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INTRODUCTION

Science and the State

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Modern science and the modern state are inextricable and co-emergent. Indeed, the rise of the state form has been accomplished through the ways of knowing and extracting that scientific analysis makes possible—including classification, hierarchization, quantification, and reductionism. States have frequently used the sciences as powerful tools for defining and delimiting the polis, for expanding markets, and for deterring, threatening, and waging war. While the practices of science and the formation of the state are relatively well studied, much remains to be understood about the relationships between the two—how states support, use, and regulate sciences, and how the sciences support the structure, function, and legitimacy of states.

This relationship received its classic US social scientific framing in the thesis that liberal democracy and modern science and technology emerged together, support one another, and flourish in their ideal forms under the same conditions. A corollary of this thesis is that when one is under threat, both are. The conditions that seemed to Robert K. Merton to tie good science and democratic governance together included aspirations of widespread participation and openness without prejudice as to one's conditions of birth, guided by overarching values of universalism, disinterestedness, and organized skepticism. In the literature and in the world alike, counterexamples abound (Haraway 1997; Latour 1987; Shapin and Schaffer 1985; Visvanathan 1997; Thompson 2005, 2013; Nelson 2011, 2016). Mertonian ideas of science insist that politics and scientific practice are separate spheres and that a stable state should model itself on the universalist practices of the sciences (Merton 1942). Yet, scholarship from science and technology studies, anthropology, sociology, critical theory, and beyond has shown that technoscience is deeply entangled in politics, economics, and cultural practices, but also that scientific institutions can have capacities to exert state-like powers. Despite widespread acknowledgment that science and politics are profoundly intertwined, and that their effects are not uniformly beneficial, the idea that good science and a stable democracy inev-

itably go hand in hand has proven durable, perhaps especially with scientists and policymakers.

Current events have thrown these debates into high relief. Pressing issues from the pandemic to anthropogenic climate change, and the new and old inequalities they exacerbate, have intensified calls to critique but also imagine otherwise the relationship between scientific and state authority. Many of the subjects and communities whose well-being these authorities claim to promote have resisted, doubted, and mistrusted technoscientific experts and government officials. How might our understanding of the relationship change if the perspectives and needs of those most at risk from state and/or scientific violence or neglect were to be centered? Likewise, the pandemic and climate change have reminded scientists and state officials that relations among states matter at home and in the world systems that support supply chains, fuel technology, and undergird capitalism and migration. How does our understanding of the relationship between science and the state change if we eschew the nationalist framing of the classic Mertonian formulation and instead account for states in different parts of the world, as well as trans-state relationships?

This special issue began as a yearlong seminar on Science and the State convened by Alondra Nelson and Charis Thompson at the Institute for Advanced Study in Princeton, New Jersey. During the 2020–21 academic year, seventeen scholars from four continents met on a biweekly basis to read, discuss, and interrogate historical and contemporary scholarship on the origins, transformations, and sociopolitical consequences of different configurations of science, technology, and governance. Our group consisted of scholars from different disciplines, including sociology, anthropology, philosophy, economics, history, political science, and geography. Examining technoscientific expertise and political authority while experiencing the conditions of the pandemic exerted a heightened sense of the stakes concerned and forced us to rethink easy critiques of scientific knowledge and state power. Our affective and lived experiences of the pandemic posed questions about what good science and good statecraft could be. How do we move beyond a presumption of isomorphism between "good" states and "good" science to understand and study the uneven experiences and sometimes exploitative practices of different configurations of science and the state?

Despite our diverse training, there was strong consensus that historical and ethnographic methods were indispensable to the task of defining the materialities of science and the state in all their granularity and specificity. Our collective comparative perspectives across nations and regions and over time helped us ascertain

persistent themes and novel trends. Three cross-cutting arguments emerged from our studies.

The first concerned the very nature of the state and the way state and governmental power is mobilized in relation to scientific authority. The state is not a unified actor, but a hybrid body: a web of interactions between agencies with different and sometimes conflicting interests, including experts, civil servants, politicians, and technocrats, and the constituents to whom each is, in theory, beholden. By tracing some practices of these complex configurations of the state, we disaggregated the state spatially, institutionally, and historically. Some of us found the concept of governance to be crucial so as to include private sector and nongovernmental entities that perform state functions beyond the formal apparatuses of the state. Legal institutions such as regulatory bodies are also integral to the purposes of the state. The reliance on scientific expertise is central to regulatory frameworks, legislation, and policies that determine the boundaries and borders of the state, whether this concerns the distribution of resources, the governance of populations, formal membership in the polity, or the legitimate uses of violence and punishment in the name of order or security. By the turn of the twentieth century, state power and capacity were increasingly dependent on the authority of experts, while technoscientific expertise was becoming ever more specialized. At the same time, states mobilized new scientific languages of uncertainty and trust (or distrust). The complexities around these intertwined forms of authority were only compounded by the increasing role of the state and science in structuring capitalist economies. Increasingly, scientific expertise used by modern states only exists in the interdependence of the public and private sectors. The entangled relationship between political economy and science was a recurring concern, as we engaged the problem of regional, national, and global governance.

The second intervention involved the implications of considering the state across time and place. Our multidisciplinary and comparative perspective—including critical, biopolitical, postcolonial, and decolonial approaches—emphasized that science operates differentially within distinct parts of the state and among different states. Some of us used the language of technoscience to emphasize the situated and messy ambiguities of expert practice and destabilize the notion of any boundary separating science and technology (Latour 1987: 174; Haraway 1997: 50–51). We conceptualized science and the state not as two coherent interacting entities, but as multifaceted and interwoven with other dynamic factors of public life. We came to conceive of our objects of study as political and sociotechnical projects that are coordinated across fields and among a variety of actors, including the scientists

and engineers working within academic settings, the civil servants and bureaucrats who populate state spaces, the varied experts situated at the porous spaces between them, the subjects and constituents of states, and the more-than-human actants dispersed across these fields (e.g., legal documents, biomaterials, aerial networks, radioactive mosquitoes, and artificial intelligence). The comparative perspective among nations, regions, and histories helped us better understand what is scientifically possible and politically legitimate in a given time and place. This context elucidates ways in which science, technology, and governance disenfranchise populations and often reinvigorate older paradigms of racism, sexism, and colonialism in newer technoscientific projects such as the biosciences or the computational sciences.

Finally, the third intervention concerned the role of the social and human sciences. These fields arose as a means for states to define and manage populations. Today, they remain crucial in navigating and mediating the relationship between expert knowledge, states, and publics. The social sciences have provided provocations and conditions for the state's collection, dissemination, and application of knowledge—increasingly rendered as digital data. State actors and their allies mobilize and seek to legitimate social scientific knowledge to govern and to shape public perception, especially when managing sociotechnical problems ranging from endemic poverty to nuclear insecurities to differential pandemic mortality. The frequent imbalance between epistemic uncertainty and the political potency of state social science has taken on different forms: thin knowledge about human psychology and cognition nevertheless propels powerful campaigns to influence individual decisions through nudges; fragile data about COVID-19 deaths nonetheless consolidate bureaucratic power; cutting-edge computational tools, operating on untested theories of geopolitics, extend the power of US national security agencies and reinforce the militarization of the state. In sum, while our critical social and human science perspectives applied pressure on the taken-for-granted nature of the nation-state as the core unit of political power and science sponsorship, our analysis of the power of the social sciences brought into stark relief the political potency of embracing the multiple functions of science and the state.

Contributions and Themes:
Power, Contradiction, Resistance, Possibility

Technoscientific expertise has often functioned as a form, expression, and legitimator of political power. A number of contributions to this special issue draw our attention to the ways that crisis may reinforce and consolidate dominant framings, trajectories, and institutions of state and economic power. Exploring the social con-

ditions that shaped the production and dissemination of mortality data in French nursing homes during the early period of the COVID-19 pandemic, Florence Jany-Catrice et al. show that despite the emergency mobilization of multiple agencies and actors, efforts to create reliable mortality statistics yielded fragile data and produced even more uncertainties. Furthermore, fragile data mirrored the fragile public institutions, degraded by years of disinvestment, that produced them; yet their production also facilitated the centralization of state public health agencies.

In an account of the World Health Organization's (WHO) role in the Republican reelection campaign of President Donald Trump and the Democratic campaign of former Vice President Joe Biden in the 2020 US presidential election, Charis Thompson shows that an opportunity to transform US global health diplomacy to incorporate health justice more fully was missed. On the surface, the contrast between Biden and Trump was dramatic. Trump pulled the United States out of the WHO, a move that Biden reversed. Despite appearances, however, neither party came close to meeting calls made at least since the WHO's Alma Ata Declaration of 1978 and heightened under COVID to put health justice and primary health care for all at the heart of global health. Taken together, Thompson and Jany-Catrice demonstrate how crisis mobilizations of science and the state may sustain and even deepen the political status quo, and in particular the invisibilization of and disinvestment in vulnerable populations, and the disregard for and deflection of appeals to justice and human dignity.

The ways that experts, state agencies, political parties, and international organizations configure the relationship between expertise, on the one hand, and political and policy action, on the other, have powerful implications for health, security, well-being, and justice. Reflecting on the similarities between the pandemic and the aftermath of the 2011 nuclear accident in Fukushima, Ryo Morimoto explores the tensions between the state, science, and the lived experience of invisible hazards. Ethnographically retelling the struggles of a medical doctor seeking to bridge the science of low-dose exposure and Fukushima residents' situated suffering and anxieties, Morimoto probes the fissures between state projects to reduce scientific uncertainty about invisible hazards and residents' diverse everyday experiences of their potential effects. He issues a powerful call for a "social science of the unreal" capable of mediating the relationship between state-backed scientific claims that seek to individuate risk perception and lived experiences of invisible threats.

While Jany-Catrice et al., Thompson, and Morimoto attend to periods of crisis, other papers in this issue shed new light on how knowledge—and its absence—operates in more ordinary, yet nonetheless contested, contexts. Diana Graizbord draws our attention to the production, legitimation, and contestation of poverty

expertise within the Mexican federal government's National Council for the Eval-uation of Social Development Policy. Treating the Mexican state not as a unitary or static actor, but instead as a complex of policy elites, academics, and bureaucrats with divergent values and goals, Graizbord reveals the way expert practices, and replication in particular, create scholarly-bureaucratic networks and extend politi-cal projects even when they are contested at the highest levels of government. In a context where poverty data are both highly politicized and central to the state's purpose and legitimacy, state actors and the public more broadly use replication as a practice, performance, and proof of the legitimacy of data, the institutions that produce them, and the political values that support those institutions.

Nudges, the subject of Magdalena Małecka's contribution, stand in contrast to the careful legitimation practices of Mexico's poverty experts and their allies. Ostensibly evidence-based policy interventions, nudges have spread around the world as popular, powerful governance tools. While critics frequently paint nudges as neoliberal and technocratic, Małecka takes aim at their claims to scientific legiti-macy. Revealing the connections between behavioral science and nudges to be thin, at best, Małecka shows that nudges and their typical critics enact an "imaginary of behavioral governing" that overlooks the vacuity of nudges' epistemic foundations. Suggesting that a more fruitful critique of these governance tools target the gap between the nudges' claims to shape behavior and the knowledge actually produced by the behavioral sciences, Małecka argues that the epistemology of science may be a powerful means to challenge states' behavioral policy expertise.

While science often legitimates policy interventions, ignorance can be a power-ful form of expertise. Focusing on the role of science-based regulatory instruments in public and environmental health in the United States and France, Emmanuel Henry puts the state at the center of the study of agnotology. While scholars have focused on the role of industrial science in the production of ignorance, Henry cen-ters policy actors and processes in the creation of non-knowledge. State regulatory apparatuses, he argues, enable economic actors to systematically wield ignorance as a tool to render toxic exposures "nonproblems." This "toxic avoidance," Henry shows, cannot be explained by corporate or expert corruption; rather, it is a struc-tural feature of the policy process itself.

Sustainability, Christo Sims and Akshita Sivakumar maintain, seems like some-thing that technoscientific experts and state power can establish. Yet when they examined how sustainability was constructed at one of Google's new corporate campuses in California, they found that experts rendered sustainability aestheti-cally and narratively, rather than technically, and took the lead in determining how sustainability in the built form was made concrete. By taking a pragmatic approach

to the question of how the politics of sustainability is materialized, they argue that the design process is a key site where the political question of what sustainability in the built form is and should be is temporarily settled. But rather than dismissing the predominance of aesthetic renderings of sustainability as mere greenwashing, they encourage environmentally concerned scholars and activists to recognize the centrality of imaginal politics in any attempt to construct inhabitable, just, and desirable worlds.

A number of contributions draw fresh attention to the relationship between data creation and dissemination, information processing technology, and governance. The COVID-19 pandemic typified the era of rapid sharing of bioinformation as vaccines were developed exclusively based on genetic sequence data. Sonja Van Wichelen shows that bioinformatics poses new challenges to the governance of scientific exchange everywhere, but has particularly profound implications for developing countries. Contributing to discussions on bioscience governance in critical times, Van Wichelen's essay interrogates the problem of materiality in assessing bioinformation for benefit-sharing purposes. Rather than focus on the conventional ethico-legal paradigms of privacy rights, on the one hand, and the public commons, on the other, she shows how bioinformation, or the datafication of biological resources, is tethered to history, environment, society, and culture and how the state and science are implicated in the "thickening" or "thinning" of data.

Data figure centrally in climate governance, and as Sarah Vaughn shows in her examination of the Insurance Development Forum (IDF), data flows also play a critical role in moral discourses about the influence of financial investment on climate insurance. IDF views financial institutions and practices as integral to addressing climate change, and Vaughn's analysis reveals that its organizational structure depends on the efficient flow of information to manage the stigma often associated with finance capitalism. Her article thus offers a lens onto the emerging dynamics of climate governance across public-private sector engagements, reminding us that the figure of the state is crucial to the formation and distribution of technical information about climate change.

Vaughn, Van Wichelen, Jany-Catrice et al., and Graizbord each demonstrate the taken-for-granted connections between information collection and sharing, on the one hand, and governance on the other. Turning to the Cold War, Joy Rohde probes the origins of computational policy knowledge's political power and epistemic legitimacy. Detailing foreign policy experts' efforts to create computational tools, such as digital databases and computer simulations of international political processes, Rohde argues that overlapping geopolitical, cognitive, and epistemic anxieties that plagued mid-century American experts and bureaucrats sparked a new epistemol-

ogy of political computational knowledge. System designers and users in the Cold War came to prioritize correlation over causality and the instrumental management of problems over scholarly understanding or explanation. That this epistemology is often touted as a benefit of the big data and machine learning revolution, Rohde argues, reveals the troubling durability of Cold War technopolitical sensibilities in contemporary computational policy knowledge.

Similarly critical of the politics and epistemology of some contemporary data science, Jacob Foster offers possibilities for different computational and social futures. Foster embraces an "anarchist squint" to intervene in contemporary debates about the promises and perils of artificial intelligence (AI). Drawing on James Scott's critique of modernist institutions for distorting and suppressing vernacular traditions, knowledges, and practices, Foster diagnoses contemporary AI and the datasets and models upon which it depends as firmly embedded in a modernist political imaginary. Contemporary AI works, Foster maintains, by imposing a "thin," universalizing, and top-down semantics on the world. As an alternative, Foster proposes a "thick" and human-compatible vision of AI, one that embraces local vernaculars, the multiplicity of objectives, the responsibilities that come with producing persons, and the potential of instigating, rather than circumventing, political contestation. To help realize his proposal, Foster calls on the social sciences to leave behind both its positivist and necessitarian traditions and to embrace instead an imaginal orientation that aims to map and navigate the spaces of possible social worlds.

Several contributions complicate and unsettle commonplace assumptions about relations between state power, territory, and the production of space. Writing against accounts of state territory as homogenized and standardized, Joshua Barkan traces the genealogy of exceptional legal devices known as *concession agreements* to examine how states have empowered private companies in their efforts to accumulate capital, particularly through resource extraction. By examining the genealogy of these peculiar legal devices, Barkan shows how concession agreements have helped produce fragmented spaces of territorial power and enclaves of capitalist accumulation in different places at different historical moments. In doing so, Barkan helps us understand the shifting position of law, sovereignty, and state power in resource economies across historical epochs.

Nikolas Kosmatopoulos's article also interrogates the limits of territorial and terrestrial state power. But while Barkan focuses on how companies have extracted resources, exercised power, and accumulated capital by producing fragmented spaces within state territories, Kosmatopoulos turns attention to how shipping companies have enriched themselves by circumnavigating state power at sea. By taking the ship as method, Kosmatopoulos shows how Greek-owned tankers helped

create financial-legal technologies—such as flags of convenience, offshore firms, and chartered loans—that transformed relations of property, authority, and (de)regulation at sea and on land during the postcolonial era. The article highlights the state's presumed inability to capture and control chains of value production beyond its territory while also showing how state authority can be firmly reestablished when groups challenge shipping companies' claims about the assumed statelessness of the sea with their own claims rooted in community traditions and the commons.

With Waqar Zaidi's essay, we leave the sea and take to the air. Arguing against dominant conceptualizations of civil aviation networks as webs of points and lines, Zaidi draws attention to how the creation and persistence of these networks depend on the production of aerial social spaces. He argues that it is these social spaces, rather than just the establishment point-and-line networks, that help produce and reproduce state power through aviation. Drawing on two cases in which civil aviation networks were extended to the developing world during the 1940s and 1950s, Zaidi excavates the cultural and logistical processes by which aerial social spaces contributed to the construction and entrenchment of state power.

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Sonja van Wichelen is professor of anthropology and sociology at the University of Sydney in Australia. She is the author of *Legitimating Life: Adoption in the Age of Globalization and Biotechnology* (2019) and *Religion, Gender, and Politics in Indonesia: Disputing the Muslim Body* (2010). She was a member of the Institute for Advanced Study in Princeton, New Jersey, from 2020 to 2021.

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Joshua Barkan is an associate professor of geography at the University of Georgia. He is the author of *Corporate Sovereignty: Law and Government under Capitalism* (2013). He is currently working on a book on the genealogy of concession agreements.

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