Henry Moe, secretary of the Guggenheim Foundation and head of the Committee of Inter-Artistic and Cultural Relations of the OIAA, Birkhoff offered the opinion “that President Roosevelt has been the first American President to realize the extraordinary importance and value to us, as well as to them, of a closer cultural and economic rapprochement between us. If I do go [to Latin America], I should therefore sedulously aim to cooperate with the purposes which our government has in mind in uniting the democracies of the western world.”¹⁹

Birkhoff’s trip did materialize a year later in the spring of 1942, and he succeeded both in gaining an overview of mathematical Latin America and in forging ties with mathematicians to the south.²⁰ Following his return, he strongly encouraged his former Harvard student and then Harvard colleague, Marshall Stone, to continue the example of mathematical good-neighborliness with a trip of his own. As a mathematician already convinced that active internationalization was key to the vitality of his field and as the President-elect of the American Mathematical Society in 1942, Stone was a natural choice for Birkhoff to handpick as his successor in Latin America. Stone resolved to use his new leadership position within the American mathematical community to help realize the ideal of the mathematical good neighbor more fully.

Plans coalesced quickly. By 10 June 1943, Stone was writing to his wife from New York City, where he had been meeting with Henry Moe in his capacity as a functionary in the Office of Inter-American Affairs. Moe, who had coordinated and underwritten Birkhoff’s 1942 Latin America trip under the aegis of the OIAA, played the same role for Stone in 1943, securing wartime air passage for him from Miami to Lima, Peru, on 13 June and arranging his itinerary from there to Bolivia and Argentina with a scientific side trip to Uruguay and an excursion to Paraguay and Brazil to view the Iguassu Falls.²¹

Although Stone delivered a two-month-long course of lectures on Boolean algebras and their connections to topology in Buenos Aires—his home base throughout the months of July, August, September, and early October—he also gave special lectures by invitation in the various cities he visited, universally welcomed and celebrated as the President of the American Mathematical Society. In Lima, for example, where he sojourned in mid-June and was made Doctor *honoris causa* of the Universidad Mayor de San Marcos [29, p. 138], Stone lectured in Spanish on

¹⁷On the Rockefeller Foundation’s involvement in the support of the internationalization of mathematics (with brief mentions of its interests in Latin America), see [34].

¹⁸On Birkhoff, in particular, see [20], [21], and [22].

¹⁹George D. Birkhoff to Henry Moe, 21 January 1941, American Philosophical Society Archives, Philadelphia, Pennsylvania, as quoted in [20, p. 5].

²⁰See the extensive account of Birkhoff’s visit and his impressions of mathematical Latin America in [21] and [22].

²¹Marshall Stone to his wife, Emmy Stone, various dates from 10 June 1943 to 6 October 1943, Stone Papers, Box 35, Folder 7.

“Algebra and Logic”, highlighting the role of Boolean algebras in connecting these two fields. In La Plata, Argentina, later in his stay, he took as his topic “Mathematics in Modern Science and Technology” and pushed the same point in a Latin American context that he had been honing while a civilian contractor, first to the Navy Department and then to the War Department in Washington, namely, that mathematics has a critical role to play in the modern world. These talks, together with his more specialized series of lectures, comprised the formal, intellectual component of his visit and were reported on by the Spanish mathematician in exile, Julio Rey Pastor, in the pages of the *Revista de la Unión Matemática Argentina* later in 1943 [29].²² In addition to lecturing, however, Stone also met and talked with students and faculty and participated in the meeting of the Unión Matemática Argentina on 10 July 1943 [7].

As a result of his experiences, Stone, like Birkhoff, came away with distinct impressions of the Latin American mathematical scene. He opened the sixteen-page, typescript report he submitted to Henry Moe on 13 April 1944 by first reflecting broadly on “our cultural relations with Latin America”, a topic he confessed to being “very deeply interested in” and on which he had “a number of ideas”.²³ In light of the fact that Moe’s office dealt with cultural relations with Latin America in the broadest sense, Stone first made clear those areas in which he felt inter-American contact would be most fruitful. “It seems to me”, he wrote, “that the great need in Latin America is for scientific and technological development, and that we on our side have far more to give in the scientific and technological fields than in most others”. In another echo of the line of argumentation for mathematics that he had honed in Washington, Stone added that “[i]t goes without saying that sound technological development is not without simultaneous development in fundamental science”.

The problem, of course, was how best to foster such inter-American technological and scientific interaction in light of the “good neighbor” policy. Stone made his case with political savvy. “If one believes, as I do”, he stated, “that the soundest relations between nations will result from mutual assistance without thought of profit or the creation of permanent obligations, then one can conclude that anything we can do to promote science and technology in Latin America will contribute in the long run to the good of all. It is exceedingly important”, he continued, “. . . that whatever the United States undertakes should be done in the spirit of helpfulness and not at all in the hope of influencing the internal or external politics of the various countries to which we give assistance. It is also of the very first importance that every step we take should be designed to discover and cultivate self reliance in our Latin American fellows”. This goal could be accomplished relative to science in general and mathematics in particular in at least two ways in Stone’s opinion.

First, barriers should be broken down between nations to allow for the “free exchange of intellectual activity at professional and university levels”. This would not only allow those trained in one Latin American country to move more easily to another, but also foster greater cross-fertilization of ideas. Second, Stone contended that “somewhat more can be accomplished for the time being”, in the case of

²²For the texts of Stone’s South American lectures, see Stone Papers, Box 35, Folder 9.

²³Marshall Stone to Henry Moe of the Committee for Inter-Artistic and Cultural Relations, 13 April 1944, Stone Papers, Box 35, Folder 7. The quotes that follow in this and the next two paragraphs are also from this report.

mathematics, “by bringing to the United States on trips of study and investigation a greater number of Latin Americans interested in mathematics than we send of North American mathematicians to Latin America”. Although he had very much profited from his trip to and experiences in Latin America, Stone well knew that this had been precisely the strategy that North American students and professors had adopted relative to Germany from the closing decades of the nineteenth century through the outbreak of World War I.²⁴ They had traveled abroad for their high-level mathematical training, they had imported key aspects of the German, and especially Prussian, educational system into the United States, and, by the outbreak of World War II, they had succeeded in establishing a mathematical community competitive on the international mathematical scene.²⁵ What Germany had been to the United States at the turn of the twentieth century, the United States could be to Latin America at mid-century.²⁶

STONE’S PLATFORMS FOR THE INTERNATIONALIZATION OF MATHEMATICS

During his presidency of the AMS, Stone worked to encourage not only U.S.–Latin American contacts but also broader international mathematical cooperation. In October 1944, for example, he received a request from Frederick Silber of the Office of War Information to make “a collection of reprint articles selected from appropriate journals” to send to mathematicians in France anxious, following the liberation of Paris in August of 1944, to resume their mathematical researches.²⁷ Although Stone himself was unable to undertake the task owing to the press of his own work within the War Department, he suggested that “[t]he most natural way for French mathematicians to satisfy their curiosity would be for them to re-establish direct contacts with American mathematicians, with many of whom they have old personal relations, with a view to obtaining our recent mathematical literature and opening up individual scientific correspondence. The sooner the obstacles to inaugurating this state of affairs can be cleared away, the happier all concerned will be!”²⁸ Given that more groundwork might be needed in order for this more natural course of events to unfold, Stone proposed that “[i]n the meantime . . . the best and most efficient way to acquaint French mathematicians with what has been going on in the outside world since 1940 would be to put into their hands enough back volumes of *Mathematical Reviews* . . . to supply each of the central *mathematical* libraries of France attached to universities or scientific institutes”. Moreover, he offered, “[i]f you can provide one or two cubic yards of express shipping space, I am sure that you will find our Society willing and able to coöperate in other respects”.

Stone’s overtures on behalf of the AMS were not limited to the French. On 8 June 1944, AMS Secretary J. R. Kline let him know that the AMS had just received

²⁴Stone later discussed this issue from an historical perspective in his article [37, especially, pp. 31–32].

²⁵On American mathematics students abroad, see [28, pp. 189–259 and 427–453].

²⁶See [22, pp. 43–61] for an account of some of the students and faculty who went to the United States for further mathematical study and for an assessment of the overall impact of, especially, Birkhoff’s visit to Latin America.

²⁷Frederick Silber to Marshall Stone, American Mathematical Society Papers, Ms.75.5, Box 29, Folder 96: “Office of Scientific Personnel Oct–Nov 1944”, Brown University Library, Providence, Rhode Island (hereinafter cited as “AMS Papers”).

²⁸Marshall Stone to Frederick Silber, 25 October 1944, AMS Papers, Ms.75.5, Box 29, Folder 96: “Office of Scientific Personnel Oct–Nov 1944”. The quotes that follow in this paragraph are also from this letter (with Stone’s emphasis).

“a cablegram of greetings from the Soviet scientists”,²⁹ and wondered whether “it would be proper for you and me to prepare a friendly cablegram of greetings and good wishes” in return and to “express the hope that within the near future it will be possible to resume normal scientific relations and to have conferences on subjects of vital mathematical importance”. Stone replied unequivocally. “By all means”, he wrote, “reply to the Russian scientists in the spirit you suggest—emphasizing our desire for cordial scientific relations in peacetime”.³⁰

A year later, Stone and Kline were still engaged in establishing international mathematical contacts, Kline from his position as AMS Secretary, but Stone as chair of the AMS’s War Policy Committee and no longer as President of the AMS.³¹ On 23 June 1945, Kline urged Stone to “see what governmental assistance can be secured in the renewal of contacts with mathematicians in the formerly occupied countries”.³² “I imagine”, he continued, “the problem will be more difficult in connection with the Polish mathematicians than with the Dutch, Norwegians, and Danes. This is an important item and should be carefully discussed by the War Policy Committee soon”. Stone wholeheartedly agreed. Even though he was extremely busy, he replied that “I think if I can get some progress . . . on the extension of our foreign relations during my off moments I shall be content”.³³ As Stone had wanted the American Mathematical Society to take the lead in 1940 with his “Appeal . . . to sister scientific organizations in all parts of the world”, so he saw the AMS playing a leading role in helping the mathematicians of France, Poland, and elsewhere recover from a war that had been waged on their soils.³⁴

Stone and others within the AMS did not embrace their internationalist agenda in a vacuum. Throughout World War II, internationalists in American politics such as Republican presidential candidate (in 1940) Wendell Willkie and Democratic congressman and later senator J. William Fulbright pressed an agenda directed toward a postwar world of international cooperation. Whereas the League of Nations, which was formed in the aftermath of World War I without the adherence of the United States, had failed to prevent World War II, the United Nations chartered in

²⁹J. R. Kline to Marshall Stone, 8 June 1944, AMS Papers, Ms.65.5, Box 29, Folder 112: “Marshall Stone June–July 1944”. The next quote is also from this letter.

³⁰Marshall Stone to J. R. Kline, 12 June 1944, AMS Papers, Ms.65.5, Box 29, Folder 112: “Marshall Stone June–July 1944”.

³¹Jointly with the Mathematical Association of America, the AMS had established the War Preparedness Committee late in 1939. The War Preparedness Committee became the War Policy Committee after the bombing of Pearl Harbor and concentrated on “[t]he solution of mathematical problems for military or naval science, or rearmament”, “[t]he preparation of mathematicians for research essential for [the previous] objective”, and “[t]he strengthening of undergraduate mathematical education in our colleges to the point where it affords adequate preparation in mathematics for military and naval services of any nature” [19, p. 711].

³²J. R. Kline to Marshall Stone, 23 June 1945, AMS Papers, Ms.75.5, Box 30, Folder 112: “Marshall Stone Feb–July 1945”. The next quote is also from this letter.

³³Marshall Stone to J. R. Kline, 29 June 1945, AMS Papers, Ms.75.5, Box 30, Folder 112: “Marshall Stone Feb–July 1945”.

³⁴In 1946 and in connection with his ongoing AMS duties, for example, Stone put forth the idea that the AMS might “consider trying to arrange an exchange of members with some of the Russian Mathematical Societies”, an idea that Kline thought was “excellent” and perfectly in line with the reciprocity agreements that the AMS had “with the London Society, the Swiss Society, and others”. See Marshall Stone to J. R. Kline, 27 February 1946 and J. R. Kline to Marshall Stone, 5 March 1946, AMS Papers Ms.75.5, Box 31, Folder 119: “Marshall Stone Feb–Mar 1946”.

San Francisco in June of 1945 as a result of much American internationalist agitation and spadework would serve to maintain world peace in the aftermath of World War II. It was incumbent upon the United States, moreover, as a world leader to work to effect this new world order [8]. As with the country as a whole, so with the country's mathematicians, at least that is how Stone and others saw it.

After the war, Stone continued his internationalist agenda both within the AMS and from the position he assumed in 1946 as chair of the Department of Mathematics at the University of Chicago. One of the transformational departments in the early history of research-level mathematics in the United States [28, pp. 261–426], the Chicago Mathematics Department of the interwar years was productive, if no longer as much on the cutting edge as it had been at the turn of the century. Leonard Eugene Dickson and A. Adrian Albert maintained high profiles in algebra, but the program in the calculus of variations that had begun under Oskar Bolza had largely played itself out in the hands of Bolza's student, Gilbert Ames Bliss [28, pp. 445–446]. In a postwar effort to restore not only the Mathematics Department but also the whole University to its former luster, Chicago Chancellor Robert Maynard Hutchins entered into negotiations with Stone to bring him from Harvard to Chicago, promising him essentially free rein relative to future appointments in the department.³⁵ By 16 May 1946, those negotiations had succeeded, and Stone was explaining to Kline that he had “just written Mr. Hutchins, telling him that I am ready to accept his offer. I think that there is a real challenge and a real opportunity out there You would give me much needed guidance”, he continued, “if you could find the time to put down on paper some of your ideas as to what a really first-class department of mathematics should be like in this modern world and some of the names of mathematicians who should be in it!”³⁶ The goal was nothing short of a “first-class department” in the “modern world”, and, by Stone's lights, that meant a department that united some of the best mathematicians not just nationally but internationally. For Stone, a “first-class department” in the “modern world” was one that reflected an internationalized community, that is, a globalized community of mathematicians, which shares a set of values or goals and which, at the same time, operates at the highest levels of mathematical achievement.

In order to attain this at Chicago, Stone consulted with trusted friends and colleagues such as Kline and John von Neumann, but, as Stone put it in his “Reminiscences of Mathematics at Chicago”, he was largely “an autocrat in making [his] recommendations” [40, p. 187]. He knew who he wanted, and he negotiated hard both with the Chicago administration for financing and with his candidates to persuade them to join in his vision for what has been called the “Stone Age” at Chicago [6].

Stone's initial list of target hires was astonishing in its audacity as well as in its quality. “I have concluded”, he wrote matter-of-factly to E. C. Colwell, the President of the University of Chicago, on 25 July 1946, “that our choice should be

³⁵For more on Hutchins's postwar initiatives, see [18, pp. 133–165]. On Stone's efforts, in particular, see [18, pp. 159–160], [6], and [40]. As Stone pointed out in [40], Hutchins's promises, while well-intentioned, were nonetheless dependent on the University's finances. Stone had an uphill battle during his tenure as department chair in wresting funds from the administration for new appointments.

³⁶Marshall Stone to J. R. Kline, 16 May 1946, AMS Papers, Ms.75.5, Box 31, Folder 120: “Marshall Stone Apr–July 1946”.

made among the following five mathematicians:

Saunders Mac Lane, Associate Professor, Harvard University

John von Neumann, Professor of Mathematics, Institute for Advanced Study

André Weil, presently Visiting Lecturer, University of São Paulo

Hassler Whitney, Professor of Mathematics, Harvard University

Oscar Zariski, Research Professor of Mathematics, University of Illinois".

In Stone's view, moreover, Whitney and Weil would have constituted "the best pair we could select from the list under consideration".³⁷ Although ultimately unsuccessful in scoring his hoped-for Whitney/Weil coup, Stone did make a string of spectacular appointments, some of which drew from this initial list. He hired the Americans Paul Halmos in 1946 and Saunders Mac Lane in 1947, the expatriate Frenchman André Weil and the Polish harmonic analyst Antoni Zygmund, also both in 1947, the Americans Irving Segal and Edwin Spanier in 1948, and the Chinese differential geometer Shiing-Shen Chern in 1949.³⁸ Zygmund, moreover, embraced Stone's "good neighbor" agenda, visiting Latin America in 1948, meeting Alberto Calderón, and encouraging the young Argentine to pursue his doctoral work at Chicago under his supervision. In the late 1940s and early 1950s, Stone expanded these local efforts at internationalization into a truly worldwide internationalist agenda, of which the American community would be a part, through his work in conjunction with the AMS both to bring the International Congress of Mathematicians to the United States and to found an International Mathematical Union.

Plans to organize what would have been the 1940 ICM in Cambridge, Massachusetts, were revived as early as February 1946 by the so-called "Emergency Committee" of the AMS constituted for this purpose and chaired by Marston Morse with Stone as one of its members. On 16 February, that committee "voted, five to one, that", while "it would be too soon to hold the International Congress in 1948", "the possibility of holding an *open* Congress in 1950 should be explored".³⁹ Moreover, "[u]pon the motion of Professor Stone, it was voted that a representative of the Emergency Committee should be sent to Europe in 1947, to investigate the attitude of the European mathematicians toward a Congress in 1950 of the type mentioned above". Related issues discussed at least preliminarily at the same meeting were the "[i]nternational cooperation problems raised by the United Nations Educational, Scientific and Cultural Organization [UNESCO]" and, in particular, "the associated problem of the revival of the International Mathematical Union [IMU]".⁴⁰

³⁷Marshall Stone to E. C. Colwell, 25 July 1946, Stone Papers, Box 35, Folder 10: "MHS—Chairmanship at Chicago".

³⁸Anonymous, "Mathematics at Chicago: 1892–1968", General Archival Files, Mathematics Department, University of Chicago Archives, Joseph Regenstein Library, University of Chicago, Chicago, Illinois.

³⁹"Memorandum RE Meeting of Emergency Committee of International Congress of Mathematicians on 2/16/46", AMS Papers, Ms.75.2, Box 15, Folder 97: "Correspondence" (my emphasis). The next quote is also from this memorandum.

⁴⁰Marshall Stone to the Rockefeller Foundation, 5 August 1946, AMS Papers Ms.75.2, Box 15, Folder 100. Interestingly, Stone engaged in these internationalist mathematical activities at a time when University of Chicago Chancellor, Robert Maynard Hutchins, and other of his University of Chicago colleagues were involved in the so-called Committee to Frame a World Constitution. Part of the World Federalist Movement that blossomed in the postwar years in reaction to the threat of unchecked nuclear proliferation and in the context of the evolving Cold War with the

As is well known, the IMU had been created in 1920 in the aftermath of the First World War amid great political turmoil and had ultimately succumbed to geopolitics in 1932. Although other international scientific unions also date from the immediately post-World War I era—for example, the International Astronomical Union (IAU) and the International Union of Pure and Applied Physics (IUPAP) were founded in 1919 and 1922, respectively—the IMU was unique. Its constituency, the world’s mathematicians, had officially rejected it as their representative and in so doing had forced it out of existence in 1932 (see below). Nevertheless, thoughts of resurrecting an IMU surfaced almost immediately following the close of World War II and in the context of the broader educational objectives of the newly formed United Nations. In particular, in a letter to Roland Richardson, Joseph Needham, British biochemist, soon-to-be noted historian of Chinese science, and first head of UNESCO’s Natural Science division, had suggested in 1946 that the American Mathematical Society “take the lead in reconstituting the International Mathematical Union”.⁴¹ As AMS Secretary J. R. Kline confided to Stone, however, “I feel strongly that we should not be a party to a Union which excludes mathematicians because of national and racial ties, just as we feel that the Congress must be an *open* Congress. There will surely be”, he noted, “some knotty problems because of the connection with the State Department and UNESCO”. Moreover, he asked, “[w]hat would be the relation between the Congress and the International Mathematical Union?” All of these were complex problems intertwined with international politics. Stone, as the chair (from 1945 to 1948) of the Policy Committee as well as initially of the Financial Committee of the 1950 ICM, actively grappled with them and other questions of an international nature from 1946 into the early 1950s.⁴²

As the correspondence between Stone and Kline makes clear, one of the most critical issues at this juncture was that of the openness of the proposed ICM to mathematicians from all nations. In 1920 when the IMU was founded at the Strasbourg ICM, mathematicians from the former Central Powers had been excluded from participation in both the Congress and the IMU largely at the insistence of the French. This exclusionary policy, at least relative to the ICMs, was maintained at the Toronto Congress in 1924, but dropped by the Italians for the Bologna Congress in 1928. The fact that it was maintained by the IMU, however, resulted in the

Soviet Union, the Committee to Frame a World Constitution aimed to establish a global federal system—as opposed to individual and competing national regimes—that would serve to unite the world. The group’s efforts culminated in a preliminary draft of such a document published by the University of Chicago Press in 1948. See, for example, [18, p. 123] and [5] on the Committee’s activities.

⁴¹J. R. Kline to Marshall Stone, 12 July 1946, AMS Papers Ms.75.5, Box 31, Folder 120: “Marshall Stone Apr–July 1946”. The quotes that follow in this paragraph are also from this letter (with my emphasis). Needham had served as British scientific liaison in Chongqing during World War II and, as early as 1944 when the war was still raging in both the European and Pacific theaters, had taken an internationalist stance in crafting plans for postwar international scientific cooperation. See [14, p. 38].

⁴²The Policy Committee was created on 1 October 1945 after the War Policy Committee was officially discharged. The new committee—consisting initially of six members, four from the AMS, one from the Institute of Mathematical Statistics, and one from the Association for Symbolic Logic—was charged with studying “those problems affecting the mathematical profession which are the common concern of the constituent organizations”. See J. R. Kline to the Rockefeller Foundation, 5 August 1946, AMS Papers Ms.75.2, Box 15, Folder 100. John von Neumann, not Stone, ultimately served as chair of the Financial Committee, owing to Stone’s involvement in establishing an IMU and to the efforts to keep the ICM and IMU issues separate.

IMU's dissolution by the mathematicians present at the next ICM held in Zürich in 1932. By contrast, as late as 1949, Germany and Austria had never been members of the International Astronomical Union. This owed, however, not to the IAU's official policies but rather to "either . . . governmental veto, or . . . the obstinate refusal of their leading academies to adhere to the International Council of Scientific Unions [ICSU]" [1, p. 9].⁴³

The facts that the ICMs had been so tightly linked to the IMU and that the IMU as an institution was viewed as politically tainted gave mathematicians in the 1940s pause. If an IMU were reconstituted under the UNESCO rubric as Needham proposed and if it were to serve as an umbrella organization for the ICMs as it had in the 1920s, then the prevailing sentiment, at least among the Americans, was that it could not be exclusionary. Unless and until that non-negotiable point was clarified, the AMS, as the organizer of the 1950 Cambridge ICM, wanted the matter of the ICM to remain separate from that of the IMU, even though it hoped for financial support from UNESCO for the ICM. Stone laid out the American position clearly in 1947. "In general", he asserted, "it appears that international congresses . . . tend . . . to be constituted without reference to membership in the sponsoring union. . . . Unless instructed in some other sense, American representatives in discussions of any proposed union should be expected to maintain the independence of the Congress, should any alternative form of organization be suggested".⁴⁴

Writing in his capacity as chair of the Policy Committee and at the request of Nobel Prize-winning physicist Arthur H. Compton, one of the two American representatives chosen by the State Department to attend a meeting of UNESCO in London in November 1946, Stone laid out his "views on the way in which UNESCO could promote the development of mathematics on the international front".⁴⁵ In particular, he stressed that "the chief international problem of mathematics seems . . . to be what might be called the problem of communications" and that "UNESCO [could] help the development of mathematics most effectively by", among other things, "eliminating or minimizing the various obstacles, political and economic, which threaten to make the travel of scholars and students between the nations of the world extremely difficult even after the conditions of peace are established".⁴⁶ Alluding to the several plans of an international nature then under way—not the least of which in the view of Stone and the Policy Committee was for the Cambridge ICM in 1950—he closed with the assurance that "[t]he mathematicians of the United States will watch with the very greatest interest the developments in UNESCO which may have a bearing on their professional activities".

Six months to a year later, speaking before the Committee on International Scientific Unions of the National Research Council, Stone was even more pointed. "[I]n considering American adherence to a Union", he stated firmly, "it must be borne in mind that we want nothing to do with an arrangement which excludes

⁴³On the tortured early history of the IMU, see [15, pp. 23–60]; for a brief history of the IAU, see [1]. Of the scientific unions currently adhering to ICSU, only the IMU is listed as having been "readmitted" after a period of dissolution. See the ICSU website at <http://www.icsu.org>.

⁴⁴Marshall Stone, "Policy Committee for Mathematics: Report to Council of the American Mathematical Society", AMS Papers, Ms.75.5, Box 32, Folder 60.

⁴⁵Marshall Stone to the members of the Policy Committee, 31 October 1946, AMS Papers Ms.75.5, Box 31, Folder 121: "Marshall Stone Aug–Oct 1946".

⁴⁶Marshall Stone to Arthur H. Compton and W. A. Noyes, 30 October 1946, AMS Papers Ms.75.5, Box 31, Folder 121: "Marshall Stone Aug–Oct 1946". These quotations and the next come from this letter.

Germans and Japanese as such". "We are fearful", he continued, "that the motive back of the great activity of the French toward the formation of a Union is political, and to promote the extension of French cultural domination over the satellite [sic] nations of Europe". Moreover, he "emphasized as one of the serious problems in relation to the formation of an International Mathematical Union, the inability of the outside world to communicate with Russian scientists, and pointed to the great importance of including the Russians in any international organization which may be set up".⁴⁷ As Kline explained to one of his many correspondents, the American efforts relative to the formation of a new IMU were motivated by the fact that "if we do not participate . . . , the Europeans will proceed to set up a Union alone. In that case, we may be forced to join a group in whose principles we do not agree or remain outside the fold entirely".⁴⁸ Clearly, neither of these was an acceptable option for an American mathematical research community poised and ready to shape and to participate in an international mathematical arena.

By 1948, Stone along with Kline and Marston Morse had constituted an official subcommittee of the Policy Committee to explore the reformation of an IMU. As early as 1947, Stone as well as the other members of the committee had begun soliciting mathematicians internationally—Harald Bohr in Denmark, W. V. D. Hodge in England, Albert Chatelet and Henri Cartan in France, Hassler Whitney, Norbert Wiener, and Hermann Weyl in the United States, among others—as to their views, particularly on the matter of a proposed IMU. Almost all⁴⁹ agreed wholeheartedly with the American conception of an open IMU, divorced as thoroughly as possible from the geopolitics of the day. As Bohr put it, reporting on a meeting on the IMU issue held in Paris in the summer of 1947 and which Whitney attended as the American representative, "the present opinion of the Danish and, I think, also the Scandinavian and Swiss mathematicians who took all rather the same view in Paris is that we are interested in a Union of real international character, but we are not in favour [of] the idea of forming a Union consisting only of a certain group of nations, as we think that such a quasi-international Union may give rise to future difficulties".⁵⁰

Despite turf and political issues that arose as early as 1948 between Stone as head of the IMU subcommittee and Garrett Birkhoff as chair of the ICM organizing committee, slow but steady progress continued on laying the groundwork for the IMU. Everything had to be done with the utmost care and deliberation. In March of 1949, just a month before the founding of the North Atlantic Treaty Organization (NATO), for example, Kline inquired of Stone "[a]t what stage do you feel that you can start communications with the Germans, Japanese, and Austrians?" and

⁴⁷National Research Council, Division of International Relations, Committee on Scientific Unions, Minutes of the Meeting of April 19, 1947, AMS Papers, Ms.75.5, Box 32, Folder 60: "IMU March 1947". See also [15, p. 76]. Stone himself had experienced difficulties in the fall of 1946 in his efforts on behalf of the Policy Committee to communicate with Russian mathematicians about the plans for the 1950 ICM.

⁴⁸J. R. Kline to R. H. Cameron, 29 May 1947, AMS Papers, Ms.75.5, Box 32, Folder 61: "IMU May–July 1947".

⁴⁹Szolem Mandelbrojt, for example, "seemed to entertain", according to Stone, "a very lively hope that a union could be formed for mathematicians, but was not prepared to agree fully with our views about the completely international character of the organization". Marshall Stone to J. R. Kline, AMS Papers, Ms.75.5, Box 34, Folder 6: "Marshall Stone Jan–Mar 1948".

⁵⁰Harald Bohr to Marshall Stone, 17 September 1947, AMS Papers, Ms.75.5, Box 32, Folder 63: "IMU Sept–Oct 1947".

offered the opinion that “we should not delay too long the approach to these groups, although I realize that the French will have to be handled carefully before the approach to the Germans is attempted”.⁵¹ Clearly, Kline and Stone were well aware of and acutely sensitive to international political realities. “Germany” was a divided nation, and at least officially, West Germany “would be treated as the representative of all German citizens” [13, p. 243]; the French were once again vociferous—as they had been after World War I—in their opposition to the inclusion of Germany in postwar political and military alliances and effectively blocked efforts to include it in NATO in 1949 [13, pp. 243–245]; the Austrians, although strictly considered one of the nations conquered by Germany during the Second World War, had nevertheless fought with Germany in the First World War and had made important contributions to the Nazi Party, not the least of which was Hitler himself; the Japanese, of course, had bombed Pearl Harbor and had then been bombed into submission following Hiroshima and Nagasaki. To say the least, it was a radically changed international political landscape from that of just a decade earlier, and this new political reality could not be ignored by the mathematicians regardless of how much they might have wished to conduct their work in an apolitical environment. By August, the Japanese and Austrians had been contacted, there had been no “trouble about having [them] set up National Committees on the Union”, and Stone had suggested that the time would soon be ripe to move “in the matter of the Germans”.⁵² In fact, he was able to report that “considerable progress ha[d] been made in the matter of persuading the various countries to appoint committees to consider the question of the establishment of an International Mathematical Union”, and that such “[c]ommittees ha[d] been formed in England, Holland, India, Belgium, Denmark, Italy, Norway, Egypt, Greece, Hungary, and France”.⁵³

This process was further facilitated at the end of August 1949, when Stone embarked on an around-the-world trip that aimed not only at establishing his own mathematical contacts but also at “negotiating in person with the national committees studying the Union problem”.⁵⁴ Departing from Chicago on 27 August, his first stop was Japan, where he had been given permission by General Douglas MacArthur, Commander of Allied Powers, to engage with the mathematicians of the former enemy nation. He spent an intense two weeks lecturing at universities in Osaka, Kyoto, Nagoya, and Tokyo and entering into discussions with his Japanese counterparts. As he described his welcome, “[a]lthough Japanese mathematicians had been able through correspondence since 1945 to break down the war-time isolation, I came as the first foreign academic visitor in the field of mathematics for many years; and I was received accordingly”.⁵⁵ Among the issues he discussed was, of course, the proposed IMU, and he could proudly report that his visit “contributed in a quite specific way to the restoration of the professional bonds between

⁵¹J. R. Kline to Marshall Stone, 3 March 1949, AMS Papers, Ms.75.5, Box 35, Folder 74.

⁵²J. R. Kline to Marston Morse, 13 August 1949, AMS Papers, Ms.75.5, Box 35, Folder 31: “Policy Committee Aug 1949”.

⁵³Marston Morse and J. R. Kline, “Report of [the] Policy Committee for Mathematics”, August 1949, AMS Papers, Ms. 75.2, Box 15, Folder 136.

⁵⁴Marshall Stone to J. R. Kline, 18 February 1949, AMS Papers, Ms. 75.5, Box 35, Folder 74: “Marshall Stone Mar 1949”.

⁵⁵Marshall Stone to Bowen Dees, Scientific and Technical Branch, Economic and Scientific Section, Tokyo, Japan, 24 February 1950, Stone Papers, Box 38, Folder 8: “Round the World 1949–1950”. The next quotes in this paragraph also come from this report.

the mathematicians of Japan and those of other countries". Following his departure, he explained, "the Japan Science Council completed the arrangements thus initiated by appointing a special Committee to represent Japan in the discussions of the new Union".

From Japan, Stone proceeded to Vietnam, Thailand, Java, Singapore, and Ceylon (modern-day Sri Lanka), before arriving for a seven-month stay and extensive lecture and sightseeing tour of India. With the Indian leg of his journey completed, he returned to the United States in May of 1950 via Egypt and France, where he gave more lectures and participated (in Nancy) in an evening of food and mathematical conversation with members of the *élite* mathematical collective, Bourbaki. In all of these venues, Stone took the opportunity not only to acquaint himself with what was being done in mathematics internationally but also to broadcast information and to exchange ideas about the IMU. In particular, he discussed the proposed IMU statutes and bylaws that had been in circulation since the time of his departure for Japan.

Stone, son of a former Supreme Court Chief Justice and brother of a lawyer, had drafted a constitution for an IMU in the summer of 1949 for the consideration and comment of the various national committees that had been formed. By the end of the summer of 1950, when the Union conference was held in New York City just in advance of the ICM in Cambridge, this document had been duly revised based on the many suggestions received both directly and indirectly from committees internationally. Consensus on it was quickly reached at the meeting in the form of an "Enabling Resolution" that then set the wheels in motion for the adherence to the proposed new union by the required minimum of ten countries.⁵⁶

If these events surrounding the reformation of the IMU reflected a certain postwar spirit of cooperation—among mathematicians at least—so, too, did the 1950 International Congress of Mathematicians in Cambridge with which discussions of the IMU had been so intertwined. The ICM was ultimately a large event—more than doubling the previous attendance record—with over 1700 mathematicians present over the week from 30 August to 6 September. Still, the Cambridge ICM was not as thoroughly an international affair as its organizers had hoped. Only 290 of the 1700 mathematical participants were from outside North America. At least two things were to blame: the cost of travel was high, and, as Kline explained in his Secretary's Report to the Congress, "[m]athematicians from behind the Iron Curtain were uniformly prevented from attending the Congress by their own governments which generally refused to issue passports to them for the trip" [30, 1: 122]. The Cold War had begun almost immediately after the end of World War II and lay behind the Soviet Union's decision to restrict travel to the West and especially to the United States. What was not to blame, however, was either a lack of interest or an absence of goodwill among mathematicians. The Congress had, for example, received a cablegram which was read at the opening ceremonies from Sergei Vavilov, noted physicist and President of the Academy of Sciences of the USSR, which

⁵⁶Although other scientific unions, such as the International Astronomical Union and the International Union of Pure and Applied Physics, had suspended their meetings in response to the worsening political situation in Europe in the 1930s, they, unlike the IMU, never officially dissolved and so were not confronted with the issue of whether or not to re-form after World War II. The IAU had held its last prewar meeting in Stockholm in 1938, while the IUPAP had held its in 1934, having been scheduled to meet in 1937, the year after Hitler reoccupied the Rhineland and formed an Axis with Mussolini.

thanked the Congress organizers for their “kind invitation”, offered the “[h]ope that [the] impending congress will be [a] significant event in mathematical science”, and wished them all “success in [the] Congress activities” [30, 1: 122]. Four years later, and despite the further escalation of the Cold War as manifested by the Korean War, five Soviet mathematicians were allowed to participate in the ICM held in Amsterdam [15, p. 118].

The international spirit in evidence at the Cambridge ICM in 1950 persisted into 1951, when the magic number of ten countries was reached relative to adherence to the proposed IMU. The “proposed IMU” then became the “new IMU”, which began its work officially as an adhering member of the International Council of Scientific Unions a year later at its first General Assembly meeting held in Rome in 1952 [15, pp. 79–88]. Eighteen countries were represented officially at that first meeting—Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Great Britain, Italy, Japan, the Netherlands, Norway, Peru, Spain, Switzerland, the United States, and Yugoslavia—while Poland and Portugal sent observers. Not surprisingly, perhaps, given the key role he had played in its reformation, Marshall Stone was the chair of the U.S. delegation, which also consisted of Einar Hille, J. R. Kline, Saunders Mac Lane, and Gordon T. Whyburn.⁵⁷

These delegates together with those from the other countries represented spent the three days from 6–8 March in spirited discussion as to the activities that should define the new IMU. In particular, Stone proposed that the IMU: 1) publish a world directory of mathematicians, 2) produce a regular newsletter that would apprise mathematicians internationally “of its activities and also of the activities of individual mathematicians, particularly the news of mathematicians about to travel abroad and consequently [be] available for lectures”, and conduct studies of 3) “the costs of printing and the problem of more prompt publication of research papers”, 4) “methods of facilitating the exchange of mathematicians between nations”, and 5) problems surrounding the issue of abstracting and reviewing of mathematical publications.⁵⁸ All of these suggestions were greeted with enthusiasm, and committees were appointed to explore them.

The General Assembly ended with the election of the first Executive Committee of the new IMU. Again, perhaps not surprisingly, Stone was elected President with Emile Borel of France First Vice President, Erich Kamke of Germany Second Vice President, Enrico Bompiani of Italy Secretary, and W. V. D. Hodge of Great Britain, Shokichi Iyanaga of Japan, and Børge Jessen of Denmark Members-at-Large.⁵⁹ “It was the unanimous opinion of the United States delegation”, Stone reported, “that the meetings were a decided success. All members of the General

⁵⁷Marshall Stone, “Report of the American Delegation to the First General Assembly of the International Mathematical Union”, p. 3, Stone Papers, Box 42, Folder 242.

⁵⁸*Ibid.*, pp. 6–9.

⁵⁹*Ibid.* p. 12. As early as October of 1951, Stone learned that the members of the Interim Committee of the IMU, among them, Børge Jessen of Denmark, Marcel Brelot of France, W. V. D. Hodge of England, and Enrico Bompiani of Italy, had nominated Stone for the IMU presidency. As he put it in a letter to Jessen, while he was not “insensible to the honor which the confidence of [his] colleagues” did him, he was sensitive to the politics of the situation, not wanting “to be a candidate if there were widespread opinion that the choice of an American mathematician might work against the best interests of the Union during the critical first years of its existence”. Kline and Morse, whose opinions Stone solicited on this, agreed. They expressed their dismay that the Interim Committee had “taken this relatively private, concerted action prior to the Assembly” and wished rather that it had “undertaken informally to obtain nominations for

Assembly were sincerely interested in the promotion of international coöperation in the advancement of Mathematics”, and, moreover, “[t]he atmosphere... was scientific and not political”.⁶⁰ The new IMU, unlike the old, had managed, at least at its founding, not to let politics interfere with its broader goals.⁶¹

As IMU President from 1952 through 1954, Stone worked diligently not only to establish an administrative routine but also to define an agenda for the new organization that would put mathematics and its promotion, in so far as possible, above contemporaneous geopolitical concerns. In particular, under his leadership, the IMU instituted its program of IMU-sponsored conferences and adopted the promotion of mathematics education as one of its initiatives [15, pp. 105–113]. Stone had become sensitive to the importance of the latter at least as early as the U.S.’s entry into World War II in connection with his work both as a contract employee for the Department of the Navy and on the War Policy Committee of the AMS. At that time, the issue was the role of applied mathematics in the college and university curricula, but with the war’s conclusion, he very quickly turned to broader educational concerns. Scarcely a year after he had stepped down as AMS President, Stone had written directly to then President of the Mathematical Association of America (MAA), Cyrus C. Macduffee, to voice his opinion on certain “educational aspects of our profession” that he viewed as “of fundamental importance”, among them: “the status of mathematics in the secondary curriculum; the adaptation of college mathematics courses both to progress in mathematics and to the changing conceptions of liberal education; the uneven standards to be found in college mathematics curricula and teaching; the revision of graduate programs in light of advances in higher mathematics”.⁶² Although Stone would soon tackle the last of these issues in the context of the revamping of the graduate program that he oversaw at the University of Chicago, in his view, “urgency of such problems is greatest at the lower levels and diminishes progressively as the higher levels are reached”. For that reason, he urged the MAA, of which he was a member, to play a more active role in bridging the gap between secondary and college-level mathematics. As he put it, “[s]ince the interest in college mathematics extends inevitably to the inter-relations of secondary and college mathematics, my concern includes a sense of dissatisfaction with the comparative inactivity of the Association in respect to the status of mathematics in the secondary curriculum”.

The “inactivity” he sensed relative to the MAA in 1945 would not be reflected in the IMU under his watch. As early as the founding of the General Assembly in Rome in 1952, Stone had argued for the centrality of mathematics education in the IMU’s agenda. “The problem of determining the place of mathematics [in society] cannot be divorced from technical considerations concerning teaching methods”, he averred. “If we judge by the results, we must find it difficult to escape from

president and secretary from each national committee, subsequently communicating these nominations to the respective national committees without comment”. See Marshall Stone to Børge Jessen, 22 October 1951, Stone Papers, Box 39, Folder 5: “IMU News Bulletin” and J. R. Kline and Marston Morse to Marshall Stone, 26 October 1951, Stone Papers, Box 39, Folder 5: “IMU News Bulletin”.

⁶⁰Marshall Stone, “Report of the American Delegation to the First General Assembly of the International Mathematical Union”, p. 15, Stone Papers, Box 42, Folder 242.

⁶¹For the subsequent history of the IMU (to 1990), a history which is by no means devoid of politics, see [15].

⁶²Marshall Stone to Cyrus Macduffee, 2 October 1945, AMS Papers, Ms. 75.5, Box 30, Folder 114. The quotes that follow in this paragraph are also from this letter.

the conclusion that our attempts to teach mathematics as part of a program of mass education have so far been, to put it bluntly, a colossal failure, traceable to our ignorance and complacency in respect to the art of teaching" [15, p. 109]. As a corrective to this situation, the IMU subsumed what came to be called the International Commission on Mathematical Instruction (ICMI) as a subcommission. A commission concerned with mathematics education had been in existence off and on since the Rome ICM in 1908 and had actively involved such distinguished mathematical forebears as Felix Klein, Guido Castelnuovo, and Jacques Hadamard. Revivified permanently in 1952, ICMI experienced some initial tensions within the IMU as Stone worked to define and clarify the relationship between commission and subcommission, but it nevertheless began its work of fostering mathematics education, most prominently through the publication of the journal, *L'Enseignement mathématique*.⁶³

At the same time that he engaged in establishing a solid groundwork for the IMU, Stone sought not only to extend his personal grasp of the issues confronting mathematics education internationally but also to satisfy his ever-growing *Wanderlust*. In 1953, he applied for funding from both the John Simon Guggenheim Foundation and the American Philosophical Society to conduct a study of the (Western) education of native peoples in colonial Africa. With "the teaching of mathematics at all levels" as a particular focus, Stone aimed to apply the principles of operations research to colonial African educational organizations "with a view to throwing some light on the dynamics of the interaction between Western and native culture at" what he deemed "one of their most significant and intrinsically interesting points of contact".⁶⁴ As Stone saw it, this initiative—which ultimately took him from December 1953 through March of 1954 to the cities of Khartoum, Kampala, Nairobi, and Dar-es-Salaam as well as to modern-day Zimbabwe, Zanzibar, the Central African Republics, the Republic of the Congo, Cameroon, the Ivory Coast, Guinea, and Senegal—was consonant with the goals of the U.S. government's so-called Point Four Program. Stemming from the ideals of the Atlantic Charter of 1941, but formally initiated by Truman in 1949 and extended by Eisenhower in 1953, the Point Four Program aimed to provide, especially economic, aid to underdeveloped countries.⁶⁵ "It may be emphasized", Stone argued, "that a better understanding of cultural interactions such as this is imperative for the future of mankind, and is indispensable for the success of concrete undertakings, such as the Point Four programs, calculated to deflect the course of history from those paths toward disaster which can be only too plainly identified by our generation". Stone also had broader personal objectives into which this trip and this initiative fit, however. At least as early as 1946, he had begun to envision a project on the application of scientific principles to statecraft and foreign relations.⁶⁶ Stone, as an internationalist mathematician, saw the potential of mathematics education as

⁶³On the history of ICMI, see [11] and [15, pp. 13–14, 65–66, and 108–113]. In 1954, Stone became one of ten members-at-large of ICMI; from 1959 to 1962, he served as its President.

⁶⁴Marshall Stone to the Chairman of the Committee on Research of the American Philosophical Society, 11 September 1953, Stone Papers, Box 41, Folder 229. The next quote also comes from this application. As it turned out, Stone's trip was funded neither by the Guggenheim Foundation nor by the APS.

⁶⁵Eisenhower's extension of the program was reported in the popular press. See, for example, the article entitled "In Search of Policies" in *Time Magazine* (12 October 1953).

⁶⁶See Stone's address as the retiring Vice President of Section A of the American Association for the Advancement of Science on 26 December 1946, published as [38].

a means for fostering the growth and development not only of mathematical communities internationally, but also of more effective relations between countries in a postwar world.

FROM A NATIONAL TO AN INTERNATIONALIZED MATHEMATICAL COMMUNITY

The efforts of Marshall Stone and others from the late 1930s into the mid 1950s to effect an international mathematical community lay squarely within the contexts of the initiatives that the American Mathematical Society explicitly articulated for the broader American mathematical research community as well as of national and international politics. Whereas other scientific disciplines, such as astronomy and physics, had managed to maintain throughout the interwar period at least a semblance of the more formalized international communities they had begun to foster in the 1920s, mathematics had not. The world's mathematicians had expressly rejected the exclusionary policies of their International Mathematical Union and had abolished it in 1932. As a result, while the astronomers and physicists could resume their international scientific relations in the context of extant administrative structures in the postwar world, the mathematicians, were they actively to foster organized international mathematical relations at all, would have to either recreate such structures *ex nihilo* or settle upon some other way to achieve their ends in a geopolitical context radically altered from that of the 1920s.⁶⁷ Who, if anyone, would take the lead?

Beginning in the United States in the 1930s, the AMS, as the representative of what had become a mature and ambitious mathematical research community, worked to bring the 1940 ICM to Cambridge, Massachusetts. In 1942, even as World War II raged, the AMS Council at the urging of G. D. Birkhoff "authorized and requested" AMS President Marston Morse "to appoint a committee of three to investigate the whole matter of relations with mathematicians in other countries in this hemisphere".⁶⁸ A year later as AMS President, Marshall Stone followed Birkhoff's mathematical "good neighbor" tour of Latin America with one of his own in an effort to maintain this international initiative, and he was fully aware that the initiative was in step with broader U.S. policies. With the close of the war in 1945 and in the context of international political initiatives such as the United Nations and the North Atlantic Treaty Organization, Stone and the AMS were immediately back at work on their explicitly internationalist agenda. Writing to J. R. Kline on 17 June 1945, Stone inquired of the AMS Secretary "what steps, whether formal and official or not, have been taken towards renewing our scientific ties with mathematicians in previously occupied territories (including those now occupied by our side)". He ventured to suggest that, given his connections in Washington, he might be able to "do a little exploration of the possibilities of governmental assistance".⁶⁹ By 1946, Stone was not only the chair of the Department of Mathematics of the University of Chicago, where he implemented a plan of program renewal that hinged on attracting some of the best mathematicians

⁶⁷The International Union of Pure and Applied Physicists resumed its meetings in 1947 in Paris; the International Astronomical Union followed a year later in Zürich.

⁶⁸"Minutes of Council, 31 October 1942, meeting at Columbia", AMS Papers, Ms.75.2, Box 15, Folder 58. The committee consisted of Birkhoff as chair, together with Arnold Dresden and Otto Neugebauer.

⁶⁹Marshall Stone to J. R. Kline, 17 June 1945, AMS Papers, Ms.75.5, Box 30, Folder 112: "Marshall Stone Feb-July 1945".

internationally to Chicago, but he was also the chair of the AMS's Policy Committee charged with a full range of domestic and international mathematical issues, among the latter of which were plans for the first postwar ICM as well as for a revival of the IMU. The Cambridge ICM in 1950, but more importantly the beginning of the work of the new IMU in 1952 with Stone as President, marked the self-conscious transformation of the American mathematical research community from a *national* community oriented toward fostering mathematics at home to an *internationalized* one sensitive to the vicissitudes of world politics and focused not only on participating actively in but also influencing the mathematical endeavor worldwide.

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