Nuclear Revolution and Hegemonic Hierarchies: Hiroshima in South America

Matias Spektor

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INTRODUCTION

When news of the bombing of Hiroshima hit the press in South America, the public recoiled in horror at the images of nuclear devastation. But in scientific and political circles, the dominant attitude was fascination. Within a few years, governments in the two most powerful countries in the region—Argentina and Brazil—were actively seeking to purchase and indigenously develop dual-nuclear technologies, as well as train a generation of nuclear scientists to build up the foundations for national nuclear industrial complexes. In the eyes of governing elites in both countries, the onset of the nuclear revolution threatened the world with the prospect of destruction, but also with a new and palpable chasm: a clash over the institutions, rules and norms that should govern global nuclear order between techno-savvy industrial states and backwards, peripheral countries of the Third World. It is therefore unsurprising that when South Americans grappled with Hiroshima, they saw long-lasting economic, commercial, diplomatic, and security implications. From that moment onwards, their quest for nuclear-related knowledge and capability was never conceived of exclusively—or even primarily—as a tool for national survival in an uncertain world. For them, deterrence was never a concern. Rather, in South America nuclear politics were from the outset intertwined with issues of hierarchy and hegemonic imposition in an unequal international system. In their eyes, the nuclear revolution became a new battlefield in the struggle for modernity, where issues of international political power and scientific knowledge

came together to structure a novel form of global political rankings. Issues of technology assistance and denial, centrifuge design and construction, nuclear trade and "trigger lists" came to be see through the prism of national autonomy and standing in the global pecking order.

South American dynamics were not unique, as the most cursory glance at the record of "Global Hiroshima" across the developing world will show similar dynamics elsewhere. Perhaps the most notable one pertains to the case of Iran. In 2005, when he was chief nuclear negotiator for Iran, Hassan Rouhani told the audience at the Supreme Cultural Revolution Council: "If one day we are able to complete the fuel cycle and the world sees that it has no choice, that we do possess the technology, then the situation will be different. The world did not want Pakistan to have an atomic bomb or Brazil to have the fuel cycle, but Pakistan built its bomb and Brazil has its fuel cycle, and *the world started to work with them*. Our problem is that we have not achieved either one, but we are standing at the threshold."[1] Rouhani's statement is analogous to the utterances of several officials in both Argentina and Brazil across time. According to such a view, the global nuclear order is not (and never was) a neutral formation, but one which has denied large developing states their rightful place among nations. There is a recurrent emphasis on the victim status of countries on the fringes of the Western world, and a call for action to claim a full and proper standing in the international system. In such a conception, nuclear technology serves purposes that go well beyond military power, the ability to deter enemies, or the capacity to project influence abroad. Instead, nuclear technology — although not necessarily nuclear weapons — is conceived of as a tool to redress the perceived imbalance that results from a history of exclusion,

[1] Emphasis added. Text of speech by Supreme National Security Council Secretary Hassan Rohani to the Supreme Cultural Revolution Council: "Beyond the Challenges Facing Iran and the IAEA Concerning the Nuclear Dossier," *Rahbord*, September 30, 2005, 7-38.

alienation, and submission to the imperial imprint of the major powers, and in particular of the United States.

The reception of Hiroshima in the South American experience is tightly linked to perceptions of the United States in the post-war order as a revolutionary power. Whereas most scholarly commentary and policy practice in the West assumes that the United States should be seen as a status quo power in the nuclear realm—perhaps a durable legacy from the days of nuclear monopoly (1945-1949)—South American decision-makers always saw U.S. practice in the nuclear arena as revisionist. From the carefree attitude of Atoms for Peace in the 1950s to the militant nonproliferation policies of the late 1970s, from lashing out against the nuclear ambitions of India before the 2000s to the embrace of India as a de facto nuclear-armed state afterwards, the United States was and is seen as constantly changing the rules of the game to skew it in its own favor.

On the face of it, there should be no surprises there: "The strong do what they can and the weak suffer what they must", reads the Melian dialogue. But seeing global nuclear order through the eyes of those sitting in Buenos Aires or Rio de Janeiro opens up potentially profitable avenues for an enquiry into the conditions for stable nuclear governance in global politics moving forward. It also helps explain why one hundred twenty-two nations in 2017 at the United Nations voted to adopt a treaty imposing a total ban on nuclear weapons, to the consternation of the nuclear-weapons states. If we as a community of scholars and practitioners can open up to the possibility that at key moments in nuclear history the United States behaved as an "irresponsible stakeholder", we might then be in a better position to make sense of the backlash against U.S. conceptions of nuclear order that has been so recurrent across the developing world.

This chapter presents an account of South America's encounter with the nuclear revolution that seeks to address two questions. First, how did the use of nuclear weapons in 1945 impact

South American visions of global nuclear order? Second, how did Brazil and Argentina seek to operate within that order?

NUCLEAR ORDER AS A UNITED STATES–DOMINATED

South America as a regional system in the twentieth century was never properly bipolar. Not only was the region a direct zone of influence of U.S. hegemony, but challengers to that hegemony were rare and unsuccessful. Josef Stalin never tried to export the revolution to South America, and when prompted by local Communist movements he turned them down in full knowledge of the enormous cost that would ensue. In his turn, Adolf Hitler briefly tried but then failed to ensure sympathetic leaders in South America would be in a position to follow him and honor their commitment to keep trade ties untouched during the Second World War in the face of U.S. opposition. It is no wonder, then, that the onset of nuclear ordering in South America in the aftermath of Hiroshima should also be the story of American hegemony in this particular part of the world. Against that background, the bombing of Hiroshima and Nagasaki by the United States set in motion two interconnected dynamics that ended up having long-lasting effects in Argentina, Brazil, and South America more widely: nuclear anticolonial nationalism and intra-regional technological competition.

Brazil moved fast to nationalize its own reserves of uranium, rare earths and thorium—three sensitive commodities that it had exported to the United States on the basis of exclusive, secret agreements since the onset of the Second World War—on the understanding that the military uses of nuclear power would create a brutally skewed market for such materials. In particular in the case of uranium, domestic debates about property rights echoed those that were beginning to emerge with regard to oil (Brazilian authorities would eventually nationalize oil fields in 1952).

Leaders in both nations expected the global nuclear order to become rife with disputes over the commerce of such commodities, and thought it wise to avoid the preferential trade arrangements of the 1940s and 1950s with the United States that they came to see as "unequal treaties." At a time when nationalization of natural resources and infrastructure was spreading across the Third World, the minerals involved in the nuclear enterprise took center stage. This is the primary reason why the outset of the nuclear era in South America was seen less as an issue of international security than as an issue of international justice dividing North and South.[2]

Yet, the emphasis on the North/South divide conceals an underlying dynamic that is best seen in the Brazilian case: as decision-makers in the capital city set out to mine and mill uranium in the backwards mines of Minas Gerais and Bahia, they reproduced a pattern of nuclear governance that was undoubtedly racialized. In the process of extracting uranium from the soil, Brazilian authorities committed a vast range of crimes against the indigenous, non-white populations on whose lands exploration too place and whose workforce was employed in conditions that resemble the well-known horror stories of uranium mining in Africa.[3] If we are to examine the nuclear orders that Hiroshima helped establish worldwide from a non-Western perspective, then we need to come to grips with the fact that racial violence is a core element of national stories too. This should be seen as an addition to the existing works on the global racialized nuclear dynamics that Sean Malloy explores in detail in chapter 4 in this volume. When we look at South American encounters with nuclear technology from the perspective of race, what emerges

[2] Emanuel Adler, *The Power of Ideology: The Quest for Technological Autonomy in Argentina and Brazil* (Berkeley, CA: University of California Press, 1987); Carlo Patti, "Brazil in Global Nuclear Order" (PhD diss., University of Florence, 2012 ; Diego Hurtado de Mendoza, *El sueño de la Argentina atómica: política, tecnología nuclear y desarollo nacional (1945-2006*) (Buenos Aires: Edhasa, 2014).

[3] Gabrielle Hecht, *Being Nuclear: Africans and the Uranium Global Trade* (Boston, MA: MIT Press, 2012).

is not only a narrative of global colonial relations, but also one that highlights the connections between race and *nuclearity* in national state-building.

It was at this juncture that the aspiration took root in Argentina and Brazil to secure "autonomy" in nuclear technological development. By the late 1940s, the acquisition of nuclear-related know-how came to be seen as part and parcel of a broader developmental enterprise that went well beyond nuclear power itself: nuclear power became a proxy for modernity in a postcolonial world. As such, nuclear politics became intertwined with issues of standing and independence in international affairs, and negotiations over the terms of global nuclear governance ended up being couched in Argentina and Brazil in a language of equality, distribution, and fairness. Twenty years later, when the Nuclear Suppliers Group began to take shape, Argentina and Brazil were convinced that the critical divide in nuclear global governance was not between the "haves" and the "have nots" but between major industrial states which dominated some or all of the major civilian uses of nuclear energy, and those countries whose access to such technologies was blocked. Their focus was not on the possession of nuclear weapons, but on the acquisition of dual technologies for purposes beyond deterrence. In their eyes, industrial nuclear powers barred the dissemination of technology not so much because proliferation would have destabilizing effects in the security realm but because it would disturb the lucrative business of an exclusive club of states in the global North.[4]

From the 1940s onwards, then, Argentina and Brazil set out to build large developmental states bent on acquiring and developing nuclear technologies. They also put plans in place to train a generation of nuclear scientists. Their universities set up new academic departments in fields like

[4] Michael Anthony Barletta, "Ambiguity, Autonomy, and the Atom: Emergence of the Argentine-Brazilian Nuclear Regime" (PhD diss., University of Wisconsin-Madison, 2000); Rodrigo Mallea, "La cuestión nuclear en la relación argentino-brasileña (1968-1984)" (MA diss., IESP-UERJ, 2012).

chemistry, physics, mathematics, and engineering with a view to generate the human capital that would be necessary to sustain indigenous nuclear industries. If the nuclear revolution was bound to produce a global political cleavage between those nations that mastered nuclear technologies and those that did not, possession of the nuclear fuel-cycle—rather than possession of nuclear weapon—would soon become the dividing line between the two camps.[5]

To be sure, this view was informed by these countries' prior experience with neocolonialism under the Spanish, the Portuguese, the British, and the Americans. Imbibing the nationalist philosophies that were born in the Third World, Argentines and Brazilians conceived of technological autonomy as a crucial tool in the kit. By the mid-1950s, the nuclear estate in both countries was a sprawling complex of institutions, with their own National Nuclear Energy Commissions running programs and dishing out funds to create indigenous nuclear industries. Key individuals within those institutions saw themselves as members of the burgeoning global network of scientists, officials and diplomats circulating around major laboratories and international institutions like the IAEA.

It is therefore unsurprising that Brazil and Argentina should have taken up U.S. offers of nuclear civilian cooperation under Atoms for Peace.[6] President Eisenhower's program to promote the dissemination of scientific information on most aspects of the civil nuclear fuel cycle (except uranium enrichment) helped Argentina and Brazil consider alternative technologies in developing the nuclear fuel cycle, like the reprocessing of spent fuel. They also rolled out the program's

[5] Emanuel Adler, *The Power of Ideology: The Quest for Technological Autonomy in Argentina and Brazil* (Berkeley: University of California Press, 1987)..

[6] Lawrence Scheinman, *The International Atomic Energy Agency and World Nuclear Order* (Baltimore: Johns Hopkins University Press, 1987), Klaus B. Stadie, "The Nuclear Weapons Legacy: Closing the Circle on the Splitting of the Atom and Estimating the Cold War Mortgage," *Environment: Science and Policy for Sustainable Development* 38, 1 (1996); G. Bunn, "Does the Non-Proliferation Treaty (NPT) require its non-nuclear-weapon members to permit inspection by the International Atomic Energy Agency (IAEA) of nuclear activities that have not been reported to the IAEA?" (Unpublished report, Center for International Security and Arms Control, Stanford University, 2012).

emphasis on government subsidies to establish national civilian nuclear industries.[7] Moreover, the United States provided these countries with information, training, and aid in acquiring equipment and materials, including nuclear research reactors (for which Washington offered a financial subsidy of $350,000 each).[8] More specifically, under Atoms for Peace the United States supplied Brazil with three research reactors, which were installed in São Paulo (1957), Belo Horizonte (1960), and Rio de Janeiro (1965). In the case of Argentina, the program included plans for a research reactor built at the Centro Atómico Constituyentes in 1958. To keep these reactors running, Argentina and Brazil bought highly enriched uranium fuel from the United States.[9]

In Latin America, Atoms for Peace also paved the way for the creation of the Inter-American Nuclear Energy Commission within the Organization of American States, and conferences on peaceful nuclear applications in Argentina (1959), Brazil (1960), Mexico (1962), and Chile (1964).[10] This was done with the support and financing of the United States, whose arsenal under President Eisenhower alone grew from 1,200 warheads in 1952 to some 18,700 in 1960.[11] In an international system that was still permissive about the trade of nuclear know-how, Argentina and Brazil negotiated nuclear cooperation agreements elsewhere, including Western Europe and the Soviet Union.[12]

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[7] Stadie, "Nuclear Weapons Legacy," 24; Norman Gall, "Atoms for Brazil, dangers for all," *Bulletin of the Atomic Scientists* 32, no. 6 (1976): 4–9; Barletta, "Ambiguity, Autonomy, and the Atom."

[8] Scheinman, *International Atomic Energy Agency*, and Martin J. Medhurst, "Atoms for Peace and Nuclear Hegemony: The Rhetorical Structure of a Cold War Campaign," *Armed Forces & Society* 23, 4 (1997): 571-593; quoted in Barletta, "Ambiguity, Autonomy, and the Atom."

[9] W. Grabendorff, "La política nuclear y de no-proliferación de Brasil," *Estudios Internacionales* 20(80), (1987): 520-568; Castro Madero and Takacs 1991; Barletta, "Ambiguity, Autonomy, and the Atom."

[10] Barletta, "Ambiguity, Autonomy, and the Atom."

[11] David Fischer, *History of the International Atomic Energy Agency The First Forty Years* (Vienna: International Atomic Energy Agency, 1997), 11.

[12] Carlo Patti, "The Origins of the Brazilian Nuclear Program, 1951–1955." *Cold War History* 15, no. 3 (July 3, 2015): 353–73; for a useful collection of primary sources on this period, see Arquivo Álvaro Alberto (University of São Paulo); Roehrlich 2016.

There was an important difference between the evolution of nuclear policy in Argentina and Brazil, however. From inception, the nuclear community emerging in Brazil was divided over purpose and policy. Private lobbies and state companies wanted the program to generate cheap electricity to quell the energy demands of a fast-growing industrializing economy: their preference was for the fast acquisition of ready-made technologies and turn-key reactors abroad. By contrast, the Armed Forces and the scientific community preferred to focus on propping up indigenous nuclear fuel-cycle technologies. They estimated that global nuclear trade would divide the industrial North as a technological oligopoly from a technologically backwards, dependent South, so they preferred investment in bottom-up technological development. These clashes were not settled until the late 1970s, when the world refused to sell Brazil sensitive technologies and authorities had little option but to develop their own. Through the 1950s and 1960s, then, nuclear policy in Brazil remained prey to division, fragmentation, and conflict. By contrast, Argentine officials coalesced around notions of nuclear autonomy from the very outset, and focused their energies on in-house technological development. At least until the 1980s Argentina seemed to be ahead of Brazil in its ability to produce scientific and technological breakthroughs in the nuclear field.[13]

REGIONAL COMPETITION

The military use of nuclear power in 1945 also awakened Argentines and Brazilians to the prospects of heightened mutual competition in the atomic age. As authorities in each state pursued nuclear fuel-cycle technologies, they also became aware that emerging capabilities could well

[13] Adler, *Power of Ideology*; Steven Flank, "Exploding the Black Box: The Historical Sociology of Nuclear Proliferation," *Security Studies* 3, no. 2 (1993): 259–294; Maria Regina Soares de Lima, *The Political Economy of Brazilian Foreign Policy: Nuclear Energy, Trade and Itaipu* (Brasília: Fundação Alexandre de Gusmão, 2013).

trigger security-dilemma dynamics with revolutionary effects on regional stability. After all, they had been rivals since time immemorial. Now Atoms for Peace added yet another competitive dimension to the Argentine-Brazilian bilateral relationship. Unsurprisingly, national and international media and foreign nonproliferation analysts soon came to see the evolution of dual-technology capabilities in South America through the prism of regional geopolitical competition. These concerns filtered through the national security communities of each country, with the military in particular interpreting technological developments on the other side of the border from a national security perspective. Such dynamics never turned into anything resembling a military race for reasons that we shall see below, but they guaranteed an enduring source of competition and a fair amount of suspicion in the Argentine-Brazilian relationship.[14]

That mutual suspicions of an intent to acquire nuclear weapons never became dominant in either Brazil or Argentina is a function of how little appeal such weapons had in South America. The voices that argued for the active pursuit of nuclear weapons were in the minority and never secured the necessary traction with their political masters. Pro-bomb arguments appeared in the public statements of some military officials in both countries and the writings of scholars in academic journals more often than in the secret correspondence within each government that is now declassified and open for historical research. And yet, the quest in both countries for technological acquisition—in particular uranium enrichment—soon became mixed up with and often confused for the search for nuclear weapons. As the nuclear era progressed and Argentina and Brazil came to actively pursue enrichment technologies, international observers and

[14] Barletta, "Ambiguity, Autonomy, and the Atom"; Rodrigo Mallea, Matias Spektor, and Nicholas J. Wheeler, *Origens da cooperação nuclear: uma história oral e crítica entre Argentina e Brasil* (Woodrow Wilson International Center for Scholars e FGV, 2015).

commentators believed they were seriously moving towards a weapon capability.[15] We now know that such assessments at the time were widely overstated or simply mistaken, a fact that has been lately confirmed by the declassification of primary sources from the U.S. intelligence agencies.[16]

But the force of anticolonial nationalism in the face of a United States–led nuclear global order was stronger than the competitive dynamics between the two regional neighbors. For all the rivalry that was typical of Argentine-Brazilian relations, the beginnings of the nuclear age actually contributed to drawing these two countries closer together in opposition to U.S. conceptions of nuclear order.

The reason for this was joint opposition to the evolution of U.S. nonproliferation policy and the emergence of a global nonproliferation regime. As officials in South America bent on acquiring dual technologies bumped up against resistance in Washington from the 1950s onwards, a powerful glue that sealed bilateral nuclear cooperation ever since. Rivalry between the two did not preclude them from building a common shield against what they saw as an unjust global order

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[15] For an early assessment, see Leonard Spector, *Nuclear Proliferation Today* (New York: Vintage Books, 1984). More contemporary works include Matthew Fuhrmann and Benjamin Tacks, "Almost Nuclear: Introducing the Nuclear Latency Dataset," *Conflict Management and Peace Science* 32 (2015), 443–461; Paul Nelson and Christopher Spreecher, "Are Sensitive Technologies Enablers of Civil Nuclear Power? An Empirical Study," *Atoms for Peace: an International Journal* 3 (2010); Dong-Joon Jo and Erik Gartzke, "Determinants of Nuclear Weapons Proliferation," *Journal of Conflict Resolution* 5 (2007): 167–194; Matthew Kroenig, "Importing the Bomb: Sensitive Nuclear Assistance and Nuclear Proliferation," *Journal of Conflict Resolution* 53 (April 1, 2009): 161–180; Mitchell Reiss, *Bridled Ambition: Why Countries Constrain Their Nuclear Capabilities* (Washington, D.C.: Woodrow Wilson Center Press, 1995); Sarah E. Kreps and Matthew Fuhrmann, "Attacking the Atom: Does Bombing Nuclear Facilities Affect Proliferation?" *Journal of Strategic Studies* 34 (2011): 161–187.

[16] Hymans, 2006; Mallea 2012; Spektor 2017. John Redick, *Nuclear Illusions: Argentina and Brazil* (Washington, D.C.: The Henry L. Stimson Center, 1995); Julio C. Carasales, "The Argentine-Brazilian Nuclear Rapprochement," *Nonproliferation Review* 2 (Spring-Summer 1995): 39–48; Barletta, "Ambiguity, Autonomy, and the Atom"; Togzhan Kassenova, *Brazil's Nuclear Kaleidoscope: An Evolving Identity* (Washington, D.C.: Carnegie Endowment for International Peace, 2014); Sara Z. Kutchesfahani, "The Role of an Epistemic Community in Argentina and Brazil's Creation of a Joint Safeguards Agreement," in *International Cooperation on WMD Nonproliferation*, ed. Jeffrey W. Knopf (Athens, GA: University of Georgia Press, 2015); Rodrigo Mallea, Matias Spektor, and Nicholas Wheeler, eds., *The Origins of Nuclear Cooperation: A Critical Oral History Between Argentina and Brazil* (Washington and Rio de Janeiro: Woodrow Wilson International Center for Scholars and FGV, 2015). See also Jacques E. C. Hymans, *Achieving Nuclear Ambitions: Scientists, Politicians, and Proliferation* (Cambridge: Cambridge University Press, 2012); Alexander H. Montgomery and Adam Mount, "Misestimation: Explaining US Failures to Predict Nuclear Weapons Programs," *Intelligence and National Security* 29 (May 4, 2014): 357–386

and a hostile United States. The Argentine-Brazilian entente to cope with the global nuclear order was powerful enough to make each side support the other's decision to acquire or develop fuel-cycle capabilities. Mutual sympathy rather than fear set the tone of the bilateral relationship in the nuclear age.[17]

Consider for instance the Argentine-Brazilian attitude towards the Cuban Missile Crisis in October 1962. Alongside Mexico, the two South American states worked towards the creation of a nuclear-weapons-free zone in Latin America.[18] The push towards a region free from these weapons came from a generation of politicians and career diplomats who self-identified as progressives as home and neutralists abroad. Throughout the 1960s they set out to turn Argentina and Brazil into champions of global nuclear disarmament. They had already opposed the Soviet nuclear test of September 1961, and, at ENDC meetings in March 1962, the Brazilians had argued for the cessation of all nuclear testing. Activism in global nuclear proliferation debates, they thought, would help them polish their credentials as modernizing frontiersmen in the emerging Third World movement. Now the Cuban Missile Crisis further strengthened this development but highlighted the urgency of such principles. By denouncing both the United States and the Soviet Union as the "nuclear irresponsibles," Argentine and Brazilian diplomats were rolling out a new brand of "Independent Foreign Policy" which was more autonomous from and defiant of the United States. Their nuclear diplomacy posture allowed them to side with the Non-Aligned Movement and keep open channels with Fidel Castro in Havana. Denouncing the superpowers for their nuclear behavior became a common staple in the Brazilian administrations of Jânio Quadros

[17] John R. Redick, Julio C. Carasales, and Paulo S. Wrobel. "Nuclear Rapprochement: Argentina, Brazil, and the Nonproliferation Regime," *The Washington Quarterly* 18, no. 1 (March 1, 1995): 107–22; Adler, *Power of Ideology*; Mallea, Spektor, Wheeler, *Origens da cooperação nuclear*.

[18] James G. Hershberg, "The United States, Brazil, and the Cuban Missile Crisis, 1962 (Part 1)," *Journal of Cold War Studies* 6, no. 2 (April 1, 2004): 3–20; James G. Hershberg, "The United States, Brazil, and the Cuban Missile Crisis, 1962 (Part 2)," *Journal of Cold War Studies* 6, no. 3 (July 1, 2004): 5–67; Musto thesis; Patti 2017.

(1961) and João Goulart (1961–64) and in the Argentine administrations of Arturo Frondizi (1958-62), José Maria Guido (1962-63) and Arturo Illia (1963-66).[19]

A counter-movement to challenge the nuclear progressives of the early 1960s in Brazil developed among military officers, diplomats, and politicians on the center right and the anticommunist far right who rejected any overtures to Cuba and socialist movements in the postcolonial world. In the eyes of these officials, any commitments to denuclearization would unnecessarily close off future options for Brazil. In this they had the support of Marcelo Damy Souza Santos. Damy, as he was known, was the top Brazilian nuclear official after founding and directing the Institute of Research on Nuclear Energy (1956-61), and then heading the National Nuclear Energy Commission (1961-64). Damy advocated for Brazil to build its own nuclear device sometime in the future and argued it would be irresponsible preemptively to close off that option by signing on to restrictive nonproliferation international agreements, like a nuclear-weapons-free zone in the region.[20]

According to the U.S. embassy in Brazil, Damy "aspired to be the Brazilian Bhabha". None of his intentions ever materialized, however. "Brazil has a small but reasonable scientific base upon which it could erect a nuclear device program if the political decisions to do so were made and the government were [sic] prepared to and capable of following through with the necessary funds and sustained effort", the U.S. embassy reported. Yet, "small staff resources and large

[19] K.L. Storrs, "Brazil's Independent Foreign Policy, 1961-1964; Background, Tenets, Linkage to Domestic Politics, and Aftermath" (Ph.D. dissertation, 1974); Lima, *Political Economy*; Patti, "Global Nuclear Order"; and San Tiago Dantas, *Política Externa Independente,* updated edition (Brasilia, FUNAG, 2011). For a curated collection of key documents from Brazil's experience with "Política Externa Independente," see Álvaro Costa Franco, *Documentos da Política Externa Independente Vol. I*. (Brasília: FUNAG, 2007); Hershberg 2014; Felipe Pereira Loureiro, "The Alliance for Progress and President João Goulart's Three-Year Plan: The Deterioration of U.S.-Brazilian Relations in Cold War Brazil (1962)," *Cold War History* 17, no. 1 (January 2, 2017): 61–79.

[20] Exposições de Motivos, November 29, 1962 and May 10, 1963, CNEN; Information, August, 12 1963, Gabinete Militar (both documents are quoted in Whitaker Salles, 1988, 36-38).

technological gaps" would make the cost and effort considerably larger than it would be in the cases of Canada, Israel, and India. "The Brazilian technological base would not seem sufficient to support a production reactor program of reasonable size in anything like the near future, especially if such a program were to be domestically based and hence 'safeguards-free.'" The U.S. embassy also doubted that Brazil had the acumen in the foreseeable future to build "domestically modified centrifuges sufficient for a cascade capable of producing weapons-grade enriched uranium in significant quantities."[21]

They were correct, and all evidence points to the fact that Argentina made a similar assessment. By the mid-1960s Brazil and Argentina were fast becoming staunch, overt defenders of the legality and legitimacy of "peaceful nuclear explosions" (PNEs).[22] By the time U.S. officials realized that their original promotion of nuclear energy under Atoms for Peace could propagate dual technologies in ways that they could not control, the indigenous rush to develop atomic energy in South America had been in motion for a while. Officials in Argentina and Brazil had already embraced the idea that U.S. laboratories had promoted in the 1950s that "peaceful nuclear explosives" (PNEs) could perform major economic functions in big public works like dredging ports, digging canals, opening pathways through rocks and mountains, or extracting natural resources underground.

With negotiations over the NPT raging in the Europe, Brazil and Argentina were firmly committed to resisting any major commitments to nonproliferation. As the world transitioned from

[21] AmEmbassy Rio de Janeiro to Department of State, Secret Airgram 792, May 23, 1968, RG 59, Subject-Numeric Files 1967-1969. Box 2895, AE 1 Brazil, NARA, in William Burr, "Nuclear Intelligence via Three Martinis" (blog), May 30, 2017. wilsoncenter.org/blog-post/nuclear-intelligence-three-martinis.

[22] Ryan Musto, "'Keep the Nuclear Beast in a Cage': Brazil, the United States, and Peaceful Nuclear Explosions Under the Treaty of Tlatelolco, 1964 – 1967," (paper presented at SHAFR Annual Meeting, Arlington, VA, June 23, 2017).

the 1950s to the 1960s, Argentina and Brazil knew full well they were soon going to become targets of incipient U.S. nonproliferation policies.

Joint opposition to the NPT—and their support for the legality and legitimacy of PNEs—provided the glue to an emerging South American nuclear order where the two major states both agreed to defend one another's right to the full mastery of the nuclear cycle. Such an operation, however, was not without cost.

TAMING U.S. POWER WHILST AVOIDING A REGIONAL SECURITY DILEMMA

Even before negotiations began in earnest for the NPT, Brazil and Argentina shared a common view of the international nonproliferation regime as intrusive, discriminatory, and detrimental to their own quest for technology acquisition. The connection between the two was strong enough that since 1962 they sent alternate ambassadors to the IAEA's Board of Governors, one side speaking on behalf of the other. From the outset of the process that eventually led to the signing of the NPT, Argentines denounced the attempt by the superpowers to "further disarm the disarmed," while Brazilians critiqued superpower attempts at "freezing world power" by denying sensitive technologies to developing countries. The two also acted in tandem during negotiations of the Tlatelolco Treaty, which would eventually turn Latin America into a Nuclear-Weapons-Free Zone.

In these negotiations, Buenos Aires and Brasília formed a coalition in defence of the legality of "peaceful nuclear explosions" at the expense of the Mexican delegates, who feared potential weaponization activity. This brand of anti-major-power cooperation was not exceptional in the nuclear field. Since the late 1950s it had become a normal feature across policy realms, as the foreign policies of the two states became more staunchly nationalist and, as officials put it at

the time, "independent" (mostly from the United States, but also from the East-West divide typical of the Cold War).[23] As the global non-proliferation regime—and U.S. nonproliferation policy—became tighter in the 1970s, Argentina and Brazil coalesced even further in defending one another's pursuit of the fuel cycle.

The more their own relations with the global nonproliferation regime and with Washington deteriorated, the more both countries found common ground for mutual nuclear-policy reinforcement. Both nations, for instance, resented the creation of the Nuclear Suppliers Group, first organized in secret by Henry Kissinger in London in 1974. The Group proceeded to restrict nuclear exports by nuclear states to non-nuclear ones. By the late 1970s both Brazil and Argentina were energetically trying to secure a seat for themselves in the Group or, alternatively, to weaken its ability to "lay down the law" to them. In the process, they exchanged information and built common positions on the core exports issue—a process that socialized the diplomats, military men, scientists and politicians of both sides to each other. Bilateral nuclear cooperation was to a large extent a way to avoid pressures from U.S. nonproliferation policy and from the nonproliferation regime itself.[24]

In 1974, West Germany and Brazil negotiated the terms of a broad nuclear cooperation agreement that involved long-term training, capacity building, and technology transfers. The issue of self-sufficiency in the production of nuclear fuel for future reactors had become a dominant theme in Brazilian policy circles because in the aftermath of the 1973 energy crisis the United States was refusing to guarantee future contracts for fuel purchases from Brazil. This cast a shadow of uncertainty as to the future of Brazil's nuclear electricity generation program, and irked Brazilian officials. When negotiations between Bonn and Brasília came to a draft text, this was the

[23] Musto, "Nuclear Beast."
[24] Mallea, "La cuestión nuclear."

largest technology transfer agreement ever signed between an industrialized country and an industrializing one. According to the agreement, Brazil would import eight reactors and receive technologies to develop the nuclear fuel cycle at home: uranium prospecting and mining; uranium enrichment; manufacturing fuel rods; and reprocessing spent fuel rods. At an anticipated value of 10 billion marks (roughly $4 billion), this was the largest single export order in German history.[25] At the time, Argentina was actively searching for technological breakthroughs in the field of uranium enrichment. Within a few years, it would disclose to the world that a secret facility in Pilcaniyeu had been set up for that purpose.

By the late 1970s, both countries had begun their pursuit of uranium-enrichment technology, reinforcing fears in the U.S. intelligence community of the emergence of a security dilemma with serious geopolitical ramifications. The belief was widespread that both countries were trying to develop nuclear-weapons programmes of their own with a view to either equalizing or surpassing each other's technological capabilities—the kind of dynamic that could spiral out of control.[26]

Yet, Argentine-Brazilian cooperation in the face of a hostile external environment gained additional traction in the aftermath of the election of President Jimmy Carter in 1976. Carter had since the campaign trail criticized his predecessor's and Henry Kissinger's policy as too tolerant of the nuclear ambitions of Argentina and Brazil. Now in office, Carter was adamant to curtail the

[25] William Glenn Gray, "Commercial Liberties and Nuclear Anxieties: The US-German Feud over Brazil", The International History Review, 34:3 (2012): 449–474. For a curated collection of key documents see Dani K. Nedal and Tatiana Coutto. "Brazil's 1975 Nuclear Agreement with West Germany." Nuclear Proliferation International History Project, August 13, 2013. https://www.wilsoncenter.org/publication/brazils-1975-nuclear-agreement-west-germany.

[26] Joao Resende-Santos, "The Origins of Security Cooperation in the Southern Cone," *Latin American Politics and Society* 44, no. 4 (2002): 89; Charles A. Kupchan, *How Enemies Become Friends: The Sources of Stable Peace*, reprint edition (Princeton, NJ: Princeton University Press, 2010); James Doyle, *Nuclear Safeguards, Security and Nonproliferation: Achieving Security with Technology and Policy* (Boston: Butterworth-Heinemann, 2008); Redick, "Nuclear Rapprochement"; Mitchell Reiss, *Bridled Ambition: Why Countries Constrain Their Nuclear Capabilities* (Woodrow Wilson Center Press, 1995); and Wrobel (1995).

access of these countries to dual technologies, while also targeting them for their use of torture against domestic opponents and other blatant violations of human rights. The scientific communities in both countries worried that the United States and Western Europe would continue to deny technology transfers, and both saw closer Argentine-Brazilian cooperation as a tool to transcend an ever more restrictive global regime. These fears were proven well-founded in 1977, when Carter convinced West Germany to deny uranium reprocessing and enrichment technologies to Brazil. These developments spurred Argentine-Brazilian nuclear cooperation as Argentina, too, was involved in a heated dispute with the United States over the right to buy a third power reactor and heavy water production facility without accepting full-scope safeguards.[27]

It is not surprising that in January 1977 the governments of Argentina and Brazil should have issued a joint communiqué stressing the need for bilateral cooperation in the nuclear field and systematic exchanges of nuclear technology. The technical exchanges were central to bilateral nuclear rapprochement, as the respective nuclear energy commission officials built up personal relationships with their national counterparts.

The military regimes governing Argentina and Brazil realized that bilateral nuclear cooperation could operate as a common defensive shield against an intrusive international nonproliferation regime. In order to bring this off, they first had to resolve their energy and water disputes in the Parana River region, which had fueled a great deal of mutual resentment throughout the 1970s. In May 1980 they negotiated an agreement for the exchange of technical information, material, and products on all aspects of the nuclear fuel cycle, leading to the first visit by a Brazilian President to Argentina in more than four decades.

[27] Patti and Spektor, forthcoming.

The return to civilian rule in both countries in the 1980s was important in facilitating the nuclear rapprochement that had begun before. President Raul Alfonsín of Argentina sought cooperation with Brazil soon after taking office in late 1983 in the belief that layers of international commitments in the field of nonproliferation would help him reassert authority at home, tame an unruly military complex, and build up an image of statesmanship that was bound to be instrumental in the domestic struggles to come. For his part, Brazilian general João Figueiredo was interested in moving toward cooperation with Argentina as a way of signalling to his military colleagues that Brazil was indeed to transition to civilian rule from 1985 onwards. Opening up internationally would then feed back into the political liberalisation at home. Argentina also hoped to end the diplomatic and economic isolation it endured in the wake of the Falklands War (1982).

By the early 1980s Argentina and Brazil were also rethinking their national security doctrines, coordinating their nuclear foreign policies, imposing new restraints on their own national nuclear programmes, and, to everyone's surprise, co-sponsoring a formal mechanism for mutual inspection of nuclear-related facilities. Observers twenty years earlier would have considered such an outcome unthinkable. In turn, this transformation fostered an incipient security community in the wider South American region that moved toward becoming a zone of international peace, democratic governance, and market economies, where there was little or no incentive for major investments in nuclear-weapons technologies. This path toward a stable peace happened while Argentina and Brazil were still under military rule. Political reconciliation did not follow social integration and economic interdependence, but the other way around.

Presidential diplomacy was critical to the process of Argentine-Brazilian rapprochement. In July 1987 President Sarney of Brazil visited the Pilcaniyeu nuclear facility near Bariloche, in Argentina. Before then, Argentina had never made that facility accessible to the public, which

rendered the nature of the visit even more historic. The Viedma Joint Statement on Nuclear Policy they signed on that occasion signalled a joint commitment to end the secrecy surrounding the countries' nuclear programs and to deepen bilateral cooperation in the nuclear field. In April 1988 Sarney reciprocally invited Alfonsín to visit Brazil's hitherto secret nuclear installation in São Paulo, after which the Ipero Joint Statement on Nuclear Policy was issued announcing the decision to set up a permanent commission on nuclear cooperation. Again, in November 1988, Sarney visited Argentina's Ezeiza facility near Buenos Aires, where Sarney and Alfonsín issued the Ezeiza Joint Statement on Nuclear Policy reaffirming their earlier commitments. These presidential statements served to restore civilian control over the two national nuclear programs and signal this decision to the international community.

Both Alfonsín and Sarney took unilateral steps to bring about a nuclear rapprochement. On the eve of announcing Argentina's capacity to enrich uranium in 1983, the government there made it a point to give early warning to Brazil. Four years later, when Brazilian authorities were about to announce their own enrichment capability, they too repeated the gesture vis-à-vis their neighbors.

The United States played a galvanizing role in Argentine-Brazilian nuclear cooperation. From the late 1970s onwards, Washington officials introduced the idea in informal conversations with decision-makers in Buenos Aires and Brasília to the effect that a system of mutual inspections might provide the basis for stability and confidence building. Although turning such ideas into policy would end up taking more than twenty years (in 1991 the two countries moved towards such a system for mutual nuclear inspections), it is remarkable that American policymakers never sought credit for the idea and never pushed these countries to adopt them overtly, a move which might have backfired. Perhaps more remarkable is the fact that the dominant attitude by the 1980s

in the United States was one of accommodation of Argentine-Brazilian nuclear policies. By the 1990s, South America's nuclear order was solidly built around Argentine-Brazilian mutual inspections, easing the path for their signing of the NPT and acceptance of a range of international nonproliferation norms and commitments.

The position of Argentina and Brazil within the global nuclear order since then has been far from obvious. Although the two countries have long relinquished their defense of PNEs and both have tied themselves up in a range of international nonproliferation commitments, they both remain critical of the way nuclear-weapons states have behaved. They are particularly opposed to what they see as the ever more intrusive set of rules pertaining to transparency and accountability, such as the national Additional Protocols to the NPT that have become common currency worldwide, in exchange for little or no progress in disarmament. Both took part in the negotiations for a Ban Treaty to make nuclear weapons illegal (Brazil eventually signed the treaty, but Argentina did not), and both have raised their voices to come out in defense of Iran's "inalienable right" to enrich uranium. In the process, they have contested the evolution of U.S. nuclear policy as deterrence comes back to the top of the international agenda, and they promise to continue to do so in the near future.

Crucially, the issue of nuclear latency is currently being re-legitimized in both countries. In the case of Brazil, it has become a core tenet of the national security policy that the country should build a nuclear-propelled submarine. Work at the shipyard has begun already, and current plans envisage commissioning around 2030. If Brazil does indeed make its nuclear submarine operational in the near future, then it is plausible to believe that a series of unpredictable feedback effects are likely to ripple through South America. In her turn, Argentina has doubled down on nuclear energy production with the building of new energy reactors, and officials have privately

suggested naval nuclear propulsion might be in the cards at some point in the future. This speaks to the broader issue of the nuclear taboo that Nina Tannenwald tackles in chapter 16 in this volume. To be sure, one of the recurring themes of global nuclear politics today is the return of nuclear weapons as core components of national security strategies across various nuclear-weapons states, and the widening gap between those states and the vast majority of countries who voted for a treaty banning nuclear weapons. But the issue of nuclear latency confounds and complicates any attempt at neatly dividing possessor and non-possessors. Argentina and Brazil illustrate the point: these are states which are happy to condemn the nuclear powers for not disarming and can go as far as negotiating the terms of a ban treaty. But they also, and simultaneously, insist on the utility of dual technologies, and organize their national priorities accordingly. In watching the evolution of the taboo that has applied to the use of nuclear weapons, we should not lose sight of the far less visible, informal understandings countries have developed over time as to the desirability of nuclear power in the twenty-first century.

CONCLUSION

The evolution of nuclear politics in South America has three main implications for our understanding of global nuclear order. First, the image of a stable core order around the major powers and their allies that progressively expanded to incorporate latecomers from the non-Western world needs to give way to a messier picture where the rules of the game are contested in a setting of vast asymmetry. Hiroshima triggered new alignments and unsettled the existing hierarchy in South America's regional order, with key states in there perceiving the United States

as an unpredictable and often hostile revisionist hegemonic power. Second, one of the major legacies of Hiroshima in South America was to create a global order in which South American policy makers and national leaders could legitimately opt to double down on their quest for national autonomy through the building of powerful developmentalist states bent on conquering nuclear science and building up nuclear infrastructure. Possessing nuclear technology and its industrial applications—although not necessarily nuclear weapons—came to be seen as an integral part of what it meant to be a modern sovereign polity in the South American post-war order.

Third, there is a powerful case for making the study of nuclear politics truly global. One might expect the study of nuclear politics to be global by its nature. It is not just that the nuclear world we inhabit is the result of the transnational circulation of scientists, natural uranium and yellow-cake, centrifuge designs, nuclear weapons, and the political economy of nuclear-energy production, but also the fact that the rules, norms, and institutions that make up nuclear order today are the product of intense political exchanges and disputes among nations. And yet the global dimensions of the nuclear era are rarely apparent in theories and histories that remain stubbornly national or largely derived from the experience of a small collection of states.

In this chapter I have offered an account of how we might appreciate "Global Hiroshima" from the standpoint of South America. If the dropping of the first atomic bomb opened a new chapter in human history, that chapter was about far more than the intersection of technologies of destruction in great-power politics or the story of the proliferation of nuclear-weapons capabilities in a dozen or so states across the globe. I have argued that in order to understand the impacts of Hiroshima around the world, we ought to focus on the way old global hierarchies came to filter new ordering dynamics coming from nuclear weapons and the world they created. Orthodox

accounts of the impacts of Hiroshima are inadequate because their analysis is too narrowly focused on great-power politics.

The mid-twentieth century—the historical time when the bomb over Hiroshima inaugurated the nuclear age—coincides with the global wave of independence movements in Africa and Asia, the rise of nationalist reassertion in the Middle East and Latin America, and what some came to call the "revolt against the West." An appreciation of how the nuclear ordering born in Hiroshima mingled with that embodied by geopolitical developments across the developing world will help us better grasp the tension and contradictions that we experience in the field of global nuclear politics today.