

Networks of Denuclearization: Transnational Nuclear Epistemic Communities under Argentine
and Brazilian Authoritarian Regimes

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Abstract

The ABACC nuclear agreement between Argentina and Brazil was an unprecedented quadripartite agreement between Argentina, Brazil, the International Atomic Energy Association and the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials that enabling the first denuclearization regime. The agreement was formed under democratic governments and hailed as a model for denuclearization in other regions of the world. My research question is: Under what conditions did this denuclearization occur? I argue that the factors of democratization that many observers and scholars attribute as the key to denuclearization play a role in the process of denuclearization, yet the agreement's foundation came as a result of the transnational relations among the epistemic communities of Argentine and Brazilian scientists during periods of authoritarianism and regime transition from approximately 1964 to 1984. Under this idea, I perform a comparative case study that analyzes primary written and verbal communications of transnational epistemic communities in Argentina and Brazil where scientists created discourses of cooperation under authoritarianism that ultimately led to the ABACC agreement. I then provide a discussion regarding epistemic communities and their role in nuclear talks for future denuclearization efforts.

Introduction

In an International Atomic Energy Agency information circular published in January of 1993, representatives from Argentina and Brazil issued a statement confirming the establishment and objectives of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), agreed and signed in 1991. The agency was created “to administer and implement a common system of accounting and control to be applied to nuclear materials used for all the countries’ nuclear activities with a view to guaranteeing their undertaking to use nuclear energy exclusively for peaceful purposes” (IAEA, 1993). This announcement solidified the cooperative, peaceful nature of the Brazilian-Argentine nuclear development programs. Heralded as a groundbreaking quadripartite agreement formed during transition to democracy between Argentina, Brazil, the International Atomic Energy Association (IAEA) and the ABACC, the agreement framework is seen throughout the academic community as a potential framework for denuclearization in other regions. Yet many academics have failed to acknowledge the conditions shaping the nuclear research programs under the authoritarian regimes in which discourses of cooperation emerged.

As early as 1967, leaders of each country’s respective nuclear programs demonstrated willingness to cooperate: Oscar Quihillalt, President of Argentina’s National Atomic Energy Commission (CNEA), issued a letter to Brazilian foreign minister José de Magalhães Pinto indicating initial willingness to cooperate with nuclear development between the two countries of Brazil and Argentina, stating, “There is a positive change regarding the Brazilian Atomic Energy Commission’s attitude in regard to its relationship exchange with Argentina” (CNEA, 1967). This early proposition of cooperation suggests that despite official rhetoric by country leaders of a regional rivalry between the two countries, within the epistemic community of nuclear

development experts shared similar goals for each program and wished to pursue the same norms. It also provides discourse occurring at the time of military governments, generally overlooked by those analyzing the ABACC agreement formation.

Investigating the notion of cooperation between scientific communities in Argentina and Brazil with respect to peaceful nuclear development is not new. Solingen (1994; 1996; 2001) analyzes forms of nuclear cooperation among industrial groups and other internal members surrounding technological development, and applies the concept of ‘comparative regionalism’ to draft frameworks with other regions of the world. Kutchesfahani (2010) and Alcañiz (2004) apply Haas’ (1996) epistemic community approach to the ABACC agreement. Each approach sheds light on the period of growing cooperation under democracy beginning roughly in 1984, and gives proper credit to the technical specialists and scientists for advancing strategies of cooperation to policymakers. As an assumption within the works and my own, the scientists and technical experts play such a vital role that without their direct contribution to development, both countries would not have the ability to produce nuclear capabilities.

The period of about two decades prior to the democratization and subsequent denuclearization of Argentina and Brazil is not adequately covered by the mentioned literature. In general, literature on nuclear development by Latin America, especially under dictatorships, is limited due to the difficulty in obtaining primary sources of information. As time passes, former scientists in the Argentine and Brazilian nuclear programs--the ‘Oppenheimers’ of the respective countries—are more willing to speak out about their role in development, in addition to former members of the military governments who perhaps once feared retribution for their association with state repression.

Government structures differed greatly over the course of each regime's political lifespan, from political coup, to instability, to another coup or democratization. Questions of legitimization, civil liberties, and domestic security drive discourse surrounding national policy. How do these transitions affect nuclear development policy, especially with respect to the scientific and technological communities of nuclear development? I argue that these regime structures and policy choices play a large role in developing epistemic communities, and in fact instigate transnational connections over boundaries that led to orientation of goals and opening of opportunities for cooperation and shared development. While the democratic transition in the mid-1980s in both countries legitimized free flow of ideas and allowed for increased cooperation, the authoritarian regimes created a foundation of trust and relationship-building that allowed the community of scientists to develop strategies for the ABACC agreement.

Materials and Methods

This study analyzes the relationship between authoritarian bureaucracies and epistemic communities--specifically the impact of authoritarian bureaucratic structures on epistemic community powers in influencing nuclear cooperation among states. The key concepts relate to O'Donnell's 'bureaucratic-authoritarianism' (O'Donnell, 1988). By classifying the amount of political and economic exclusion, bureaucratization of governmental organizations, depoliticization, and transformations in capital accumulation within a regime, the political spectrum of authoritarianism can be widened and explored. Through exploring the levels of bureaucratic-authoritarianism in authoritarian regimes, key permissive conditions of the denuclearization decision. The epistemic communities are formed by key individuals within each country's nuclear program, which will be utilized as a means of determining the attitudes of and

relationships within the scientific communities of Argentina and Brazil. The selected individuals' transnational connections can then be analyzed within primary documents such as published articles, speeches and journals. In terms of bureaucratization, I explore the epistemic communities and their ability to voice opinions, as well as track support of the communities by various governments in the form of executive or legislative decrees.

I approach the project through a comparative case study that analyzes the bureaucratic authoritarian structure of the various governments within Argentina and Brazil between 1968 and 1984, along with identifying the influence of views and identities of those within academic and scientific epistemic communities on a state's nuclear policy based on personal accounts and their accordance with public policy. The research method provides identifies key networks and identities among nuclear experts. There may be alternative explanations to the findings, especially if those within epistemic communities are entrenched within the military echelons and maintained similar ideologies to the hardliner members of specific authoritarian regimes. Through analyzing the networks of these bureaucracies I can find relationships within the government regimes and their impacts on the nuclear experts.

Literature Review/Placement within Literature

IR Constructivist Theory

I propose that the authoritarian governments' decisions of nuclearization and international cooperation were influenced by academics and nuclear thought leaders in the region.

Additionally, I suggest that various elements within authoritarian regimes influence the scientific epistemic community, signifying a mutually constituted relationship. The work follows a constructivist international relations worldview, following Wendt's (1999) argument that

international relations are socially constructed as a summation of ongoing processes of interaction in social settings. This approach allows for a more in-depth exploration of norms and social structures within states that are neglected by other international relations worldviews such as realism. Discovering identities within the domestic structures of states, key scientists and politicians involved in nuclear development provides insight behind non-material motivations of security and individual behavior. Transnational nuclear knowledge building, especially as a result of NPT agreements and IAEA regulation, enables cooperation at an epistemic level. Constructivism provides a better explanation of cooperation given the many international scientists tasked with working on projects in different countries. However, the approach is viewed as less rational to proponents of realism. Those following neorealism and Waltz's (1981) nuclear optimism view having nuclear weapons as another form of deterrence that will ultimately avoid large-scale conflict. Rather than focusing on individuals, the states themselves provide security. States maintain the same structure, and all have the same interest: self-protection. After studying the interactions between Argentina and Brazil in the 1960s and 1980s, discourse suggests that there was a security threat, but actions among the epistemic communities and other actors overrode this view because of the shared views among experts that indigenous nuclear programs would reduce foreign dependence.

Regime Change and Denuclearization in a Global Context

As academics argue for democratization and regime change as a primary driver for denuclearization, other global examples such as South Africa, Kazakhstan, Ukraine, and Belarus provide further examples of the complexities involved with denuclearization that do not inherently concern regime type. Each country contains several different sets of motivations, from its existential crises to its economic gains.

Stumpf (1995) provides contextualization behind South Africa's decision to denuclearize. He presents two primary reasons for denuclearization: external threat reduction and the election of de Klerk as president of the country. After the fall of the Berlin Wall, the tripartite agreement terminating conflict among South African, Angolan, and Cuban forces, and independence of Namibia, South Africa no longer felt the external existential threats from outside actors. Coupled with the election of de Klerk as president and his implementation of domestic reforms, South African politics shifted internally and many noted the superfluous nuclear deterrent. While Stumpf hints that the initial political reforms towards democracy played a role, the termination of nuclear weapon development in the Y-plant occurred only six months after de Klerk came to office. As external threats were reduced, South Africa understood the liability of maintaining a nuclear deterrent, hoping to draw advantages internationally to its NPT accession as internal political reforms drew attention. The attention of the international community, and the pressures placed on South Africa after the reduction of its existential threats, Stumpf argues, is what drew South Africa into the NPT.

In the instance of Kazakhstan, Tokaev (2004) notes the internal conflict among political actors in the Kazakh government. From his position as deputy foreign minister of Kazakhstan, Tokaev states the decision to denuclearize was "far from unanimous," as a great quantity of political actors lobbied the president Nursultan Nazarbayev to use Kazakhstan's resources to maintain the strategic stockpile of nuclear arms as a security safeguard (Tokaev, 2004: 93). Kazakhstan's ultimate decision to sign the Lisbon Protocol, according to Tokaev, resulted from security assurances provided by all five permanent member states. Kazakhstan at the time was not a fully-developed western style democracy, and relied upon autocratic methods of government that reduced the populace's voice in the matter. Even over ten years after the signing

of the Lisbon Protocol, he continued to note the need for continued political development. He suggests that international influence and economic development rather than popular opinion and civil rights drove key political actors into making a decision for denuclearization.

Similar to Kazakhstan, Ukraine and Belarus also emerged from the Soviet Union's collapse with nuclear weapons arsenals and faced similar political and economic problems. Gak (2004) argues that the Ukrainian decision to dismantle its nuclear weapons program came from its successful negotiation of security assurances within the international community, but also takes into account the complex nature of denuclearization. Ukraine claimed ownership of the nuclear weapons within its sovereign territory, primarily out of economic hardship. This was due to the value of the nuclear material involved and the need to hold negotiating power with Russia, who at the time gave Ukraine fuel rods for its nuclear power plants that provided the country 50 percent of its energy (Gak, 2004:119). Ukraine desired less dependence on Russia, and through reaching out to NATO countries for security assurance, Ukraine also achieved economic diversification. Pursuing denuclearization provided foreign powers to revise policy towards Ukraine. The United States expressed willingness to provide economic assistance if Ukraine denuclearized through the Cooperative Threat Reduction program, which Gak argues accelerated the denuclearization process.

Lastly, in the case of Belarus, Cerniello (1996) surmises that denuclearization occurred as a consequence of NATO-Russia negotiation, a part of a larger conflict resolution among former rivals. As Belarus became threatened by NATO states expanding eastward, Belarus pursued initial cooperation with Russia by maintaining its nuclear weapons, ultimately transferring its arms to Russia when tensions were resolved. Belarus sought security under Russia and economic benefits as a result of it, while Russia sought to regain its nuclear weapons. Cerniello notes that

Belarus felt financial strains with regards to withdrawing the nuclear weapons, and waited on Russia to provide compensation for the uranium found within the warheads. He does not mention the internal political situation, further hinting at a larger political battle, using Belarus as a sort of proxy.

Many times, as illustrated by the cases of the other countries, international assurances and the potential for development and economic gain is enough of a cause for developing a framework for denuclearization. Yet even with democratic conditions, the conditions can foster debate over nuclear weapons development. Countries such as Australia faced internal discussions and discourses behind developing an indigenous nuclear weapons program. Broderick (2014) links Australia's participation in the Atoms for Peace program with its desires to acquire nuclear weapons. The Plowshare program, mainly the use of PNEs, gave the Australian Atomic Energy Commission (AAEC) thermonuclear weapons as proxy weapons that led to a hole in treaty interpretation in the 1960s. Broderick points out how NPT negotiation documents reveal an Australian dialogue for internal deterrence, which was only quelled after popular opinion deemphasized the Plowshare program.

Explanations of Argentine-Brazilian Denuclearization

Denuclearization is a widely covered topic in international relations literature. Given the fact that Latin America is the first successful NWFZ in the world, authors utilize the Treaty of Tlatelolco and analyses based on its implementation and negotiation as a model for denuclearization and non-proliferation elsewhere. With the emergence of 'comparative regionalism,' authors like Etel Solingen (2001) analyze Latin America's domestic models of denuclearization for relevance and potential application in regions such as the Middle East with the primary function of identifying coalition development. Redick (1994) suggests an Argentine-Brazilian 'convergence of views'

on nuclear issues based on documentation from the 1967 Tlatelolco treaty formation. At the time of negotiations from 1964-1967, Argentina had a fragile civilian government eventually crumbling under the authoritarian coup of General Juan Carlos Onganía in 1966. In Brazil, there existed a military government following a 1964 coup, which indicates that denuclearization was pursued under fragile and authoritarian governments. Redick also notes how both countries hoped to facilitate integration into the NPT framework over time and their governments faced similar pressures from the great powers of the USSR and the United States. Perhaps a similar standing internationally in foreign perceptions of the two countries provided further explanation behind movements towards denuclearization. Few explanations attend to forms of denuclearization. While Sagan (2006) explains why nations pursue nuclear weapons, his factors of nuclearization--domestic politics, security and norms--could offer explanations behind denuclearization. Hughes (2013) attempts such an argument with the case of Argentina and Brazil, identifying the primary factors of norm building that drove each country to denuclearize.

Epistemic Communities as Transnational Bridges

Haas (1992) proposes a structure in which not only state figures but academics and thought leaders on certain policies drive state behaviors. These thought leaders also cross political boundaries in their connections, and can influence cooperation. Haas presents four conditions in which an epistemic community forms. The community must have a “shared set of normative and principled beliefs” in addition to “shared causal beliefs, which are derived from their analysis of practices leading or contributing to a central set of problems in their domain” (Haas 1992:3). Also, the communities must have shared notions of validity which drive knowledge evaluation and a common policy enterprise, which in the case of Argentina and Brazil is obviously nuclear development. I will utilize this structure to help develop a network of epistemic communities in

the Argentina-Brazil case study and will then explore regime type as an influence on these structures and institutions. Through identifying states' internal influences and groups, more reasons and motivations behind denuclearization can arise. Kutchesfahani (2010) applies the epistemic community approach to the cases of denuclearized states including Argentina and Brazil.

The cases of the two countries provides an outline for the conditions within epistemic communities to promote non-proliferation. Among the greatest influences on the success of non-nuclearization initiatives between Brazil and Argentina is that of "shared normative, principled, and causal beliefs." The framework created by policymakers encouraged bilateral inspections, which led to further connections among communities and development of similar norms (Kutchesfahani, 2010: 52). Kutchesfahani identifies the transnational structure of academic and professional nuclear development communities in South America within her analysis, in addition to directing her focus on state administrators and international institutions. Her approach, however, does not provide in-depth coverage of the early stages of the epistemic community during periods of political turmoil under authoritarianism. Under the epistemic model, knowledge and the diffusion of information lead to shifts in the patterns of decision making. The approach identifies epistemic communities and individual states as primary actors.

Regime types, Bureaucratic Authoritarianism, and Transitions to Democracy

I build upon Kutschesfahani's approach by explaining how the structure of authoritarian regimes, especially those formed under the umbrella of O'Donnell's (1988) 'bureaucratic authoritarian' regime types influence epistemic communities. My contribution will help to describe the complex role of regime type on epistemic communities in Latin America, offering further differentiation among authoritarian regime types other than that of 'personalist' and 'non-

personalist' dictatorships Way and Weeks (2012) propose. Both authors argue that regime type has been identified poorly and has been discounted as a factor for determining nuclear proliferation capabilities of a state. They separate authoritarian regimes into 'personalist' and 'non-personalist' dictatorships, and identify a higher threat of proliferation within personalist regimes. I agree with the approach, but argue that even reducing authoritarian regimes to personalist and non-personalist regimes is too simple. I will apply O'Donnell's 'bureaucratic-authoritarian' model to Way and Weeks' perspectives to better identify regime conditions and their roles in non-proliferation. Defining governments on a polarized authoritarian or democratic labeling system oversimplifies political structures.

O'Donnell (1988) provides a basis for authoritarianism in the context of development and economic crises. Using Argentina's government from 1966-1973, he notes the dependency and transnationalization of society. He states, "The productive structures of these societies are complex and differentiated, but at the same time they are unbalanced and incomplete in that their vertical integration is limited by the dearth of internal production of complex capital goods and of technology" (O'Donnell, 1988:12) This can be applied to both Argentina and Brazil, with a strong connection to each country's nuclear programs. Their pursuits for indigenous nuclearization highlight this notion, as both countries faced the dilemma of not only financing the ambitious projects, but also developing a knowledge base and infrastructure for sustainable future development.

Findings

Key Epistemic Actors

After analyzing the personal accounts and official documentation of members of the Argentine-Brazilian epistemic community of nuclear development, the role and influence of regimes on these actors is highly apparent. Within the community, I identified and focused upon key epistemic actors within each country's nuclear development agencies.

In Argentina, three primary figures proved vital in the nuclear epistemic community: Rear-Admiral Oscar Quihillalt, Jorge Sabato, and Vice Admiral Carlos Castro Madero. As president of the CNEA from 1956 to 1973, Quihillalt brought forward discourse of cooperation throughout his time with the commission and allowed for the autonomy and civilian-driven policies of Sabato as the director of the Metallurgy department of the CNEA. Sabato devised structural and policy adjustments in his position until he left the organization in 1976. In the second period of CNEA existence during authoritarianism, the primary actor from 1976-1984 was Vice Admiral Carlos Castro Madero, who took on the presidency of CNEA in 1976. His role brought continued development with the emphasis on production within the Vidal regime (.

Brazil's key scientific epistemic influencers were Hervasio Carvalho, Mario Schenberg, Paulo Nogueira Batista, and Jose Goldemberg. Carvalho was the president of the Brazilian agency, CNEN, from 1969 to 1982. He played a direct role in forming relationships with members of the CNEA such as Castro Madero, and he maintained a consistent role in developing the commission's organization as political conditions changed within Brazil. Schenberg was exiled to the United States after the 1964 coup in Brazil. Many other scientists were compulsorily retired as the military government shut down universities. Schenberg's work outside of Brazil demonstrated the knowledge base of Brazilian nuclear physicists, and also demonstrated the negative role of authoritarian repression on Brazilian nuclear development with his exile. Nogueira Batista was the president of Nuclebras from its founding in 1975 to 1983. He

was a career diplomat that played a role in negotiations when Nuclebras was working hand-in-hand with West Germany. His various relationships and discussions are important to understand as the Brazilian program developed parallel ones. Goldemberg was professor at the University of Sao Paulo's Institute of Physics, which he directed from 1970 to 1978. Among other roles within academic institutions, he also held roles within government and became a key environmental policymaker in Brazil.

These actors are by no means the only actors within the respective epistemic communities. Each actor however, provides a distinct viewpoint and role within the larger transnational Argentine-Brazilian epistemic community and represents distinct parts of the community that created the foundation for the ABACC agreement. The actors provide individual discourses behind key findings in the establishment of the epistemic communities and qualitative evidence behind influences of regime type on nuclear development.

Finding 1: Early Discourses of Cooperation and Shared Normative Beliefs

Discourses of cooperation and shared research existed among Brazilian and Argentine scientists as early as 1967. The letter by CNEA President Oscar Quihillalt to Brazilian foreign minister sent after a visit by Brazil asking "to facilitate a direct exchange of ideas" provided a fundamental understanding that the CNEA and the CNEN, Brazil and Argentina's attempts at indigenous nuclear development, had ties and frameworks in place for communication (CNEA, 1967). With respect to indigenous development, both countries shared similar stances in policy debates regarding the NPT and technological autonomy. Brazil and Argentina viewed the NPT as a discriminatory regulatory regime, and despite signing the Treaty of Tlatelolco, both countries avoided accession of the NPT until 1995 for Argentina and 1998 for Brazil.

Both countries also had a shared idea of technological autonomy and energy independence of region. Roberto Ornstein, Head of International Affairs at the CNEA stated in a conference in 2012

“What existed on the Argentine side, and this I can state clearly and in full conscience – and the facts demonstrate the same on the Brazilian side – was a strong desire not to be restricted in absolutely nothing that could be an option within the uses of nuclear energy: explosions for civil engineering purposes, development of electricity generation from nuclear sources, etc., but military uses were never in the cards” (*The Origins of Nuclear Cooperation*, 2012: 64)

This admission follows suit with the transnational dependence explanation that O'Donnell presents as an economic motivator for regimes. As Argentina progressed with nuclear development, the goal was not nuclear weapons, but expanding the country's domestic capabilities. Brazil shared those views- in the tenth session of the Brazilian National Security Council in August 1947, the foundation of the Brazilian Atomic Energy Program, director Alvaro Alberto argued,

“Nothing justifies the thesis of a restrictive international policy, capable of summarily depriving nations possessing the raw materials from which nuclear fuels are extracted from the right to utilize them in a peaceful manner, since a similar policy does not apply to other natural sources of hydro energy, also unequally distributed in the several regions of Earth” (Brazilian National Security Council, 1947).

Alberto's critique of international efforts to regulate uranium which he considered to be led by the United States brings forth discourse of anti-imperialism found in Latin America since the Monroe doctrine's creation in the early 19th century. The often negative views of the United

States brought about a common ‘enemy’ in which Argentina and Brazil were working against in terms of independent indigenous nuclear development.

Finding 2: Development of Nuclear Energy Commissions within Authoritarian Bureaucracies

Structures of nuclear energy commissions in Argentina and Brazil affected scientific development as authoritarian bureaucracies became institutionalized in regimes during the late 1960s and early 1970s. Within Argentina, Jorge Sabato’s push for CNEA autonomy and centralization in development provided stability and power despite changes in politics. As Adler (1988) notes, both Quihillalt and Castro Madero developed a form of leadership and political influence that “provided dynamism and continuity” which allowed for the CNEA under Quihillalt to watch eight governments rise and fall throughout his eighteen years of leadership (Adler, 1988:73) However, despite leadership from Quihillalt, the primary individual to develop a consistent set of policies and objectives was the head of metallurgy: Jorge Sabato. He brought forth the idea of a “triangle of relations” among the government, production structures, and scientific-technological infrastructure (Sabato, 1973). The notion of the triangular structure suggests that Sabato hoped to consolidate production structures and scientific-technological infrastructure under the umbrella of CNEA, while also maintaining positive standing with the government through Quihillalt and Castro Madero. Quihillalt and Castro Madero were obviously involved in and associated with the Argentine military, but according to Ornstein:

“The Argentine armed forces were never seriously involved in the nuclear question. The nuclear problem was never an issue for the Navy. The fact that some of the presidents of CNEA had come from the Navy is due to mere coincidence. They were specialists in nuclear issues and had graduated as nuclear engineers” (*The Origins of Nuclear Cooperation*, 2012: 75).

In that regard, the connection to government worked in favor of autonomy, given the scientific expertise of both active admirals. Under the framework of Bureaucratic Authoritarianism, there still exists exclusion of the general citizenry from leadership roles. Quihillalt and Castro Madero were both within the military, yet both preferred scientific roles over military ones. Yet with Quihillalt's approval, Sabato worked to draft policy stating, "The foremost objective of the Argentine atomic energy policy has been to build up an autonomous decision-making capability" (Sabato 1973: 25).

In Brazil CNEN was decentralized. The commission's autonomy was constantly under scrutiny, placed initially under executive branch and then under mining and energy ministry. Competition with other energy sectors after the West German deal led to uncertainty and distrust of the authoritarian regime. The many institutions which the CNEN was supposed to work with (the Institute of Radioactive Physics, the Institute of Nuclear Engineering) were widely dispersed throughout the large country (Adler, 1988, 79) Instead of developing capacity internally, the CNEN and the Brazilian government turned to foreign markets. The Angra 1 reactor, purchased from Westinghouse, marked a diversion from the centralized, domestic development in Argentina. The conflict among the various groups within Brazil hindered development, giving Argentina a relative advantage for more rapid nuclear development in the 1970s according to Adler.

However, the superiority of the Argentine program at the time was not adversarial, as Oscar Camilion, Argentine Ambassador to Brazil from 1976 to 1981, describes in *The Origins of Nuclear Cooperation*. Camilion had invited CNEA leader Castro Madero and Nuclebras President Nogueira Batista to a meeting. In the meeting, both figures spoke about the situations of both programs. Camilion notes,

“At that time Captain Castro Madero said very seriously to Ambassador Nogueira Batista, a good friend of mine, that from the technical point of view he was worried about the program agreed between Brazil and Germany because he knew of the previous German difficulties with its first plan for a 750mW plant. He believed it would be very difficult to build a 1350mW plant without having carried out any prior tests” (*The Origins of Nuclear Cooperation*, 2012: 43).

The constructive criticism presented by Castro Madero and the reception of various ideas by Nogueira Batista reflect standard of scientific exchange. Scientists build on one another’s advice and work, which easily pushes towards a path of cooperation. While Camilion explicitly notes that the meeting was by no means filled with discourse of cooperation, he presented the incident as

“a demonstration of the goodwill and constructive spirit between the two highest officials responsible for the nuclear programs of the two countries. The atmosphere [of cooperation] started to be created in the nuclear establishments” (*The Origins of Nuclear Cooperation*, 2012: 43) .

The acknowledgement of an atmosphere of cooperation in the 1970s indicates that the basis of cooperation formed throughout the trials and tribulations of each program’s structural problems. Each group sought advice in order to advance their respective agendas.

Finding 3: Authoritarianism and Expansion of the Nuclear Epistemic Community

Authoritarian regimes did in fact cause expansion and connections of epistemic groups transnationally, through brain drains and brain gains as a result of repression and exile and through maintaining preexisting national and international contexts. In both Argentina and Brazil, scientists faced persecution. In Brazil the exiles of several scientists occurred after the AI-

5 decree by its 1964 military government. The decree compulsorily retired physicists like Jose Leite Lopes and Mario Schenberg- some of the world's most promising physicists, and placed them in involuntary and voluntary exile until the 1970s in the United States and Europe. Mario Schenberg commented on not only the role of the forced retirements on his personal life, but on Brazilian development:

“I was revoked. I do not know if it was revoked, if the term is technically correct, but in any case, that's what happened. And of course, I know the fact that I had to interrupt my collaboration with the Brazilian Center for Physics Research hurt me a lot and, perhaps, hurt also to other sectors of Brazilian science” (Schenberg, n.d.)

Authoritarian restrictions on civil rights also affected Argentine program development:

According to Kutchesfahani (2010), in the mid-1970s, some scientists in the CNEA fled to Brazil due to low salaries, poor working conditions and intense political persecution. Jorge Sabato himself left the CNEA and began to protest the regime's treatment of scientists and repression of civil liberties. The global connections as a result of exile and disassociations with existing political regimes created an inherent lack of nationalism that drove nuclear experts together.

Other possible influences in unifying members of transnational epistemic communities were preexisting economic connections and allowed attendance at international science conferences. Luiz Augusto de Castro Neves, Deputy Chief of the Energy and Mineral Resources Division at the Brazilian Foreign Ministry (1979-1981) noted another important element: already at the end of the 1960s, Brazil was the second largest trading partner of Argentina and Argentina was the fourth most important trading partner of Brazil (*The Origins of Nuclear Cooperation*, 2012). The economic connections of both countries could be seen as a precursor for the establishment of MERCOSUR as well as the ABACC, especially as countries worked to adopt

policies of cooperation in peaceful economic regards. The political regimes did not prevent scientists from participating in various international conferences as well: Argentine and Brazilian scientists attended Pugwash conferences throughout the 1970s and 1980s. Nuclear specialists Enrique Otieza, Carlos A. Mallman and Jorge Sabato of Argentina and their Brazilian counterparts Oscar Sala and Jose Goldemberg attended conferences in 1973 and 1978 (Pugwash, 2007). Conference topics were about the participation of scientists in Latin American development and about social values and technological choice, which suggests nuclear topics arose during discussions. These connections were relatively unimpeded during authoritarianism, and allowed opportunities for professional and personal links along with direct collaboration among Brazilians and Argentines.

Finding 4: Nuclear Specialists' Negative Opinions in Policy Advocacy

Specialists' negative opinions of government instigated discourses and policies of denuclearization. In Argentina, public approval of the program resulting from nationalism and pride in its success after the 1945 Richter fiasco was overridden by disappearances of 15 CNEA members in state terrorism (CNEA). Even Castro Madero, a member of the navy, "pressured the Argentine government hard in order to achieve quickly an agreement with Brazil. On the other hand, this was facilitated by the good relations that Castro Madero had established with Hervásio de Carvalho, the president of CNEN, and afterwards with the president of Nuclebrás, Paulo Nogueira Batista." (*The Origins of Nuclear Cooperation*, 2012: 64) Leveraging connections as the Argentine regime attempted to decentralize and loosen power from the CNEA, Castro Madero pursued cooperation to end Vidal's overarching goals of secretly pursuing nuclear weapons use.

In Brazil, scientists in the CNEN opposed Nuclebras government deal in 1975, because of the government's flip-flopping from importing nuclear technology to development of its own nuclear technology created suspicions of its redundancy. Brazil also had a wide array of hydroelectric options that were at the time being ruled out as policymakers preferred nuclear development (Memorandum, 1978). As the authoritarian regime continued to repress civil liberties found within democracies and also silenced dissenters, Goldemberg believed that the government was not able or not willing to suppress the voice of physicists when it came to nuclear development. He states:

“Perhaps [the government] recognized the value of our inputs. I learned much later that precisely in 1975, when the German nuclear deal was launched, the state enterprise in charge of the expanding electrical supply (ELETROBRAS) was seeking government support to start the Itaipu Dam. Being part of the government, ELETROBRAS could not openly oppose the nuclear deal even though it competed with government projects, but very quietly it supported our position” (*The Origins of Nuclear Cooperation*, 2012: 68)

Goldemberg also believed that the majority of Brazilian scientists understood nuclear energy for peaceful purposes

“could only play a very limited role in Brazil, because of its enormous untapped hydroelectricity potential and because of the possibility of developing other renewable resources. There was thus no justification for a crash nuclear program as envisaged” (Goldemberg, 1998).

This hints at a Brazilian epistemic resistance to furthering nuclear development, especially with the advent of parallel military programs. Scientists advocated cooperation

because they hoped to ensure their ability to develop peaceful nuclear programs while curtailing the impact of the state.

Policy Recommendations and Conclusion

After analyzing the contextual framework for installing the ABACC agreement and the agreement's ties to authoritarianism, I urge academics and policymakers alike to reconsider using ABACC and the Brazilian/Argentine example as a direct framework for denuclearization, given a variety of reasons. Brazil and Argentina have coexisted for over a century (since 1828) without bilateral armed conflict between the two countries. While discourses of conflict emerged within public speeches by the military governments of each country, the reality of Argentine-Brazilian relations is that both countries are interdependent with one another, and share similar goals.

While Brazil and Argentina had different sovereign governments, the scientists and technical specialists within each country had shared experiences of repression, exile, cooperation and development that added to the norms in which the transnational epistemic community was formed. Other areas of the world may have more diversity in histories of scientists, along with their place in various governments. For example, Iran's and Israel's governments and nuclear programs both are driven out of antagonism, and lack systems of mutual transparency that the CNEA and CNEN had from the outset of development. While the Iran nuclear agreement may enable development of more trust in the region, Israel still demonstrates its firm disapproval of the agreement, seeing it as international legitimization of an Iranian nuclear program. Compared to the shared goals and shared contextual ties of scientists in Latin America, Israel and Iran see each other as threats. It can be argued that in South America, there was no existential threat

given the even-matched and generally peaceful post-independence relations and development of nuclear capabilities within both countries.

Political conditions internally drove formation of national epistemic communities as epistemic communities played a role in promoting transnational cooperation: agreements came after decades of progress. The initial propositions of cooperation in 1967 were not fully reached until 1991. Arguments that the collaboration started in the period of post-authoritarianism do not take into account personal connections scientists shared, and the shared belief that scientists build off of one another's work. Nuclear science is based on a foundation of international collaboration. The Manhattan project and even Argentina's and Brazil's programs had received aid in many forms from countries like West Germany, the United States and others. Not to mention, neither side developed full capacity for detonating or delivering nuclear weapons before the 1991 agreement. Goldemberg noted that his former students involved in the Brazilian navy's secret program of weaponization said that the progress was nominal (Goldemberg 1998). One element discouraging cooperation and eventual regulation were the negotiations over the Itaipu dam (Letter, 1974). The Brazilian decision to build one of the world's largest hydroelectric dams on the Parana River upstream of the Argentine territorial claims on the river, caused political strife. The Itaipu negotiations slowed progress on nuclear cooperation.

I do suggest, however, using the case of Argentina and Brazil as an example for leveraging epistemic community formation especially with regards to curbing nuclear weaponization. Scientists and technical experts represent a key set of actors in the development of a comprehensive international nuclear strategy of denuclearization within a given region, and has been overlooked in many current debates in areas of denuclearization and nuclear collaboration. To make use of the epistemic communities within the nuclear sphere, it is

necessary to identify policy objectives of scientists. The approach that integrates the ideas of scientists will best identify a comprehensive solution towards denuclearization.

Regime type does factor into the status of epistemic communities in both positive and negative ways. While the CNEA in Argentina was able to develop autonomously, mostly free from governmental constraints, that autonomy was challenged during the Vidal regime as scientists were disappeared and livelihoods were threatened. In Brazil, the lack of centralization under the regime led to unofficial competition and networks of support among various groups like Nuclebras and CNEA. The parallel programs instituted by the military of Brazil were successful in enriching uranium, but had no support from civilian epistemic actors. The Brazilian discourse on developing indigenous nuclear energy capabilities was questioned given the Itaipu project, and thus civilian scientists like Goldemberg strayed away from nuclear energy in the post-Germany deal. As regimes influence the civilian epistemic actors, the opposite occurs as well upon civil liberalization.

Conclusion

Argentina and Brazil shared a similar set of circumstances and developed discourses of cooperation long before democratization and ABACC negotiation. The transnational legacies, coupled with the international basis of nuclear development created a framework of cooperation that expanded throughout respective periods of authoritarianism. Persecution of scientists and attempts at political exclusion of nuclear specialists created a similar socio-political standing of scientists in both countries. Similar goals of peaceful nuclear development were not zero-sum. Both countries hoped to produce indigenous energy and achieve prestige that was not dependent on another country's failure. While competition among governmental authorities provided a sense of an arms race, ultimately the development of nuclear capabilities for both countries were

driven by the civilian scientists who hoped to achieve nuclear sovereignty, not nuclear weaponry. Unlike the Manhattan Project's goal of developing a weapon to end a costly war, key figures in Argentine and Brazilian nuclear energy commissions worked first and foremost to develop internal infrastructures of a scientific and technological nature to support future development. Connections among scientists supported nuclear development for peaceful purposes, not weaponization.

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