

Mathematical Superpowers: The Politics of Universality in a Divided World

Was postwar mathematics globally distributed or politically fractured? Accounting for the movement of ideas, bodies, and objects across borders has long puzzled historians of Cold War science, who must elucidate a set of practices that espouse a universal epistemology and yet remain stubbornly grounded in divided ideologies.¹ One need only look to the history of Richard Courant and Herbert Robbins' 1941 introductory textbook, *What is Mathematics?* Lamenting overspecialization, Courant's concise introduction promised that the book's five hundred pages would show an underlying "organic unity" to the field. Courant claimed that if anything might prove universal, surely mathematical knowledge—the fundamental "expression of the human mind"—could forge common understanding even in the midst of war and political ferment.²

*Université de Genève, GSI, Rue des Vieux-Grenadiers 10, 1205 Geneva, Switzerland; ksenia.tatarchenko@unige.ch.

**Carnegie Mellon University, History Department, Baker Hall 240, 5000 Forbes Ave., Pittsburgh, PA, USA; cjpt@cmu.edu.

1. Paul N. Edwards' research exemplifies the tension, as his approaches range from emphasizing a "closed world" of political discourse and computing in Cold War America to a global *longue durée* study of meteorology and atmospheric sciences as they came to rely on computer and international knowledge infrastructures: Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: MIT Press, 1997); Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, MA: MIT Press, 2010); and more programmatically, Gabrielle Hecht and Paul N. Edwards, *The Technopolitics of Cold War: Toward a Transregional Perspective* (Washington, DC: American Historical Association, 2007).

2. Richard Courant and Herbert Robbins, *What Is Mathematics? An Elementary Approach to Ideas and Methods* (New York: Oxford University Press, 1941), on xv.

Historical Studies in the Natural Sciences, Vol. 46, Number 5, pps. 549–555. ISSN 1939-1811, electronic ISSN 1939-182X. © 2016 by the Regents of the University of California. All rights reserved. Please direct all requests for permission to photocopy or reproduce article content through the University of California Press's Reprints and Permissions web page, <http://www.ucpress.edu/journals.php?p=reprints>. DOI: 10.1525/hsns.2016.46.5.549.

When the book appeared in translation in the Soviet Union in 1947, however, the introduction's paean to unity had not managed to make it across the border unaltered. The introduction was shortened and a new, three-page-long preface was literally glued into the opening pages of the Russian edition. The new preface acknowledged the "philosophical eclecticism" of Courant's position and pointed out his failure to sufficiently celebrate Russian contributions. Most importantly, the unsigned preface stated, "it is unnecessary to explain to the Soviet reader that the author's wishes for the future of mathematics, which conclude his introduction, cannot be realized by bourgeois science. This is the task of Soviet mathematics."³ According to V. M. Tikhomirov (who edited the third Russian edition), this pasted-in preface was penned by the prominent Soviet mathematician Andrei Kolmogorov to protect the already printed translation from political censors.⁴ The translation's 1947 appearance placed it in the midst of early Cold War political maneuvering, from the American Truman Doctrine providing anticommunist aid to the Soviet Zhdanov Doctrine (or "two-camps" doctrine) postulating incommensurability between Soviet and bourgeois cultures.⁵ Was, then, the translation evidence for the persistence of nationalistic styles and approaches, even in the seemingly universal domain of mathematical knowledge, or evidence for the triumph of the mobility of mathematics at the low price of pasted-on rhetorical camouflage?

Such questions ultimately emphasize binary politics and disembodied knowledge at the expense of a deeper understanding of science during the Cold War. After all, subsequent editions of *What is Mathematics?* complicate the matter. The second Russian edition, printed in 1967, appears to invert Cold War politics yet again. This time, Andrei Kolmogorov's introduction was followed by a brief note from Courant himself prizing a distinct "Russian" way of practicing mathematics: "The Russian mathematical tradition, in a higher degree than in certain Western countries, preserved the ideal of unity

3. "Preface" reprinted in Richard Courant and Herbert Robbins, *Chto takoe matematika? Elementarnyi ocherk idei i metodov*, 3rd ed. (Moscow: MTsNMO, 2001), 534–36, on 536.

4. V. M. Tikhomirov, "Predislovie k tret'emu izdaniui na russkom iazyke," in *ibid.*, 10–12, on 11.

5. Geoffrey Roberts, *Stalin's Wars: From World War to Cold War, 1939–1953* (New Haven, CT: Yale University Press, 2006); Melvyn P. Leffler, *A Preponderance of Power: National Security, the Truman Administration, and the Cold War* (Stanford, CA: Stanford University Press, 1992); Francis Maes, *A History of Russian Music: From Kamarinskaya to Babi Yar* (Berkeley, CA: University of California Press, 2002), esp. 398–17; Evgenii Dobrenko, "Sumerki kultury," *Druzhba narodov*, no. 2 (1991): 249–71. For a detailed study of the Zhdanov campaign in medicine, see Nikolai Kremontsov, *The Cure: A Story of Cancer and Politics from the Annals of the Cold War* (Chicago: University of Chicago Press, 2002).

in our discipline and fostered its position in scientific and technical applications.”⁶ In the context of his increasing resistance to mathematical abstraction and the fragmentation of the discipline into “pure” and “applied” camps, Courant seems to suggest that his international, unified vision for mathematics was best exemplified by Soviet practices. With the book listed at the symbolic price of 1 rub 57 kopek, this edition’s forty thousand volumes quickly found their way to the bookshelves of Soviet students and with it Courant’s embrace of the dialectic between concrete and abstract, local and universal.

The translation history of Courant’s textbook is but one example of numerous instances of interactions that call for a more encompassing study of the interplay taking place between the world of mathematical ideas, the social forms of the production and circulation of knowledge, and the shifting politics of the twentieth century. The 1967 translation appeared four years after Courant himself had helped organize a joint Soviet-American symposium on differential equations. This was a period in which disciplinary, political, and national boundaries were simultaneously foregrounded and transgressed, as many scientists made extraordinary efforts to collaborate even as they acknowledged substantial political and economic differences. Unlike two emblematic instances of Cold War encounters in which scientific internationalism was trumped by geopolitical pressures—Atoms for Peace and the International Geophysical Year—the 1963 symposium hosted in the newly built Soviet “city of science,” Akademgorodok, was a different kind of event.⁷ Organized on a much smaller scale, the meeting became a collective enactment of mathematicians’ desires to link the idea of mathematics as a universal language to the service of global peacemaking, under the banner of the advancement of

6. Richard Courant, “K russkomu chitateliu,” reprinted in Richard Courant and Herbert Robbins, *Chto takoe matematika? Elementarnyi ocherk idei i metodov*, 3rd ed. (Moscow: MTsNMO, 2001), 14. See also A. N. Kolmogorov, “Predislovie ko vtoromu izdaniui na russkom iazyke,” in *ibid.*, 12–13.

7. For examples of studies emphasizing the state-level agenda of scientific internationalism, see John Krige, “Atoms for Peace, Scientific Internationalism, and Scientific Intelligence,” in *Global Knowledge Power: Science and Technology in International Affairs*, *Osiris* 21, ed. John Krige and Kai-Henrik Barth (Chicago: University of Chicago Press, 2006), 161–81; Kenneth Osgood, *Total Cold War: Eisenhower’s Secret Propaganda Battle at Home and Abroad* (Lawrence: University Press of Kansas, 2006); and Jacob Darwin Hamblin, *Oceanographers and the Cold War: Disciples of Marine Science* (Seattle: University of Washington Press, 2005), ch. 3, “The International Geophysical Year, 1957–1958,” 59–98. For an example of recent work giving more agency to a scientific community, see David P. D. Munns, *A Single Sky: How an International Community Forged the Science of Radio Astronomy* (Cambridge, MA: MIT Press, 2012).

mathematical knowledge. For the hosts and the two dozen or so American mathematicians who travelled to the Soviet Union, the symposium's agenda was at once scientific and political, national and international, personal and collective.

The history of Cold War science and mathematics has for too long been told as if these international and transnational exchanges were insubstantial or irrelevant. Very few historians, even in an age of transnational and global histories, attempt to narrate the history of a discipline from both sides of the Iron Curtain.⁸ Long overshadowed by questions of power and patronage, purity and profits, Cold War science needs to be rethought by connecting disciplinary developments to the real movement of bodies and monies across borders. The history of mathematics in the mid-twentieth century forms a particularly compelling counter to simplistic narratives that either collapse into a stark portrayal of isolationism and distrust or vaguely grant agency to an ideal scientific methodology able to transcend political divides.

Each of the four contributions that follow offers a different, multifaceted vision of Cold War science by focusing on institutions, people, and ideas that navigated or transgressed political, national, and disciplinary boundaries.⁹ The papers demonstrate the processes, mechanisms, and stakes involved in the interdependence between the mobility of and nature of mathematical

8. A 2010 focus section of *Isis* helped to expand the basis of Cold War historiography, though—tellingly—only one of the articles significantly engaged non-American sources and none drew from Russian-language sources. See Hunter Heyck and David Kaiser, eds., “Focus: New Perspectives on Science and the Cold War,” *Isis* 101 (2010): 362–411; similarly, see “Special Issue: Science in the Cold War,” *Social Studies of Science* 31, no. 2 (April 2001): 163–310. For that matter, few historians of Cold War science writing in English engage both Western and Soviet sources to construct broader narratives. For a notable exception, see Michael Gordin, *Red Cloud at Dawn: Truman, Stalin, and the End of the Atomic Monopoly* (New York: Farrar, Straus, and Giroux, 2009); Gordin, “How Lysenkoism Became Pseudoscience: Dobzhansky to Velikovsky,” *Journal of the History of Biology* 45, no. 3 (2012): 443–68; Gordin, “The Dostoevsky Machine in Georgetown: Scientific Translation in the Cold War,” *Annals of Science* 73, no. 2 (2016): 208–23. Some historians of Soviet science and technology also encompass international interactions and call for globalized narratives: Slava Gerovitch, *From Newspeak to Cyberspeak: A History of Soviet Cybernetics* (Cambridge, MA: MIT Press, 2002); and Asif A. Siddiqi, “Competing Technologies, National(ist) Narratives, and Universal Claims: Toward a Global History of Space Exploration,” *Technology and Culture* 51, no. 2 (2010): 425–43.

9. Earlier versions of these papers were presented at a February 2014 conference, “Mathematical Superpowers: The Politics of Universality in a Divided World,” cosponsored by the NYU Jordan Center for the Advanced Study of Russia, the NYU Gallatin School of Individualized Study, and the New York City History of Science Working Group. Thanks to Yanni Kotsonis, Michael Gordin, and Myles Jackson for comments on previous versions of the papers.

knowledge. Thus the articles are connected not only on the level of the subject, but also on the level of methodology, cross-pollinating transnational histories with studies of disciplinary and interdisciplinary dynamics. They also trace the roots of mid-century developments back to the 1930s, de-emphasizing the role of the immediate postwar period in forging Cold War scientific arrangements.

The Soviet Union and the United States remain central locales for understanding Cold War science. The papers that follow also draw, however, from developments in Germany, Poland, Denmark, Argentina, Brazil, France, Great Britain, and Uruguay. When juxtaposed, the articles suggest a geography of Cold War science that is both globalized and entangled.¹⁰ While transnational approaches can reinforce the very notion of “national” histories, especially when the “national” is important to actors themselves, these papers navigate that problem in part by following the way actors also relied upon nongovernmental or transnational organizations—including professional societies, scientific academies, and international agencies—and their own personal networks. The papers therefore recognize the importance of different “centers” of knowledge, and focus on the ability of individuals to construct their professional and political identities and communities, even in the midst of Cold War geopolitical realities.

Two of the papers take the 1963 Soviet-American symposium as a starting point. Brit Shields studies Courant’s extensive involvement in scientific diplomacy throughout his career to highlight the connections between his ideas about the unity of the discipline of mathematics with the complex identity of an embodied mathematician—a mobile agent able to change the world. An émigré scientist whose institution-building in the United States was always done with an eye to European models, Courant articulates and enacts his role as an “ambassador” circulating between the worlds of science and politics, across the Atlantic and the Iron Curtain. Ksenia Tatarchenko revisits the early history of the Siberian scientific town, Akademgorodok, where the 1963 symposium was held, to interpret the city as a showcase. Privileging the role of the city’s founder—mathematician Mikhail Lavrentiev—this reading integrates the newly built city into the national and international landscape, and positions Akademgorodok against the changing background of Soviet science

10. Odd Arne Westad, *The Global Cold War: Third World Interventions and the Making of Our Times* (Cambridge, MA: Cambridge University Press, 2005); Gabrielle Hecht, ed., *Entangled Geographies: Empire and Technopolitics in the Global Cold War* (Cambridge, MA: MIT Press, 2011); and Naomi Oreskes and John Krige, eds., *Science and Technology in the Global Cold War* (Cambridge, MA: MIT Press, 2014).

during the domestic “thaw” of the late 1950s and the international détente of the 1960s. Both articles focus on the mythology and personal charisma surrounding powerful mathematicians, and the authors trace the multiplicity and malleability of representations of the Cold War, of “big” science, and of mathematical universality.

The American-born discipline of cybernetics, despite its condemnation as a bourgeois pseudoscience in the Soviet press, took root in the Soviet “closed” institutes, where Norbert Wiener’s work was accessible to Soviet military elites. Adam Leeds traces the reception and transformation of Soviet cybernetics into an alternative scientific metalanguage and demonstrates the importance of networks among a particular group of Soviet mathematicians, including Lavrentiev. Leeds explores the integration of military and academic experts in iconic Cold War projects—nuclear energy, space exploration, and antimissile defense—emphasizing research institutions as sites where technological projects forged hybrid identities and bringing the focus back to the complex disciplinary arrangements within the penumbra of Soviet science. By showing how scientists navigated these boundaries and dichotomies, he ultimately offers a new understanding of the intertwined fate of cybernetics, economics, and the scientific-technical intelligentsia in the late Soviet Union.

Michael Barany’s article also follows a group of actors circulating across national, professional, and generational divides. Whereas the socialist ideal of economic control is the key context to Leeds’ article, the economic and political realities of the global South and international development form the background to Barany’s study. He shows how the dissemination of novel mathematics, in particular Laurent Schwartz’s theory of distributions, was part and parcel of colonial and postcolonial infrastructure. Focusing on the role of fellowships provided by the Rockefeller Foundation and UNESCO, he traces the travels of three young mathematicians between Latin America, Europe, and the United States, and analyzes how international agencies, political activism, and personal connections shaped mid-century research programs. Not unlike Soviet-American exchanges, mathematicians building connections between Europe and Latin America were required to coordinate complex institutional, personnel, and intellectual arrangements.

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The photograph of participants in the 1963 symposium is a reminder that mathematicians, with their own idiosyncratic biographies, styles, and politics, were the ones who practiced mathematics. And yet these mathematicians

shared an intellectual commitment that enabled them—and in some cases compelled them—to cross national, political, disciplinary, and economic boundaries. Cold War scientific exchanges emerged out of the confluence of national and individual goals, shared disciplinary traditions, and a belief in the authority and mobility of scientific knowledge.

