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Global Routes and Hidden Labor in the American Mathematical Society's Cold War Chinese Mathematics Translation Program

ABSTRACT

This article argues that the first important comprehensive efforts by US mathematicians to survey, translate, and disseminate the work of Chinese mathematicians resulted from Cold War geopolitical and scientific competition and economic pressures that emerged in the 1950s and 1960s. The success of the American Mathematical Society's (AMS) translation program and its journal *Chinese Mathematics* depended less on official diplomatic channels and more on an informal network of Chinese American mathematicians and librarians in the United States, which provided the infrastructure and hidden labor necessary for transnational mathematical exchange and translation. The history of the Chinese translation project demonstrates the importance of moving beyond the biographies and work of established mathematicians to capture the broader transpacific social history of Chinese American mathematical research and technical labor in the early Cold War. Moreover, the article demonstrates the importance of bringing Asian American history and the history of Cold War science together, as the mathematical and linguistic expertise and labor required came from recently immigrated Chinese American mathematicians

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The following abbreviations are used: AMS, American Mathematical Society Records, John Hay Library, Brown University; *HSNS*, Historical Studies of the Natural Sciences; INS, The Records of the Immigration and Naturalization Service, 1787–2004, Record Group 85; NA, National Archives, Washington, DC; NSF, National Science Foundation; SM, Records of the School of Mathematics, Shelby White and Leon Levy Archives Center, Institute for Advanced Study, Princeton, NJ; TLY, Yuan, T'ung-li (Yuan, Tongli) Papers, Hanna Holborn Gray Special Collections Research Center, University of Chicago Library

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caught at the nexus of Cold War anticommunist politics and the incomplete repeal of Chinese exclusion. Historians of mathematics have mostly narrated the late 1940s and early 1950s as a time of anti-communist purges that impacted the lives of Chinese scientists and derailed US–China scientific exchange. Meanwhile, the 1960s have remained unexamined. Instead, we see the ways in which the AMS's translation program generated important mathematical exchanges that widely impacted mathematics and adjacent fields.

KEY WORDS: Chinese translation, mathematics translation, Chinese postman problem, Cold War, Chinese mathematics, American Mathematical Society, Acta Mathematica Sinica

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The famous "Chinese Postman Problem" (CPP) on transportation routing by Guan Meigu (管梅谷) made its way into American mathematical research in the 1960s.[1] In the 1950s, Guan, a professor at Shantung Normal College, worked with provincial colleagues on a range of transportation issues that included mail delivery during the Great Leap Forward. He later published those results in the September 1960 issue of *Acta Mathematica Sinica* (数学学报), China's top mathematics journal. Guan's original article, "奇偶点图上作业法"—very roughly translated as "Working Method on Parity Point Graphs" and attributed to "Mei-ko Kwan"—appeared with another one of his articles, "图上作业法的改进," or "Improvement on Graphic Method," and established Guan's importance in the field of graph theory (图上作业法). Guan himself did not travel to the United States, and American researchers did not go to the People's Republic of China due to the cessation of formal diplomatic relations between the two countries after 1949. Guan's work traveled to the United States via scientific networks for translation largely built by Chinese mathematicians and technical workers who came to the United States during and after World War II.

By the time Guan first published his groundbreaking article in fall 1960, US mathematicians were already intrigued with the state of scientific and

1. In this paper, Chinese names are romanized using the pinyin system with names appearing in the order of family name followed by given name unless referring to how a name was noted historically. For example, the paper refers to the Chinese mathematician Guan Meigu unless referring to the transliteration of the same name as "Mei-ko Kwan" as it appeared in the originally published text. If an individual was also well known through another romanization, it is provided in parentheses, followed by Chinese characters. Exceptions are made for individuals who employed a different romanization system to render their name into English. Chinese American names such as Chia-Kuei Tsao and Shiing-Shen Chern follow the English convention of given name followed by last name and use the transliteration system preferred by their owners.

mathematical research taking place in "communist China." Earlier that spring, the American Mathematical Society (AMS) applied to the National Science Foundation (NSF) to complete a survey of mathematical research in the People's Republic of China based on reports that Chinese scientists were making great advances in many fields, including mathematics. The NSF-funded survey would be led by Chia Kuei Tsao (曹家騏), who, along with his colleagues Ky Fan (樊琦), Yu Why Chen (程毓淮), Shu-teh Chen Moy (陳树德), and Steve Sze-Tsen Hu (胡世楨), comprised an accomplished group of Chinese American mathematics professors then employed at Wayne State University.[2] Tsao's bibliography, published in 1961, along with growing curiosity and concern about Chinese scientific advancements, led the NSF in January 1962 to fund the AMS's already successful Soviet mathematics translation program to begin cover-to-cover translations of *Acta Mathematica Sinica*.

Rediscovering the ways in which Guan's seminal work traveled to the United States brings into focus this brief, yet significant, moment in the transnational history of American mathematics when the field's leaders after World War II strove to rebuild relations around the world. The AMS's Chinese translation program marks the first significant scholarly effort to survey comprehensively and provide cover-to-cover translations of Chinese mathematical research for wide-scale distribution to US researchers. Mathematicians around the globe navigated a shifting Cold War international landscape and attempted to move past the ashes of war to reestablish intellectual exchanges and create new collaborations. The widely held perception that mathematics was its own language, familiar to all practitioners in the form of abstract equations and specialized terms, led many to believe that international mathematical exchange would be within easy reach. Yet, as historian Michael Gordin reminds us, "calling mathematics a language is a move in the direction of discourse, and does not, in any event overcome the problem of the language barrier."[3] Indeed the obstacles to translating mathematical Chinese to English were enormous and required extensive behind-the-scenes scientific and non-scientific labor, as well as public and private support to maintain the flow of scientific information, especially in a time of border closures. With new

2. AMS, "Proposal to the National Science Foundation: Contemporary Chinese Research Mathematics," 29 Apr 1960, AMS Papers, Ms. 75.10, Box 2, Folder 25.

3. Michael Gordin, *Scientific Babel: How Science Was Done before and After Global English* (Chicago: University of Chicago Press, 2015), 12.

funding encouraged by Cold War political anxieties, the AMS found new support for their publications as well as efforts to establish international exchange and mathematical translation programs in Russian and Chinese.

In recent years, transnational studies of science and technology have paid closer attention to how knowledge travels, examining how states regulate flows of knowledge, whether through national security policies or immigration border controls.[4] Studies situated during the Cold War have especially examined the close relationship between scientists and the state particularly in relation to military research and development of international politics and policies.[5] Indeed, historians of science continue to wrestle with the question of how to understand the choices available to individuals or groups of scientists vis-à-vis the institutions and infrastructures that organize and condition their work.[6] Most recently, scholars have argued for the importance of looking at transnational nongovernmental organizations in mobilizing and facilitating knowledge exchange as well as advocacy projects.[7] At the same time, historians have called for examining the ways in which scientific inquiry and knowledge conducted outside of the global north shaped seemingly universal scientific knowledge.[8]

4. John Krige, ed., *How Knowledge Moves: Writing the Transnational History of Science and Technology* (Chicago: University of Chicago Press, 2019); Simone Urchetti, Néstor Herran, and Soraya Boudia, "Introduction: Have We Ever Been 'Transnational'?" *The British Journal for the History of Science* 45, no. 3 (2012): 319–36.

5. Zuoyue Wang, "Transnational Science during the Cold War: The Case of Chinese American Scientists," *Isis* 101, no. 2 (2010): 367–77; Zuoyue Wang, "U.S.–China Scientific Exchange: A Case Study of State-Sponsored Scientific Internationalism during the Cold War and Beyond," *Historical Studies in the Physical and Biological Sciences* 30, no. 1 (1999): 249–77; Simon Turchetti, *The Pontecorvo Affair: A Cold War Defection and Nuclear Physics* (Chicago: University of Chicago Press, 2012).

6. Julia Harriet Menzel and David Kaiser, "Weimar, Cold War, and Historical Explanation: Rereading Forman," *HSNS* 50, nos. 1–2 (2020): 31–40.

7. Alison Kraft, Holger Nehring, and Carola Sachse, "The Pugwash Conferences and the Global Cold War: Scientists, Transnational Networks, and the Complexity of Nuclear Histories," *Journal of Cold War Studies* 20, no. 1 (2019): 4–30; Michael J. Barany, "Fellow Travelers and Traveling Fellows: The Intercontinental Shaping of Modern Mathematics in Mid-Twentieth Century Latin America," *HSNS* 46, no. 5 (2016): 669–709; John Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe* (Cambridge, MA: MIT Press, 2008).

8. Stuart McCook, "Focus: Global Currents in National Histories of Science: The 'Global Turn' and the History of Science in Latin America," *Isis* 104, no. 4 (2013): 773–76; Kapil Raj, *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650–1900* (London: Palgrave MacMillan, 2006); Marcos Cueto, *Beyond Imported Magic: Essays on Science, Technology, and Society in Latin America* (Boston: MIT Press, 2014).

This article aims to contribute to the above trends by bringing transpacific Asian American history into the study of Cold War mathematics. As this study makes clear, the AMS's Chinese translation project depended on the development of an informal infrastructure of translation and exchange developed by recently immigrated Chinese mathematicians and technical workers who had to contend with postwar domestic US racial politics with the ongoing operations of a race-based immigration and naturalization bureaucracy established to administer Chinese Exclusion. Yet, at the same time, Cold War geopolitics gave rise to a Cold War economics fueled by scientific competition with the Soviet Union that created new professional opportunities and means of entry into the United States. Re-examining the AMS's Chinese translation program allows for a closer look at the ways in which Chinese scientists contended with the social, economic, cultural, and political structures that enabled as much as constrained their private and professional lives and research.

A study of the AMS's Chinese translation program in this period widens our understanding of Chinese American scientific research and labor beyond well-known figures such as Hua Luogeng (華羅庚), Shiing Shen Chern (陳省身), and Qin Xuesen (錢學森) and argues for reconsidering the 1950s and 1960s as a time of important exchange even with the poor state of US-China relations.[9]

Taking the work of translation—linguistic and technical—as the central topic of inquiry makes visible the extensive hidden labor required, especially when that work took place outside of the usual European and American centers of research. The 1960s AMS Chinese translation project makes clear that Cold War competition and the national security concerns of both China and the United States drove these nations to find ways to access research coming out of these countries. Yet acquiring the latest mathematical research completed in China was only one part of the challenge. Establishing a pool of technical workers with both the linguistic and mathematical expertise to translate pure and applied mathematics posed another difficulty that could only be resolved by the Chinese émigrés caught at the nexus of Cold War geopolitics and US race-based immigration laws. Largely unacknowledged, the translation project required the mobilization of this cadre of Chinese émigré intellectuals whose social and professional networks facilitated the acquisition, translation, and dissemination of work out of the People's Republic of China and impacted mathematics and related fields in the United States and around the world for decades afterwards.

9. Wang, "Transnational Science during the Cold War" (n.5), 367–77; Wang "U.S.-China Scientific Exchange" (n.5), 249–77.

REBUILDING CHINESE MATHEMATICS POST-1949

The politically tumultuous years following the establishment of the People's Republic of China and the departure of the Academia Sinica to Taiwan severely disrupted scientific and mathematical research on the Chinese mainland. Nonetheless, research continued with the many who remained, as well as those who returned from abroad. The Chinese Communist Party (CCP) established a new Chinese Academy of Sciences (CAS) by the end of 1949 tasked with leading the country's scientific endeavors toward practical application to rebuild a China that had been at war for over a decade. Between 1949 to 1960, scholars estimate that Chinese journals published more than a thousand papers on topics in mathematics.[10]

After China lost many important scientists and mathematicians to the United States, the return of mathematician Hua Luogeng from his tenured position at the University of Illinois was critical to rebuilding mathematics in post–Civil War China. According to historian Zuoyue Wang, roughly four thousand Chinese scientists chose to remain in the United States after the establishment of the People's Republic of China, whereas only several hundred returned. Between 1949 and 1956, "129 of these returned students went to work in the elite Chinese Academy of Sciences (CAS), and 109 of them achieved the senior status of associate research fellow (equivalent to associate professor), accounting for one quarter of all such positions in the academy."[11] These returning US-trained Chinese scientists were joined by their peers educated in Europe such as Wu Wenjun (Wu Wen-Tsün, 吳文俊).[12]

In 1952, Hua became the inaugural director of the new Institute of Mathematics. The "Thought Remolding" campaign led Hua to make public

10. Yibao Xu, "Dialectics of Numbers: Marxism, Maoism, and the Calculus of Infinitesimals," Chunjuan Nancy Wei and Darryl E. Brock, eds., *Mr. Science and Chairman Mao's Cultural Revolution: Science and Technology in Modern China* (Blue Ridge Summit: Lexington Books, 2012): 175–95.

11. Wang, "Transnational Science during the Cold War" (n.5), 369–75.

12. Wu completed his doctorate at the University of Strasbourg in 1949 and established himself as an expert in algebraic topology before returning to China in 1951. Jiří Hudeček, "Ancient Chinese Mathematics in Action: Wu Wen-Tsun's Nationalist Historicism after the Cultural Revolution," *East Asian Science, Technology and Society: An International Journal* 6, no. 1 (2012): 41–64. Other Chinese mathematicians chose to go to Hong Kong, such as Kuo-Tsai Chen, who had completed his doctorate at Columbia University under Samuel Eilenberg. Richard Hain and Philippe Tondeur, "The Life and Work of Kuo-Tsai Chen," *Illinois Journal of Mathematics* 34, no. 2 (1990): 175–90.

statements on the need to reform Chinese mathematics to "serving the people."[13] In a 1951 article in the *Kuangming Daily* (光明日报), Hua criticized Tsinghua's historically elitist approach to mathematics research and training, which focused on educating a small number of "geniuses," graduating only sixty-one undergraduates and seven graduate students in its twenty years of existence. Hua further condemned the "semi-colonial" practice of basing one's research on problems posed by foreign scholars and seeking recognition through publications in foreign academic journals. Rather than criticizing the United States, he supported turning to the Soviet Union, where he had studied in the 1940s.[14] In 1953, Hua joined a twenty-six-person Chinese delegation to tour the top research centers across the Soviet Union and returned convinced more than ever that a Sino-Soviet collaboration would be the way to develop math and science in China. Hua's efforts to work with Soviet scientists fit with Mao's famous "Leaning to One Side" policy in the early 1950s, which favored working with the Soviet Union. Mao and other party members mistrusted domestic Chinese scientists, who had been largely educated in the West and trained in academic institutions established by the Nationalists. The CCP policy of allying with the Soviets allowed for rapid development of 156 major civil and military industrial projects without relying on domestic Chinese scientists.[15]

In 1956, the People's Republic of China announced the "Twelve-Year Long-Term Plan for the Development of Science and Technology, 1956–1967" that would set a new national agenda for scientific and technological research and industrial development and launch the State Science and Technology Commission to develop scientific policy. For many Chinese scientists like Hua, the 1956 announcement seemed to make research a priority again, albeit under restricted conditions and at the service of national security and industrial development.[16] During the Great Leap Forward, however, the CCP emphasized applying science and technology to increase industrial and agricultural

13. Stephen Salaff, "A Biography of Hua Lo-Keng," *Isis* 63, no. 2 (1972): 142–83, on 154.

14. Ibid., 154–55. For another example of socialist critique of mathematical research in this same period, see Arunabh Ghosh, *Making It Count: Statistics and Statecraft in the Early People's Republic of China* (Princeton, NJ: Princeton University Press, 2020): 98–106.

15. Zuoyue Wang, "The Chinese Development State during the Cold War: The Making of the 1956 Twelve-Year Science and Technology Plan," *History and Technology* 31, no. 3 (2015): 180–91.

16. Ibid.

production and moved away from basic research and pure mathematics. As the Chair of the Department of Mathematics and Vice President of USTC, Hua shifted attention to popularizing mathematics and promoting Operations Research, a branch of applied science and mathematics established around World War II to optimize military efficiency and industrial production. Hua particularly promoted linear programming, an aspect of applied mathematics that finds the optimal solution to a wide range of everyday problems encountered in the production, transportation, and distribution of everything from raw materials to finished goods.[17] Although the concepts could be highly theoretical, the mathematical knowledge needed for the calculations only required basic arithmetic.[18] Hua and his colleagues launched broad educational campaigns to promote linear programming which included mobilizing three-thousand university teachers, students, and scientists in Shandong to work with teachers and students in lower grades and hold academic conferences on programming.[19]

As the director of the Institute of Mathematics, Hua reported on these experimental developments and published often in Chinese journals, including the September 26, 1959, issue of the *Chinese Science Bulletin* (*Kexue Tongbao* 科学通报) that celebrated the tenth anniversary of the founding of the People's Republic of China. The issue contained reports by prominent Chinese scholars in many fields, which caught the attention of American mathematicians eager to see the latest research developments in "Communist China." In December 1959, Hua's article was translated and printed in *Notices*, a newly established AMS publication that served as a forum for important issues.[20] Along with two other *Scientia Sinica* (中国科学) articles, Hua's piece alerted the world that mathematical research was indeed being conducted in the PRC by scholars whose names were familiar on this side of the globe. Perhaps it was time for American mathematicians, whose field had gained high visibility and importance during the Second World War, to take notice.

17. Note that "linear programming" can be better understood as "linear scheduling" coming out of the field of operations research and not computer science.

18. Jean W. Richard, "Hua Loo-keng and the Movement of Popularizing Mathematics in the People's Republic of China," *Journal of Mathematics Education at Teachers College* 1 (2010): 23–24.

19. George Ecklund, "Communist China Tries Linear Programming," *Asian Survey* 1, no. 7 (1961): 28–29.

20. Michael Barany, "'All of These Political Questions': Anticommunism, Racism, and the Origin of the Notices of the AMS," *Journal of Humanistic Mathematics* 10, no. 2 (2020): 527–38.

COLD WAR ECONOMICS AND THE AMERICAN MATHEMATICAL SOCIETY

The wartime contribution of American mathematicians established the field's importance alongside physics, chemistry, and engineering.[21] In the immediate postwar years, the US Office of Naval Research (ONR) recognized pure and applied mathematics as essential to US military strength in the Cold War and became the main source of funding for new research. This section explores the ways in which Cold War geopolitics shaped new economic possibilities for the AMS in the forms of new government funding for scientific research and publications that promised new revenue streams for the organization. The AMS actively took on the urgent language of Cold War competition against "the Soviets" and "Communist China" to drum up membership and interest in new journal subscriptions and cover-to-cover translations that would raise its profile among American mathematicians and American government science funding agencies. As the premier American mathematics professional organization, the AMS both increased and limited opportunities to recognize and support the work of Chinese mathematicians in the new Cold War economy.

By 1947, the AMS, supported by ONR, began translating Russian mathematics journals into English under the direction of mathematician Sydney Gould. A shift from ONR to the newly established National Science Foundation (NSF) in 1950 did not change the importance of mathematics or technical translation to US national defense in the rapidly escalating competition with the Soviet Union.[22] In the NSF's 1954 annual report, director Alan Waterman cited the results of a recent survey administered to members of the American Institute of Physics, that called for "complete English translations of Soviet physics journals" in recognition of "the national danger of underestimating the strength of the U.S.S.R., particularly as far as scientific advances are concerned."[23] That year, the NSF agreed to support the AMS's effort to translate about "1,000 pages a year of the most significant Russian

21. Karen Hunger Parshall, *The New Era in American Mathematics, 1920–50* (Princeton, NJ: Princeton University Press, 2022), 339–96.

22. Ibid., 403–5; Dael Wolfle, "National Science Foundation: The First Six Years," *Science* 126, no. 3269 (August 23, 1957): 335–43.

23. National Science Foundation, *Annual Report* (Washington, DC: US Government Printing Office, 1954): 57. For more on US government support of Russian translation, see Gordin, *Scientific Babel* (n.3), 256–60.

mathematical papers."[24] The Sputnik launches in fall 1957 added to the urgency of President Eisenhower's November 7 address emphasizing the critical importance of science and technology in building US military strength.[25]

AMS officers understood that Cold War competition with the Soviet Union created funding opportunities for the organization and its journals. Earlier that year, AMS submitted a more ambitious proposal to NSF asking for $17,685 to translate 1,500 pages of Russian mathematics into English. Around the same time, the National Research Council approached Gould about creating a new Russian–English dictionary jointly sponsored by the Russian National Academy and the US National Academy, to be overseen by the AMS. The project would update earlier efforts to produce a similar Russian–English technical dictionary that had been immensely popular, selling out after two printings of up to three thousand copies. As testament to that dictionary's popularity, a similar French version sold only twenty-two copies.[26]

AMS Executive Director John H. Curtiss used popular Cold War rhetoric to market library subscriptions, promoting *Mathematical Reviews* as the most comprehensive list of abstracts of ongoing math research, with "remarkable coverage of the mathematics published behind the Iron Curtain."[27] AMS also explored new collaborations with related organizations such as the Institute of Mathematical Statistics to expand Russian translations through additional NSF grants. Curtiss reasoned that even if AMS had to devote some of its own funds to the enterprise, "the investment is about as safe as the purchase of Chase-Manhattan Bank stock and quite a bit more profitable."[28] Meanwhile, AMS's proposals to NSF for its own projects related to Soviet mathematics grew to $50,000, which included $15,000 to translate "the pure

24. Ibid. Waterman specifically named "molecular spectroscopy, magnetism, low temperature physics, underwater sound and related applied acoustics, solid state physics, nonlinear mechanics and differential equations" as fields where Soviets had excelled.

25. "Text of the address by President Eisenhower on science in national security," *New York Times*, 8 Nov 1957, www.proquest.com/historical-newspapers/text-address-president-eisenhower-on-science/docview/114308416/se-2 (accessed 2 Aug 2022).

26. AMS, "Quarterly Report of the Executive Director, December 1, 1956–February 28, 1957," AMS Records, Ms. 75.13, Box 1, Folder "1956 Dec.–1957 Feb."

27. AMS, "Quarterly Report of the Executive Director, June 1, 1957–November 30, 1957," AMS Records, Ms. 75.13, Box 1, Folder "1957 Nov–1958 May."

28. AMS, "Quarterly Report of the Executive Director, June 1, 1958–November 30, 1958," AMS Records, Ms. 75.13, Box 1, Folder "1958 Nov. 1959 Feb."

mathematics section of the Proceedings of the USSR Academy of Science" titled *Doklady*.[29]

The financial success of the Soviet mathematics translation program in increased NSF funding and subscription sales spurred AMS editors to consider reviewing and publishing mathematical research from the People's Republic of China. Strained US–China relations along with US anti-communist and national security concerns curtailed direct communication with Chinese scientists, but American scholars were not completely ignorant of research occurring on the Chinese mainland and appearing in top journals such as *Acta Mathematica Sinica* and *Scientia Sinica*. The AMS, through its publication *Mathematical Reviews,* had previously reviewed nearly four hundred articles published in these journals, but provided only short reviews rather than full translations.[30] The AMS's Translations project had published in its second series a full translation by Lensey Namioka of Wu Wen-tsün's "On Pontryagin Classes. III," which had been previously published in *Acta* in 1954.[31] Namioka completed her MA in mathematics at the University of California, Berkeley, in 1952, and by the late 1950s was teaching at Cornell University, where her Japanese American husband Isaac Namioka was an assistant professor in the mathematics department. Neé Chao, Namioka was also the daughter of renowned Chinese linguist and polymath, Yuenren Chao (趙元任), a close friend and colleague of Shiing-Shen Chern.[32] Also in 1959, the AMS Translation series published Chiang Tse-pei's (江泽培) "Remark on the Definition of the Quantity of Information," which was part of a larger set of writings with Soviet mathematicians Izrail M. Gel'fand and Akiva M. Yaglom.[33] Having received positive feedback on these projects, the editors asked the *Notices*

29. AMS, "Quarterly Report of the Executive Director, June 1, 1959–November 30, 1959," AMS Records, Ms. 75.13, Box 1, Folder "1959 May–Nov."

30. AMS, "Report of the Executive Director, December 30, 1960," AMS Records, Ms. 75.13, Box 1, Folder "1960-Dec."

31. Wen-sün Wu, "On Pontryagin classes. III." *AMS Translations, Series 2*, 11 (1959): 155–72.

32. Chern joined the mathematics department at Berkeley in 1960. The Cherns were close family friends with Lensey Namioka's family. Lensey Namioka, interview by Zhijia Shen, 28 Jul 2017, https://digitalcollections.lib.washington.edu/digital/collection/ohc/id/3508, accessed on 15 Nov 2022. Yuenren Chao though primarily known for his seminal work in Chinese linguistics was also fascinated by cybernetics. Chen-Pang Yeang, "From Modernizing the Chinese Language to Information Science: Chao Yuen Ren's Route to Cybernetics," *ISIS* 108, no. 3 (2017): 553–80.

33. Chiang Tse-pei, "Remark on the Definition of the Quantity of Information," *AMS Translations, Series 2*, 12 (1959): 247–50. Chiang's article had been published in the Soviet journal, *Teoriya Veroyatnostei I ee Primeneniya*.

readership to send suggestions for "articles in foreign languages, particularly in Russian and Chinese, to be translated and published by the Society."[34]

At year's end, *Notices* translated and published Hua Luogeng's "Report on Mathematics in China," providing the first glimpse into Chinese research that had taken place since the establishment of the People's Republic of China. Translation was no simple undertaking and required assistance from "many colleagues, who desire[d] to remain anonymous," and raised problems with some "more specialized mathematical passages" that required "a paraphrase rather than a translation."[35] Hua's article began with anti-capitalist rhetoric familiar to the anti-feudalist political campaigns of the era. China had a "long and brilliant history in mathematics" but suffered "a long stagnation produced by the feudal system in our society" as well as a focus on elite and Western-oriented mathematical research. Hua summarized the state of Chinese mathematics just prior to "liberation" as "[c]reative work in modern mathematics had been started, but still had a semi-feudal and semi-colonial social character, since it had no connection with the practical development of our country and produced no fruitful results in this direction."[36] But post-liberation, Hua asserted that Chinese mathematics was "no longer a branch cut from a capitalist tree but is a sapling, growing up on the fertile soil of our own country" and stated that from 1950 to 1958, 983 papers in various fields of mathematics were published in China.[37] Hua also noted the range, depth, and variety of research had increased thanks to the assistance of the Soviet Union, and had shifted to practical applications for the purposes of production. He specifically named five fields that had developed greatly in recent years because of the Great Leap: numerical analysis, partial differential equations, probability and statistics, operations analysis, and logic.

AMS members could have easily dismissed this glowing report of rapid progress under CCP leadership as communist propaganda had it been written by anyone other than Hua Luogeng. His reputation as one of the top living Chinese mathematicians remained intact. Indeed, the accompanying biographical note written by Hua's former colleague at the University of Illinois at Urbana-Champaign, Lowell Schoenfeld, simply stated that Hua's wide

34. "The AMS-IMS Translation Program," *Notices* 6, no. 6 (1959): 611.

35. "Report on Mathematics in China," *Notices* 6, no. 7, pt. 1 (1959): 724. This was a short introduction to the translated Hua article.

36. Loo-keng Hua, "Mathematical Research in China in the Last Ten Years," 6, no. 7, part 1 (1959): 724. Hua's article was translated and reprinted from *Kexue Tongbao*, 18 (1959): 565–67.

37. Ibid., 725.

breadth of knowledge and impressive publication record was "more than ample to qualify him as one of the foremost mathematicians in the world."[38] When AMS began their full book translation program in the early 1960s, Hua stood out as the only Chinese mathematician to have his work translated cover to cover in an otherwise long list of Soviet mathematicians.[39]

Strong reader interest in Hua's state-of-the-field report convinced the AMS to explore the financial feasibility of a focused Chinese translation project going directly to the NSF. The following February, *Notices* reported on the AMS's rapidly expanding translation program's attempts to keep up with the output of scientific research coming from across the globe. Although the translation of Soviet research continued to take precedence, the report noted that "Communist Chinese scientific literature has grown impressively in the last five years, and is becoming increasingly interesting to American scientists, making a translation program for Chinese Scientific literature highly desirable."[40] The April 1960 issue of *Notices* ran two more articles surveying Chinese mathematical research reprinted from the November 1959 issue of *Scientia Sinica*: Su Buchin (蘇步青) and Ku Chao-hao (谷超豪) on differential geometry, and K. H. Look (陆启铿) on the theory of functions of several complex variables.[41] Both articles were published in English in *Scientia*, saving the AMS editors the trouble of locating translators. The introduction to the Su and Ku article repeated some of the same anti-feudalist critiques from Hua's piece, namely calling out the elitism of mathematics in "Old China" while praising the flowering of mathematics into a field in service of national construction. Nonetheless, both articles provided clear surveys of the work done in their respective fields and referenced articles published in *Acta Mathematica Sinica,*

38. Ibid., 730.

39. AMS, "Report of the Executive Director, October 31, 1961," AMS Records, Ms. 75.13, Box 1, Folder "1961 Oct." The choice of Hua's "Harmonic Analysis of Functions of Several Complex Variables on Classical Domains" was likely not just based on interest. Originally published in Russian, the translation work would have matched the linguistic capabilities of the AMS translation program.

40. "Communist China," *Notices* 7, no. 1 (1960): 44–45.

41. "More on Mathematics in China," *Notices* 7, no. 2 (1960): 155–68; K. H. Look, "A Study of the Theory of Functions of Several Complex Variables in China During the Last Decade," *Notices* 7, no. 2 (1960): 155–63; and Su Buchin and Ku Chao-hao, "The Developments of Differential Geometry in China for the Past Ten Years," *Notices* 7, no. 2 (1960): 163–68. The last two articles were reprinted from *Scientia Sinica* 8, no. 11 (1959): 1229–42. Note that "K. H. Look" is the Cantonese romanization of Lu Qikeng (陆启铿) who was born in Guangdong province and known for the "Lu Qi-keng Conjecture."

Scientia Sinica, and other Chinese-language journals inaccessible to non-Chinese readers, justifying AMS's efforts to seek NSF funding to track and translate mathematical research from the PRC.[42]

That same issue of *Notices* published a letter to the editor from Paul Erdös, a renowned Hungarian mathematician known for his work in number theory and combinatorics, who reported on his whirlwind trip through Beijing and Shanghai. Erdös described an expanded and lively mathematics scene and specifically mentioned meeting Hua Luogeng, who "sends regards to his many friends," as well as reconnecting with his old friend Ko Chao (柯召), a specialist in algebra, number theory, and combinatorics on the faculty of Sichuan University.[43] The two had not met since the 1930s when Ko was at the University of Manchester, where he completed his doctorate under Louis Mordell. Erdös's letter no doubt raised further interest in the mathematical activities on the mainland as well as reminding readers that the Cold War hindered collaboration and exchange with former Chinese colleagues.[44]

Notices continued to challenge its readership's "complacent assumption that an English-speaking scientist able to read scientific French and German would have access to all the scientific literature of any possible interest to him."[45] Rather, "spectacular Soviet achievements in science and technology and the growing quantity and quality of scientific research in China have brought home the fact that the translation of scientific literature from these and other countries whose languages are not generally known to Americans is an important part of research and development in this country."[46] A 1960 report further asserted that the extraordinary growth of "Communist Chinese scientific literature," estimated at "over 450 scientific publications . . . a 500 percent increase over the total of five year ago" has made the prospect

42. S. H. Gould, "Announcing a Survey of Chinese Mathematical Literature," AMS Records, Ms. 75.9, Box 2, Folder 8 "News Announcements."

43. Paul Erdös, Letter to the Editor, *Notices* 7, no. 2 (1960): 183.

44. Two years later, Erdös and Ko along with Richard Rado, who had emigrated to England from Germany in the 1930s, published their important article "Intersection Theorems for Systems of Finite Sets." The 1961 article was based on work that had been completed in 1938 after the three met each other in England. Erdös, Paul, Chao Ko, and Richard Rado. "Intersection Theorems for Systems of Finite Sets," *Quarterly Journal of Mathematics* 12 (1961): 313–20; James Bumgartner, "In Memoriam: Paul Erdös, 1913–1916," *The Bulletin of Symbolic Logic* 3, no. 1 (1997): 70–72; C. A. Rogers, "Richard Rado. 28 April 1906–23 December 1989." *Biographical Memoirs of Fellows of the Royal Society* 37 (1991): 413–26.

45. "Foreign Science Information," *Notices* 7, no. 1 (1960): 38.

46. Ibid.

of a "translation program for Chinese Scientific literature highly desirable."[47] Whereas the author dismissed many of the publications from the earlier period as translations of Soviet mathematics and "political exhortations," he concluded that "the primary scientific journals today contain[ed] an increasing amount of original Chinese basic and applied research."[48] The article complained that most of these published materials remained inaccessible because of trade restrictions with China. Instead, journals such as *Science Abstracts of China* that provided brief English-language abstracts of Chinese research articles from the biological, Earth, technical, mathematical, and physical sciences, and chemistry and chemical technology, allowed AMS members to make rough counts of the research done in these fields and imagine the scale of research undertaken and would continue to come out of the PRC.

In spring 1960, AMS submitted a proposal to NSF to conduct a full survey of "contemporary Chinese research mathematics" in twelve months. The proposal made clear that the project depended on a remarkable group of five "Chinese-born mathematicians" at Wayne State University—C. K. Tsao, Ky Fan, Yu Why Chen, Shu-teh Chen Moy, and Steve Sze-Tsen Hu—who had the language fluency and mathematical expertise to complete the work. The grant writers stressed the political and intellectual urgency of the project given the "sharp increase in both the quantity and quality" of research coming out of the PRC but remained inaccessible to American researchers. The AMS proposed conducting an exhaustive survey of all Chinese mathematical publications, creating a mechanism for ongoing review of new work, and selecting truly significant works for full translation. The proposal did not provide much information on these five mathematicians' personal and professional background, especially their areas of research, only stressing the unique opportunity with the five professors being "Chinese-born and [able to] read and speak Chinese fluently; they are in five different fields of mathematics, so that their counsel is an essential element in the proposed Survey."[49] In preparation, the AMS staff of *Mathematical Reviews* established relations with national libraries in China to receive journals for review.[50] AMS planned to enter into a contract with Wayne State's mathematics department and aimed to hire Tsao as a full-time associate editor of *Mathematical Reviews* for summer 1960 and part-time

47. Ibid., 44.

48. Ibid.

49. "Proposal to the NSF" (n.2).

50. The journals were *Acta Geodetica et Cartographica Sinica, Acta Mechanic Sinica*, *Science Record, Scientia Sinica, Acta Mathematica Sinica,* and *Shuxue Jinzhan (Progress in Mathematics)*.

for the 1960–1961 academic year for his work leading a research seminar at Wayne State. The Kresge Library, Wayne State's newly built scientific library, also agreed "to subscribe under United States Treasury Department license as necessary, to all worthwhile material originating from Chinese sources or in the Chinese language on mathematics." The proposal further identified Yvonne Chen, a Chinese-speaking librarian, to help procure and process the necessary journals.[51]

The AMS initially acquired Chinese mathematical publications through the American Association for the Advancement of Science (AAAS) when the AAAS planned to host a symposium on the state of sciences in "Communist China" at their December 1960 meeting.[52] The conference facilitated large-scale gathering of scientific materials originating from the PRC that had previously been difficult to obtain because of US trade laws "prohibiting the purchase of goods (including scientific publications) from Communist China with a Treasury Department license" along with Chinese restrictions on sale of journals in places such as Hong Kong and London to procure the work of Chinese mathematicians.[53] In preparation for the December conference, Federal libraries authorized to collect materials published in the PRC sent all mathematics publications to AMS headquarters in Providence, Rhode Island, where Tsao had relocated for the summer with NSF support. Between July and September, Tsao provided "yeoman service" to prepare an eighty-nine-page pamphlet that contained about four hundred listings of reviews of Chinese mathematical publications that had been published in *Mathematical Reviews*. At the end of Tsao's Providence stay, Gould widely marketed the soon to be published volume.[54] When Tsao returned to Wayne State, he worked with graduate students from Taiwan, B. L. Lin and S. Yuan, to prepare a bibliography of "900 titles of articles published in Communist China in the period 1949 through June, 1960."[55] Tsao also began to shape what the AMS would later dub the "Seminar at Wayne State University" to begin the work of full article translations for publication by AMS.

51. "Proposal to NSF" (n.2).

52. "AAAS New York Meeting," *Sciences* 132, no. 3440 (1960): 1627–48, on 1628–29; "Preface," *Sciences in Communist China*, edited by Sydney H. Gould (Baltimore, MD: Horn-Shafer Company, 1961): iii–vii.

53. "Foreign Exchange Program," *Notices* 7, no. 1 (1960): 44–45.

54. "Announcing a Survey of Chinese Mathematical Literature."

55. "Survey of Chinese Mathematical Literature," *Notices* 7, no. 5 (1960): 586.

The AMS also looked into promoting additional Chinese mathematics bibliography projects. At the same time Tsao was preparing his bibliography, Dr. Tung-Li Yuan (袁同禮), a librarian at the Library of Congress, embarked independently on a project to catalogue monographs and journal articles by Chinese mathematicians in European languages from 1919 through the emergence of the "Communist regime in 1949."[56] Yuan reached out to Gould in October 1960 expressing his excitement at the upcoming AAAS December conference to offer his services. Gould, looking to expand the Chinese translation program, initially responded with warm interest and offered to put Yuan and Tsao in touch with each other "to work out some sort of collaboration whereby we may compare our index of Chinese mathematical articles with yours."[57] That winter, the AMS expressed the possibility of publishing Yuan's text, after printing Tsao's bibliography, as "Report No. 2 of the project in view of the fact that it throws valuable light upon the earlier careers of mathematicians now active in China."[58]

Yuan completed his bibliography in early 1962 and submitted the manuscript to Gould in the form of index cards to be typeset for publication.[59] From April to October, Yuan wrote frequently, asking Gould to update the status of "Report No. 2." In October 1962, Gould finally delivered the disappointing news that the AMS's editorial committee had chosen not to publish Yuan's bibliography, since "the work does not appear to fit very suitably into the publishing program of contemporary mathematical research."[60] Yuan, clearly frustrated, pushed back and warned to "enable the AMS to obtain larger support from the Foundation, it is highly desirable to win their good-will by publishing this bibliography."[61] Not wishing to jeopardize the AMS's NSF support, Gould offered instead to help publicize the work should Yuan secure

56. AMS, "Report of the Executive Director, December 30, 1960" (n.30). Yuan had spent the early 1920s in the United States as a student of library science at Columbia University and the New York State Library School in Albany. He returned to China and oversaw the National Library of Peiping and returned to the United States following the Chinese Civil War. In the end, his bibliography was self-published in 1963. Tung-li Yuan, *Bibliography of Chinese Mathematics, 1918—1960* (Washington, DC: Tung-li Yuan, 1963).

57. S. H. Gould to T. L. Yuan, 25 Oct 1960, TLY Papers.

58. AMS, "Report of the Executive Director, December 30, 1960" (n.30); S. H. Gould to T. L. Yuan, 5 Dec 1960, TLY Papers; S. H. Gould to T. L. Yuan, 5 Jan 1961, TLY Papers.

59. T. L. Yuan to Fiscal Department, AMS, 14 May 1962, TLY Papers.

60. S. H. Gould to T. L. Yuan, 22 Oct 1962, TLY Papers.

61. Tung-Li Yuan to Sydney Gould, 26 Oct 1962, TLY Papers.

another publisher. In the end, Yuan spent his own funds to publish the bibliography.

Yuan and the AMS had different ideas of the importance of cataloguing the works of Chinese mathematicians and scientists. For Yuan, the bibliography was one of several projects he undertook to record the scholarly contributions of individual Chinese academics to American academia that signaled the long and unrecognized history of US–China cultural exchange, especially during the Chinese Exclusion era.[62] The AMS, however, had no use for such a project. By 1962, the AMS was receiving significant NSF support for cover-to-cover translation work on the most current issues of *Acta Mathematica Sinica*, a logical next step after publishing Tsao's contemporary bibliography of Chinese mathematical research. Moreover, the NSF's pressing need for translating Chinese mathematical works in the early 1960s stemmed from postwar US national security concerns and Cold War scientific competition with the Soviet Union. A bibliography naming the works produced by Chinese scholars prior to 1949 held less urgency and originality, as other mathematicians had already dismissed the earlier period as derivative. Fearing Yuan's manuscript would be a costly enterprise with few readers, the AMS withdrew its support in favor of Tsao and his colleagues at Wayne State.

THE WAYNE STATE SEMINAR GROUP AND THE HIDDEN LABOR OF CHINESE MATHEMATICAL TRANSLATION

In 1960, Wayne State University in Detroit had just officially become a state institution of higher learning. It changed names from Wayne University to Wayne State University, achieving the same constitutional status as the University of Michigan and Michigan State University. During President Clarence Hilberry's tenure, the campus grew rapidly, with new construction that included the Kresge Science Library, new science and engineering buildings, and an IBM 650 data processing system computing center. From 1945 to 1955,

62. In 1962, Yuan had previously published *A Guide to Doctoral Dissertations by Chinese Students in America, 1905–1960* (Washington, DC: Sino-American Cultural Society, 1961). This guide listed the 2,789 doctoral works completed by Chinese students with majority falling into the physical sciences category. A review praised the collection as "a valuable document of Chinese–American cultural exchange and relations, in which both China and the United States can take pride." T. H. Tsien, "A Guide to Doctoral Dissertations by Chinese Students in America 1905–1960. Tung-Li Yuan," *The Library Quarterly* 32, no. 3 (1962): 241–42.

fall enrollments nearly doubled from just under ten thousand students to roughly eighteen thousand students drawing from all over the state of Michigan.[63]

Expansion inevitably led to hiring new faculty. Yet, nothing in Wayne State's recent past would have suggested they would hire five highly accomplished Chinese émigré mathematicians. According to the China Institute's annual directory of Chinese students in the United States, fewer than five Chinese students studied at Wayne University in the early 1950s. The directory for the 1951–1952 academic year listed only four Chinese students, none studying mathematics.[64] Over the course of a decade, Wayne State proudly named Yu Why Chen, Sze-Tsen Hu, Ky Fan, Shu-Teh Chen Moy, and Chia Kuei Tsao to their mathematics faculty. All five were born and educated in Republican China, left to pursue postgraduate mathematical training in Europe or the United States, and like many of their Chinese émigré peers, navigated the murky political waters of World War II and the Chinese Civil War.

This section brings to light the hidden labor behind this transpacific translation project to understand the ways in which Cold War geopolitics, immigration laws, and the postwar mathematics profession shaped the private and professional lives of this group of Chinese American mathematicians. In each case, we see how the AMS valued their Chinese background in ways that diminished their mathematical achievements. These mathematicians confronted the social and legal legacies of Chinese Exclusion as they navigated the US immigration and naturalization bureaucracy previously established to deter Chinese migration to the United States. Indeed, as scholars, the five would have been granted entry into the United States under the Chinese Exclusion Acts as members of the "exempted class" defined under section 6. Repeal did away with this exemption and left in its place a general immigration quota of fewer than a hundred persons per year, creating new problems for Chinese scholars seeking to come to the United States.[65]

In 1952, Yu Why Chen and Chia Kuei Tsao became the first of the group to be hired into the mathematics department. Born in China in 1922, Tsao came to the United States in 1948 to complete his doctorate in mathematics at the

63. Evelyn Aschenbrenner, *A History of Wayne State University in Photographs,* 2nd edition (Detroit: Wayne State University Press, 2018): 6–9, 116, 155.

64. *Directory of Chinese Students in Colleges and Universities in the United States of America, 1951–52* (New York: China Institute in America, 1952).

65. Madeline Y. Hsu, *The Good Immigrants: How the Yellow Peril became the Model Minority* (Princeton, NJ: Princeton University Press, 2015): 104–65.

University of Oregon. In January 1952, Tsao filed his dissertation, titled "A General Class of Discrete Distributions and Mixtures of Distributions," and accepted his position at Wayne University specializing in statistical mathematics.[66] That same year, he married Ying Lan Wang, who had arrived in the United States in 1950 to attend Clark University in Worcester, Massachusetts.[67]

Yu Why Chen, the most senior of the group, spent most of his professional career navigating the tumultuous internal and international politics of the 1930s and 1940s. Born in Nantong in Jiangsu province, Chen traveled to Göttingen in 1928 to study with Richard Courant.[68] The global center for pure mathematics, Göttingen attracted scholars from around the world, including China and Japan. By the time Chen graduated in 1934, however, Courant had left Germany after the 1933 Law for the Restoration of the Professional Civil Service pushed him and other scholars of Jewish descent from their teaching positions. Chen finished his dissertation with Franz Rellich and Gustav Herglotz.[69]

In 1936, Chen returned to the National University of Peking for a year before its relocation to Kunming. A decade later, Chen traveled to the United States, reuniting with Courant at New York University where he had been invited to create a mathematics institute after fleeing Nazi Germany in 1937.[70] Chen's wife, Cho-Tchin Tsiang, and their child, Kai-Wa, arrived in January 1947, months after the outbreak of the Chinese Civil War.[71] The Chens settled into Parkway Village in Jamaica, Queens, a newly built housing complex developed for United Nations staff and visitors. For the cosmopolitan couple,

66. "News and Notices," *The Annals of Mathematical Statistics* 23, no. 4 (1952): 649; "Chia-Kuei Tsao Received," *The Eugene Guard,* 3 Feb 1952.

67. *Passenger Lists of Vessels Arriving At San Francisco, California*. 4 Feb 1950, INS, NA, Ancestry.

68. Yu Why Chen curriculum vitae, 4 Jan 1949, SM, Members, Visitors, Assistants, 1933–1977, Box 4, Folder Char-Chen.

69. Robert E. O'Malley, *Historical Developments in Singular Perturbations* (Germany: Springer International Publishing, 2014), 14–15.

70. O'Malley, p. 22; see also Constance Reid, *Courant in Göttingen and New York: the Story of an Improbable Mathematician* (New York: Springer-Verlag, 1976).

71. *Passenger Lists of Vessels Arriving At San Francisco, California*, 4 Jan 1947, INS, NA, Ancestry. The names of Chen's family appear in the records of the Port of Detroit. *Card Manifests (Alphabetical) of Individuals Entering through the Port of Detroit, Michigan, 1906–1954*, 29 Oct 1951, INS, NA.

fluent in German and English, the compound was a welcomed refuge of cultural diversity and racial tolerance.[72]

In June 1949, however, Chen received the surprise news from the United States Immigration and Naturalization Service (INS) that he no longer had authorization to remain in the country and could not be employed in the United States. At the time, Chen worked with Courant and others on projects sponsored by the US Army's Ballistics Research Laboratory in Aberdeen, Maryland.[73] The letter ordered Chen to leave the country by September 21, 1949.[74] No doubt aware of the dire political situation in China, he frantically searched for another way to stave off deportation. Chen managed to secure an assistantship with Marston Morse at the Institute for Advanced Study (IAS) for the fall but learned his visa status did not allow him to be hired as Morse's assistant. Instead, Morse suggested Chen's appointment as a "member," a position that could not be construed as employment.[75] INS continued to oppose the renewal of Chen's visa, but he eventually prevailed and in December moved his family to Princeton. Knowing that his stay in the United States would again be in jeopardy at the end of his IAS membership, Chen lost no time looking for a permanent position by enlisting the support of his IAS colleagues. By the new year, Hermann Weyl was writing in support of Chen, commenting on both his mathematical research and the political situation in China preventing his return.[76] Chen must have breathed a sigh of relief when he was invited to join the mathematics department at the University of Oklahoma that fall. INS continued to keep strict tabs on Chen's whereabouts and required him to report to their local office once settled.[77]

72. The Chens lived at 150–46 Village Road in Jamaica. Y. W. Chen to Robert Oppenheimer, 15 Oct 1949, SM, Members, Visitors, Assistants, 1933–1977, Box 4, Folder Char-Chen. Pamela Hanlon, *A Worldly Affair* (New York: Fordham University Press, 2017): 31–38; Sylvie Murray, *The Progressive Housewife: Community Activism in Suburban Queens, 1945–1965* (Philadelphia: University of Pennsylvania Press, 2003), 72–74. Tsiang's documents record her as fluent in English.

73. Richard Courant to Trent Doser, 18 Oct 1949, SM, Director's Files, Box 20, Folder Chen, Yu Why.

74. Trent Doser to Y. W. Chin, 27 Jun 1949, SM, Director's Files, Box 20, Folder Chen, Yu Why.

75. Marston Morse to Robert Oppenheimer, 10 Oct 1949, SM, Director's Files, Box 20, Folder Chen, Yu Why.

76. Herman Weyl to C. E. Springer, 1 Feb 1950 and Letter form Herman Weyl, 5 Jan 1949, SM, Members, Visitors, Assistants, 1933–1977, Box 4, Folder Char-Chen.

77. Y. W. Chen to Mrs. E. Leary, 30 Sep 30, 1950, SM, Director's Files, Box 20, Folder Chen, Yu Why.

Chen moved to Wayne University in 1952 and was once again able to receive federal funding from the Office of Scientific Research (OSR), newly established by the US Air Force. In January 1955, Chen submitted a proposal to OSR with the hopes of spending a year at IAS. He wrote Deane Montgomery to express his plans and "sincere hope to come back to the Institute for half year, possibly through some support from the Office of Scientific Research." Marston Morse and J. Robert Oppenheimer supported Chen's application "subject to his obtaining Air Force support," and Chen was once again able to return to the IAS for another year.[78]

Shu-Teh Chen Moy, the only woman of this exceptional group, joined Wayne University in 1954. In 1944, Chen Moy began as an electrical engineer and attended the National Central University of China at Chongqing in Sichuan province, completing her Master of Science in 1942. In 1944, she married Arthur Moy, a Chinese American engineer who was born in Massachusetts and served in the US Army in the China theater during the war. The couple married in Chengdu and registered their marriage with the US Consulate in Chongqing as between "Arthur Moy" and "Sunny Shu-teh Chen."[79] In 1946, Sunny Moy sailed on the *Fred C. Ainsworth*, an army transport vessel, with her infant daughter, Jane Wei, to the United States to rejoin her husband. Once there, Moy shifted her focus to mathematics and studied for a year at the University of Illinois with Joseph L. Doob before entering the doctoral program at the University of Michigan. By 1950, the family was living in Detroit where Arthur had taken up the position of city engineer.[80] Moy filed her dissertation, titled "Applications of Conditional Expectations," in 1953 while also juggling life as a wife and mother.[81] Her collaboration with Doob through predoctoral research support from the Atomic Energy Commission led to a few publications in the 1950s, and she also received the Emmy Noether fellowship

78. Y.W. Chen to Professor D. Montgomery, 18 Jan 1955, SM, Members, Visitors, Assistants, 1933–1977 Box 4, Folder Char-Chen.

79. "Certificate of Witness to Marriage," 27 Sep 1944, *Marriage Reports in State Department Decimal Files, 1910–1949*, RG 59, General Records of the Department of State, 1763–2002, NA, Ancestry.

80. U.S. Census Bureau, 1950 U.S. Census, Detroit, Michigan, Enumeration District 85-1691, Ancestry.

81. J. L. Doob, "In Memory of Shu-Teh Chen Moy," *The Annals of Mathematical Statistics* 41, no. 2 (1970): 758; Shu-Teh Chen Moy, "Applications of Conditional Expectations" (PhD dissertation, University of Michigan, Ann Arbor, 1953).

in mathematics of Bryn Mawr College.[82] Moy stayed at Wayne State until 1960 when she accepted an associate professorship from Syracuse University.[83]

Sze-Tsen "Stephen" Hu, the next to join Wayne State, took up his position in 1956. Hu received his doctorate in 1947 from the University of Manchester studying algebraic topology with Max Newman and then returned to Nanking taking up a position with the Academica Sinica. In 1948, Hu applied for membership at the IAS for the 1949–50 academic year.[84] Shiing-Shen Chern, who was himself trying to find a way out of China to come to the United States, wrote to Oswald Veblen in support of Hu's work and reminded Veblen of the grim political situation: "Considering the present conditions in China any effort to bring him out will certainly mean a great deal to him. In this connection I cannot forget my personal experience, when in 1943 I was granted a stipend by the Institute. It is undoubtedly the turning point of my mathematical career."[85] By the time the IAS sent back an offer the following March 1949, Hu, along with several of his colleagues in the Institute of Mathematics of the Academia Sinica, had already departed for Taipei in anticipation of the Nationalist withdrawal to Taiwan.[86] Desperate to come to the United States, Hu accepted a visiting position at Tulane University's mathematics department led by William Duren, who had successfully applied on the department's behalf for an ONR contract for "A Study of Fictional Analysis in Topological Algebras," Hu's area of specialization.[87] Unbeknownst to Hu, an IAS offer was already making its way around the world. Only when Hu returned to

82. Shu-Teh Chen Moy, "Characterizations of Conditional Expectation as a Transformation on Function Spaces," *Pacific Journal of Mathematics* 4, no. 1 (1954): 47; Moy, "Applications of Conditional Expectations." A German Jew, Emmy Noether had come to Bryn Mawr from Göttingen University having lost her right to teach in 1933. She passed away suddenly in 1935. Qinna Shen, "A Refugee Scholar from Nazi Germany: Emmy Noether and Bryn Mawr College," *The Mathematical Intelligencer* 41, no. 3 (2019): 1–14.

83. University of California Academic Senate, "Shu-Teh Chen Moy, Mathematics: Santa Barbara," *1970, University of California: In Memoriam* (Berkeley: University of California Regents, 1970): 67–68. Moy taught at Syracuse University until 1967 when she moved to University of California at Santa Barbara. She was reunited with her former Wayne State colleague Ky Fan before she passed away unexpectedly in 1969.

84. "Application to School of Mathematics, The Institute for Advanced Study, Princeton, N. J." 15 Oct 1948, SM, Members, Visitors, Assistants, 1933–1977, Box 13, Folder Hsiang-Huebsch.

85. S. S. Chern to Oswald Veblen, 11 Feb 1949. SM, Members, Visitors, Assistants, 1933–1977, Box 13, Folder Hsiang-Huebsch.

86. Chih-Bing Ling, "Mathematics and Physics Education and Research in Taiwan of the Republic of China," *Notices* 7, no. 5 (1960): 582–83.

87. Parshall, 418–21.

Guangzhou to work out his passport did he receive the offer letter.[88] Hu went to Tulane for the 1949–1950 academic year before taking a leave of absence to join the IAS in September 1950, where he remained until August 1952.[89] In 1956, he joined Wayne State after teaching at the University of Georgia for a year.[90] In 1959, Hu published the first comprehensive textbook book on homotopy theory, a branch of algebraic topology. Yale mathematician William Massey, one of the foremost experts in the field, called Hu's textbook a "'must' for any mathematical library having any pretensions to completeness."[91] In January 1960, Hu relocated to UCLA as Professor of Mathematics, where he stayed until he retired in 1982.[92]

Born in Hangzhou, China, in 1914, Ky Fan was the last to join the Wayne State group. Fan began his mathematical career at National Peking University in 1932 and went on to study at the University of Paris with Maurice Fréchet through a "*boursier*" of the Commission Mixte des Oeuvres Franco-Chinoises from March 1939 to February 1942.[93] He received his doctorate in two years and remained in France throughout the war working at the Centre National de la Recherche Scientifique and the Institut Herni Poincaré, publishing over twenty articles in French academic journals on abstract analysis and topology by 1945.[94] That spring, he applied for IAS membership and was accepted with a stipend of $1,800 for the 1945–1946 academic year.[95] Similar to Chen and Hu, Fan experienced immigration and travel challenges. For Fan, his journey across the Atlantic occurred during the chaotic close of the war in Europe, with American troops moving back to the United States, and Chinese Exclusion

88. Sze-Tsen Hu to Robert Oppenheimer, 6 May 1949, SM, Members, Visitors, Assistants, 1933–1977, Box 13, Folder Hsiang-Huebsch.

89. Memorandum from R. Barnett to Director's Office, 6 Sep 1952, SM, Members, Visitors, Assistants, 1933–1977, Box 13, Folder Hsiang-Huebsch. Hu returned to Tulane following his IAS term.

90. University of California Academic Senate, "Sze-Tsen Hu, Mathematics: Los Angeles," *2000, University of California: In Memoriam* (Berkeley: Academic Senate, University of California, 2000), 95.

91. "Book Reviews," *Bulletin of the American Mathematical Society* 66, no. 6 (1960): 475–76.

92. University of California Academic Senate, "Sze-Tsen Hu, Mathematics: Los Angeles" (n.90), 96.

93. Curriculum Vitae of Mr. Ky Fan," 16 Apr 1945, SM, Members, Visitors, Assistants, 1933–1937, Box 8, Folder Fadell-Fay.

94. Ky Fan application, 18 Oct 1945, SM, Members, Visitors, Assistants, 1933–1937, Box 8, Folder Fadell-Fay.

95. Frank Aydelotte to Ky Fan, 16 Apr 1945, SM, Members, Visitors, Assistants, 1933–1937, Box 8, Folder Fadell-Fay.

repealed only two years prior.[96] Fan had made repeated attempts to obtain a visa while in Paris but to no avail. Frank Aydelotte, IAS Director, and his staff intervened by writing the State Department and stating on no uncertain terms Fan's importance as a "scholar of great ability who needs the kind of training we can give him here in order to make himself of maximum usefulness in China after the war."[97] Within a few weeks, Ky Fan obtained his visa.

Fan arrived in the United States on a one-year visa in October 1945, having set sail from La Havre, France, on the *S.S. India Viceroy*.[98] He went straight to Princeton to take up his residency at the IAS and listed Shiing-Shen Chern and Yu Why Chen as the "person to notify in case of emergency."[99] Fan spent two years at IAS before moving to the University of Notre Dame, where he later earned tenure and published his highly cited work on minmax theorems.[100] According to his students, Fan had a remarkable range with his published papers "spanning the gamut of theoretical mathematics, and studied problems in analysis, topology, and algebra."[101] Fan joined Wayne State's upwardly striving mathematics department that boasted of "twenty-six regular staff members" teaching "twenty-two post calculus courses" with ample opportunities for "graduate students to work closely with the faculty in small classes."[102] After only a year, however, Fan moved onto Northwestern University.[103]

The similar yet distinct journeys of these five mathematicians to Detroit reflected the challenges they faced in the tumultuous postwar decades as academic and political conditions shifted rapidly in China and the United

96. Jane Richardson to Ruth Shipley, July 18, 1945; Frank Aydelotte to Dr. Fan, 18 Jun 1945, SM, Members, Visitors, Assistants, 1933–1937, Box 8, Folder Fadell-Fay.

97. Frank Aydelotte to Howard K. Travers, 4 Aug 1945, SM, Members, Visitors, Assistants, 1933–1937, Box 8, Folder Fadell-Fay.

98. *Passenger Lists of Vessels Arriving at Boston, Massachusetts, January 1944–November 1954*, 30 Sep 1945, INS, NA, Ancestry.

99. Ky Fan application, 18 Oct 1945, SM, Members, Visitors, Assistants, 1933–1937, Box 8, Folder Fadell-Fay. Chen had only arrived about a month earlier to take up his position at the Courant Institute in New York University.

100. Ky Fan, "Minmax Theorems," *Proceedings of the National Academy of Sciences,* 39, no. 1 (1953): 42–47; Ky Fan, "Fixed-point and Minimax Theorems in Locally Convex Topological Linear Spaces," *Proceedings of the National Academy of Sciences* 38, no. 2 (1952): 121–26.

101. Bor-Luh Lin, "In Memoriam Professor Ky Fan (1914–2010)," *Linear Algebra and its Applications* 434, no. 1 (2011): 1–3.

102. "Wayne State University," *Notices* 6, no. 7, Part II (1959): 74–75.

103. Bor-Luh Lin, "Every Waking Moment Ky Fan (1914–1920)," *Notices* 57, no. 11 (2010): 1444–47.

States. As the Republic of China broke into Civil War to reemerge as the People's Republic of China, the United States ended nearly six decades of Chinese Exclusion only to shift into anticommunist politics of the Cold War. Their stories also speak to the ways in they were much more than the flattened racialized identities ascribed to them by the AMS proposal: mathematicians who were "Chinese-born and read and speak Chinese fluently" and "represented five different fields of mathematics" as highlighted in the 1960 proposal to NSF.

Rather, as evidenced by Chen, Hu, and Fan, their mathematical training came from the main centers and figures in Europe—Courant at Göttingen, Fréchet at Paris, and Newman at Manchester—as well as the IAS, the center of US mathematics. It would have been more appropriate to talk about this Wayne State group not only as Chinese-fluent experts in their respective fields but also as representing the most important mathematical centers of Western Europe and fluent in their respective languages. Indeed, their biographies reflected the ways in which institutions like Wayne State did not simply hire five "Chinese-born mathematicians" but European or American-educated mathematicians whose advanced training came by the way of traversing educational networks that brought them out of colonial peripheries into the mathematical metropoles of the West. But in the context of 1960s Cold War geopolitics that fueled the urgency and funding of Chinese translation work, these more complex cosmopolitan academic journeys and colonial geographies held less value and legibility than their Chinese ethnic and racial identities. These five Wayne State mathematicians would be referred to by their white American mathematical peers simply as "Chinese mathematicians" who served as the key conduit to knowledge hidden behind the bamboo curtain.

Perhaps as a result of their arduous travel in and out of colonial metropoles and their keen awareness of their racial categorization as "Chinese" that continued to present challenges for remaining in the United States, all five applied and received US citizenship during the 1950s and early 1960s, not leaving to chance the shifting winds of US–China relations or the unsteady terrain of domestic US race relations and immigration laws. Already married to an American citizen, Shu-teh Chen Moy quickly filed for citizenship in Michigan in 1949.[104] Sze-Tsen Hu, who experienced the Nationalist withdrawal to

104. *Index Cards to Naturalization Petitions for the U.S. District Court for the Eastern District of Michigan, Southern Division, Detroit, 1907–1995*, Microfilm Serial: M1917, Roll 149, NA, Ancestry; U.S. Census Bureau, 1950 U.S. Census, Detroit, Michigan (n.85).

Taiwan first-hand, applied for US citizenship while teaching at Tulane and put his application through the Eastern District court of Louisiana in March 1955. He used the opportunity to officially change his name to "Stephen Sze-Tsen Hu."[105] Yu Why Chen applied for citizenship in 1957 while at Wayne State. In June, he wrote to his IAS colleagues Marston Morse and Dean Montgomery to act as witnesses testifying to the Chens' residence at Princeton. The two completed and submitted their forms in support of Chen's petition.[106] Chia Kuei Tsao and his wife, Ying Lan, were the last to become citizens in 1961, though Tsao had received permanent residency status in July 1955 under the Refugee Act of 1953.[107]

Given that all five renounced their affiliations to a fractured China to claim citizenship in the United States, it would have been more accurate for the AMS proposal to name them as five Chinese American mathematicians. Nonetheless, Tsao and his colleagues understood that as "Chinese-born" or "Chinese-speaking" mathematicians they were highly sought after and indispensable as translators, providing a service of great urgency to the American mathematical community and ensuring national security. Tsao's visibility in the field increased with his temporary appointment with AMS for his bibliography work that became ready for distribution in 1961. For the 1960 to 1961 academic year, Tsao, along with his graduate students, planned to hold a seminar on campus to explore the "research problems suggested by the reviews and translations of the . . . Chinese material that they had encountered with the project."[108] Chen and Fan had also signed on to participating in the seminar. The branding of Tsao and his colleagues as "the Wayne State Seminar" led to immediate recognizability by AMS and NSF and eased the funding application process. In January 1962, the AMS received a hefty $29,270 grant just for the translation and publication of the 1960 and 1961 volumes of *Acta Mathematica Sinica*. The editors quickly got to work on the design of a new journal cover and sent out the articles from the 1960 volumes for translation with the first

105. *Lists of Granted, Denied, and Continued Petitions, Compiled 1929–2000*, RG21, Records of District Courts of the United States, National Archives and Records Administration—Southeast Region, Ancestry.

106. Y. W. Chen to C. Underwood, 17, Jun 1957; Secretary of School of Mathematics to Y. W. Chen, 6 Jun 1957, SM, Members, Visitors, Assistants, 1933–1977, Box 4, Folder Char-Chen.

107. *Index Cards to Naturalization Petitions for the U.S. District Court for the Eastern District of Michigan, Southern Division, Detroit, 1907–1995*; Microfilm Serial: M1917, Roll 24, NA, Ancestry; "Refugee Relief Act of 1953," Pub. L. no. 203, 400–407.

108. AMS, "Report of the Executive Director, December 30, 1960" (n.30).

two issues coming back by March of that year for publication by the summer.[109] A domestic subscription to the series was offered at the handsome sum of $17.50 per volume, the same cost for the AMS's translated Soviet mathematics journals.[110] With topics including topology, recursive algorithms, kernel functions, and more, journal editors were confident an audience of subscribers would emerge.

BUILDING AN INFRASTRUCTURE FOR EXCHANGE AND TRANSLATION

In July 1962, the AMS published the first issue of *Chinese Mathematics*, offering ten translated articles from *Acta Mathematica Sinica*, volume 10, issue 1, which had originally been published in 1960. Sidney Gould's name appeared in the inside cover as the volume editor, leaving unrecognized the Chinese editorial work for the volume. Yet, Chinese translational and editorial choices and coordination was evident throughout the first issue of *Chinese Mathematics*. Something as basic and important as the author's name, for example, required choices and clear explanatory notes. In the table of contents, the editors placed an asterisk by the name of the Chinese author listed and stated: "When an author's name appears in this table of contents in the form Lee Shen-ling it is to be understood that the family name appears first. In bibliographies and elsewhere the same person may also be referred to as S. L. Lee."[111] The brief note made clear the importance of Chinese linguistic expertise in the making of the journal even when names did not appear in Chinese characters and only in their transliterated form. The note also smoothed over the complexity of Chinese translation in the international political context of the early 1960s. The editors, for example, did not explain the political and cultural nuances behind choosing to transliterate names following the older Wade-Giles system of romanization versus the pinyin system developed after 1949 as a nation-building project for the People's Republic of China following a Soviet linguistics model. Although pinyin became the official transliteration system in the PRC in 1958, texts printed for export overseas continued to use the Wade-Giles

109. AMS, "Report of the Executive Director, May 22, 1962," AMS, Ms. 75.13, Box 1, Folder 1962 May.

110. *Chinese Mathematics* 1, no. 1 (1962): inside cover. For comparison, subscription to one of AMS's flagship journals such as *Proceedings of the AMS* was $11.

111. Ibid., iii.

system familiar to Western readers.[112] Thus any translation of Chinese mathematics had to acknowledge and contend with both systems.

The journal did credit the work of translators by printing in English their names at the end of the article, but it did not include their institutional affiliations. By then, three of the original members of the Wayne State Seminar—Hu, Fan, and Moy—had departed for other institutions. But the use of the name "Wayne State Seminar" for publications for the AMS's Translations II series suggested that the Chinese translation collective continued to function although Tsao and Chen were the only names appearing as translators for *Chinese Mathematics*. Like Tsao, Chen worked alongside his wife, Susan (Cho-Tsin) Chen, as a translation team beginning with the third issue of volume one.

Research into the professional backgrounds of the seven translators who worked on the first issue points to the widespread recruitment across the Chinese mathematics diaspora needed to complete the work. Mobilization of Chinese mathematicians extended into personal and professional networks bringing scientists and their spouses into the project. Translators ranged from senior scholars to graduate students from different institutions across the United States. Nearly all worked in mathematics or closely adjacent fields such as physics and engineering and came to the United States to complete their doctorates in the 1950s and early 1960s. The extent to which translation required both Chinese fluency and mathematical knowledge can be seen in the case of the husband-and-wife translation team of Elsie and Loren Argabright. At the time, Loren Argabright was completing his doctorate in mathematics at the University of Washington and translated his article with his wife, Elsie, née Wong, who was born in China. The two married while Wong was completing her studies in the journalism program at the University of Washington.[113] Only one translator of Chinese descent, Lensey Namioka, who had also worked on Wu Wen-tsün's "On Pontryagin Classes. III," was born in the United States. "Y. T. Chou" or Russell Y. T. Chou was born in Zhenjiang and was the son of a metallurgist. Chou completed his doctorate in

112. Pär Cassel. "'Spelling like a State': Some Thoughts on the Manchu Origins of the Wade-Giles System." *Central Asiatic Journal* 58, no. 1–2 (2015): 45–47.

113. University of Washington, *Tyee* (Seattle, Washington: 1961): 91, https://digitalcollections.lib.washington.edu/digital/collection/uwdocs/id/39511, accessed on 17 Dec 2022; Loren Argabright and Elsie Wong marriage certificate, 1 May 1961, Washington Marriage Records, 1854–2013, Washington State Archives, Olympia, Washington, Ancestry.com. Loren was not of Chinese descent, and the Argabrights went on to translate several articles together.

mathematics from Carnegie Mellon in 1957.[114] In the early 1960s, he was working with the Edgar C. Brian Laboratory for Fundamental Research that was part of the US Steel corporation in Pennsylvania. Several of the translators were in the middle of their respective graduate programs. Chung Lie Wang, born in Hubei and relocated to Taiwan where he completed his BS, was studying at Rutgers University and "Y. M. Chen," or Yung Ming Chen, did his undergraduate studies at Nanyang University in Singapore and was completing his PhD at New York University.[115] These translators worked on no other articles for the first volume. Instead, different sets of translators worked on the second and third issues. In other words, the three issues in the first volume of *Chinese Mathematics* required the work of twenty-three translators for twenty-two articles.[116]

The labor-intensive nature of translation was not lost on the AMS. As early as 1961, growing interest in accessing Chinese mathematical research led the AMS to explore creating a "Chinese Cram School" that would provide sufficient language instruction for non-native speakers to translate articles for review or publication. At the time, the degree of translation required was mostly for reviewing Chinese mathematics articles that usually resulted in a short English review in *Mathematical Reviews*. However, the pending NSF proposal to "translate *Acta Mathematica Sinica* cover-to-cover, and presumably other magazines" that could expand the Chinese translation program to the scale of the Soviet mathematics program sparked concern. "It is clearly not realistic to count on the small number of Chinese-born mathematicians living in this country, England, and so forth, to pass on the Chinese results to us," one AMS member charged. "Many of them are overworked; their specialties do not include all branches of mathematics; and in some cases their command of English, while sufficient for writing reviews, is not sufficient so that they could write translations without undue expenditure of editorial effort, either by them or by others." Indeed, for the AMS to make the Chinese translation program profitable, it needed to address a serious labor issue, namely the short supply of Chinese mathematics translators. Instead, the proposal stated that it

114. "Russell Y. T. Chou Memorial Service to be Held Saturday," *Lehigh News*, 24 Sep 2019, www2.lehigh.edu/news/russell-yt-chou-memorial-service-to-be-held-saturday, accessed on 31 August 2022.

115. Brian Wang, "Chung-Lie Wang," 11 Nov 2011, www.nextbigfuture.com/2011/11/chung-lie-wang.html, accessed on 17 Dec 2022.

116. The three issues combined had twenty-six articles. Some of the articles were originally published in English and did not require translation.

was more important to have "experts in the subject matter field and in the English language (or other west Europe language into which the material might be translated)" than to have "experts in the Chinese language."

This new proposal separated categories of Chinese language fluency and mathematical expertise and placed the native Chinese-speaking mathematicians below the so-called field expert, presumed to be fluent in English or another European language. The extent to which the proposal created a hierarchy of expertise that undervalued the importance of the Chinese mathematician's linguistic and technical expertise can be seen further in the proposed staffing of the "summer cram school." The proposal suggested that such a school be held in the summer of 1962 under the direction of Sydney Gould, and envisioned only "one Chinese-born mathematician with a good command of English and one professional teacher of beginning Chinese."[117] The proposal suggested siting the cram school at the University of Washington, where the NSF was funding research on machine translation of Chinese, but just as quickly added "it would be just as good to go to Aspen, Colorado; Sun Valley, Lake Placid, or Coral Gables"—all popular vacation spots. The proposal concluded, perhaps optimistically, that students of the school will "work like beavers and will emerge fully competent translators of mathematical Chinese."[118] It is unclear if the proposal ever went forward, though Sydney Gould would indeed take a greater interest in Chinese translation for the AMS, eventually translating a few articles in the mid-1960s.

As the translation infrastructure developed and stabilized with the recruitment of Chinese technical translators, the AMS worked on building a separate infrastructure for acquiring mathematics journals published in the People's Republic of China. Unlike the bibliographic projects that went only so far into tracking down and compiling citations or brief published abstracts, a cover-to-cover translation program meant that translators had to get their hands on full articles and journal volumes. The 1960 AAAS conference initially provided the AMS with access to the Chinese journals collected in four large federal repositories, seeding the first cover-to-cover translation of the 1960 volume of *Acta Mathematica Sinica*. But an ongoing supply of new material would be needed to ensure the longevity of the AMS's subscription-based translation journal.

117. AMS, "Report of Executive Director, April 30, 1961," AMS Records, Ms. 75.13, Box 1, Folder 1961 April.

118. Ibid.

By 1958, relations between the Academy of Sciences in the United States and Soviet Union had improved enough to create a formal agreement that led to efforts to host one nation's scientists at the other's annual conferences and congresses as well as exchange journals.[119] The following year, the AMS submitted a $25,000 NSF proposal to host "foreign mathematicians to visit American mathematical centers and several for Russian" and also received a $2,500 grant from the Asia Foundation "to subsidize travel to meetings and AMS dues of selected Asian mathematicians."[120] The support brought mathematicians from Pakistan, India, and Taiwan to the United States and sent AMS publications to countries in Southeast Asia.[121] The AMS also began to enter into "reciprocity agreements" with mathematical societies of other countries whereby members of one could receive membership and journals from the other. In 1960, for example, the reciprocity agreement with the Mathematical Society of Japan allowed AMS members to become members of the former by paying half the regular dues and receive two journals: *Journal of the Mathematical Society of Japan* and *Sugaku*.[122]

China's cessation of diplomatic relations with the United States meant that the AMS could not obtain journals through formal channels and had to find alternative sources. In fall 1960, when AMS Executive Director Gordon L. Walker traveled to Europe, the itinerary included stops in the Soviet Union to follow up on earlier invitations to the Moscow Mathematical Society to form a reciprocity agreement. While in Moscow, Walker also looked to establish journal exchange programs with the Soviet Library of the Academy of Sciences and reciprocity with the Leningrad Mathematical Society. Walker used the opportunity to inquire about Chinese journals. Following discussion with the librarians of M. E. Saltykov-Shchedrin State Public Library in Leningrad, however, Walker reported "that this library was not any more successful than MATHEMATICAL REVIEWS in obtaining mathematical literature from Communist China."[123] In January 1961, Gould left for a four-month tour of the Asia Pacific region, stopping in Hawai'i, Japan, South Korea, India,

119. Harold Kuhn to John Green, 1 Sep 1959, AMS Collection, Ms. 75.10, Box 2, Folder Green Corr; AMS, "Report of Executive Director, December 30, 1960" (n.30).

120. AMS, "Quarterly Report of the Executive Director, June 1, 1959–November 30, 1959" (n.29).

121. AMS, "Report of Executive Director, December 30, 1960" (n.30).

122. "Reciprocity Agreement with the Mathematical Society of Japan," *Notices* 6, no. 6 (1959): 611.

123. AMS, "Report of Executive Director, December 30, 1960" (n.30).

Pakistan, and the Soviet Union but could not visit the People's Republic of China.[124] These trips helped to formalize journal exchanges such as between Tohoku University for their mathematical journal to be sent to twenty-six US libraries in exchange for various journals published in the United States or the Library of Leningrad dispatching 947 Soviet journals to sixty-two US institutions.

In the People's Republic of China, the National Peking Library (NPL) maintained active exchange programs with about one hundred countries, regardless of political outlook or ideological leanings.[125] AMS eventually made contact with NPL and the Institute of Scientific and Technical Information of China (ISTIC) in Beijing. Founded in 1956 with support from the central government and the State Science and Technology Commission, the ISTIC served as a repository for China's scientific and technical research and publication.[126] The ISTIC agreed to send two copies of *Acta Mathematica Sinica* by airmail and one copy of *Scientia Sinica* by surface mail in exchange for receiving copies of *Mathematical Reviews, Bulletin*, and *Proceedings* published by AMS. Issues of *Acta Mathematica Sinica* generally arrived in the United States shortly after their publication in China. In May 1963, for example, the AMS reported that the first fully translated and printed issue for 1962 was already sent to subscribers, while the second issue was with the printer, and the third ready for varityping.[127] The speed of translation and production increased over time. In June 1964, the AMS reported that the first issue of the 1964 volume was already nearing completion for the printer.[128]

By 1966, the translation of *Acta* had stabilized into a steady bimonthly publication schedule. In addition, the AMS made a goodwill gesture to send back copies of the published translations to China via Professor Yi-Chan, Vice-Director of the Library of Academia Sinica, "with the request that they be

124. AMS, "Report of Executive Director, April 30, 1961" (n.122).

125. Priscilla Yu, "Leaning to One Side: The Impact of the Cold War on Chinese Library Collections," *Libraries & Culture* 36, no, 1 (2001): 260–62; Lee-Hsia Hsu Ting, "Chinese Libraries during and after the Cultural Revolution," *The Journal of Library History* 16, no, 2 (1981): 419–20. For more on the history of China's library system in this era, see Lee-Hsia Hsu Ting, "Library Services in the People's Republic of China: A Historical Overview," *The Library Quarterly: Information, Community, Policy* 53, no. 2 (1983): 134–60.

126. AMS, "Report of Executive Director, May 27–28, 1966," AMS Records, Ms. 75.13, Box 2.

127. "Proposal to NSF" (n.2); AMS, "Report of the Executive Director, May 27–28, 1963," AMS Records, Ms. 75.13, Box 1, Folder 1963 May.

128. AMS, "Report of the Executive Director, June 4–5, 1964," AMS Records, Ms. 75.13, Box 1, Folder 1964 Jun.

distributed to the individual authors."[129] In December, the AMS reported that the exchange programs with libraries in the Soviet Union and the PRC were proceeding well, though the numbers of publications exchanged were minimal for keeping the translation program running. The AMS relied on key librarians with three main libraries in Beijing. At the NPL, the AMS depended on Dr. Mao Chin of the international Exchange Section, who sent one set of *Acta Mathematica Sinica* and *Kexue Tongbao* in exchange for a set of the AMS's *Mathematical Reviews* and *Chinese Mathematics*. At the ISTIC, the AMS sent two sets of *Mathematical Reviews* and one set of *Transactions*, a journal dedicated to pure and applied mathematics published since 1900. In exchange, Chief Librarian Yuan Han-Ching sent two sets of *Acta Mathematica Sinica* and one set of *Scientia Sinica*. Lastly, the AMS established an arrangement with the Library of Academia Sinica and worked with Vice Director Wu-yi-Chan to send one set of *Transactions*, *Proceedings,* and the *Journal of Symbolic Logic* in exchange for one set of *Acta Mathematica Sinica, Shuxue Jinzhan*, and *Applied Mathematics and the Mathematics of Computation*. These precious few copies, nonetheless, materialized only through the exchange infrastructure painstakingly set up between the AMS and Chinese research librarians, allowing mathematical research to move across the Pacific. As the AMS approached the end of 1966, it looked forward to building on these relationships with key Chinese libraries for the following year to stabilize the acquisitions infrastructure needed to expand their translation and exchange program.

THE DECLINE OF THE CHINESE TRANSLATION PROGRAM

The economic opportunities brought forth by the Chinese translation program also aided the careers of non-Chinese mathematicians, establishing them as experts in technical translation. As seen in the case of Sydney Gould, he would be recognized by the AMS as the chief editor and director of the Chinese journal translation project. For John DeFrancis, the opportunity to work on the AMS's Chinese–English mathematical glossary project would pave the way for his academic rehabilitation and become one of the first university instructors to develop a widely popular system for teaching the Chinese language.

C. K. Tsao had first raised concerns about translation consistency when he began work on his bibliography in the summer of 1960, stating that he

129. AMS, "Report of the Executive Director, May 27–28, 1966" (n.126).

experienced "considerable difficulty" because of the "nonexistence of Chinese-English mathematical dictionaries."[130] With the assistance of his wife, Ying Lan Tsao, he was able to develop a makeshift glossary by reversing an English–Chinese dictionary published in Beijing in 1956. The Tsaos, along with their graduate students, added more words and phrases as they proceeded with their translation work, but regarded the dictionary "far from complete."[131] The Tsaos were not alone in their efforts. That same year, the Joint Committee on Contemporary China of the American Council of Learned Societies (ACLS) and the Social Science Research Council (SSRC) awarded the first grants for Chinese research to twelve scholars, including John DeFrancis, "for research for three years in preparation of a Chinese mathematics dictionary."[132] At the time of the grant, he was listed as an Associate Professor in Mathematics at Quinnipiac College in Connecticut and had already received two years of funding for the "study of current developments in Chinese mathematics and its history" as an assistant professor through a new joint committee on Asian Studies of the ACLS and the SSRC.[133]

In actuality, DeFrancis was not a mathematics professor but a sinologist who had lived and studied in China before completing his PhD at Columbia University in the 1940s. The House Un-American Activities Committee investigations, however, derailed DeFrancis's scholarly aspirations and he lost a decade as "a vacuum salesman" before securing a teaching position at Quinnipiac. The passage of the National Defense Education Act (NDEA) in 1958 provided major federal investment in teaching non-European languages for the sake of diplomacy and scientific research and gave DeFrancis an opportunity to resurrect his career as a China specialist familiar with mathematics.[134] Beginning in 1960, DeFrancis published articles on contemporary Chinese mathematics, focusing on subjects such as classroom teaching and mathematical competitions in the PRC. That work brought DeFrancis to the attention

130. AMS, "Report of Executive Director, December 30, 1960" (n.30).

131. Ibid.

132. "Grants for Research on Contemporary China," *Items* 15, no. 1 (1961): 8. The other eleven grants focused on cultural, social, political, and economic issues facing China in the contemporary moment.

133. "Grants for Asian Studies," *Items* 13, no. 2 (1959): 23; "Grants for Asian Studies," *Items* 14, no. 1 (1960): 8.

134. Edward Wong, "John DeFrancis, Chinese Language Scholar, is Dead at 97," *New York Times*, 15 Jan 2009; Victor H. Mair, "John DeFrancis, August 31, 1911–January 2, 2009," *Journal of Chinese Linguistics* 37, no. 1 (2009): 184–86; John B. Tsu, "The Teaching of Chinese in Colleges and Schools of the United States," *The Modern Language Journal* 54, no. 8 (1970): 566–78.

of Seton Hall University, where the Asian Studies department had begun to envision bringing Chinese-language instruction to the American mainstream. While teaching Chinese to undergraduates, he continued to work on the Chinese–English mathematics dictionary project as well as develop textbooks for Chinese instruction to American students.

In 1963, just as the joint funding from the SSRC and ACLS was winding down, the AMS secured a no-cost extension to their Chinese Literature Survey grant from NSF "to cover the possibility of producing a Chinese–English Mathematical Dictionary."[135] The AMS appointed Sydney Gould, Steven Hu, and H. C. Wang to a committee to oversee DeFrancis's work. During that year, commercial presses objected to the NSF for "furnishing funds for the publication of a book which could be published by a commercial press."[136] The AMS followed up with several commercial and university presses, but by year's end no other press appeared interested. The AMS proceeded with plans to produce DeFrancis's dictionary at three hundred 8.5" × 11" pages, with a first run of no more than eight hundred units.

Gould and others had hoped that the DeFrancis dictionary, *The Chinese–English Glossary of the Mathematical Sciences,* would be as successful as the Lohwater *Russian–English Dictionary* that sold quickly upon the first printing. The following year, DeFrancis's glossary became available to AMS members at the discounted price of $3. More than 150 libraries appear to have purchased the glossary.[137] The finished work contained an impressive list of 16,540 terms gathered from various Chinese mathematical dictionaries produced around the globe, particularly Japan and the Soviet Union.[138] In other words, building the

135. AMS, "Report of Executive Director, May 27–28, 1963" (n.127).

136. AMS, "Report of Executive Director, December 16–17, 1963," AMS Records, Ms. 75.13, Box 1, Folder 1963 Dec.

137. A 2023 Worldcat search of the title, *Chinese-English Glossary of the Mathematical Sciences*," lists 152 libraries with the De Francis glossary.

138. According to DeFrancis, the project consisted of reverse reading and transcribing two 1950s English–Chinese dictionaries: *Shu-hsüeh Ming-tz'u (Mathematics Dictionary)*, published in Beijing in 1956, and *Shu-hsüeh Ming-tz'u (Mathematics Dictionary)*, published in Taipei in 1958. Compiled mostly prior to the war and reprinted in Taiwan by the Ministry of Education, the Taiwanese dictionary contained many of the same terms as the Beijing publication. DeFrancis also incorporated dictionaries produced in other countries, especially Japan and the Soviet Union, such as the 1961 publication of a Japanese–English dictionary, *Sugaku Ziten* (数学事典) by the Mathematical Society of Japan. DeFrancis was able to adopt the *kanji* (Chinese characters) used as many of the characters were in Chinese and Japanese. DeFrancis also used a specialized Japanese statistics dictionary, *Tōkeigaku Ziten* (統計学事典), DeFrancis used a Russian–Chinese dictionary, *Kitaïsko Risskil Slovar' nauchnykh i tekhnicheskykh terminov,* published in Moscow in

Chinese–English glossary reflected the globalized nature of mathematical training of Chinese and Chinese American mathematicians in the mid–twentieth century, and required exchanges spanning Asia, Europe, and the United States, rather than the singular direct China–US route of translation or knowledge transference that the title might have suggested.

Whereas the English definitions could be typed, all Chinese terms in the glossary had to be meticulously handwritten in traditional characters. For that task, DeFrancis reported to the AMS that he relied on the assistance of "Mr. Yung Chih-shi, Mrs. Teng Chia-yee, Miss Josephine Yung, and Mrs. Wang Fang-yu for writing the Chinese characters and assisting in filing the cards."[139] The glossary was not as financially successful as the AMS's earlier Russian–English mathematics dictionaries. From the first page, it would have been clear to any user that an understanding of Chinese characters would be necessary to navigate the glossary. Moreover, DeFrancis had chosen to convert any simplified character he encountered into their traditional form for publication to maintain consistency, meaning that researchers encountering simplified characters in publications coming out of the PRC would need to convert to traditional characters to use the glossary. This would have been straightforward for a Chinese-literate reader but not for a novice.

The glossary project nonetheless helped to establish further Sydney Gould's reputation as a mathematical translator. The same year of the glossary's publication, Gould published a report on the current state of Chinese–English mathematical dictionaries that was available to AMS members for $1. Gould trumpeted the AMS's recent Chinese translation successes and added that the DeFrancis dictionary marked the first attempt to create a comprehensive technical dictionary in any scientific field but also noted its failures and possible directions for future work.[140] If the glossary were useful, it would have been for

1959. He then used the 1961 *Russian–English Dictionary of the Mathematical Sciences* compiled by Rice University mathematician, A. J. Lohwater, and jointly supported by the National Academy of Sciences of the United States, the Academy of Sciences of the Soviet Union, and the AMS to help with the translation of terms from the Russian–Chinese dictionary into English. He also turned to some of the major translations already done by AMS mathematicians. Similarly, DeFrancis examined the Chinese translations of well-known English and Russian works such as Emil Artin's *Galois Theory*. When appropriate, DeFrancis consulted specialists in mathematical German, Russian, and English. John DeFrancis, *Chinese-English Glossary of the Mathematical Sciences* (Providence, RI: American Mathematical Society, 1964): iii–iv.

139. Ibid., i.

140. S. H. Gould, *A Report on Chinese–English Mathematical Dictionaries* (Providence, RI: American Mathematical Society, 1964).

those undertaking serious translation work for the AMS's Chinese translation program.[141]

In March 1967, the AMS sent a letter to all subscribers of *Chinese Mathematics* stating the journal had been temporarily suspended. The letter gave no indication of how long readers would have to wait for publication to resume, but they asked all readers to renew their subscription and to wait until 1968 if necessary. In truth, AMS had received no issues from NPL since August 9, 1966, but did not want to alarm subscribers.[142] Unbeknownst to the AMS, as well as to much of the world outside of the People's Republic of China, Chairman Mao Tse-tung had launched the Cultural Revolution. By early 1967, it was clear that something was amiss, and in January, Mao Chin informed the AMS Translations department that *Acta Mathematica Sinica* had been suspended.

In April, with copies of *Acta* yet to appear, the AMS Translations Committee decided to move forward with cover-to-cover translations of earlier volumes 8 and 9 of *Acta* from 1958 and 1959, respectively, to buy time and stave off subscription cancellations. In one last effort to salvage the Chinese translation program and the significant funding that accompanied it, the AMS submitted a proposal to NSF in March 1967 to support "Research on Machine Aides to an Editor of Scientific Translations." Support for machine translation had waned after the 1966 Automatic Language Processing Advisory Committee report launched the first so-called "AI winter," but the AMS reasoned that "there still exist capabilities of high-speed computers which can provide assistance in the translation process as performed by human beings."[143] The proposal supported the development of a system for inputting and outputting Chinese characters and the creation of a basic character file of Chinese technical terms using DeFrancis's dictionary that enabled the user to look up words quickly to aid in manual translation. The NSF funded the project that June at the sum of $238,900, earmarking a quarter of the sum to Susumu Kuno, a recently minted PhD in linguistics, to undertake the project. The AMS planned to hire young Chinese women to do the work of character input:

141. Ho Peng Yoke, "Chinese–English Glossary of the Mathematical Sciences by John DeFrancis," *Journal of the American Oriental Society* 85, no. 2 (1965): 212–14.

142. AMS, "Report of the Executive Director, May 14–15, 1967," AMS Records, Ms. 75.13, Box 2.

143. AMS, "Report of the Executive Director, September 1967," AMS Records, Ms. 75.13, Box 2; W. John Hutchins, "Machine Translation over Fifty Years" *Histoire Épistémologie Langage* 23, no. 1 (2001): 7–31. See also Gordin, *Scientific Babel* (n.3) 213–40.

"one Chinese girl [who] is now working in the Editorial Department and another is scheduled to report early in September."

At the start of 1968, the AMS planned to translate and publish volume 10 of *Acta* in the hopes of keeping the program running for another year. By year's end, however, NSF funding cuts forced AMS to suspend the translation program indefinitely.[144] Volume 9 would be the last volume of *Acta* translated and published by AMS. By the time the program folded, the AMS and its members could no longer count on Cold War urgency to motivate the NSF to continue large-scale investment into pure-math research projects. The Nixon administration's reduction of science support and rising inflation particularly impacted mathematics funding around the country, leading the AMS to create a new Committee on the Relations with Government (CRG) to strategize ways to make mathematical research relevant and important to the nation's future. As one member of the committee opined, "We can resort to polemic, point with pride, and raise the spectre of competition with the USSR and Europe. . . . This has some psychological strength, but is certainly weak in logic."[145] As the Cultural Revolution swept across China's universities and took its own toll on mathematics research, the work of Chinese mathematicians was already traveling around the globe. Their work, translated and disseminated through a network of Chinese diasporic mathematicians caught at the nexus of Cold War geopolitics and US immigration laws, would fuel advances in a wide range of mathematical and scientific fields.

COLD WAR CHINESE TRANSLATION AND THE HISTORY OF US MATHEMATICS

Although *Chinese Mathematics* existed for only six years (1962–1967), the AMS heavily marketed and sold subscriptions to university libraries and researchers domestically and abroad.[146] As a result, the AMS and numerous scholars owe a debt to the Chinese translation program for making accessible the impressive

144. AMS, "Report of the Executive Director, April 1, 1968–December 31, 1968," AMS Records, Ms. 75.13, Box 2.

145. R. C. Buck, "The Argument for Federal Support for Mathematics," 5 Dec 1971. AMS Records, Ms. 75.9, Box 1, Folder 1.

146. In 2022, the authors conducted a search in WorldCat and located one hundred university research libraries in the United States that had purchased subscriptions to *Chinese Mathematics*. The journal also had several university subscribers in Canada, United Kingdom, France, Germany, Australia, and the Netherlands.

body of research conducted in the People's Republic of China in the years leading up to the Cultural Revolution. The many citations of the articles in *Chinese Mathematics* argue for the importance of re-examining the history of the Chinese translation program as well as challenge Marshall Stone's 1960 dismissive assessment of the state of Chinese mathematics as having "created no very great stir in mathematical circles during a period which has been distinguished elsewhere by extraordinarily intense research activity and the rapid proliferation of new ideas, new points of view, and new methods."[147]

Opening the volumes of *Chinese Mathematics* one sees familiar names such as Lo-Keng Hua. His "Application of Mathematical Methods to Wheat Harvesting" (1962) has sixty-two citations, most recently in 2022.[148] The influence of the Chinese Communist Party's priorities is visible in both the title and throughout the article. But many more names appear whose work has continued to influence scholars working in fields beyond mathematics. Li-Shang Jiang (姜禮尚), "Existence and Differentiability of the Solution of a Two Phase Stefan Problem for Quasi-Linear Parabolic Equations" (1965), has fifty-nine citations, most recently in 2022.[149] The original article addressed phase transitions, particularly the thermodynamical problem of water-to-ice transition known as the Stefan problem. The statistical methods used for these phenomena gained interest in financial engineering in the late 1990s,[150] so its most recent citations deal with finance, not physics. Jiang would become a faculty member at Tongji University.

"On Least Number of Fixed Points and Nielsen Numbers" (1966) by Gen-Hua Shi (石根华) has forty-five citations, including one in 2022.[151] Shi's contemporaries have since referred to his result as the "theorem of Shi."[152]

147. Marshall Stone, "Mathematics, 1949–1960," *Sciences in Communist China*, ed. Sydney H. Gould (Baltimore, MD: Horn-Shafer Company, 1961), 619.

148. Blair Sweigart and Rex Kincaid, "Mixed-Weight Locating-Dominating Formulations and Their Use to Monitor Terrorist Networks," *Military Operations Research* 27, no. 2 (2022): 5–24.

149. Junkee Jeon and Jehan Oh. "Finite Horizon Portfolio Selection Problem with a Drawdown Constraint on Consumption," *Journal of Mathematical Analysis and Applications* 506, no. 1 (2022): 125542.

150. Rosario N. Mantegna and H. Eugene Stanley, *Introduction to Econophysics: Correlations and Complexity in Finance* (Cambridge: Cambridge University Press, 1999).

151. Cary Malkiewich and Kate Ponto, "Periodic Points and Topological Restriction Homology," *International Mathematics Research Notices* 2022, no. 4 (2022): 2401–59.

152. Boju Jiang, "On the Least Number of Fixed Points," *American Journal of Mathematics* 102, no. 4 (1980): 749–63.

After completing his master's at Peking University in 1968, he obtained a PhD from the University of California, Berkeley, in 1988. His dissertation invented Discontinuous Deformation Analysis for soil and rock analysis, a significant departure from his 1966 work. His career followed in the vein of his dissertation.

"On Kaehler Manifolds with Constant Curvature" (1966) by Qi-Keng Lu (陆启铿) has one hundred citations, with four in 2022.[153] The main question from this paper is now known as the Lu Qi-Keng Conjecture. Cases where it has been shown to be true are sometimes called Lu Qi-Keng domains.[154] During the Cultural Revolution, Lu translated many of Albert Einstein's papers on relativity so that the Red Guards could "properly denounce" the theory.[155] He would become a faculty member at the Chinese Academy of Sciences. "Estimation of the Nielsen numbers" (1964) by Bo-Ju Jiang (姜伯驹) has eighty-three citations, including one in 2022.[156] The paper deals with the number of fixed points in a homotopy class, and the main result is commonly referred to as the Jiang subgroup.[157] This work got Jiang appointed to the faculty of Peking University in 1983, and he was still publishing as of 2021.

Far and away, the journal's most-cited article is "Graphic Programming Using Odd and Even Points" by Mei-Ko Guan, which appeared in the first volume of *Chinese Mathematics*.[158]

The article has 740 citations, including fourteen from 2022.[159] The main reason for its popularity stems from its relationship to the traveling salesman problem (TSP). Modern public-key cryptographic systems are based on the (unproven) assumption that it is impossible to devise an efficient algorithm for solving the TSP. Unlike the Lu Qi-Keng Conjecture or Jiang's Subgroup, Guan's problem became known as the Chinese Postman's Problem. The

153. Robert Xin Dong, "Equality in Suita's Conjecture and Metrics of Constant Gaussian Curvature," preprint, posted 15 Jul 2018, last revised 17 Jan 2022. https://arxiv.org/abs/1807.05537

154. Liyou Zhang and Weiping Yin, "Lu Qi-Keng's Problem on Some Complex Ellipsoids," *Journal of Mathematical Analysis and Applications* 357, no. 2 (2009): 364–70.

155. Hudeček, "Ancient Chinese Mathematics" (n.12), 83.

156. Li, Ping. "Characteristic Numbers, Jiang Subgroup and Non-Positive Curvature," preprint, posted 10 May 2022, https://arxiv.org/abs/2205.04937.

157. Robert F. Brown et al. "Lifting Classes for the Fixed Point Theory of n-Valued Maps," *Topology and Its Applications* 274, no. 1 (2020): 107125.

158. Mei-Ko Kwan, "Graphic Programming Using Odd or Even Points," *Chinese Mathematics* 1, no. 3 (1962): 273–77.

159. Burak Boyaci, Thu Huong Dang, and Adam N. Letchford, "On Matchings, T-Joins, and Arc Routing in Road Networks," *Networks* 79, no. 1 (2022): 20–31.

earliest known publication using this name comes from the 1965 Semi-Annual Report of the National Bureau of Standards, where researcher Jack Edmonds is reported as "having obtained an efficient algorithm for 'the Chinese postman's problem.'"[160] It is not clear why the tradition of assigning an eponym (e.g., Guan's Problem or Guan's Postman Problem) was not followed in this instance. The omission is especially glaring in Edmonds's later paper on the topic, "Matching, Euler Tours and the Chinese Postman" (1973), where he is careful to mention Leonhard Euler's name but omits Guan's, although Edmonds cites Guan's seminal work. Edmonds's naming choice is all the more jarring as the field of mathematics by the 1960s had clearly moved away from simple orientalist naming practices, such as the "Chinese Remainder Theorem," to honoring the work of Chinese mathematicians as seen in the examples of the Lu Qi-Keng Conjecture and the Jiang Subgroup.

The more the "Chinese Postman Problem" (CPP) traveled, the less scholars associated the problem with the transnational Cold War history of the AMS's Chinese translation project. Subsequent researchers formulated many new variations on the CPP, including the "mixed CPP," "hierarchical CPP," "maximum benefit CPP," "min-max k-CPP," and "k-arc CPP." Whereas these research works that addressed twice-removed versions of the CPP still tended to cite Edmonds's work, references to Guan's original work started to disappear, leaving in its place a fictitious "Chinese postman."[161] Not only did Guan and his original paper fall out of view, but the *Chinese Mathematics* project and the extensive labor and social networks and infrastructures of translation and acquisition involved were also slowly erased.

Cold War geopolitics and racialized understandings of mathematical and linguistic expertise had already rendered the work of Chinese mathematical translators nearly invisible to readers during the run of *Chinese Mathematics*.

160. Jack Edmonds, "The Chinese Postman's Problem," *Operations Research* 13, Suppl., B73–B77.

161. Chryssi Malandraki and Mark S. Daskin, "The Maximum Benefit Chinese Postman Problem and the Maximum Benefit Traveling Salesman Problem," *European Journal of Operational Research* 65, no. 2 (1993): 218–34; Yves Nobert and Jean-Claude Picard, "An Optimal Algorithm for the Mixed Chinese Postman Problem," *Networks* 27, no, 2 (1996): 95–108; Gianpaolo Ghiani and Gennaro Improta, "An Algorithm for the Hierarchical Chinese Postman Problem," *Operations Research Letters* 26, no. 1 (2000): 27–32; Dino Ahr and Gerhard Reinelt, "A Tabu Search Algorithm for the Min–Max k-Chinese Postman Problem," *Computers & Operations Research* 33, no. 12 (2006): 3403–22; Gregory Gutin, Mark Jones, and Bin Sheng, "Parameterized Complexity of the k-Arc Chinese Postman Problem," *Journal of Computer and System Sciences* 84 (2017): 107–19.

Thus it is hardly surprising that the AMS's 1988 history of the organization barely mentioned the Chinese translation project: "The translation of *Acta Mathematica Sinica* under the title *Chinese Mathematics* was established by the Council of January 1961 but for political reasons lasted only through 1967 when the Cultural Revolution took hold."[162] Unlike the extensive discussion of the Russian translation project, the chapter acknowledged none of the Chinese translators who worked on the project nor listed notable works translated and published. Instead, the chapter called attention to a new Chinese translation committee begun in the 1980s and chaired by Tsit-Yuen Lam, a mathematician from Hong Kong who completed his graduate degree in 1967 at Columbia University and joined the mathematics faculty at the University of California, Berkeley, shortly thereafter.[163]

If the AMS had forgotten the importance of their Cold War translation program, Ky Fan had not forgotten the AMS. In 1999, Ky Fan, then an emeritus professor at the University of California at Santa Barbara, and his wife Yu-Fen Fan donated $1 million to AMS to establish an endowment to support collaborations between Chinese mathematicians and mathematicians in other parts of the world, especially North America, and to support talented high school students in the United States."[164] Fan departed Northwestern only a few years after he left Wayne State, and in 1965, he relocated to Santa Barbara where he had a long career before retiring in 1985. In their eighties, the Fans' generous act reflected the ways in which Ky Fan's own career straddled mathematical and national cultures across the continents of Europe, Asia, and North America and not necessarily by choice but shaped by domestic unrest, global war, and Cold War geopolitics. Although the AMS's description of the endowment's purpose of enabling international collaboration and exchange hinted at the Cold War Chinese translation project, no explicit mention of that history was made.[165] Instead, extensive descriptions of Ky Fan's long and successful career as an exemplary mathematical scholar and teacher replaced the precarity he and his fellow Chinese scientists faced in the late 1940s and

162. Everett Pitcher, *A History of the Second Fifty Years of the AMS, 1939–1988* (Providence, RI: AMS, 1988): 137.

163. Ibid., 137–38. Pitcher listed Sun-Yung Alice Chang, S. Y. Cheng, Tai-Ping Liu, and Chung-Chun Yang as the new generation of prominent Chinese mathematicians born and educated in Hong Kong and Taiwan before completing their graduate studies in the United States.

164. Bor-Luh Lin, "Every Waking Moment, Ky Fan (1914–2010)" (n.103).

165. "AMS Establishes Ky Fan and Yu-Fen Fan Endowment," *Notices* 47, no. 3 (2000): 379.

1950s as they struggled to navigate a wildly shifting Cold War international political landscape and a US immigration system that continued to exclude Chinese migrants even after the official repeal of Chinese Exclusion. Indeed, the AMS announcement suggested that only funding or intellectual will posed an obstacle to international collaboration rather than issues of race and geopolitics or the difficulties of linguistic and technical translation as experienced by Fan and his colleagues.

By closely re-examining the history of the AMS's Cold War translation program, we see again the complexities of social networking and labor stretching across nations and continents needed to enable the transfer of scientific knowledge across closed international borders. We can note the ways that Chinese American mathematicians in the 1960s provided the critical technical labor needed for Chinese translation and editorial work though their contributions were often obscured behind the AMS's English editors. These scholars nonetheless found ways to navigate these limitations and made use of the new opportunities made possible by Cold War scientific competition to solidify their place in US mathematics albeit through their racialized identities as "Chinese-born mathematicians." Shaped by two distinct yet overlapping histories—Cold War geopolitics and Asian Exclusion—these Chinese American scientists navigated the ways in which their race and technical expertise could be understood and valued by colleagues, state officials, and public and private funding agencies. By focusing our attention on the Wayne State mathematicians and their development of an infrastructure to mobilize their fellow Chinese peers to review and translate research coming out of the PRC, we see fully their labor in facilitating the flow of critical mathematical research developments out of China and into North America.

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