

1 Global Science and National Sovereignty

A New Terrain for the Historical Sociology of Science

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There are good reasons for the renewed scholarly attention being given to the ongoing socio-political transformations of globalizing science over the last decade. Krige and Barth (2006b: 1) recently stressed that responses to major issues such as global warming, national and world security, health and well-being, and other social problems “largely depend on science and technology.”¹ They further point out that academic studies of the globalization of science and technology remain scattered in various disciplinary clusters, which hardly engage in a mutual dialogue. Historians of science and technology, sociologists of science, and political scientists interested in science and security issues rarely discuss each other’s work. They too often do not perceive that they are all involved in the production of a new field of research (Jasanoff 2005; Krige and Barth, 2006a, 2006b).

That is why Krige and Barth (2006b: 5) propose “build[ing] a bridge between historians of science and technology and diplomatic historians, political scientists and policy analysts who study international affairs.” This volume shares the same ambition, and it expands interdisciplinary dialogue to other disciplines: sociology and, to a lesser extent, science policy studies. We suggest that we call the new interdisciplinary field emerging from these efforts “historical sociology of science.” Sharing a common self-identification, as well as common research interests, will aid in producing more multidisciplinary publications on the globalization of science, and will draw attention to its major issues.

This volume provides detailed studies, both comparative and focused on single cases, which help map out the kind of questions that historical sociologists of science, as we shall now call them, can answer. In particular, this volume deals with how scientific disciplines, knowledge practices, and research objects have constructed, reaffirmed, and transformed national sovereignty throughout the twentieth century and into the twenty-first. We asked contributors, either sociologists or historians of science, to tackle the following questions: Which kinds of scientific knowledge, skills and capital do scientists set up in order to secure their professional autonomy, within

and outside of the nation? How do they demarcate the field of science from that of politics? Do they seek to put themselves under the patronage of nation-states, whose sovereignty they recognize as superior? Or, on the contrary, do they support the advent of international or supranational organizations challenging the sovereignty of nation-states for the sake of scientific universalism?

The first two sections of this introductory chapter explore how the existing disciplines of sociology of science, anthropology of science, and historical sociology treat the relationship between national sovereignty and science when studying globalization or nation-state formation. Based on case studies gathered for this volume, the third section shows how these disciplines can articulate with the emerging field of historical sociology of science.

THE GLOBALIZATION OF SCIENCE IN THE SOCIOLOGY AND ANTHROPOLOGY OF SCIENCE

Cosmopolitanism as a General Norm of Science

Sociologists of science, who had their heyday under the tutelage of Robert Merton (1942/1973, 1978), raised some of the same questions as we do, although in a significantly different way. Merton considered the relation between science and the state as rather invariable since the seventeenth century. He opposed the scientific spirit to particularistic attachments such as nationalism. Building on his pioneering work, sociologists of science studied the norms, as opposed to practices, that scientists profess as they adjudicate disputes between scientific theories and facts. Sociologists of science established the prevalence of four norms of evaluation in the natural sciences: “Universalism” prescribes that no one should be excluded from scientific discussions because of his/her social characteristics; “Disinterestedness” prescribes that scientists ought not to possess hidden political agendas; “Communalism” prescribes that scientists ought to make available to anyone their method of analyzing and collecting empirical objects; “Organized Skepticism” prescribes that truth claims should be subject to examination by peers (Cole, Rubin, and Cole 1978; Cole and Cole 1981; Merton 1996).

Merton (1942/1973) posited the wide acceptance of these norms as he hypothesized that their transgression would result in sanction.² In this perspective the real scientist, as portrayed by sociologists of science as well as by scientists themselves in the twentieth century, was an intrinsically cosmopolitan figure. Sheila Jasanoff (1987: 196) writes that “[m]uch of the authority of science in the twentieth century rests on its success in persuading decision-makers that the Mertonian norms present an accurate picture of the way ‘science really works.’ Unlike politics, science is ‘disinterested’ and ‘objective’ and, unlike religion, it is ‘skeptical.’”

This was especially true in the United States. The Cold War context in which Robert Merton developed his ideas influenced his argument that true scientists follow the cosmopolitan Enlightenment norms of universalism, as opposed to class-based truth claims in the natural sciences such as those exhibited by the Soviets, particularly during the Lyssenko affair (Hollinger 1999). In the 1960s, North American sociologists of science, heavily influenced by modernization theorists, believed that emerging countries from the South should follow the same cosmopolitan path toward modernity as the United States had (Price 1965). They shared the common belief that the whole world would inevitably adopt the universal norms of scientific enlightenment presumably initiated by the West, and that the world as a whole would move in linear fashion from the realm of magical thinking to that of scientific reasoning, although at different speeds and with different upheavals. Scientific globalization described a normative epochal change, bringing a welcomed unity of mind across cultures (Bell 1976).

North American sociologists of science have recently revived this approach, with its exclusive focus on the universal norms of science, in neo-institutionalist studies (Drori et al. 2003; Finnemore 1993; Meyer et al. 1997). Since World War II, so they observe, science has experienced a few striking worldwide features, such as the blossoming of national science policy bodies,³ the convergence between scientific educational curricula, and the expansion of female participation in science training. Furthermore, global scientific experts show a rather large degree of consensus on a wide range of policy problems. Experts' adherence to the same norms of communalism and universalism leads them to an objectivist vision of the world, whether the issue is science policy or political and strategic outcomes of research innovations, whether they deal with the management of nuclear proliferation or environmental issues (Adler and Haas 1992; Haas 1992).⁴ Transnational networks of scientists propose convergent solutions to global problems of development and welfare. As members of the "world society," they respect Mertonian norms of universalism, disinterestedness, communalism, and organized skepticism that prevent them from considering nations' unequal economic-technical and scientific capabilities as sources of a particularistic hegemony or resistance (Finnemore 1996; Meyer et al. 1997; Drori et al. 2003).

The Boundary between Science and the State as a Historical Construct

North American sociologists of science are thus mostly concerned with identifying and explaining the autonomy scientists can secure for themselves, in order to reject the extraneous influence of political and particularistic forces, like that of nation-states. Their perspective has echoed some questions asked by European sociologists of science, although both have drawn different

and sometimes opposite conclusions on the extent to which scientists can, and should, be said to be autonomous from states.

In France, Pierre Bourdieu (1975) stressed conflicting dynamics in the fields of science and power. Studying the relation between academia and the state, Bourdieu (1988) criticized the assumption that science is de facto autonomous from the state. Bourdieu (2001) does portray real scientists as seeking autonomy from the state. But, in contrast to Merton, Bourdieu and others (Heilbron 1995) show that if universalism and disinterestedness are often the manifest norms that scientists claim to adhere to when they adjudicate disputes, informal particularistic cultures operating in the scientific field build latent norms affecting how scientists construct this authority and autonomy. Bourdieu demonstrates that the symbolic boundary between the academic “field”—a set of relations of cooperation and conflict between diverse academic positions—and the state should not be taken for granted: It varies depending on the position a particular scientist has in the field, and on his/her social capital or *habitus*. Bourdieu further showed that as the academic field gained its autonomy in France, it became more complex as a system of social positions determined by the level and type of social capital accumulated.⁵ Indeed, differences in social capital generated various kinds of social predispositions and expectations as well as different cultures of knowing and evaluating knowledge (what Bourdieu calls *habitus*) among scientists. The relationship of joint autonomy between science and the state, even in the West, must therefore be placed in a specific historical context rather than being taken for granted. Depending on its history, a national field of science can be seen as a melting pot of autonomous scientists who will follow, in practice, Mertonian norms of cosmopolitanism and universalism, and of other scientists, who will follow practices more closely associated to the state logics, as they will select those works and students who shall reproduce the nation- and class-based characteristics that they, themselves, embody. In contrast to Merton, Bourdieu thus pays attention to whether science is determined by the state, but rarely analyzes how, in turn, science shapes the state.

This latter question has been recently raised by European sociologists and science policy analysts, who explicitly questioned the general value of the Mertonian model of science, arguing that post-war sciences, especially in the biochemical fields, transformed the articulation between states and sciences in a way that dramatically changed the informal culture shared by scientists and statesmen in the West (Gibbons et al. 1994, Nowotny, Scott, and Gibbons 2001). In an era when global science has become a producer of innovations and of products that are patented and appropriated according to national legal systems, the norms of universalism and communalism, which presupposed that science would create universally accessible goods, are no longer upheld. Hence, particular sciences have acquired new responsibilities vis-à-vis national and global populations that make it necessary for the state to challenge their normative isolation from society. Gibbons and Nowotny

et al. (1994) see techno-science as inevitably increasing democratization of access to research objects produced by science. They claim that globalized techno-science requires a norm of “reflexivity,” whereby the interests of social groups may be represented in the evaluation of science and scientific innovations. Then, science can conform to the norms of democratic representation upheld in liberal democracies. Against the supporters of the new techno-scientific order, other European authors have emphasized that the ways scientific innovations are appropriated at the national and global level often produce new inequalities both between citizens of the same nation and between nations at the global level (Beck 1992). According to Ulrich Beck, for instance, this tension between production and representation should become the focus of a global sociology of knowledge before one can conclude how science has transformed the state since World War II.

To further analyze this articulation between sciences and states, one could turn to the thriving field of Science Studies, largely marked by the anthropology of science. In contrast to Mertonian sociologists of science, since the 1970s, anthropologists of science have tackled questions pertaining to the globalization of science by providing rich archival and ethnographic analyses, often at the laboratory level (Bloor 1976; Latour and Wolgar 1979; Gilbert and Mulkay 1984; Callon and Law 1989; Pickering 1992; Shapin 1995; Knorr-Cetina 1999; Mackenzie 1999). Anthropologists have described local practices and idiosyncrasies that condition the production of knowledge. Behind the global trends toward homogenization and standardization, so they claim, is a multiplicity of interpretive frameworks largely conveyed through contingently organized networks of interpreters (Rosental 2003; Mallard 2005). One of the main tenets here is that the authority of science is ultimately contingent and construed through negotiation; closure of boundaries between science and politics is an historical construct that may reopen in new circumstances (Collins 2000). Therefore, anthropologists of science “invite us to take the boundaries themselves as entry points for inquiry into the relations between science and power, to ask how they come about, and what functions they serve in channeling both knowledge and politics” (Jasanoff 1987: 394). Their perspective, like that of Pierre Bourdieu, could thus be followed to study how global science transforms our understandings of national sovereignty today.

Too rarely, however, have anthropologists of science analyzed how scientists draw these boundaries between the political and the scientific, the national and cosmopolitan, the realms of representation and production.⁶ Of course, counter-examples exist. Historians of science have provided key leverage for historical sociologists, for they are more inclined to study the history of political sovereignty than are anthropologists, who focus on the micro-interactions of science. For instance, Steven Shapin and Simon Schaffer (1989) have showed not so much how the state can influence the autonomy of science, but how the rhetoric publicly authorized in scientific disputes can also affect the way the state action is legitimized.⁷ Treading such a path,

which capitalizes on the advances brought forward by the anthropology of science and tries to tackle issues pertaining to political sovereignty, requires an ever mindful attention to a series of issues that Sheila Jasanoff (2005) has highlighted. Historical sociologists of science should focus precisely on how scientists engage in scientific *and* political debates, in which scientists address both the question of their own identity as scientists and the question of the identity of the political sovereignty to which they claim adherence, as opposed to excluding themselves from debates about political sovereignty. In doing so, we could renew standard analyses not only in sociology and anthropology of science, but also in historical sociology.

HISTORICAL SOCIOLOGY AND THE PROBLEM OF SCIENCE- AND STATE-FORMATION

In this section, we briefly explore how historical sociologists have analyzed the rise of nation-states and national identities.

The Fate of Nation-States: From Marxist Mechanical Visions to the Understanding of Historical Contingencies

Historical sociologists have long paid attention to factors explaining the rise of nation-states and their hegemonic legitimacy in the realm of representation (Marx 1869/1991; Poggi 1978; Mann 1990; Tilly 1990). But they have scarcely paid attention to scientific issues. Marx and Engels (1967) explained the development of what Poggi (1978) later called the nineteenth-century national “constitutional state,” by the emergence of class-based alliances brought about by the rising capitalist system of production, which clashed with the feudal system of cosmopolitan dynastic rule. Poggi (1978) pointed toward the contradictions present in the eighteenth-century “absolutist state,” which led to the development of the nation-state⁸ as well as to the contradictions inherent in the nineteenth-century constitutional nation-states that led toward what he calls “post-constitutional states.” When observed in a dynamic perspective, nation-states appear as fragile entities, as pointed out by twentieth-century theorists of sovereignty (Schmitt 1928/1988; Arendt 1951; Habermas 1991). Any serious study in historical sociology should study these historically dynamic contradictions and tensions, which ground the state’s transformations. Observing the tensions that emerge in practice from the transformations of production and representation, in a context where production is increasingly driven by scientific innovations, and where representation is increasingly formatted by scientific undertakings (from the use of scientific polling methods to social scientific knowledge applied to shape political interests), opens a field for historical sociologists of science.

Although it often developed out of materialist accounts of the rise of nation-states, the field of historical sociology ultimately broke away from

classical Marxism.⁹ A theoretical shift occurred when North American social scientists influenced by historical materialism started to develop comparative approaches that stressed not only similarities across countries but also their differences (Moore 1966; Skocpol 1979, 1984; Laitin 1985; Evans, Ruesh Meyer, and Skocpol 1985; Ragin 1987; Hall 1989; Tilly 1989, 1990; Centeno 1993; Biernacki 2000; Adams, Orloff, and Clemens 2005; Prasad 2005). Orthodox materialists, like Poggi (1978), believed that the politico-legal changes (and overall the super-structure of values) evolved mechanically, in a quite general manner determined by the sense of world history, to solve contradictions between changing conditions of production and representation. Through a series of brilliant comparisons, American historical sociologists showed that ways of solving contradictions between production and representation were, on the contrary, historically specific, contingent on prior events that put each nation on certain pathways,¹⁰ including cultural creation of meanings through which these contradictions were understood.

For instance, Richard Biernacki (2000) used a comparison of British and German cultural understandings of the workplace to analyze how socio-technical differences in nineteenth-century British and German systems of production led to different understandings in each national context of the contradictions identified by Poggi as universals. These various cultural visions affected not only the production of critical theories (such as Marx's), but also claims for political representation and social compensation that shaped the politico-legal pathways taken by European countries. Margaret Weir and Theda Skocpol (1985) similarly developed a comparative analysis of the transformations that turned twentieth-century liberal nation-states into welfare states. They emphasized not only the role of class-based alliances, but also the different meanings associated with the Keynesian revolution that national experts diffused from diverse institutional niches. More recently, Monica Prasad (2005) explained how late-twentieth-century welfare states in Europe and America evolved into diverse types of neoliberal states, showing that different outcomes revealed a historical dependency on their prior pathways from liberal states to welfare states. In parallel, historical sociologists developed comparative studies explaining the diversity across nations of modes of governance of technology-intensive sectors, like railroads (Dobbin 1997), nuclear technology (Adler 1987; Jasper 1995), or information technology (Evans 1995). They showed how different states oriented technologies and sciences to help them respond to imperatives of national development.

This move toward historicist and cultural approaches using rigorous methodological imperatives brought both the "scientific experts" and "the state back in" (Evans et al. 1985). Scientific experts, historical sociologists told us, should not only be treated as "outcomes" whose transformations could be explained by production changes, but as dynamic actors, whose past development, present operation, and projected futures can generate

differences in the ways countries solve the tensions between production and representation.¹¹

The Shaping of Knowledge-Making Practices and the Creation of Subjects in Nation-States

Mechanical materialist conceptions of history have also been attacked by European scholars for their lack of attention to the historical contingencies and cultural understandings built into the contradiction between production and representation. The criticism and re-evaluation of materialist accounts initiated by American historical sociologists has taken a different route in Europe, under the major influence of Michel Foucault (1995, 2003, 2004). Michel Foucault paid more attention to the diversity of knowledge-making practices (from idea generation to methodological refinements, technological innovation and the cognitive re-ordering of social relations) than American comparativists did—the latter focused almost exclusively on the production of “ideas” rather than on the whole range of knowledge-making practices. Foucault’s analysis of disciplines, narratives, and biopolitics showed that Western economic activities were themselves shaped by forms of knowledge in the nineteenth century, which transformed the modern constitutional system of political rule. As Foucault (1995: 23) demonstrated, the operations of new disciplines in the social and human sciences subverted the dominant Enlightenment discourse of governance held by the constitutional state, by decomposing the governed body politic of the nation into a multiplicity of subjects and subjectivities, granting the state more power to exclude individuals deemed unworthy of entering into the national body politic. Foucault showed not only how new social sciences constituted new forms of administering power at the micro-level, but also how they contributed to transform the macro-level liberal conception at the heart of the constitutional state by building aggregates characterized by regular behaviors. The Foucaultian perspective derailed the historical logics assumed by materialists by emphasizing how much economy and political power relations are shaped by historically specific ways of understanding subjectivities and identities, themselves based on various scientific undertakings.

The same concern for such historically contingent and culturally specific forms of power inspired studies of scientific practices in Europe and particularly in France, which paralleled the developments in U.S. historical sociology. But French authors were less concerned than their American counterparts with the methodological issues raised by historical comparisons. Foucault (2003) himself compared widely across periods and countries, showing for instance how the invention of new forms of national subjectivities by new historiographic traditions in Britain and France propelled revolutionary political changes.¹² His followers did not seek to systemize his comparative approach. Some scholars, studying for instance the

development of statistical knowledge, built comparisons between different state knowledges in nineteenth-century Europe (Desrosières 1993; Porter 1995), without showing the same concern for identifying causal mechanisms and independent variables as American historical sociologists did.¹³ Foucault also inspired scholars in the United States. For instance, James Scott (1998) built on a Foucaultian approach to compare how twentieth-century nation-states created “legible” categories to increase their capacity to control subjects, extract resources, and predict future wealth in the name of social progress and decreased inequality. In the twentieth century, Scott (1998) labeled as “high modernist” these projects that not only made subjects more legible but also “re-wrote” identities and subjectivities to fit the standardized categories that sciences and states had developed to equalize their subjects. Other authors also conducted single case studies from which they built tentative generalizations, for instance of the ways in which scientific disciplines and imperializing European nation-states understood and thereby re-wrote the social fabric in colonized societies (Mitchell 2002).

The Missing Role of Natural Sciences in the Creation of Modern Polities

American and European historical sociologists have thus delved into the study of the conflicting transformations of scientific knowledge and forms of state and representative practices. Yet, most of them have so far limited their analyses of sciences to the social sciences. Rarely did they claim that natural sciences also reorder the political space of representation. Doing so might seem a long stretch, as many might intuitively think that the worlds of nature and politics are separate, and that the sciences that matter in the art of political government must be social and political. But anthropologists—or, rather, historical sociologists of science—have shown the contrary. Departing from his previous micro-level focus on laboratory knowledge practices in the biomedical sciences, Bruno Latour (1993) undertook a vast historical study explaining how the late-nineteenth-century French Republic transformed its vision of its responsibilities for the welfare of populations. Based on the case of Pasteur, he showed that both natural scientists and the state transformed the orders of nature (microbes, animals, humans-transformed-into-epidemiological subjects), policies (research programs, normal medical practices), and society (coalitions of scientists, doctors and peasants, etc.).¹⁴ Access to Pasteur’s innovations (the “pasteurization of France”) could not have happened without the development of a vast socio-technical network in which scientists became a central node, administering and arbitrating between divergent social interests.

American comparativists might have overlooked Latour’s work because they often privilege methodological standards over detailed analyses of how scientific practices operate in single cases.¹⁵ Too often, they have adopted a classical understanding of scientists as providers of “ideas,” whose

independent influence on state bureaucracies and class-based alliances they trace in diverse countries (Hall 1989; Adler and Haas 1992; Haas 1992). Peter Hall (1989) writes, for instance, that “[m]ost important are the theoretical characteristics of the ideas themselves, that is to say, those aspects of the ideas that render them more or less persuasive to other experts.” But as showed by Bruno Latour, comparativism will remain unable to capture how natural sciences—not just social sciences—can re-order both nature and politics if it does not engage in the study of knowledge-making practices. The study of pure ideas, just like the study of pure Mertonian norms, does not provide an adequate framework to capture their co-transformations.

Today, historical sociologists should extend their investigations from social to natural sciences, as the latter have been at the heart of the contemporary dilemmas faced by modern nation-states. Indeed, tensions between the formal requirements of equality in representation in democratic societies and the “durable inequalities” (Tilly 1998) in production and welfare have increased, both between citizens of the same nation and between states in the international sphere. Sciences sometimes lessen and sometimes exacerbate these tensions. On one hand, they produce new categories and new identities, which divide the body politic and allow states to legitimately target those populations that they deem worthy of their efforts to improve welfare, while excluding others from state redistribution. By doing so, they transform modern notions of political representation. On the other hand, sciences participate in production by creating scientific and technical innovations to which access is not universal. Thus they create inequalities between states and between citizens. The relationships between sciences and states, global science and national sovereignty are therefore tightly interdependent, in contrast to what some interpreters of Foucault have sometimes written (Hardt and Negri 2000; Rabinow and Rose 2003).¹⁶ Contemporary scientific knowledge practices are thus at the heart of the ways in which modern nation-states envision how they respond to the liberal imperatives of formal equality between citizens of the same nation and among nation-states in the international sphere, and to the challenges issuing from this demand for equality.

SINGLE CASE STUDIES IN HISTORICAL SOCIOLOGY OF SCIENCE

The contributions gathered in this volume explore these issues, with the same methodological concerns as historical sociologists and with the same attention to knowledge-making practices exhibited by previous anthropologists of science. This volume presents seven studies of how scientists have tried to respond to the two problems identified previously: balancing unequal access to the goods offered by scientific innovation with the formal goal of equality between citizens of a nation, and balancing unequal

economic-technical development across nations with the goal of formal equality between nations.

Strict historical materialists might identify this dilemma with the classical contradiction generated by tensions between production and representation. They might try to find a general rule showing the logic of history. This is not the approach privileged by our contributors. Each shows, rather, how scientists created cultural meanings accounting for their identity as scientific subjects and the identity of their scientific products, drawing boundaries between the national and cosmopolitan in historically specific ways, to solve or reduce these tensions. Our theoretical and methodological procedures thus implicitly question recent theories in historical sociology addressing the rise and decline of the nation-state as the most rational form of government.

The chapters in the first section, by Michael Gordin, Vincent-Antonin Lepinay, Grégoire Mallard, and John Krige, explain how practices that draw boundaries between cosmopolitan or national identities operate. They pay attention to the ways in which the operation of science worked to solve the aforementioned tensions, either by empowering nation-states to increase the welfare of their populations (Gordin and Lepinay), or by empowering cosmopolitan communities to reduce the economic-technical inequalities between sovereign states (Mallard and Krige). These case studies also highlight the different ways in which science is evaluated, either within the boundaries of professions and organizations (Gordin and Krige), or in the public sphere through a series of controversies (Mallard and Lepinay)—see Table 1.1 for a systematic presentation of case studies.

Professionalization as Nationalization of Subjects of Science

Michael Gordin points to these intersections of state and professional logics in Russia at the beginning of the century, in a context where the Russian state

Table 1.1 Single-Case Studies

<i>Where scientific claims are expressed</i>	<i>Identities claimed by scientists</i>	
	<i>National identities</i>	<i>International and cosmopolitan identities</i>
<i>Private debate within organizational boundaries (profession or international organization)</i>	Early-twentieth-century Russian chemistry (Gordin)	Post-war U.S. operation research (Krige)
<i>Public controversies aired outside organizational boundaries</i>	Early twenty-first-century U.S. biochemistry (Lepinay)	Post-war U.S. nuclear science (Mallard)

tried to catch up with more advanced European states. Both state officials and scientists sought to ensure the national autonomy of Russian knowledge producers from the hegemonic control of cosmopolitan (European) leaders in the field by professionalizing their discipline. Professionalization of chemistry meant, in the case of Russia, the adoption of national criteria by which knowledge producers and knowledge claims would be evaluated. This case study shows that the professionalization of science along Mertonian norms is just one among other historically specific strategies by which scientists try to gain more resources from their national states. The professionalization of Russian chemistry ran in contradiction to the common understanding of professionalization, conceived as the adoption of formal universalistic criteria based on earned credentials rather than on ascribed particularistic status (Powell and DiMaggio 1991). Indeed, Russian chemistry adopted a particularistic strategy, whereby the language, persons, and social stratification of science all had to be cleansed of Western influence to reflect Russian sovereign will and Russian identity. Russian chemists who had been expatriated for a few years in German centers of higher learning recruited one another into their “circles” through informal ties and on the basis of their nationality. The originality of this model, compared to what Merton claims to be characteristic of Western Europe, was that the same logic favoring informal connections and the use of particularistic criteria presided in the first professional association of Russian chemists. Most scientific debates were relegated to the prior and most pressing question of sharing the same language, ideology and national identity, or, as Gordin writes, the same understanding of what “it meant to be Russian” in certain contexts.

The case study presented by Gordin shows what historical sociologists could gain from an analysis of the intersection of natural sciences and state formation. To use Scott’s concept of legibility, the case of Russian chemistry shows that natural sciences not only created a legible society but also a legible nature for the Russian sovereign. At a time when the Russian sovereign state sought to achieve increased legibility of its society by strengthening both the surveillance of society within its territory and its military might at its frontiers, it also sought to increase the legibility of what it conceived as a Russian order of nature. The project of creating an elementary classification of nature that was truly Russian and amenable to use by Russian scientific elites was congenial to such leading scientists as Mendeleiev. The scientific elites, conscious of the vulnerability of the Russian empire, could not resolve themselves to adopt directly from Western Europe a functionally isomorphic nomenclature of natural elements, in the same way as the Russian sovereign could not count on direct importation of Western administrative science and laws to administer its populations. They thereby tried to find a way to order nature’s elements in a Russian way. Through the nationalization of the elements of nature, scientists tried to lessen the perception that their

level of scientific development was “backward” compared to West European nation-states.

While Gordin locates his story at the intersection of these macro-processes of profession and state-formation in a context of international state competition, he also insists on cultural and local factors. The Russian sovereign did not modernize its state infrastructure by resorting to the expertise of foreign experts directly advising the Russian government, as it did for a short period of time a hundred years after, when its leaders tried to build a market economy from the remains of the Soviet empire. As Gordin (p. 40) writes, “instead of importing all the infrastructure and context of science, so to speak, off the shelf, the Russian state preferred to train Russian subjects abroad in the epicenters of international science and then have them build up the necessary institutions for a self-sufficient scientific establishment at home upon their return.” The two-pronged process by which a state exported some domestic elites into the hegemonic centers of knowledge before importing them back to its territory is not idiosyncratic to the late imperial Russia, as is shown in the next section with the case developed by Yves Dezalay and Bryant Garth. The particularistic socialization encouraged by the later Russian profession in chemistry might just be the unintended consequence of this two-pronged process by which scientists built their discipline: The unanticipated alienation experienced by young Russian expatriate scientists in Germany fed an oppositional culture that found a structuring principle in a national sentiment built in the institution of the *kruzhok* (circle). Can this specific process that led to the creation of a professional science explain why the latter departed from the Mertonian normative model? Or is the story exclusively Russian and affected by macro-cultural Russian traits?

This case study cannot answer this question in a definitive way. But it provides interesting insights into the historical dependency of the path toward Russian scientific professionalization. Robert Merton believed that cosmopolitanism was strongly ingrained in the universalistic and race- or nation-blind character of the scientific ethos, and that internationalism represented a strong antidote to the evils of nationalism that plagued Russian biochemistry at the time when he wrote, agitated as it was by the Lyssenko affair (Hollinger 1999). But the case of early-twentieth-century Russian chemistry shows that Russian chemists were able to strategically use a kind of internationalism as a rhetoric furthering nationalistic goals. Indeed, and paradoxically, the process of distinction between German and Russian chemistry led, when Russian science was taken a step further, to a discourse in favor of the internationalization of the Russian scientific language and sociability, against French and German nationalisms that hampered the discipline in Russia. Here, the adherence by certain scientists to the value of internationalism stemmed from Russian scientists’ particularistic claims to relegate to the dustbin of history the French and German nationalistic claims to primacy. Russian science, at least twice plagued by some form of particularism,

either race-based, in the case of the pan-Slavic discourse mobilized in the early-twentieth-century controversies, or class-based, in the case of the Lysenko affair, claimed nonetheless to represent true internationalism. Claims of internationalism and cosmopolitanism, so Gordin tells us, therefore must be analyzed in the larger sequence of a specific historical and contingent pathway. In contrast to what Merton believed, internationalism did not run in contradiction with nationalistic claims of scientific primacy.

Contested Objects of Science: Public Controversies over National Identity

The recent controversy about stem-cell research analyzed by Vincent-Antonin Lepinay also shows that scientists' claims to represent a cosmopolitan identity are intertwined with claims to national supremacy in a context where the products of science have come to be identified as essential national assets. George W. Bush's 2001 decision to overlook the 1995 advice of scientific experts that the federal government should fund research on both embryonic and adult stem cells with promising health benefits has often been presented by liberals as the mere reflection of Bush's strict observance of a conservative and anti-science agenda promoted by pro-life and creationist groups of the American religious Right. Put simply, the debate would have posited pro-science versus anti-science; the Democrats who harbored the cosmopolitan values of the Enlightenment versus the Republicans who adhered to a backward nationalistic self-identification with the Christian faith of the Founding Fathers; the defenders of the autonomy of science versus those who wanted to crush its relative sovereignty. Lepinay explains that this controversy was more complicated than it first appeared. Both sides claimed a strong normative attachment to the values of science and the national interest. But they articulated different visions of science with diverse understandings of the national and cosmopolitan biological identities of the research objects manipulated by stem-cell scientists. In the same way as boundary-making practices between different understandings of "what it meant to be Russian" played a central role in scientific controversies in early-twentieth-century Russia, symbolic boundaries opposing different understandings of "what it meant to be American" mattered to define the boundaries of science and non-science in early-twenty-first-century American biomedicine.

Following the principle of symmetry long advocated by anthropologists of science (Bloor 1976; Latour 1987), Lepinay's analysis shows how political elites and scientists in the field of stem-cell research made competing national promises of "better living" (Foucault 1998) by drawing differently the boundaries between science and politics, and between national and cosmopolitan identities. On one side, the U.S. federal government assumed that embryonic stem cells were potential embryos, thereby reintegrating them into the national body politic as subjects over whom it had exclusive rights

to decide life and death. As this case illustrates, natural sciences participate in the definition of a nation just as social sciences do, as analyzed by Foucault (1995); and this process does not operate through the mere diffusion of “ideas.” Besides, the political sovereign itself often became a scientific expert, entering the technical debates. It contributed by setting the exploration of promises offered by alternative (adult) stem cells high on the scientific agenda. Rather than being anti-science, the political sovereign opposed real and fake science, and denounced the promises made by its opponents as illusions used by scientists to dupe a gullible public. On the other side, scientific contenders focused their criticism on what they perceived as their government’s lack of political concern for the national American interest. They endorsed a more nationalist than cosmopolitan subjective identity, as they accused the nation-state of betraying the nation: By limiting its national scientific subjects’ freedom of action, the federal state limited the protection offered by science to the populations constituting the American body politic. Besides, scientists claimed that George W. Bush’s decision could harm science by accelerating a brain drain from the U.S. territory to foreign countries less concerned with the political and ethical dimensions of their research objects. Far from valuing the cosmopolitan character of scientific subjects, scientists feared that migrations would lessen the national dominance of U.S. scientists, as measured in numbers of patents and publications. They endorsed the view that U.S. research laboratories should become a global “center of calculation” (Latour 1987: 214) extracting and administering the biological material of the whole world. Here, Lepinay shows that the scientists’ claims of both national and cosmopolitan allegiances were made possible by their reinforcement of the boundary between the (national) subjects and (cosmopolitan) objects of science. Here, thus, scientists and politicians both sought to achieve the contradictory goals of ensuring the widest welfare for their nation’s subjects (however extended their definition was) and the need to win the international competition.

Analyzing the cultural underpinnings of how each side perceived the solution to this dilemma between production and representation, Lepinay shows the import of different claims of morality by scientists and politicians. The setting in which these claims were proffered (i.e., the public sphere) differed from the traditional context analyzed by Mertonian sociologists of science (i.e., peer review). That public controversies involve an intensive work of self-presentation by those who participate in these debates as moral persons might come as less a surprise than the conclusion reached by Michael Gordin, that is, that the outcome of peer review in Russia itself was strongly determined by scientists’ moral and national attributes. In the case studied by Lepinay, the cultural importance of representing the voice of families in the United States gave both sides of the controversy a powerful symbol of morality to which to attach their political and scientific claims. This finding, nonetheless, builds upon the analysis of Steven Shapin (1994), who has showed that culturally constructed claims of morality were, from the

beginnings of peer review in the West, essential to assess the trustworthiness of truth and political claims, even if Merton might have considered them extraneous to the realm of scientific ethics.¹⁷

Lepinay shows that after the discovery that adult stem cells could also offer unexpected health promises, proponents of biological savings accounts placed all their hopes in this system of personal and familial insurance; those who urged scientists to respect the life present in embryonic stem cells could argue that these savings accounts reflected the broader historical national American character, for the need for solidarity in the face of future threats is here met by careful familial private planning and capitalization rather than by public offering of others' cells through a national public bank. Lepinay (p. 70) writes that the government could present "the solution of a family stem-cell savings account" as superior to "reliance on the generosity of unknown donors." This project would commensurate the subjects and objects of research under the same American identity.¹⁸ In contrast, the institutions of medical care based "their critique of this new system of biological banking" on the premise that familial autarky would disrupt "the traditional circulation of biological products between self and others, and will even threaten to duplicate and supplant them," (p. 68) thereby leaving scientists without access to biological material provided on the international market. Cautious not to challenge the importance of family in the formation of the American body politic, the coalition of patients and scientists presented themselves as representatives of another type of family. The "suffering family," as it is called by Lepinay (p. 71), bore no "allegiance to a particular territory and political community," as its situation of emergency required it to tap into a pool of biological material circulating on transnational markets. In this case, scientists' nationalistic affirmation of the necessity to maintain U.S. predominance in patenting the biological material circulating within these transnational networks of donors and patients was backed by this alternative figure of the American family, associated with the biological cosmopolitanism of their research objects.¹⁹ Whereas Gordin emphasizes the role of path dependency in the process of professionalization to explain how Russian science came to be defined as it was, Lepinay focuses on the role of macro-cultural constructions of the polity (in the American case, the polity conceived as an aggregation of families) to explain how it constrained scientists and politicians alike as they tried to hold together the contradictory imperatives of representation and production.

The Resistible Rise of Cosmopolitan Subjects of Science: Translations and the Public Sphere

Chapters 4 and 5 leave chemistry and biochemistry to explore the ways by which nuclear sciences shifted the legitimate boundaries between science, the nation, and cosmopolitan orders in the post-war discourse on nuclear proliferation and nuclear strategy. Applying the cultural approach developed

by sociologists of science (Gieryn 1983, 1999; Lamont and Molnár 2002) who have shown how scientists use the symbolic divide between science and non-science to acquire resources and autonomy from the state (Jasanoff 1987), Grégoire Mallard takes up the study of symbolic boundary-making practices between science and non-science to analyze the formation of proposals for cosmopolitan control of post-war nuclear science, in a context of intense post-war demands to share the benefits of nuclear energy at a global level. Until now, the literature has posited that scientists draw a boundary between science and technology to claim their cosmopolitan identity and their autonomy from nation-states' logics, especially in light of rising inequalities of access to new technologies between nations. When they do so, scientists dismiss the validity of the traditional political logic of representation in the realm of science, on behalf of a developmental ideology that acknowledges no national boundary to progress.

The case of wartime and post-war debates over the dangers and promises of nuclear science and technology presents an interesting counter-example. Mallard shows that, on one hand, nuclear scientists who managed the Manhattan Project during the Second World War drew a clear Mertonian boundary between an autonomous science and the heteronomous realm of technology. Doing so justified American national desires to keep their scientific and technological discoveries from their wartime allies, not only the Soviet Union but also the United Kingdom, and to sequester those activities with unclear boundaries under the national control of the United States. As they claimed, the United States had the duty to exchange scientific information with its allies, but it did not have to share any information on the technological procedures that they developed within the Manhattan Project. On the other hand, a large number of nuclear scientists who worked in the Manhattan Project espoused the views of scientists in exile in the United States, who blurred the boundary between science and technology in order to justify their claims to create, after the war, a cosmopolitan space for science and technology development whose production would benefit all humanity. American nuclear scientists and New Deal lawyers, like David Lilienthal, who prepared the United States's official nuclear nonproliferation policy after the war, endorsed these views. When they prepared the so-called Acheson–Lilienthal report, this alliance of scientists and developmental New Dealers forced the top scientific management to extend and blur the boundaries between science and technology, as they attempted to supersede the traditional power of the sovereign nation-state over representation in science and politics. In the place of the nation-state, deemed responsible for the protection of its people thanks to the control of its territory, they wanted to substitute a new sovereign, made of a cosmopolitan community of nuclear scientists whose supranational authority would grant them the responsibility to protect all populations (humanity) thanks to the control of their expert knowledge. At the same time as they claimed that both science and technological research products (discoveries, theories,

facts, technologies, know-how, etc.) belonged to the “fraternity of the men of science,” New Dealers and cosmopolitan nuclear scientists re-introduced a boundary between science and politics. This time, however, the boundary did not differentiate between types of research products, but between types of subjectivities. They argued that international affairs in the nuclear age should be conducted by persons who “know the facts.” They claimed that traditional representatives of nation-states were incapable of seeing beyond their national interests. New Deal lawyers, whose passion for technology was mixed with doubt about the capacity of national legislative bodies to regulate economic development at times of emergency, strongly supported this attack on the old view that democratic representation was the national prerogative of representatives of the nation-states.

Grégoire Mallard highlights the key processes that explain why nuclear scientists and New Deal lawyers failed to institutionalize this boundary, which they advocated, between the realm of international diplomacy and nuclear science and technology on one side, and the realm of national politics on the other side. He shows in particular the major role played by those who “translated” (Latour 1987) these different policy proposals, both in the domestic public sphere and in the international public forum. Here, he confirms the finding that “ideas” do not have a role of their own, in contrast to what comparativists like Peter Hall (1989) tried to argue. Indeed, public debates did not conform to the structured exchange of transparent information and ideas—the implicit model of transactions in scientific peer review, assumed by Merton (1978).²⁰ During the Truman administration, the message that nuclear scientists and New Dealers sent to the Russians and to the Allies was consistently blurred in its translation into policy and diplomacy by public officials designated by Truman. This capacity of “policy entrepreneurs” to “translate” policy proposals into new proposals that hardly resemble those previously prepared by experts is rarely analyzed by political scientists (Haas 1992), as they believe that the messages sent by experts in the international sphere can be as transparently understood as theorems in physics in peer review. Mallard shows that processes of translations explain whether, and how, policy proposals come to be accepted. The experts’ social capital, as Pierre Bourdieu would have called it, mobilized by those who designed policy proposals in transnational networks, certainly played a role in determining who was allowed to make these translations. In the case of post-war debates about international control of nuclear science, most of the policy proposals were based on the claims made by nuclear scientists in exile, who lacked the social capital to be the direct representatives of their proposals in international negotiations. In contrast, in the case of transatlantic negotiations over the future European Community of Atomic Energy, also inspired by cosmopolitan scientific ideals, those experts who proposed such a plan to President Eisenhower had enough social capital to directly translate their proposals to U.S. administrations (Mallard 2005). A sociology of knowledge-making practices, extending far beyond the limited study

of ideas and their diffusion, is therefore needed to understand the creation of international organizations.

Scientists versus Experts: Informal Cultures at Work in International Organizations

In post-war transatlantic debates about the rational definition of Western nuclear strategy, scientists benefited from a pre-existing international organization, the North Atlantic Treaty Organization (NATO), to buttress their desire to create a cosmopolitan space for scientists sharing research norms and procedures beyond the boundaries of their nations. Although the diffusion of the American “science” of Operations Research (OR) was not engineered by the highest political U.S. authorities but by academic entrepreneurs, like Philip Morse, it was in affinity with broader American efforts to modify the formal organization of NATO. It was a logical step toward the accomplishment of Eisenhower’s goal to shift the burden of nuclear responsibilities in the West European theatre to the Europeans themselves. The education of continental European experts in the science of OR would have created the informal culture within NATO, based on the sharing of similar nuclear war planning norms and procedures. It would have enabled a future united continental European nuclear authority to make rational decisions regarding the use of nuclear weapons.²¹ Yet, John Krige shows that changes in the informal culture of NATO were as hard to implement as changes within its formal structure, although for different reasons. Indeed, whereas domestic U.S. concerns largely explain the limitations of Eisenhower’s attempts to change the legal provisions of NATO, which were for the most part welcomed by European allies,²² socio-cultural differences between NATO nations explain Philip Morse’s relative failure to diffuse an American way of conducting the science of OR. As Krige (p. 131) writes, “‘Operations Research’ was not just a clutch of theories, not just a set of computer-based models ‘applied’ to practical problems. It was also a set of social relations” that had to be exported to the national contexts in which OR would be diffused. Like Grégoire Mallard, Krige rejects the hypothesis offered by political scientists such as Peter Hall (1989): Ideas cannot be separated from organizational and socio-economic factors that would explain the international diffusion of public policies. In this case, two factors prevented these new American “ideas” of OR from affecting European nuclear strategy: what Pierre Bourdieu would have called the *habitus* of European experts in OR and the informal culture within NATO.

Philip Morse’s efforts to diffuse American OR within NATO aimed to create a new kind of Western scientist of OR closely embedded within both academia and the military, as were MIT scientists. This new transnational class of Western scientists could trespass disciplinary boundaries and develop formal mathematical solutions applying to a wide range of problems, which the military would implement. But such a *habitus* was rare in

European nations, where the different fields of knowledge were structured along lines that opposed the university and the military. Thus, the socialization pathways proper to each national culture explain the lack of influence of Morse's socio-cultural model. Krige also shows that NATO's informal culture, emphasizing the role of the military and stressing the need for security and privacy, left little room for a transnational space of science to be developed within its closed organization. If the military commanders sought to rationalize North Atlantic nuclear strategy, they objected to transnational "scientists" of nuclear strategy on the grounds that they could adversely affect security. They preferred to train national "technicians," working as *attachés* and accountable before their government inside the international (rather than supranational) organization of NATO. By drawing a boundary between science and non-science, transnational versus (inter)national, general knowledge versus applied knowledge, the military authorities as well as the scientists sitting on NATO's scientific boards defined the subject of OR in terms that were opposite to those promoted by Philip Morse.

One would expect that the formal existence of an international organization (NATO) would have facilitated the social relations of cosmopolitan scientific subjects. Krige's study tells us that such was not the case. This counterintuitive finding is explored by highlighting how the informal culture at work in NATO prevented the creation of a cosmopolitan space for OR. This example shows the primacy of the implicit cultural norms of the organization over its formal structure, especially when the two conflict with one another. NATO formally placed under its jurisdiction the developments aiming at "strengthening Western science" officially sponsored by its members. As Krige (p. 121) writes "NATO's interest in OR was part of a general concern to strengthen European science and technology," involving also Western governments as well as American philanthropic organizations, like the Ford Foundation, and other international organizations²³ such as the Organization of European Economic Cooperation (OEEC) and the European Community of Atomic Energy (Euratom). Indeed, after 1953 and Eisenhower's accession to the U.S. presidency, the United States was involved in a series of attempts to re-frame the formal structure of the North Atlantic Alliance, aiming at building a better equilibrium between its state members. The new strategy proposed by Eisenhower was to gradually shift control of the nuclear defense of Western Europe from the United States to an integrated North Atlantic structure, uniting the Europeans as a whole on one side and the United States on the other side (Trachtenberg 1999). The President's plan did not go as far as he wished, mainly because of domestic Congressional opposition. He could not obtain from Congress the authorization to delegate authority to fire nuclear weapons in the European battlefield from the President to the Supreme Allied Commander in Europe (SACEUR). He also had some trouble convincing the U.S. Congress to allow technology transfers in dual-use activities from the United States to continental European nations.²⁴ He did, however, achieve a long-lasting

change outside of NATO's formal structure, as he obtained the formal transfer of U.S. controls over exported fissile materials in Europe from the U.S. Atomic Energy Commission to the Euratom Commission and its control agency (Mallard 2009). These political and diplomatic developments affecting the formal organization of nuclear responsibilities in NATO form the legal background in which the search for a continental European nuclear strategy in NATO took place, including the case of OR explored by Krige. A sociology of knowledge-making practices, attentive to the cultural differences in the construction of various *habitus* among transnational networks of experts, and to the informal cultures at work in international organizations, is necessary to understand how these international organizations can change, or not.

COMPARATIVE STUDIES IN HISTORICAL SOCIOLOGY OF SCIENCE

The next set of chapters shifts the focus from the construction of identity and social *habitus* to more structuring factors, illuminated by comparative approaches. Each of these chapters pays attention to the ways in which the operation of science worked to solve tensions between representation and production, either by empowering nation-states as to increase their populations' welfare (Dezalay and Garth; Gaudillière and Joly), or by empowering cosmopolitan communities as to lessen the economic-technical inequalities between sovereign states (Dahan Dalmedico and Guillemot). These cases also highlight different ways of articulating identities, either within the boundaries of professions and organizations (Dezalay and Garth; Dahan Dalmedico and Guillemot), or within the public sphere, through a series of controversies (Gaudillière and Joly).

The Social Determinants of Autonomous Scientific Fields: Social Capital

Like Gordin, Yves Dezalay and Bryant Garth analyze the diffusion of a science from the center to the periphery of the "world system" (Wallerstein 1976; Chase-Dunn 1979), in a context in which logics of profession and state-formation entertained an ambiguous relation with the goal of achieving greater equality between sovereign states. They enrich our understanding of hegemonic designs underlying the diffusion of post-war economics—others have recently focused on the same issue (Fourcade-Gourinchas 2001; Fourcade-Gourinchas and Babb 2002). They see the post-war science of economics as a hidden weapon for American political hegemonic ambitions. Global dominance of U.S.-made economics would operate through the American "geographic concentration of centers of excellence supported by a cosmopolitan recruitment process." (p. 143) The project embedded into

Table 1.2 Paired Comparisons

<i>Where scientific claims are expressed</i>	<i>Identities claimed by scientists</i>	
	<i>National identities</i>	<i>International and cosmopolitan identities</i>
<i>Private debate within organizational boundaries (profession or international organization)</i>	Post-war economics in South Asia (Dezalay and Garth)	Late-twentieth-century climatology (Dahan Dalmedico and Guillemot)
<i>Public controversies aired outside organizational boundaries</i>	Late-twentieth-century biogenetics in the North (Gaudillière and Joly)	

economics as a science was also one of social reform in South Asia, aiming at transforming the social fabric of national elites in the periphery. Thus, our contributors complement previous studies by political scientists interested in the diffusion of economic ideas, like Keynesianism (Hall 1989), while totally changing the viewpoint. Political scientists have long assumed that “ideas” can be singled out as a separate factor, distinct from both “institutions” and “interests,” which affect the global diffusion of economic policies; they have designed comparative strategies that allow them to highlight the influence of one factor (ideas) by controlling that of others (institutions and interests). On the contrary, following Pierre Bourdieu (1984), Dezalay and Garth claim that ideational, institutional and economic factors operate through specific classes of *habitus*, which bind together socially constructed individual attitudes and expectations.²⁵ Therefore, as already highlighted by Krige, ideas cannot travel across borders and be supported by foreign governments, economic powers and bureaucratic institutions, if not through the emergence of new classes of idea makers, whose *habitus* is compatible with the broader goals set by these ideas. Dezalay and Garth’s analysis focuses on the factors that allow new classes of cosmopolitan idea-makers to emerge from the social fabric of different countries. They build a comparative framework that allows them to control for both the political and historical idiosyncrasies in each society. They can thus specify how social processes of status attainment are modified with the formation of a new *habitus* in a cosmopolitan class of knowledge producers in the periphery. Here, their empirical focus has moved from South American countries (Dezalay and Garth 2002) to four South and East Asian countries, and their selection of cases is based on two dimensions: the nature of the peripheral regime, either democratic (India) or authoritarian (South Korea, Philippines and Indonesia); and its relative openness to U.S. hegemonic imports, either relatively open (South Korea and the Philippines) or relatively closed, due to enduring close elite relationships with the colonial metropolis (India and Indonesia).

The composition of social capital among cosmopolitan knowledge producers varied across the four countries under study, and with it the pre-eminence of economics in public policies, as well as the ability of the first generation of economists in the new peripheral professions to mold the economic doctrines that future generations would come to accept as legitimate. The *habitus* of the first-generation economists in the periphery was marked by the 1950s U.S. emphasis on developmental economics, still inspired by the example of the New Deal. When their social capital was strong enough, they successfully maintained the legitimacy of their knowledge in spite of the paradigmatic shifts affecting the U.S. economic profession after the neo-liberal turn of the late 1960s—and this, independently of the political and historical characteristics of each country. Both Indian and North Korean economists, whose ties with the state and social elites were grounded on a shared *habitus*, succeeded in filtering and translating the new economic principles brought from the United States by new generations of returning post-docs who had studied neo-liberal economics in the United States. In contrast, in the Philippines, where returning post-doctorates who had studied in the United States lacked the shared social capital of their Indian and South Korean counterparts, first-generation cosmopolitan economists did not succeed in maintaining the legitimacy of their views after the American paradigmatic shift. They were soon replaced by U.S. neo-liberal economists, who directly contributed to the shaping of their domestic policies.

Pierre Bourdieu's inspiration leads Dezalay and Garth to unexpected findings. One deserves special mention: the effect of the state's political nature on the speed with which generational renewal occurs in a specific professional field (an issue that Pierre Bourdieu never tackled, just as he rarely used international comparative approaches in his work). Our contributors show that the discontinuous nature of regime change in authoritarian regimes, with its traditional series of *coups d'Etat*, actually accelerated the rate of entry of new generations into the highest echelons of the profession. Indeed, the series of coups in authoritarian states required new state elites to find new economic advisors to differentiate their domestic image from that of their predecessors. So the economic profession needed newcomers ready to respond to this demand. Besides, after a coup, new state elites needed to build up their legitimacy vis-à-vis international organizations (like the IMF), and they recruited new professional entrants with enough cosmopolitan credentials to speak the latest language shared by these international organizations. This was the case for instance in Indonesia. In contrast, in democratic regimes like India, where state power was exercised with relative continuity, professional elites could maintain their grip on expert niches for a longer time, retain legitimacy as advisors, and could appear neutral and bipartisan.

This comparative analysis of processes of profession- and state-formation in the periphery therefore departs from that of the previous chapters. Michael Gordin, John Krige, Grégoire Mallard and Vincent-Antonin

Lepinay all emphasized the role of collectively constructed self-presentations and boundary-making practices between national and cosmopolitan identities, as they were manipulated by scientists trying to reshape the legitimate forms of scientific and political sovereignty. While Dezalay and Garth also show the essential role played by cosmopolitan and national elements as parts of scientists' *habitus*, they treat them as social resources, rather than as essentially contested cultural representations, which more often than not enter in tension with one another, especially in the case of economics, the internal logics of which are driven by the contradiction between the logics of production, which economics seeks to rationalize, and representation, which economics claims to shape in a democratic fashion. However, their analytic shift from the cultural to the social does not mean that they are unaware of the tensions between the logic of representation and production, and between cosmopolitan and national elements in scientific and political *habitus*. Indeed, as they write, the new U.S.-centered cosmopolitanism of Indian elite economists often turned them into what the authors call "*hérésiarques*," challenging the doxa of their own national class of origin, thus putting them at risk of being perceived as foreigners in their own country—a strong liability in postcolonial states where the domestic purity of the body politic is defended with fierce nationalism. Hence, to the extent that the authors' model points toward these tensions in the subjective positioning of economists from the periphery, it leaves room for the cultural approaches developed by the preceding chapters. It would be interesting to apply the case studies method to see how economists from the periphery were able to draw symbolic boundaries between their national and cosmopolitan identities when these tensions created by their split *habitus* arose.

Changing National Regulatory Regimes: Transnational Legal Cultures

In a double comparative analysis, Jean-Paul Gaudillière and Pierre-Benoît Joly focus on the transformation brought by the globalization of science to the regulation of the objects of science (here, cancer-testing procedures and genetically modified organisms, or GMOs), and in two countries (France and the US). In contrast to Dezalay and Garth, they pay little attention to the selection/regulation of the subjects of science. They largely ignore the way the globalization of science transformed the *habitus* and subjective identity of those who could claim authority in national scientific fields and over their nation-states' public policies. Rather, they analyze how the globalization of new markets for scientific products privileges the nation(s) most advanced in the discovery and patenting of these new products (in this case, the United States) and impacts the way in which states, scientific professions, and consumers identify and appropriate new research objects in each nation.

Among historical sociologists, the construction of the identity of research objects is generally overlooked by sociologists of development, who simply claim that national regulations will differ depending on their country's position in the global techno-scientific race: on one hand, leading countries advocating for free trade; and on the other hand, developing countries advocating for gradual state regulation of imports so that they can not only consume new products but also learn to appropriate specific niches in their global production (Adler 1987; Evans 1995). Political scientists and historical sociologists alike, such as Sheila Jasanoff (2005), Frank Dobbin (1997), or James Jasper (1995), have also shown that macro-political cultures of state action generally regulate the marketing of innovations by identifying common sets of tasks and rules to solve similar problems. These macro-political cultures, which Sheila Jasanoff (1987) also calls "civic epistemologies," give meaning to specific innovations, which are then administered by the state according to the rules embodied in past regulations. Historical sociologists thus tend to emphasize path dependency and long-term macro-cultural idiosyncrasies. Their approach generally leads authors to compare how the regulation of the same scientific/technological innovation differs in a wide range of countries, otherwise similar in terms of technological/economic conditions.²⁶

Jean-Paul Gaudillière and Pierre-Benoît Joly contend that this approach gives too much credit to the role of the state in the definition of research objects, and fails to analyze how political change is brought about by scientific change. According to them, analysts should observe how identities of objects originate in the interaction of a wide range of heterogeneous actors, each working to impose new cultural understandings of scientific innovations, at different levels, both formal and informal. To make their point, the authors adopt an alternative comparative strategy: They limit the number of countries (comparing only France and the United States), but they extend their comparison to two different sectors (biomedical innovations and agricultural bioengineering products) in each country. Thus, they analyze how four cases of scientific regulation are affected by globalization, which are differentiated along two dimensions: the unequal national levels of scientific development for each technology (the leading scientific position of the U.S. in the race for patenting cancer test procedures over France versus the relatively equal initial position between Europe and the United States in agronomic research); and the type of political macro-culture characteristic of each country (supposedly market-oriented in the United States versus state-oriented in France). The authors are thus able to point out the role played by the collectively constructed identity of research objects in the transformation of their regulation, while controlling for the broader technical/economic factors (generally emphasized by sociologists of development) and political/cultural elements (generally privileged by historical sociologists) affecting their regulation in each case.

The United States held a strong advantage over France in terms of patents and marketability of breast cancer tests. American professionals and state officials advocated loose regulation that fostered these tests' marketability to the broad public, while the French professionals and state officials prevented the expansion of this market by restricting their access only to sick populations under clinical observation. In contrast, in the case of the regulation of GMOs, in which American and European research centers initially held a relatively balanced technical/economic position, the state and the profession advocated at first a fairly similar set of proposals in each country. Both American and French bureaucrats and experts expressed the view that these new products should be regulated by the state and preexisting professional authorities before their introduction on the market, and that they did not require specific rules, which might hamper their economic promise. At that early stage in the innovation process, Jean-Paul Gaudillière and Pierre-Benoît Joly's comparison seems to give advantage, to a certain extent, to the approach privileged by sociologists of development over that of historical sociologists: Differences in levels of development matter more than civic epistemologies.

However, the final policy outcomes differed from the initial regulations, bringing the authors to analyze, as Michael Gordin did, the dynamics of each case, and its specific sequence. This leads them to discover the shortcomings of strictly cross-national comparative approaches generally used in sociology of development and in historical sociology. In particular, they show the limits of a purely cross-national comparative approach, which sees countries as isolated and independent units and ignores the circulation of cultural meanings and public policies in a global era. Globalization disrupts the autonomy of states' political culture, as transnational networks of experts and activists can modify the lenses through which both professions and states understand the meaning of a product and define the adequate tools to regulate its production. Shifting attention to the meaning-making activities of transnational networks, which reframed the identity of research objects according to new lenses, the authors are able to explain how the public perception of each research product became the site of intense controversy, which unfolded in unexpected ways.

For instance, they show that policy advocacy of transnational networks, such as Greenpeace, and national organizations, such as the French *Confédération paysanne*, changed the identity of GMOs in France. They turned an object that was originally presented as a "national" asset, which French public officials and scientific experts sought to develop and market, into a threat to the national existence of a whole range of actors who symbolized France's body politic and cultural purity. As they write (p. 182) GMOs came to "symbolize globalization" and "acted as a lightning rod for criticism of its distorting effects on French agriculture." In a Latourian manner, as already exemplified by Vincent-Antonin Lepinay's argument, Jean-Paul Gaudillière and Pierre-Benoît Joly (p. 183) point out that the re-qualification of research

products from “national” to “anti-national” was performed thanks to the mobilization of new “[d]isciplines, not previously considered to be relevant, like agronomics, ecology and population genetics.” The mobilization of this counter-expertise changed the ways in which these products came to be seen, not just as genetic constructs whose internal purity would be assessed, but also as social and environmental constructs, whose interactions with the outside world needed to be evaluated. Wendy Espeland (1998) already discovered similar processes affecting the environmental decisions to stop dam construction in the United States when new disciplines were mobilized to create a “space of commensuration” between the real world and the artificial world assumed by risk-assessment exercises. Here, the novelty introduced by Gaudillière and Joly is to show that these re-qualification processes were part of larger processes of globalization, which created new transnational coalitions as well as new legal principles adopted by international organizations, whose meaning-making practices overflowed states’ traditional lenses and cognitive routines. Indeed, in the case of GMOs, the counter-expertise introduced by transnational experts and expert-citizens affected not only French debates but also American ones, although in different ways.

A major factor explaining why the American and French public and professional authorities responded differently to these transnational challenges is actually to be found in the evolution of the international legal/constitutional cultures of which these states are part (in this case, the United States and the European Union). Whereas the United States did not reject traditional liberal adjudicating procedures, in which decisions are made on the basis of scientific facts presented by the plaintiff (in this case, transnational networks proposing a counter-expertise), the constitutional adoption of the precautionary principle in Europe and in France shifted the burden of proving “scientific facts” from the plaintiff to the defendant: Bioengineering companies had to prove that their products did not harm the environment. As this was not yet possible, as is often the case in these disputes (Beck 1982), American public authorities concluded that the defendant was authorized to market its products, whereas French public authorities concluded that the introduction of these products should be postponed until the defendant could present scientific facts. The difference in constitutional adjudicating procedure explains why the controversies led to different outcomes. The same is true for the case of cancer testing procedures. French scientists, followed by the European Union, denounced the American authorization of generic patents (patents that concern not only a technical discovery with direct application, but also the whole range of indirect applications that might be discovered in the future), as being a direct proof of American hegemonic designs to appropriate nature without regard for the due process. In this case, a transnational coalition claimed that U.S. scientists unduly nationalized the subject and object of science, while research had just started as a multinational and cosmopolitan endeavor.

Gaudillière and Joly thus show that, in a global era, the policy outcomes in terms of regulation of diverse techno-scientific objects will depend less on the economic/technical initial position of each country, or on the broader political culture of each state, than on two other factors: the ability of defendants and plaintiffs to redraw the boundaries between cosmopolitan and national identities of the techno-scientific subjects and objects; and their ability to present their case before international courts (the World Trade Organization, or bilateral organizations), whose adjudicating procedures will directly affect the outcome. This conclusion reaches to some extent the opinion of sociologists of science, like John Meyer and his colleagues (Finnemore 1996; Meyer et al. 1997; Drori et al. 2003). But, whereas the latter portray the interactions between transnational networks of experts in the world society as consensual and harmoniously webbed around the same Mertonian norms and procedures, Gaudillière and Joly emphasize the conflicts between the norms to which scientists adhere. In a world where legal pluralism in dispute adjudication procedures is more often the norm than the exception, more research would be needed to define the relationship between transnational experts and international organizations, and their role in challenges against the representatives of the nation-state.

Changing Informal Cultures in International Organizations: Subversion Tactics versus Mobilization of Social Capital

Amy Dahan Dalmedico and H  l  ne Guillemot present a comparative study that points to some of the processes at work in interactions between an international scientific organization and the national scientific communities of its member-states. Normative conflict in transnational and international scientific relations, as identified by Gaudill  re and Joly, is also here certainly more prevalent than the kind of consensual culture posited by John Meyer and his colleagues. Dahan Dalmedico and Guillemot's argument is all the more powerful a case against John Meyer's argument, as in the case they study, the working of the Intergovernmental Panel on Climate Change (IPCC), adjudication of political/scientific disputes is by consensus only. Hence, by unearthing the changes in the informal culture of this international organization, the two authors are able to show that behind the vernacular jargon that is generally spoken in the world society about the worth of consensus-building procedures, the desirability of science for development, etc., the history of the IPCC is rife with implicit conflicts about norms and procedures. Their study nicely complements that of John Krige, as it explains how the informal culture of an international organization could be changed, and not be reproduced as in the case of NATO analyzed by Krige.

Dahan Dalmedico and Guillemot insist that one must go beyond the formal guidelines that describe how international organizations are supposed to work. In the case of the IPCC, the inner working of the organization differed

widely from the neat linear process that was supposed to draw out decisions and prescriptions about climate change from sound physical science. The authors show that the formal structure of the organization was set according to the principles of the linear model of diffusion of science, wherein the moment of discovery of scientific facts, which comes first, is clearly demarcated from the moment of political decision making, which comes second. Indeed, the IPCC was originally divided into three groups: one devoted to gathering physical facts about climate change through a simulation methodology pioneered by U.S. scientists during the Cold War; another assigned to assess the impact of these changes on the socio-biological environment; and a third group charged with the design of strategies to curtail the most damaging impacts and to address the most critical vulnerabilities. According to formal guidelines, decision-making thus proceeded from sound science to expert evaluation of impact, and finally to political decision making about alternative solutions. But as the two authors tell us, the inner informal working of the IPCC constantly bridged the boundaries set between each group in the neat linear sequencing of decision making: for instance, economists and environmental scientists present in the second and third group asked physicists and mathematicians of the first group to incorporate the effect of their proposals in the physical simulations.

National and regional concerns soon overlapped with these disciplinary conflicts, and national viewpoints entered into the scientific debate. The authors compare how different groups of countries tried to build up their credibility in the IPCC as they sought to influence its inner working and informal culture. They compare two types of strategies, that of a North Western country, France, and that of a group of Southern countries. Both types of countries tried to question the logical primacy of the physical models of the first group, initially largely developed by American scientists, over the whole sequence of decision making—a primacy that was built into the guidelines of the IPCC. But the two groups of countries followed different strategies to challenge this primacy. French scientists tried to give credibility to their own original models of climate change in the first place, therefore reinforcing the formal primacy of the physical climate scientists while proposing alternative models. In contrast, Southern states tried to reshuffle the balance of power between the three groups and various disciplines. These different countries might have chosen these different strategies because of national differences in technical development of climate science: Southern states that lacked the technical infrastructure to develop their own physical models asked the first group to hear their voice through their influence in the two other groups, which gathered “softer” and less capital-intensive sciences. The two authors suggest another line of explanation: The different levels of autonomy reached by different national fields of science might also explain strategic differences.

Here, their analysis reaches back to that developed by Dezalay and Garth, who emphasize the relationship between scientists’ *habitus* and the level of

autonomization of a scientific field from external demands, whether the latter originate from states or international organizations. Indeed, the case of France shows that climate science has been polarized around a set of routines and expectations embodied by scientists, in a manner characteristic of fields that have attained a high level of autonomy (Bourdieu 1988). As the authors (p. 209) write, the field opposed different “cultures, *modus operandi* and the criteria that determined what constituted worthwhile research” for climate scientists. In other words, the field was structured around various *habitus*. Those scientists who valued what they perceived as original, personal and pure research resented the demands placed upon them by the IPCC’s request for modeling simulations that involved a lot of menial and collective tasks with low scientific payoffs. The autonomy reached by the field of climate science in France thus “partly explain[s] the dearth of French models in the first two IPCC reports.” (p. 209) French scientists who gradually rose to the challenge offered by the IPCC’s agenda-setting strategy adopted a counter-strategy that was partly dictated by this specific *habitus*. They did not engage in the debates of the two last groups of the IPCC, which might have been less costly in terms of time and resources. Instead, they chose to engage the debate with what they perceived as the “purest” scientific aspects of the IPCC’s work: the methods of simulation modeling developed by the first group of the IPCC. Hence, the socio-cultural dispositions developed in national scientific fields have to be taken into account to understand why various countries choose specific strategies to engage with the working of an international organization.

The comparison between the cases of France and Southern countries shows that the national development of an autonomous field of research is not the only strategy that nation-states can pursue to influence the workings of international organizations, a point that Yves Dezalay and Bryant Garth’s comparative framework did not highlight. Indeed, in contrast to France, Southern countries that lacked an autonomous national field of climate science adopted a strategy of subversion oriented against the formal organization of work developed by the IPCC. Paradoxically, it seems to have been more successful at changing the agenda of the IPCC than the strategy of French scientists, a point toward which John Krige’s analysis already hints, when he compares British re-definition of OR within the informal culture of NATO and American efforts to mold the *habitus* of scientists in national fields of OR. Indeed, Southern countries subverted the symbolic order at the level of practice, by inverting the formal hierarchy between the different groups of the IPCC. The last conferences held by the organization raised the questions addressed by the two last groups up in the agenda. Southern experts were successful in doing so partly by drawing a boundary between what they perceived as the “Northern language” of simulation modeling and the cosmopolitan role that the IPCC as a whole was supposed to play. As Southern experts, numerically dominant in the IPCC, were mostly present in the two last groups, they sought to shift the inner balance of power

in the IPCC through boundary-making practices between national (regional in this case) and cosmopolitan identities. The fact that the IPCC integrated from the start a wide range of disciplines allowed disciplinary and national battles to be played out within the organization, without being widely publicized abroad. As reported by one of the authors' interviewees, this informality smoothly shifted, without apparent public polarization and controversy, the identity of the problem that scientists were supposed to solve from "climate" to "impacts" and eventually to "development." This constitutes a striking difference with the examples discussed by Gaudillière and Joly, who also emphasize the role played by the introduction of new disciplines in the reframing of research objects. In the cases they discuss, however, the new disciplines had been excluded from the start, and their involvement in discussion could only take the form of public controversy orchestrated by the media. In the case of the IPCC, the informal inner balance of power in the IPCC could subvert its formal order without major public dispute.

CONCLUSION

From these chapters, we can conclude that the sovereign power of the nation-state has been more resilient throughout the century than the profusion of new definitions of sovereignty at the transnational, supranational, and international levels would lead us to expect. But this resilience, this surprising strength, evidenced throughout the volume, hides the multiple transformations undergone by the meaning of science and that of the nation. John Meyer and his colleagues have developed an influential linear narrative, according to which the globalization of a Mertonian model of science and expertise since the Second World War, embedded at the transnational level, in relative autonomy from the realm of nation-states, helped to strengthen the sweeping hegemonic legitimacy of the nation-state, conceived as the most rational form of government. In contrast, these single-case and paired-case studies highlight the challenges and sources of conflict between various forms of political authority entailed by the globalization of science. Global sciences have often confronted nation-states with the imperative of holding together the conflicting goals of both ensuring increased production and fair representation. Although historical sociologists have overlooked the specific political transformations undergone because of techno-scientific changes, they have recognized that nation-states have responded to global challenges based on their historical idiosyncratic trajectories, macro-cultural norms, and differential levels of development.

These chapters provide key analytic tools to conceptualize both reproduction and change in a political order pressured by the globalization of technosciences. These concepts are not altogether new, but they are applied here to new terrains and new processes. Michael Gordin emphasizes the path dependency of the socialization processes of chemical scientists in Russia, from its

beginnings to its later take-off. Such path dependency can be explained by what Yves Dezalay and Bryant Garth would call a structured and structuring scientific *habitus*, the characteristics of which can be reproduced in succeeding generations when a scientific field has gained national autonomy from international pressures, but not from its own nation-state. This process of autonomization of a national scientific field from the world premiers in the scientific race is also predicated, Dezalay and Garth tell us, on the kind of *habitus*, or social capital, from which first-generation scientists can benefit at home. Pioneers of science must be capable of drawing on multiple connections to their state bureaucracy, economic elites, and national imaginaries if they want to be able to reproduce the kind of socialization pathway in which they have developed their expectations and predispositions. In that way, the Mertonian structure of science, wherein scientists must entertain no relationships with state elites and avoid making claims to national purity as they go on producing and evaluating science, is the exception rather than the norm for scientific take-offs in a world of unequal scientific development. In none of the cases under study was the Mertonian autonomy of science from the state a part of the normative structure that we have observed.

Other chapters show how national macro-cultures enable states to resist or facilitate change in the national regulation of science. Vincent-Antonin Lepinay shows the prevalence of what Sheila Jasanoff calls a national and macro-cultural “civic epistemology,” which gives meaning and credibility to public claims to shape both the nation’s duty and the scientists’ responsibility. In each country, a civic epistemology organizes the relationship between science and politics around common figures, symbols, and principles. Lepinay shows how “the family” served as an organizing vector, allowing scientists and politicians alike to redefine their relationships in the face of threats of competition entailed by the globalization of networks of scientists, biological materials, and exchange circuits. Jean-Paul Gaudillière and Pierre-Benoît Joly specify how this nation-specific notion of civic epistemology operates, and they also emphasize its limitations. For them, the globalization of exchange circuits between scientists and innovations brings new actors to the forefront, whose meaning-making practices reduce the impact of state-driven meaning-making and framing practices. International and supranational courts and transnational networks of scientists and activists are able to force change upon state bureaucracies, which operated in relative autarky, according to historically contingent routines. But in contrast to John Meyer and neo-institutionalists, who stress the global convergence between states and national cultures, Gaudillière and Joly show that the existing legal pluralism and multiplicity of transnational voices lead to increased complexity within and between state regulatory cultures, rather than to the diffusion of shared understandings of states and scientists’ roles in production and representation.

The other chapters, finally, improve our understanding of how international organizations responsible for the diffusion of scientific practices,

the evaluation of their outcomes, and the adjudication of politico-scientific disputes operate, reproduce themselves, or change. As they play an increasingly important role in a complex global environment, understanding their inner workings has now become a prime goal for historical sociologists of science. Grégoire Mallard shows how deliberative tactics of translation can hamper the creation of such new organizations involved in the global regulation of science and technology development. A similar process of translation operates not only during negotiations over new international organizations' formal responsibilities, but also during negotiations over the internal jurisdiction of an international organization's segments once it has been institutionalized, as Amy Dahan Dalmedico and H  l  ne Guillemot show in the case of the International Panel on Climate Change. John Krige's analysis of post-war attempts to reform NATO's internal structure also stresses the significance of how a science itself—and the range of scientific practices it encompasses—can further change, or not, in these projects of translation. In contrast to John Meyer and his colleagues, who limit their analysis of international organizations to the coding of formal guidelines in order to produce quantitative analysis of large cross-national data sets, these authors develop concepts and forms of investigation that allow them to go beyond the formal structure of organizations and reach their informal workings. We hope that their analyses will serve as exemplars for future research that will highlight the webs of knowledge-practices by which these organizations come to play a role in the global governance of techno-scientific development and in the reformulation of fair rules of representation.

NOTES

1. See Krige and Barth (2006a). The present volume gathers revised translations of articles published in a special issue of *Sociologie du Travail*, which we prepared at the same time as John Krige and Kai-Henrik Barth prepared their *Osiris* volume—see Mallard, Paradeise, and Peerbaye (2006).
2. Studying primarily peer review in scientific journals, these authors have shown that “particularism” is unlikely to be a significant determinant of publishing decisions (Zuckerman and Merton 1971; Cole, Rubin, and Cole 1978; Cole and Cole 1981).
3. For neo-institutionalists, ministries of research (Finnemore 1993), higher education institutions, and scientific professional associations (Drori et al. 2003) have spread in every country since 1945 and have made it possible for a world society of experts to assemble scientists from across the globe. Thus, for them, the formal equality between nation-states, which is embedded for instance in the United Nations Charter, is not threatened by the globalization of science, but strengthened.
4. Haas (1992) refers to these transnational networks of scientists who have gained autonomy from states at the global level as “epistemic communities.”
5. Social capital is measured by such variables as being a tenured professor at a prestigious university, having many publications, sitting in funding committees, etc.

6. Rabinow (1999) undertook a case study showing how concerns about the appropriation of national identities in a late-twentieth-century world of global biological exchange were fiercely expressed by states and scientists alike, but he does not show how biomedical research, in turn, redefined the political claims to representativity.
7. As Steven Shapin and Simon Schaffer beautifully demonstrated, the cosmopolitanism of early modern natural philosophers was suspicious to those, like Hobbes, who fought against the privilege granted to this emerging class formed by the men of science whose class solidarity spanned over national frontiers, and whose loyalty to the national monarch could not be fully established. While “Boyle’s programme of experimental philosophy was a solution to the problem of order . . . Hobbes’ threat [against Boyle’s programme of experimentation] was a threat to the social space in which experimenters, priests and lawyers could work” (Shapin and Schaffer 1989: 326–327).
8. Nation-states grew from attempts to nationalize public and private offices by the absolutist states in the eighteenth century. But, as states strengthened their resource extraction capabilities, thereby creating the administrative structures necessary for states to operate in a wide geographical territory (Centeno 1993), new forms of contestations arose from within the ranks of the bourgeoisie and capitalist farmers who supported individual rights, democratic conceptions of representation, and government by national delegation.
9. Neo-Marxist authors concerned with explaining the rise of bureaucracies and their influence on policy outcomes have integrated the Weberian lesson on the bureaucratization of politics (Evans, Rueschmeyer, and Skocpol 1985). Yet, they have paid more attention to the institutional niches that experts build to access decisional posts in the state apparatus than to the actual forms of knowledge that they bring with them into these niches.
10. On this notion of path-dependency, see Adams, Orloff, and Clemens (2005).
11. The use of comparison dates back to Barrington Moore’s (1966) classic study of the divergent pathways of West European nation-states, which mixed comparative methods with a materialist concern with class-based alliances, which fostered modern nineteenth-century nation-states in Europe.
12. At other times, his generalizations were based on an accumulation of case studies without much concern for finding a rationale for his case selection (Foucault 1995).
13. Many of those in Europe who stressed the necessity of analyzing local and culturally constructed ways of governing invented by nation-states and scientific practices might not recognize themselves under the label of “historical sociology,” which is an American rubric. In the US, the field of historical sociology even has its institutional niches, for instance, in the influential section on “Historical and Comparative Sociology” of the American Sociological Association.
14. In contrast to diffusionist models of ideational change often assumed by American comparativists, Latour (1987) was concerned with showing the limits of a classical “history of ideas” applied to the study of the role of experts in public policies: He showed that Pasteur’s “ideas” did not even exist prior to their “diffusion” in the realm of institution and politics.
15. French scholars like Bruno Latour put more effort into describing the operation of scientific practices than to comparative methodological concerns that would allow them to generalize their findings on the articulation between science- and state-formation to other cases.
16. Interpreters of Foucault, like Rabinow and Rose (2003) or Hardt and Negri (2000), have assumed that modern sciences developed independently from the field of sovereign power and constituted, as a result, a separate field of “bio-

- politics” where they are called to manage the life of populations. This is not our reading of the work of Foucault, and we hope that this volume demonstrates the necessity of bridging the disciplinary boundary between political theory and science studies.
17. See also Guetzkow, Lamont, and Mallard (2004) for a similar conclusion on contemporary peer evaluation.
 18. George W. Bush’ campaign for an “ownership society,” in which families administer risk and uncertainty, also found an echo in these debates about biological risk.
 19. Applying a Latourian approach, common in the anthropology of science, to the study of the cultural identities (cosmopolitan or national) of objects of science, Lepinay adds that reconfigurations (or translations) of national and cosmopolitan identities were held together not only by a reference to these various cultural understandings of morality, but also by a variety of hybrids of human and non-human associations (Callon 1986), linking together biological materials of different kinds and different kinds of laboratory equipment as well as various culturally organized storage and market arrangements. Adult stem cells worked as a “boundary object” (Star and Griesemer 1988), allowing a heteroclite coalition of actors to coordinate their action as well as to draw boundaries between their claims and those of others.
 20. For a criticism of that view as applied to the peer evaluation process, see Rosental (2003).
 21. John Krige briefly mentions that the British were not included in the list of experts to brief on the methods of OR, and, with the exception of Northern countries, the main targets of Philip Morse’s efforts were state parties to the Euratom treaty: France, Italy, West Germany, the Netherlands, and Belgium.
 22. At least, until General de Gaulle’s return to power in France in 1958.
 23. Krige (2007) presents elsewhere a series of case studies on the influence of American philanthropic foundations on European science.
 24. Eisenhower signed US legislation in 1958 to authorize such technological transfers to nations who had advanced far enough in developing nuclear weapons.
 25. They actually use alternatively the notion of *habitus* and that of “social capital.”
 26. For instance, France and Sweden in the case of nuclear development, as analyzed by Jasper (1995).

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