

## A MATHEMATICAL “GOOD NEIGHBOR”: MARSHALL STONE IN LATIN AMERICA (1943)

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*To Ubi D'Ambrosio with Best Wishes on the  
Occasion of His Seventy-fifth Birthday*

When Franklin Delano 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.”<sup>1</sup> 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.”<sup>2</sup>

Roosevelt began to build that structure later in 1933 first through the participation in December of his Secretary of State, Cordell Hull, in the Pan-American Conference in Montevideo, Uruguay and then through his own personal “Good Neighbor trip” in July of 1934 from the Caribbean and Latin America to the Pacific via the Panama Canal. The latter initiative, in particular, gave Roosevelt the distinction of being the first U. S. President to cross the Canal as well as the “distinction among Latin Americans as ‘the world’s best

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<sup>1</sup> Franklin D. Roosevelt, *Roosevelt's Foreign Policy 1933–1941: Franklin D. Roosevelt's Unedited Speeches and Messages* (New York: Wilfred Funk, Inc., 1942), p. 3.

<sup>2</sup> *Ibid.*, pp. 4-5.

neighbor.’ ”<sup>3</sup> This position had been solidified even further by 1935 through reciprocal trade agreements between the United States and a number of Latin American countries.<sup>4</sup> If the U. S. government made manifest its notion of the “good neighbor” primarily 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,<sup>5</sup> 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—like 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 Affairs (OIAA), they actively fostered scientific relations throughout the Americas in the late 1930s and into the 1940s.<sup>6</sup>

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.<sup>7</sup> In particular, Birkhoff, arguably the doyen of American mathematics in the interwar period, 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.”<sup>8</sup> Birkhoff’s trip did materialize a year later in the spring of 1942, and he succeeded both in gaining an overview of

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<sup>3</sup> Robert Dallek, *Franklin D. Roosevelt and American Foreign Policy, 1932–1945* (New York: Oxford University Press, 1995), pp. 65-66 and 86-87. For the quotes, see pp. 86 and 87, respectively.

<sup>4</sup> *Ibid.*, pp. 122-123.

<sup>5</sup> *Ibid.*, p. 124.

<sup>6</sup> On the Rockefeller Foundation’s involvement in the support of the internationalization of mathematics (with brief mentions of its interests in Latin America), see Reinhard Siegmund-Schultze, *Rockefeller and the Internationalization of Mathematics between the Two World Wars* (Basel: Birkhäuser Verlag, 2001).

<sup>7</sup> Thomas F. Glick, “Science and Society in Twentieth-Century Latin America,” in *The Cambridge History of Latin America*, ed. Leslie Bethell, vol. 6, pt. 1 (Cambridge: Cambridge University Press, 1994), pp. 463-535, especially pp. 467-522. On Birkhoff, in particular, see Eduardo Ortiz, “George D. Birkhoff, Harvard University, Roosevelt’s Policy, and the Inter-American Mathematical Network,” History of Mathematics Research Report HM-11-1999, Imperial College, London; “La política interamericana de Roosevelt: George D. Birkhoff y la inclusión de América Latina en las redes matemáticas internacionales: Primera Parte,” *Saber y Tiempo: Revista de Historia de la Ciencia* 15 (2003): 53-111; and “La política interamericana de Roosevelt: George D. Birkhoff y la inclusión de América Latina en las redes matemáticas internacionales: Segunda Parte,” *Saber y Tiempo: Revista de Historia de la Ciencia* 16 (2003): 21-70.

<sup>8</sup> George D. Birkhoff to Henry Moe, 21 January, 1941, American Philosophical Society Archives, Philadelphia, Pennsylvania, as quoted in Ortiz, “George D. Birkhoff, Harvard University, Roosevelt’s Policy, and the Inter-American Mathematical Network,” p. 5.

mathematical Latin America and in forging ties with mathematicians to the south.<sup>9</sup> Following his return, Birkhoff 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 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 hand-pick as his successor in Latin America.

### **Marshall Stone: The Formation of an Internationalist Mathematician**

Marshall Harvey Stone was born in New York City on 8 April, 1903, the son of Harlan Fiske Stone and Agnes Harvey Stone. At the time of Marshall’s birth, his father was serving as an Adjunct Professor of Law at Columbia University. By 1905, however, Harlan Stone had left academe for private practice only to return to Columbia in the summer of 1910 in the prestigious posts of Professor of Law and Dean of the Law Faculty. Holding those positions until 1923, Stone père then spent a year as the head of the litigation department at the leading Wall Street firm of Sullivan and Cromwell, before being appointed Attorney General of the United States in 1924, 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.<sup>10</sup> Marshall Stone thus grew up in a privileged, educationally minded, and politically well-connected family.

He 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 Birkhoff in 1926 for a thesis on “Ordinary Linear Homogeneous Differential Equations of Order  $n$  and the Related Expansion Problems.”<sup>11</sup> A string of positions—at Columbia, Harvard, and Yale—prompted his 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.”<sup>12</sup> 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 1947.

Stone’s somewhat 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,

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<sup>9</sup> See the extensive account of Birkhoff’s visit and his impressions of mathematical Latin America in Ortiz, “La política interamericana de Roosevelt: George D. Birkhoff y la inclusión de América Latina en las redes matemáticas internacionales: Primera Parte,” and “Segunda Parte.”

<sup>10</sup> For the complete biography of the elder Stone, see Alpheus Thomas Mason, *Harlan Fiske Stone: Pillar of the Law* (New York: The Viking Press, 1956).

<sup>11</sup> For an overview of Stone’s life and career, see George Mackey, “Marshall H. Stone: Mathematician, Statesman, Advisor, and Friend,” in *Operator Algebras, Quantization, and Noncommutative Geometry: A Centennial Celebration Honoring John von Neumann and Marshall H. Stone*, ed. Robert S. Doran and Richard V. Kadison, Contemporary Mathematics, vol. 365 (Providence: American Mathematical Society, 2004), pp. 15-25.

<sup>12</sup> Harlan Fiske Stone to Marshall and Lauson Stone, 21 December, 1932, as quoted in Mason, p. 541.

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*, a book that has been deemed “one of the great classics of twentieth-century mathematics.”<sup>13</sup> 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.”<sup>14</sup> By the mid-1930s, Stone had shifted areas again to explore Boolean algebras and their links 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,” among them, Stone’s proof 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. The depth and breadth of Stone’s research was recognized 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.<sup>15</sup> 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 American Mathematical Society (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. It was in the latter capacities that he began to focus on international relations in mathematics, sparked perhaps by his invitation to and participation in the topology conference held in Moscow in 1935.<sup>16</sup>

As a member both of 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 European political situation, Stone drafted a letter to the Council of the AMS that

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<sup>13</sup> Marshall H. Stone, *Linear Transformations in Hilbert Space and Their Applications to Analysis*, American Mathematical Society Colloquium Publications, vol. 15 (New York: American Mathematical Society, 1932). For the quote, see Mackey, p. 17.

<sup>14</sup> Mackey, p. 18.

<sup>15</sup> For an overview, see Karen Hunger Parshall. “Historical Contours of the American Mathematical Research Community,” in *A History of School Mathematics*, ed. George M. A. Stanic and Jeremy Kilpatrick, 2 vols. (Reston, VA: National Council of Teachers of Mathematics, 2003), 1: 113-157, especially pp. 133-139.

<sup>16</sup> See Mason, p. 540.

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 their individual sufferings may be mitigated and their scientific activity continued to the benefit of all men."<sup>17</sup> The Council voted unanimously to distribute Stone's appeal and sent it on to some thirty-nine mathematical societies internationally.

As Stone looked outward in the early 1940s, he also looked inward as the American mathematical community prepared itself for war. On 7 September, 1939, the Council of the AMS had empowered then AMS President Griffith Evans to form a committee jointly with the Mathematical Association of America "to advise regarding mathematics in preparedness measures, teaching, research, etc."<sup>18</sup> The so-called War Preparedness Committee, chaired by Marston Morse, made its first official report in September of 1940. Its stated objectives were:

- (1) The solution of mathematical problems for military or naval science, or rearmament.
- (2) The preparation of mathematicians for research essential for objective (1).
- (3) The 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.<sup>19</sup>

To meet these goals, the committee was divided into three subcommittees—on research, on preparedness for research, and on education for service—with Stone chairing the second of the three. As Morse explained in the committee's second report dated 24 December, 1940, "Stone's committee has been busy with organization work and with the collection of preliminary data and opinions. It is hoped that mathematicians will wholeheartedly back this important work, for which a large collaboration is necessary. The work of Stone's committee is closely correlated with the problem of a significant revival of applied mathematics."<sup>20</sup>

Stone threw himself not only into the work of this committee but also into the broader issue of the role of mathematics nationally in time of war. Relative to the former, by 1942, he not only chaired the War Policy Committee, the new incarnation of the War Preparedness Committee, but he had also personally taken up secret war work of an applied mathematical nature on mine warfare in the Navy Department's Bureau of Ordnance in Washington, D.C.

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<sup>17</sup> Marshall Stone writing to the Council of the AMS, 24 February, 1940, Marshall H. Stone Papers, Box 41, Folder 9A, John Hay Library, Brown University, Providence, Rhode Island (hereinafter cited as "Stone Papers").

<sup>18</sup> Everett Pitcher, *A History of the Second Fifty Years: American Mathematical Society 1939–1988* (Providence: American Mathematical Society, 1988), p. 273.

<sup>19</sup> "Report of the War Preparedness Committee of the American Mathematical Society and Mathematical Association of America at the Hanover Meeting," *Bulletin of the American Mathematical Society* 46 (1940): 711–714 on p. 711.

<sup>20</sup> Marston Morse, "Report of the War Preparedness Committee," 24 December, 1940, American Mathematical Society Papers, Ms.75.4, Box 27, Folder 80, John Hay Library, Brown University, Providence, Rhode Island (hereinafter cited as "AMS Papers").

Relative to the national role of mathematics in wartime, he lobbied hard beginning in 1941 for the greater influence and participation of America's mathematicians in, for example, the work of the National Defense Research Committee (NDRC), a group created by presidential decree in 1940 to coordinate the scientific community, industry, and the military in the war effort.<sup>21</sup> Capitalizing on his temporary, wartime relocation, Stone, in fact, served as a sort of liaison for the AMS in Washington. As he put it in a letter to AMS Secretary, J. R. Kline on 4 January, 1942, although he had "no secretarial assistance here and little time for letter writing," he hoped "[a]t least ... to get something done locally by using the phone, in my spare moments (which are now pretty long) at the office."<sup>22</sup>

Marshall Stone worked tirelessly throughout the war to make connections, both direct and indirect, with the NDRC, the Army, the Navy, and the Federal government, and to contribute his mathematical expertise as a contract employee of the Navy.<sup>23</sup> By January of 1943 when he assumed the presidency of the AMS for a two-calendar-year term, he was thus particularly well poised to carry out his agenda for the American mathematical community, an agenda that included greater visibility for America's mathematicians in the war effort, increased activity in applied mathematics directed toward specific wartime problems, and the maintenance and enhancement of international mathematical contacts in so far as the war allowed. Relative to the latter, Latin America represented an area both ripe for mathematical contact and relatively accessible given the wartime theaters of activity in Europe and the Pacific.

### **The Path to and through Latin America: Marshall Stone in 1943**

In one of the last meetings of the Council of the AMS before Stone assumed the Society's presidency, George Birkhoff had "presented a communication from Professors Alejandro Terracini and Felix Cernuschi of the National University in Tucuman, Argentina, inviting closer scientific cooperation with South America. The Council authorized and requested the President [Marston Morse until 1 January, 1943] to appoint a committee of three to investigate the whole matter of relations with mathematicians in other countries in this hemisphere. President Morse subsequently appointed Professors G. D. Birkhoff (Chairman), Arnold Dresden, and O. E. Neugebauer."<sup>24</sup> By 8 January, 1943, just days after Stone had officially assumed the AMS presidency, Stone's supervisor in the Bureau of Ordnance was already writing a memorandum in which he stated, first, that "Dr. Stone is anxious to do work in Operations Analysis in the Air Force in the Far East specializing, although no[t] exclusively concentrating in mine warfare" and, then, that "Dr. Stone and I agreed that it would probably be desirable for Dr. Stone to take the proffered lectureship in Buenos Aires" before getting the new war work fully under way.<sup>25</sup> Stone was already

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<sup>21</sup> The NDRC oversaw the Manhattan Project, among many other wartime efforts.

<sup>22</sup> Marshall Stone to J. R. Kline, 4 January, 1942, AMS Papers, Ms.75.5, Box 28, Folder 37.

<sup>23</sup> For fascinating, previously classified reports on some of Stone's war work in 1945, see Ronald H. Spector, ed., *Listening to the Enemy: Key Documents on the Role of Communications Intelligence in the War with Japan* (Wilmington, DE: Scholarly Resources, Inc., 1988), pp. 136-150.

<sup>24</sup> "Minutes of Council, 31 October, 1942, meeting at Columbia," AMS Papers, Ms.75.2, Box 15, Folder 58.

<sup>25</sup> Memorandum of Lt. Col. W. B. Leech, 8 January, 1943, Stone Papers, Box 35, Folder 12.

committed to Birkhoff's vision of the mathematical good neighbor and resolved to try to use his new leadership position within the American mathematical community to help realize it more fully.

By early April, Stone had informed Birkhoff that a South American trip, and in particular a stay in Argentina, seemed like a real possibility. Replying on 8 April, Birkhoff was most pleased at the development. "In my opinion," he wrote, "you will be able to render a very important service there, to Argentinian and thus to continental mathematical development, and indirectly, but with deep effectiveness nevertheless, aid the cause of further favorable development of the relations between the Republic of Argentina and the United States. To me," he continued, "it has been more or less obvious that you would be the *best* person to follow me in this highly important enterprise."<sup>26</sup> By 10 June, 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 a year later, securing wartime air passage for Stone from Miami by plane to Lima, Peru on 13 June and arranging his itinerary from there to Bolivia and Argentina with a scientific side trip to Uruguay and a touristic excursion to Paraguay and Brazil to view the Iguassu Falls.<sup>27</sup>

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,<sup>28</sup> Stone lectured in Spanish on "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 making 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.<sup>29</sup> In addition to lecturing, however, Stone also met and talked with students and faculty and even had the opportunity to participate in the meeting of the Unión Matemática Argentina on 10 July. There, he had

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<sup>26</sup> George D. Birkhoff to Marshall Stone, 8 April, 1943, Stone Papers, Box 35, Folder 7 (Birkhoff's emphasis).

<sup>27</sup> Marshall Stone to his wife, Emmy Stone, various dates from 10 June, 1943 to 6 October, 1943, Stone Papers, Box 35, Folder 7.

<sup>28</sup> Julio Rey Pastor, "Profesor Marshall H. Stone," *Revista de la Unión Matemática Argentina* 9 (1943): 138-140 on p. 138.

<sup>29</sup> See *ibid.* For the texts of Stone's South American lectures, see Stone Papers, Box 35, Folder 9.

the opportunity to hear talks firsthand by Rey Pastor, Félix Herrera, Fausto Toranzos, and Alberto Calderón, all then associated with the Universidad de Buenos Aires.<sup>30</sup>

### **The Future of Inter-American Mathematical Relations: Stone's Considered Opinion**

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."<sup>31</sup> In light of the fact that Moe's office dealt with cultural relations with Latin America in the widest 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. Of course, I would be the last to suggest that our cultural activities should be exclusively in these most important fields. Nevertheless, I have the impression that the present policy to some degree represents an overevaluation of activities along other lines." Echoing perhaps the line of argumentation that he had honed in Washington in his efforts to secure for mathematics the place it merited in the war effort, 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."<sup>32</sup> 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."<sup>33</sup> 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. In fact, as Stone saw it, "[i]n the field of science it

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<sup>30</sup> "Cronica: Asamblea de la Unión Matemática Argentina," *Revista de la Unión Matemática Argentina* 9 (1943): 144.

<sup>31</sup> Marshall 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 paragraph are also from this report.

<sup>32</sup> *Ibid.*

<sup>33</sup> *Ibid.* The quotes that follow in this paragraph are also from this report.

might even be possible at some time to create a pan-American scientific institution which would provide opportunities for work and teaching to outside scholars from all Latin American countries."<sup>34</sup> He was quick to add, however, that "[a]ny suggestion of this kind coming from me is put forward in the most tentative spirit, since the political aspects of such an enterprise might well prove too complex and too forbidding upon closer examination." The abortive efforts of the American committee on which he had served in the latter half of the 1930s to host the International Congress of Mathematicians in Cambridge, Massachusetts had driven home to him just how much at odds scientific idealism and political reality could be in the modern world.

Second, although he had very much profited from his trip to and experiences in Latin America, Stone contended that, in the case of mathematics, "somewhat more can be accomplished for the time being 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."<sup>35</sup> In his view, a visitor's influence was transitory, and visiting lectures were, by definition, supplementary. Moreover, since the mathematical life of the United States "cannot be well conveyed to a foreign audience in a few casual remarks," it would be better to bring talented students and professors to the U. S. to allow them to experience the system for themselves. "The Latin American who comes to us with some knowledge of the English language," Stone argued, "can appreciate at first hand our very rich and active mathematical development. He can see at first hand the structure of our scheme of instruction and upon his return he can probably present to his fellow countrymen the advantages and disadvantages of our North American mathematical organization in a way which will command the closest attention." This, as Stone well knew, 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.<sup>36</sup> 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 fully competitive on the international mathematical scene.<sup>37</sup> 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.

If these strategies were ultimately implemented, then where did Stone think they would have the greatest impact relative to mathematics? He closed his report to Moe with a brief

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<sup>34</sup> This idea of a pan-American scientific institution foreshadowed the initiatives Stone would take in the late 1940s and early 1950s to effect an International Mathematical Union. See Olli Lehto, *Mathematics without Borders: A History of the International Mathematical Union* (New York: Springer-Verlag, 1998).

<sup>35</sup> Stone to Moe, 13 April, 1944. The quotes that follow in this paragraph are also from this report.

<sup>36</sup> Stone later discussed precisely this issue from an historical perspective in his article, "International Relations in Mathematics," in *Men and Institutions in American Mathematics*, ed. J. Dalton Tarwater, John T. White, and John D. Miller, Graduate Studies Texas Tech University, no. 13 (October 1976), pp. 31-39, especially on pp. 31-32.

<sup>37</sup> On American mathematics students abroad, see Karen Hunger Parshall and David E. Rowe, *The Emergence of the American Mathematical Research Community, 1876-1900: J. J. Sylvester, Felix Klein, and E. H. Moore*, *History of Mathematics*, vol. 8 (Providence: American Mathematical Society and London: London Mathematical Society, 1994), especially pp. 189-259 and 427-453.

survey of the Latin American mathematical landscape as he had experienced it. From his perspective, the best places for mathematical work “(exclusive of Brazil) are: Lima (Perú), Montevideo (Uruguay), Buenos Aires (Argentina), La Plata (Argentina), Rosario (Argentina) and Tucumán (Argentina). So far as I could ascertain,” he continued, “mathematical instruction in Bolivia and Chile is not at a very advanced level. The same is probably true of Paraguay .... From my point of view, the most progressive outlook and the greatest promise are to be found in La Plata. The two mathematicians who are most active scientifically there are Professor Augustin Durañona y Vedia and Professor A. Sagastume Berra.”<sup>38</sup> Stone had been somewhat less impressed by Buenos Aires and the program that Rey Pastor animated there. He found Rey Pastor’s brand of geometrical research “a little out of the modern currents,” even though he acknowledged that Rey Pastor “has shown a very great interest in the most modern topics and has done much to bring them to the attention of his students and colleagues.” From Stone’s perspective the fact that “Professor Rey Pastor does not seem to have a gift for organizing and promoting the group interest of mathematicians” should be of considerable concern for the Universidad de Buenos Aires. “As a result” of this situation, he went on, “no other mathematician of talent has been named to a chair in the University of Buenos Aires and the future of the Department at the advanced level is accordingly somewhat dubious, so far as one can see at the present time.” This was a less charitable impression than the one Birkhoff had given Moe in the summer of 1942. “In my opinion,” Birkhoff had reported, “Godofredo García [of the Universidad Mayor de San Marcos in Lima] and Rey Pastor in their generation have done more for South American mathematics than anyone else, and I owe much to their thoroughgoing cooperation.”<sup>39</sup> Regardless of whether La Plata or Buenos Aires had the mathematical edge in the mid-1940s, Argentina clearly seemed to both Stone and Birkhoff to be a country in which the cultivation of mathematics at the research level would pay off. Following their visits, a number of talented Argentine and other Latin American students came northward to hone their mathematical skills at Harvard and elsewhere.<sup>40</sup>

### **Mathematical Good Neighbors: A Lasting Relationship?**

The United States’s foreign policy in the 1930s and 1940s of cultivating the “good neighbor” was just one of a number of official or unofficial national initiatives aimed at Latin America.<sup>41</sup> As early as 1907, France had established its “Groupement des Universités et Grandes Écoles de France pour les relations avec l’Amérique Latine,” and although it ultimately concentrated less on science and more on cultural diplomacy, it nevertheless

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<sup>38</sup> Stone to Moe, 13 April, 1944. Unless otherwise indicated, the quotes that follow in this paragraph are also from this report.

<sup>39</sup> George D. Birkhoff to Henry Moe, 18 August, 1942 as quoted (without further attribution) in Ortiz, “La política interamericana de Roosevelt: George D. Birkhoff y la inclusión de América Latina en las redes matemáticas internacionales: Segunda Parte,” p. 48.

<sup>40</sup> See Ortiz, “Segunda Parte,” 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.

<sup>41</sup> Hebe M. C. Vessuri, “Science in Latin America,” in *Science in the Twentieth Century*, ed. John Krige and Dominique Pestre. (Amsterdam: Harwood Academic Publishers, 1997), pp. 839-857 on pp. 843-848.

strongly influenced the establishment in 1934 of the Faculty of Sciences and Letters at the Universidade de São Paulo. Similarly, Germany, Italy, Great Britain, and, most naturally perhaps, Spain made scientific inroads into Latin America. In mathematics, of course, the presence of Julio Rey Pastor in Argentina after 1921 is a prime manifestation of Spanish influence in the development of mathematics there in the 1920s and 1930s. Following Roosevelt’s death in 1945 and the escalation of the Cold War beginning in the 1950s, the United States was, however, perhaps less focused on Latin America than it had been in earlier decades.

Relative to mathematics, moreover, Birkhoff’s death in 1944 and Stone’s involvement in secret war work from 1943 through 1945 resulted in a lessening—although not in a cessation—of inter-American mathematical contact. Following Birkhoff and Stone’s examples, Solomon Lefschetz, Norbert Wiener, and Antoni Zygmund also journeyed to and made connections in Latin America.<sup>42</sup> When Stone became chair of the Department of Mathematics at the University of Chicago in 1947 and actively took up his charge of revivifying the department, he immediately hired the Polish harmonic analyst, Zygmund, who visited Latin America in 1948, met Calderón, and encouraged the young Argentine to pursue his doctoral work at Chicago under his supervision. Calderón earned his Chicago Ph.D. in 1950 and, after taking positions first at the Ohio State University, then at the Institute for Advanced Study in Princeton, and finally at the Massachusetts Institute of Technology, he returned to Chicago as a Professor of Mathematics in 1959. Calderón served as a strong magnet, attracting Latin American mathematical talent to the United States.

The example of Calderón exemplifies the fact that Birkhoff and Stone established mathematical ties in Latin America in the early 1940s that did have lasting, although not perhaps transformative, consequences for mathematics both in Latin America and in the United States. As Stone’s efforts in the late 1940s and early 1950s to found an International Mathematical Union suggest, however, mathematics by the 1950s had become a more truly international, worldwide endeavor. It was bigger than one country or group of countries. It increasingly depended on worldwide collaborations and cooperation, not just targeted initiatives like that sparked by Roosevelt’s “good neighbor” policy.

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<sup>42</sup> Ortiz, “Segunda Parte,” p. 58.

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