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From
Information
Theory
to
French
Theory

BERNARD DIONYSIUS GEOGHEGAN

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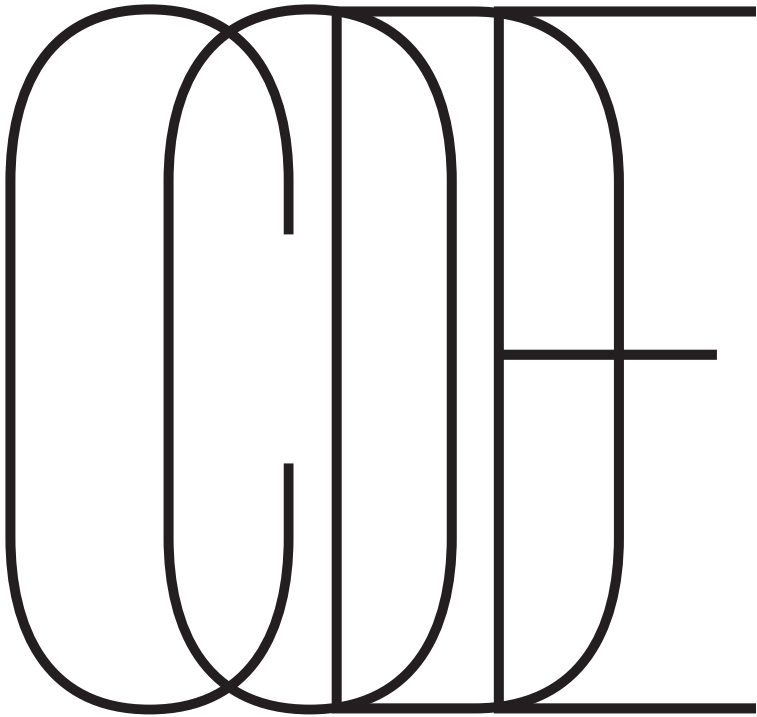
EDITED BY JONATHAN STERNE

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Bernard Dionysius
Geoghegan



From
Information
Theory to
French Theory

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*This book is dedicated to my
very first reader and editor,
Rhoda Geoghegan.*

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All the repetition and incarnation of the sanitized term *information*, with its cleansing cybernetic properties, cannot wash away or obliterate the fundamentally dirty, semiotic, semantic, discursive character of the media in their cultural dimensions.

Stuart Hall, "Ideology and
Communication Theory," 1989

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Introduction

Codification

Three grim human enclosures—laboratories, really—provided models for efforts to theorize society in digital terms. The *colony* acted as a human enclosure for theorizing data-driven cultural adjustments on a national and even planetary scale. As anthropologist Margaret Mead wrote in 1953, computing, communication engineering, and cybernetics focused ethnographic attention on communicative flows permeating “the entire network of human relationships.”¹ The *asylum* provided an enclosure for documenting how codes and communication shaped human thought. In 1958, anthropologist Gregory Bateson declared, “Today, data from a New Guinea tribe and the superficially very different data of psychiatry can be approached in terms of a single epistemology” revealed by cybernetics and communication theory.² The *camp*, particularly the death camp, acted as a warning against states wielding unchecked technical power over life. In his 1948 book *Cybernetics*, MIT mathematician Norbert Wiener explained that the technical science he and his colleagues developed commanded “great possibilities for good and for evil. We can only hand it over into the world that exists about us, and this is the world of [the German death camp] Belsen and Hiroshima.”³ His colleague, the neurophysiologist Warren McCulloch, went one step further, arguing that it fell to scientists to construct a social order with sufficient cybernetic feedback to prevent a next, perhaps final and totalizing, world holocaust.⁴

The colony, the asylum, and the camp embodied the terrific threats of technocratic power run amok, of the state’s data-driven exercises to control human conduct. They also, however, exercised allure as delimited social milieus in which supposedly controlled borders and simplified living conditions permitted the study of human communication in its elementary forms. Perhaps they even heralded the conditions of some future technological world in which all life on Earth might be subject to computer-regulated

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networks of communication and control. If so, was it not the responsibility of socially conscious intellectuals to look at these worlds head-on and uncover the codes and relays by which they achieved felicity or destruction?

With these examples in mind, and the fate of the world at stake, Mead, Bateson, Wiener, McCulloch, and their colleagues, aided by a chain of philanthropies funded by some of the world's wealthiest industrial magnates, rallied anthropologists, psychologists, linguists, philosophers, semiologists, physicists, physicians, and literary critics in a new epistemic machinery: the cybernetic apparatus. Refugee intellectuals, some of whom had fled fascist genocides and authoritarian pogroms or witnessed decimation wrought on indigenous persons in the Global South, flocked to the techno-political call of cybernetics. By the early 1950s, enthusiasts of cybernetics and information theory comprised a transatlantic axis of well-connected researchers winning sought-after appointments at elite universities, museums, and hospitals. By the end of the 1950s, their cybernetic jargon of *code*, *communication*, *computing*, *feedback*, and *control* would form part of the chatter in scientific and policy discussions across North America and Europe. They recast thought with troubling links to biological racism and eugenics in cultural systems and codes. Their turn toward communicative structures embodied an effort to develop more enlightened analytics for the force wielded by science and the state. In the course of the 1960s, a motley crew of intellectuals allied with movements such as literary semiology and structural psychoanalysis generalized this work to fields such as poetics and dementia. In the decades to follow, even as the cybernetic movement hollowed out, the promise of a theoretically rigorous approach to communicative codes endured, an unacknowledged inheritance surfacing in fields as varied as cognitive behavioral therapy in California and poststructural Marxism in Paris.

Code: From Information Theory to French Theory shows how efforts to formulate expert and technical responses to grave political crises drove the reciprocal transformation of the natural and human sciences in the twentieth century. In particular, it traces the dark industrial and colonial crises that bound adherents—including scientific philanthropies, social scientists, philosophers and literary critics, natural scientists, and engineers—in a common epistemic cause that celebrated digital research as a basis for confronting political violence. Rejecting familiar narratives of cybernetics and computing as the offspring of World War II engineering, I argue that liberal technocrats' 1930s dreams of eliminating aberrancy through noncoercive communicative techniques oriented the informatic

programs of World War II and the Cold War. That dream and its paradoxical outcomes started in the rise of Progressive Era philanthropies committed to supporting communication research, traveled through media-driven studies of colonies and mental patients from the 1930s through the 1950s, drove the rise of laboratories in Cold War linguistics and anthropology, and finally roosted in the semiotic adventures of 1960s Paris intellectuals. Across these endeavors, an organizing concept of *code*—indexed to computing but derived from technocratic social science—lent proponents a powerful trope for reinterpreting the global subjects of the human sciences.

This book recovers the political impetus behind these long-running efforts to render diverse phenomena—culture, literature, illness, speech, kinship—as forms of code. My analysis encompasses the political aspirations that enveloped early efforts in information theory and electronic computing as well as the rise of so-called French theory in 1960s France. These projects, along with a wider family of programs in colonial anthropology, mental health, linguistics, literary studies, and semiotics, form diverse facets of a single political project. The roots of the project lie in Progressive Era technocracy and its agenda to transform social strife into matters for technical problem-solving.

My analysis covers the period from 1930 to 1970, occasionally touching on prehistories and afterlives outside that frame. Chapter 1 looks at robber baron philanthropies' efforts to transform the humanities and social sciences into a single field, the human sciences, oriented toward communication. It reconstructs how fields as varied as cybernetics, criminology, eugenics, and ethnography emerged as elements of an interlinked program of technocratic reform, aided by research administrators such as Warren Weaver of the Rockefeller Foundation. Chapter 2 examines how the 1930s colonial ethnography of Mead and Bateson developed the outlines of cybernetic analysis in photographic and filmic studies of Balinese tribes. Their analyses subsequently served as the basis for Rockefeller- and Macy-funded efforts to establish cybernetic approaches to the human sciences.

Chapters 3 through 5 focus on intellectual relays linking Moscow, Prague, Paris, New York, Cambridge (Massachusetts), São Paulo, and tribal territories of the Brazilian interior. Chapter 3 considers refugee structural linguists and ethnographers in America, most notably Russian linguist Roman Jakobson, whose flight from Soviet pogroms and Nazi genocides led him to embrace communication theory as a new foundation for the human sciences. Chapter 4 focuses on how French anthropologist Claude Lévi-Strauss's effort to develop a scientific and administrative response to

cultural destruction wrought by colonialism, World War II, and postwar globalization shaped his ambivalent call for a cybernetic approach to the study of man. Chapter 5 considers French modernization from the 1950s to the 1970s (including the rise of laboratories, centers, and seminars as a centerpiece of French intellectual life) and how it figured in key French intellectuals' reception of cybernetics, information theory, and communication theory. Against the backdrop of decolonization, modernization, and ascendant technocracy, theorists including psychoanalysts Jacques Lacan and Luce Irigaray, literary semiologist Roland Barthes, and philosopher Michel Foucault thematized the material and political operations responsible for cultural codes. Even as their work critiqued technocracy, however, their analyses entrenched the technocratic agenda behind US philanthropies' support for communication theory. The book's conclusion argues that these histories form a common inheritance for latter-day digital humanities, cultural analytics, critical theory, and social media, and that we have much to learn from the political and ethical dilemmas that animated the cybernetic apparatus.

As a historical and theoretical study, *Code* brings information theory and French theory down to earth, situating their proponents within a landscape of cultural and political crises that drove their efforts to master the unruliness of human communication with technical expertise. This book seeks to dislodge academic theories from an impulse toward universality that inflects much scientific inquiry, and instead situates these efforts as responses to determinate political crises that were neither universal nor general.⁵ In this respect, *Code* is a somewhat classical exercise of critical theory in the sense of reconstructing the historical problems and political interests that organize a system of knowledge and that lend that system an appearance of disinterested generality (particularly through its complementarity to a larger system of economic production).⁶ All theories, of course, involve some degree of abstraction as a preliminary step in relating diverse specific instances to a more general condition. An ongoing task of theory (and history) is to develop and intermittently reassess such abstractions according to changing circumstances.⁷ In that respect, this book, if successful, is not only an assessment of, but also a contribution to, theoretical reflection. Yet some adherents would deprive theory of this worldliness, preferring to appoint this or that theoretical system as total and complete. The deadening result of such methodological dogmatism is to render theories primarily of theoretical interest, depriving them of contact with the

situated struggle that allows them to know and intervene in the world. When that happens not only theory, but theorists, too, become remote and unworldly. Against such hermeticism *Code* insists on theory's place in uneven and changing fields of scientific and political struggle, in which it plays the part of participant as well as observer.

Knowledge Lost in Information

What is the reality of a sign? In a world marked by the proliferation of technical communication, at what point must signals be considered not representations but full-fledged objects for scientific and political calculation? These questions preoccupied the natural and human scientists of the twentieth century, motivating them to turn to one another for provisional answers. Technical advances in telephony, computing, propaganda, and the mathematics of signal transmission renewed the urgency of such questions. Likewise, the inevitability of cultural confrontation at a distance—exemplified by colonial command and control across oceans or dueling fascist and democratic propaganda—outlined a problem intractable to traditionally conceived politics. Confronting these challenges drove mathematicians, anthropologists, psychotherapists, linguists, and semiologists to reconsider the sciences writ large. As scientists formed interdisciplinary working groups to address these questions, they aligned their investigations with external funding—and, in turn, priorities—made available by private foundations, their officers and executives, and myriad strategic initiatives cutting across the scientific, political, and military spheres. “Theory” provided one means of formulating research programs that could navigate the institutional thickets of scientific funding circa 1930–1970. Read as trans-historical statements, notions of communication propounded by the likes of Mead, Bateson, Jakobson, or Barthes might appear bizarre. Read as interventions in the knowledge machineries of their day, they take on the profile of canny political performances that affirmed the risk of intellectual engagement in their contemporary ethical concerns.

The conceptual itinerary running from information theory to French theory is partly a history of how technocracy shaped the language and professional norms of responding, as an academic or intellectual, to political urgency and in particular tracks how informatics offered a tempting framework for ordering those norms, especially when the underlying intellectual

models stemmed from politically motivated research into nonnormative populations. Interest in code, a theme that recurs across the chapters in this book, reflected one ideal of scientific precision at a time of technocracy and ascendant information sciences. Particularly after World War II, progressive researchers embraced communication theory as a resource for securing a place for the human sciences among the then emergent technical sciences. This project had contradictory outcomes with peculiar resonances across disciplines and political cultures. For example, as I recount in chapter 5, in 1967 Barthes launched a seminar in Paris at the *École des hautes études en sciences sociales* dedicated to the close reading of codes in Honoré de Balzac's novella *Sarrasine*, a work rife with the contradictions of class, gender, and narrative. For Barthes, word-by-word reading revealed the pervasive codification of language as well as the cacography, countercommunication, and noise confounding its signals.⁸ Sociologist Daniel Bell of Columbia University in New York wrote that same year, "What has now become decisive for society is the new centrality of theoretical knowledge, the primacy of theory over empiricism, and the codification of knowledge into abstract systems of symbols that can be translated into many different and varied circumstances."⁹ On two sides of the Atlantic, analysts of diverse stripes embraced theory as a way of interrogating how far analysis might go in defining order and disorder through a theory of cybernetic codes.

Scientists' cybernetic efforts to reconstruct society in terms of totalizing codes outpaced existing communication technologies. As of 1970, no data system adequate to the task existed. If it had, no liberal democracy would have tolerated its deployment. The closest thing to a real-world implementation of such a system—the US military's shoddy surveillance systems in the jungles of Vietnam—proved no match for popular resistance.¹⁰ This restricted the actual deployment of cybernetic methods to specialized domains such as the colony, the clinic, the asylum, homes of the mentally ill, so-called ghettos, and, as it turned out, literary seminars. This lent a speculative quality to midcentury communication research due to its proponents' penchant for generalized claims based on data from the colonized, the institutionalized, and the fictionalized. In the conclusion of this book, I ask how those constraints remain operative in an era of cultural analytics and pervasive social networking.

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Cybernetics' Technocratic Backstories

A major goal of the book is to recover the history of the human sciences as a test bed for the rise of the communication sciences, as realized in the experimental systems of imperialism, colonialism, and industrial capitalism. To adapt a formulation from feminist historian of science Donna Haraway, the informatics of domination began not in informatics but in domination.¹¹ Progressive Era political crises—which is to say, liberal expert programs to save industrial democracy from racial, economic, and other inequities threatening the integrity of the entire social order—drove a technicization of the human that swept across policy and science in the early decades of the twentieth century. These crises shaped the meanings attributed to communication and culture across the humanities and social sciences. Indigenous myths, French literature, Russian poetry, mental illness in the American suburbs, ethnographic film and photography, and press photographs were among the exemplary objects used for working out the roles of information, code, and communication in the modern world.

Acknowledging the histories of cybernetics and the human sciences demands a reconsideration of what kinds of violence and innovation count in histories of computing. For too long, media theory and the history of science have taken armed conflict between nation-states as the mother of media invention. Groundbreaking works by historians, including Peter Galison and Paul Edwards, posited wars between Western states as the engine for digital technologies and epistemologies.¹² The technocratic roots of cybernetics in the Progressive Era and interwar years challenges that historiography. They show that political dilemmas raised by inner cities, colonies, asylums, and even zoos modeled the epistemological and technological developments of cybernetics, information theory, computing, and digital media in World War II and the Cold War.

My reorientation toward the role of interwar technocracy in cybernetic development follows a larger reconsideration set in motion by historian Jennifer S. Light's seminal study of cybernetics' role in welfare policy.¹³ While evidence for the practical efficacy of cybernetics in armed conflict is limited, Light has shown that its application to urban ghettos in the United States was broad and aggressive. In the intervening years since Light's scholarship, a booming literature has examined how Native Americans, criminals, children and other learners, colonial subjects, minority communities, people with disabilities, and animals served as key objects for theorizing the information sciences.¹⁴ These works have definitively

shown that the “enemies” and “closed worlds” decisive to cybernetics were not typically foreign nationals of the Axis but rather domestic and colonial populations within the borders of nominally democratic industrial states. These populations’ precedence in the rise of cybernetics shows how colonies, asylums, and suburban enclaves figure constructively in larger histories of systems theory, game theory, computational methods, and data-driven analytics.

This enlarged context for computing history not only supplements an inadequate history that has consistently privileged engineers and their machines as the subjects of historical narrative, but it also takes steps toward a global history of information and computing that includes the suffering, strife, and participation of persons deemed less than full citizens or subjects by the state. To incorporate these sites and subjects, including their management by the human sciences, is to counter an insistent analytic that has attributed minoritized media practices to “culture” while reserving the categories of “technology” and “invention” for the activities of scientists backed by industrial laboratories and state sponsors.¹⁵ Much work remains to be done for a historiography of technology that also grasps the diverse agencies and contributions of minoritized subjects. The present history concentrates on a small and privileged network of highly educated scientists (e.g., Mead, Bateson, Irigaray) who observed other communities put under surveillance by social science and the state. In a handful of instances, the scientists faced the prospect of their own annihilation as minoritized persons (e.g., Jakobson, Lévi-Strauss), an experience that shaped their later work.¹⁶ This book is a partial and initial survey of the definition of computing, communication, and informatics in the United States by political refugees and ambivalent witnesses to colonial violence. As these theorists occasionally noted, myriad scientific and historical techniques militate against incorporating the voices of people enclosed by medical, colonial, fascist and other technologies. *Code* does not overcome this problem but takes modest steps toward its fuller recognition.

Recognizing the priority of liberal social science in histories of cybernetics and computing also demands that we rethink these fields’ identification with movements such as posthumanism and antihumanism. We can think here of essential writings by N. Katherine Hayles, Donna J. Haraway, Friedrich Kittler, Rosi Braidotti, and Claus Pias, to which *Code* is deeply indebted.¹⁷ These works credit the rise of informatics with fostering new attention to codes, signs, and relays not anchored in classical liberal humanist categories like body, author, and intention. Yet, often, this claim over-

looks the priority of colonial ethnographers in formulating this analytic through studies in the 1920s and 1930s of practices such as gender, performance, and storytelling in indigenous communities. This has often led to a strange historiography in which Western technological inventiveness claims credit for categories borrowed from non-Western social collectives. Exemplary is media theorist Pias's account of cybernetics as an "affront to anthropology" that sought to "demystify instead of mythologize" humanity.¹⁸ For Pias and other proponents of a hardware-oriented media theory, cybernetics—born in the mathematics and tinkering of US and German laboratories—staged a conceptual assault on humanist thought. There is much truth to such claims. The popularization of cybernetic ontologies in fields including semiotics did support a decisive turn from categories like intention and authorship to those of signification and systems. Yet it overlooks how thinkers of cybernetic systems, among them the anthropologists Mead, Bateson, Lévi-Strauss, and Lacan, drew on indigenous cultures to formulate an account of system, influencing thinkers from Wiener to French biologist Jacques Monod in the process.

A more complete historiography of cybernetics, including its global and colonial roots, complicates claims to its supposed antihumanism. No longer a break *from* Western humanism, it rather traces fissures and contradiction internal to that humanism. Where one draws a historical or epistemic break is, itself, a deeply political and historical choice. To consider World War II and computing as a great rupture is also to mark oneself off what from what came before—to free oneself, in a sense, from its entanglements. Choices about periodization entail decisions about which social, political, and ethical configurations most weigh on us today. So, too, that assignment of the break entails assignments of agency as well as of margins and centers to the historical change it sets in motion. *Code* offers a periodization attentive to how ideas about cybernetics, information, and computing on the rise in the 1940s belong to a program of technological reform that took shape across the 1920s and 1930s, in connection with projects like colonial anthropology and eugenics. This analysis—which views the cybernetic critique of humanism as part of its humanist agenda—seems faithful to the insights of many of its early proponents. If, as Lévi-Strauss claimed, the goal of informatically inspired human sciences was "not to constitute, but to dissolve man," this concerned a fulfillment of global processes at work long before digital computers offered figures for their conceptual refinement.¹⁹ That dissolution is not unrelated to the battlefields of World War II Europe, to be sure, but it also travels through

a global network of colonies and asylums that formed an early training ground for thinkers like Lévi-Strauss, Mead, Bateson, and McCulloch. In our era of pervasive digital communication, when digital methods serve epidemiology, criminology, literary studies, data visualization, and social networking, it's time to recover these histories—not to find their true and hidden origins but to start grappling with their political and cultural complexity.

Cybernetics' technocratic pedigree, cultured in the human sciences, also reorients how we think about the disembodiment often identified with cybernetics and information theory. That reorientation, in turn, shapes our understanding of pervasive datafication in the present. As a critical intervention to the preoccupation with virtual reality in 1990s web cultures, literary scholars such as Hayles and Mark B. N. Hansen linked cybernetics and information theory with ideologies of posthuman disembodiment.²⁰ But perhaps the key erasure was more political than technological (an argument that the fuller arc of writings by Hayles and Hansen would seem to support). Like the dreams of sublime communication that shaped the early histories of networked railroads and telegraphy, dreams of cybernetic posthumanism depended on disappearing the bodies of native persons and other subjects regarded as less than human. That drive toward informatic disembodiment belongs to a liberal ideology that promises equality through the technological suspension of geographical, linguistic, ethnic, and class differences.²¹ The ideology of an information society central to projects from Facebook to informatic policing updates this old political fantasy.

Cybernetic anthropology, psychotherapy, and semiotics offered an early sketch of a larger cultural analytics ascendant in twenty-first-century academia, industry, and governance. Practitioners recast phenomena as diverse as madness, suicide, dance, and poetry as informatic "codes" suitable for expert reform. As mid-twentieth-century heads of state celebrated notions of human rights with distinguished Enlightenment pedigrees, interdisciplinary alliances of anthropologists, linguists, literary critics, psychotherapists, and philosophers met in conference halls, classrooms, museum collections, and laboratories and developed theories of the cybernetic subject. In these spaces, nascent ideologies of an information society took shape decades before the large-scale implementation of information processing. Fields such as the arts, social sciences, and humanities served as experimental laboratories for the engineering of a society of information superhighways. Far from trailing behind engineers and natural scientists, human scientists spearheaded the reconceptualization

of cultural forms prerequisite to the emergence of an information society, furnishing a legitimating ideology for an era to come.

The Language of Communication Science

I would like to briefly review a few key terms found throughout *Code*, with a caveat: much of the interest of cybernetics springs from its incessant resignifications, sometimes from year to year, of familiar terms. Frequently, invocations of concepts, such as encoding, decoding, information, feedback, entropy, and system, veiled the political dimensions of social analysis, lending to social scientists the appearance of cool and dispassionate scientism.²² The bottomless well of signification of these terms, and their ability to cross disciplinary and political borders, proved a mixed blessing for proponents. As Mead said of the cybernetics conferences, “We were impressed by the potential usefulness of a language sufficiently sophisticated to be used to solve complex human problems, and sufficiently abstract to make it possible to cross disciplinary boundaries. We thought we would go on to real interdisciplinary research, using this language as a medium. Instead, the whole thing fragmented.”²³ This fragmentary nature was there at the beginning of the field, corresponding to the wide spectrum of political stakes the field attracted. Landmark works by historians Steve Heims, Ronald Kline, and Geoffrey Bowker, among others, have done much to capture the process by which cybernetics manufactured, managed, and sometimes erased political and scientific differences.²⁴ As such, *Code* does not seek to recover an originating moment or problem that fully defined cybernetic research. My aim is rather to reassemble what I see as key, and somewhat overlooked, social attachments that shaped these fields and their significance for our conflicted present moment.

Among the terms displaying some semantic variability throughout this book are *cybernetics*, *information theory*, and *game theory*. Their meanings were particularly unstable from around 1948 to 1964. Efforts to canonize one definition or another usually speak to specific theorists’ desire to monopolize credit or authority and shape specializations in the shifting grounds of postwar universities. Those goals, reasonable within the push and pull of academic politics, obscure the epistemic webs essential to tracing common endeavors from information theory to French theory. For this reason, my treatments of these terms often emphasize the periods of formative and developing methods, such as computing at MIT in the

1930s or Lévi-Strauss's work at the Paris office of UNESCO in the 1950s. The interest of these sites is as relays: sites of decisive epistemic exchange along routes that may have collapsed over previous decades of scientific specialization. I view that shifting groundwork as central in reconstructing decisive affinities typically hidden by traditional disciplinary accounts. In other words, this book is interested in mapping the diffractions and differential specializations that bind diverse fields together—what Kline has termed “the disunity of cybernetics.”²⁵

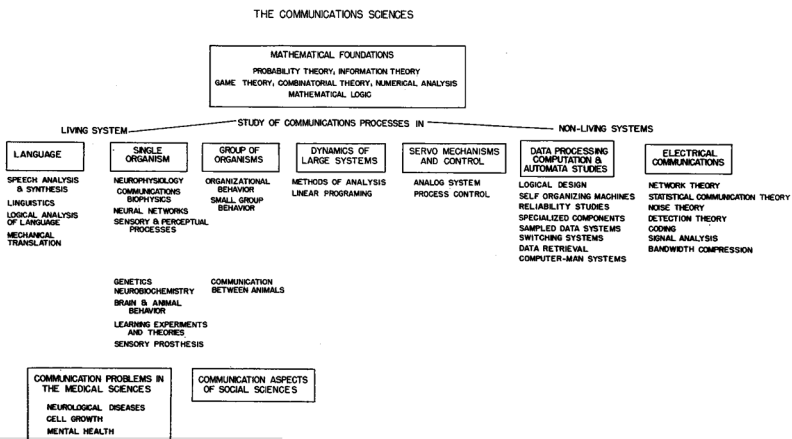
With those caveats in mind, by *cybernetics* I usually refer to a science that emphasizes communication and control in humans, machines, and living systems. For Wiener, as for Shannon and mathematician John von Neumann, cybernetics variously subsumed or overlapped with information theory and game theory.²⁶ Cybernetics closely aligns with 1940s research into electronic computing, feedback mechanisms, and biology. The term is commonly identified with Wiener, who coined its modern usage in the late 1940s; but in the course of chapters 1 and 2 I reset its meaning within the broader associations of the Macy conferences on cybernetics that supported its conceptualization, including the media anthropology of Mead and Bateson in the 1930s. Indeed, cybernetics is capacious and at times has included works by the likes of Lévi-Strauss, Lacan, and even Barthes.

By *information theory* I generally mean Shannon's account of the theoretical limits and coding schemas for data transmission as well as its reinterpretation by mathematician Warren Weaver in his celebrated commentary to their coauthored book, *The Mathematical Theory of Communication*.²⁷ Yet there is also a theory of information embedded in Wiener's cybernetics, much as cybernetic concerns with feedback mark Shannon's writings. *Game theory* most directly concerns the writings of mathematician John von Neumann and economist Oskar Morgenstern on games and economic behavior. But its kernel is not their work but rather a more general effort, either mathematical or social scientific, to formalize diverse behaviors through reference to (usually) simple games. Throughout this book I also touch on remarks on games by Bateson, Lévi-Strauss, Lacan, and Shannon that fall within the ambit of 1950s and 1960s game theory.

Occasionally I invoke the terms *communication science* and *communication theory*. Although somewhat familiar as phrases since the 1950s, these fields were never subject to the same disciplinary stabilization. The collapse of MIT's longstanding efforts to establish a center for communication sciences (figure 1.1), where thinkers as diverse as linguist Noam Chomsky, information theorist Shannon, and experts in fields such as ser-

vomechanisms, biology, sociology, and psychology were to be brought together, is telling. That effort speaks to both the institutional reality of these ideas and their insistently unwieldy characters. For the purposes of this book, *communication science* refers to the far-reaching effort in the 1950s and 1960s to redefine diverse disciplines in terms of communication—a project that included communication studies, structural anthropology, and cognitive science. While the present book has little to say about molecular biology or ecology in the 1960s, there are key works in those fields that could be classified as communication science. In contrast to cybernetics and information theory, communication science was not explicitly tied to industrial engineering or data transmission. Saussurean linguistics, for example, might be understood as a field of communication science. Yet an implicit reference to the technical underpinnings of cybernetics and information theory abided whenever more theoretical efforts were made to conceive of all these diverse objects as part of a common project. Hence the term *communication theory* refers to conceptual frameworks invoked by these fields to classify their objects as communicative.

By the phrase *cybernetic apparatus* I mean the network of institutions, methods, techniques, researchers, conferences, instruments, laboratories, clinics, infrastructures, and jargon mobilized around cybernetic themes. I use the term *apparatus* to evoke two aspects of that mobilization. First,



1 Draft diagram of disciplinary structure at MIT's Center for Communication Sciences, ca. 1959. Use of *communication* and *science* in singular and plural forms reflected broader conceptual instability around these key terms.

Source: J. B. Wiesner Papers, box 4, folder 130, MIT Distinctive Collections, Cambridge, MA.

I have in mind the sense of an apparatus as an instrument or device. Researchers celebrated the power of new instruments such as telecommunications, computers, and electronics to reveal the organization of the world in discrete signals. They also hailed the ability of these instruments to organize transdisciplinary knowledge that transcended such instruments and techniques. The term *cybernetic apparatus* therefore refers to cybernetic instruments and techniques that permitted the mobilization of diverse objects and people within apparently cybernetic relations—for example, by revealing patterns, codes, and systems underpinning diverse elements. Bateson and the Palo Alto group used family therapy observation rooms, which included instruments such as film cameras, magnetic recording, and structured interviews, for the disclosure of recursive informatic patterns structuring social groups. These rooms and their instruments became cybernetic apparatuses. In this sense, references to the cybernetic apparatus always imply concrete instruments and techniques that translate diverse objects into cybernetic flows.

Second, with the term *cybernetic apparatus* I have in mind the strategic and political alliance of researchers around cybernetic technologies, usually supported by foundations or other interested sponsors. The apparatus always corresponds to urgent problems that mobilized researchers and institutions across disciplinary, political, and national borders by reference to the quasi-transcendental powers of cybernetic instruments. The management of colonial subjects, mental illness, the Soviet threat, the fallout of decolonization and globalization, and the rise of mass media constituted problems that mobilized an apparatus of researchers, institutions, and techniques for analysis and management. *Code* explains how the blurring of these potentially distinct types of apparatuses—instruments on one hand, a strategic convention of heterogeneous actors on the other—resulted in a new epistemic machinery. My historical reconstruction of the cybernetic apparatus casts new light on the pervasive technological and political dimensions of the communicative epistemology that spread across disciplines in the twentieth century and laid the groundwork for our digital present.

Technocracy and Theory

Throughout this book I refer to technocratic orientations of the cybernetic apparatus. Somewhat more detailed clarification is needed of my use of this term. By *technocracy* I mean a political strategy that invokes technology,

data, and expertise as a means for the neutral (or nonpartisan) adjudication of political difference. Although there were a few political groups of the 1930s with *technocracy* in their names, I am using the term here to refer to a general political strategy of the period rather than to a specific group. Surveys, social sciences, laboratories, theory, and jargon often figure prominently in technocracy. Technocracy is frequently misunderstood as governance by means of technology and its related apparatus of data, bureaucrats, and nonexperts. But the core feature of technocracy is a politically motivated valorization of the technical as a supposedly nonpolitical and neutral tool of governance. It defuses social struggle by likening social conflict to mechanical failures, suitable for impartial redress by technical experts. In other words, the essence of technocracy is not the technical as such but rather a political rhetoric of the technical. Technocracy obfuscates the political through appeals to technology, techniques, procedures, data, technical precision, and so forth as tools of neutral governance.

As historian Dorothy Ross argues, the rise of the social sciences in the United States owes much to middle- and upper-class professional researchers who interpreted social and political conflict that was industrial in origin in depoliticized terms of adjustment and adaptation.²⁸ Technocracy appealed to liberal reformers and even to industrial magnates, who sometimes funded scientific philanthropies, universities, and similar expert institutions of technocratic reform. In a society that was plagued by capitalist inequality but that had an official commitment to equality, freedoms of belief and movement, and the protection of private property, technocratic social science seemed to promise noncoercive means for adjudicating these interests. A 1943 essay coauthored by Harold A. Lasswell, a major figure in interwar communication research and postwar cybernetic social science, praised the increasingly “technical and exhaustive” techniques of the “modern specialists on the human sciences” for furnishing knowledge that could be “applied and retested in the selecting of personnel in business, government, army, and other social structures.”²⁹ By means of the “laboratory of the psychologist, the field expedition of the ethnologist and the clinic of the physician . . . systems of incentive are explored for their efficacy in raising production and reducing disciplinary problems.”³⁰ This kind of technocratic social science obfuscates how industrial management sets social ideals by transforming its dictates into supposedly general theoretical knowledge about the human condition. Despite that, technocracy is not as blunt a form of industrial exploitation as strike-breaking with

Pinkerton detectives. As an instrument of technocratic governance, the human sciences displace force through the mediating instruments of numbers, laboratories, peer review, and data, giving the dictates of industrial and elite management the trappings of neutral scientific adjudication.

A particular relationship prevails between theory in the human sciences and technocracy, particularly in the United States. To characterize that relationship in very rough and general terms, theory is a means of rendering the humanities more consonant with the dictates of technocracy that obfuscates political decisions through an appeal to abstract norms. As philosopher Jürgen Habermas has argued, since industrialization—itsself a process dependent on a certain institutionalization and application of theoretical knowledge—science and technology have provided a central model for nonideological governance.³¹ Fields from economics to politics increasingly legitimated their professionalism via appealing to theoretical models that oriented professional practice. Indeed, adhering to scientific theory remains one of the markers setting off professions from “mere” trades.³² These theories and their models form an ever-advancing set of theoretical points of reference by which the disciplines submit to rules of formal analysis and definition. Particularly in fields open to contingent and singular impressions of an individual (e.g., sciences of the mind, literary criticism, media studies), theory often seems to promise a set of neutral and professional standards for ordering observations.³³ The late twentieth-century rise of “theoretical schools” in the US humanities shows that the demands of professionalization render even theories thematically opposed to such standardization, such as Marxist critical theory or deconstruction, susceptible to the development of standard machine-like techniques for predictable selection, interpretation, and publication of results. This alliance between theory and professionalization is one manner in which the contemporary university accords with the demands of a technocratic era.

These remarks on theory, technocracy, and professionalization bring up a decisive point: a false dichotomy opposes *technocratic analysis*, identified with empirical and data-driven inquiry, preferring practices of *theory* or *theoretical analysis*, allegedly defined by a speculative analysis of metaphysical or critical inflection. Yet the rise to prominence of theory in the study of humans closely tracks with efforts to develop scientific correlations between empirical observations and systematic social critique. For example, it was amid an intense emphasis on reorienting the relationships among empiricism, social science, and critical philosophy that so-

ciologist Max Horkheimer proposed critical theory as a new manner of orienting rational social inquiry.³⁴ Indeed, many modern critical projects that explicitly reject scientific positivism nonetheless resound with an effort to retool philosophy for an industrial age, including an adaptation of critical inquiry to the methodological and professional models of the technocratic human sciences. Theodor Adorno's well-known work *The Authoritarian Personality* is an exemplary effort by a critical theorist to align critical theory with rigorous and empirical social science for the purposes of improved educational policy and the like. Theoretical schools' frequent recourse to institutes, external funding, and think tanks reflects a broader drive to reorder the humanities in forms and values borrowed from the social sciences. This apparatus belongs to an effort to reconstruct critique according to the professional, institutional, and political exigencies opened up by empirical social sciences.

In so-called French theory the debts to technocratic social science were particularly evident. As Lévi-Strauss wrote of linguistics, which he treated as a model for the human sciences, linguistics "is probably the only [social science] which can truly claim to be a science and which has achieved both the formulation of an empirical method and an understanding of the nature of the data submitted to its analysis."³⁵ It was on this basis that Jakobson's structural linguistics, Barthes's structural semiology, Lacan's structural psychoanalysis, and to some extent Louis Althusser's structural Marxism took linguistics as the model of a modern and exacting inquiry. As discussed in chapters 4 and 5, far-reaching reforms in the 1950s and 1960s that promoted data-driven research centers, teamwork, empirical methods, and a reorientation of philosophy and literature toward the "human sciences" were a precondition for the theoretical revolutions tied to psychoanalysis, semiology, and Marxism in Cold War France. That does not necessarily mean that theorists are technocrats, but it does suggest their work was being refashioned according to the conditions of a technocratic institution craving legitimacy in industrial democracies that value professionalism and technical expertise.

The technocratic advance of theory in the human sciences in France and across Europe and North America correlated with efforts to restructure singular works—literature, art, political events—into symbolic fields structured in more or less predictable manners disclosed by organized professional study. The drive in the modern research university toward regulation by field-specific jargons, professional bodies, research centers, peer reviewed journals, conferences, and increasingly complex hierarchies

of supposedly meritocratic distribution reflects the same technocratic tendency. When film theorist David Rodowick writes that “from the late 1960s and throughout the 1970s, the institutionalization of cinema studies in universities in North America and Europe became identified with a certain idea of theory,” the term *institutionalization* is at least as crucial as *theory*.³⁶ Theory not only translates words and images into a logical system of discrete elements permitting reconstruction in the scientific frameworks implied by semiotics or psychoanalysis of the period. It also becomes a key element in coordinating new inscriptions of objects and personnel into the modern research university in accordance with professional and methodological distinctions loosely modeled on the natural and social sciences. The inscriptions carry with them jargon, hierarchies, interpretive prescriptions, authoritative texts, and other standards that discipline research communities. This need for professionalism, as Ross notes, corresponds in turn with the demand that the social sciences display the rigor, impartiality, and neutrality that liberal industrial democracies require of the modern research university. Theory thus systematizes both its subject and its object, the researcher and the researched.

The Human Sciences and the Behavioral Sciences

Throughout this work I refer to the *human sciences*. In general, it designates the idea of a scientific, systematic approach to the social sciences and humanities. Geography, linguistics, anthropology, criminology, and literary semiology, when practiced with a systematizing and theoretical emphasis, fall within its ambit. Psychiatry and psychoanalysis are also frequently within its purview. Aspects of biology may occasionally be within its mandate, particularly when, for example, they bear on a humanistic field such as physical anthropology or linguistics. I use the term *human sciences* throughout this book not only because it surfaces among the subjects I study but more importantly because it designates a conceptual effort to which my subjects implicitly subscribed. At key moments in their research careers, Mead, Bateson, Wiener, Shannon, Lévi-Strauss, Barthes, and others believed fields such as cybernetics, information theory, and semiology were uncovering general principles that underpinned natural and human systems including psychology, linguistics, and the arts. This belief led to a certain skepticism toward existing disciplinary arrangements as well as to the effort, through initiatives such as the Macy Conferences on

Cybernetics, to found new fora for dialogue between the humanities and social sciences.

Perhaps more decisively, the human sciences refer to a project of systematization long sought but never achieved in an enduring form. For example, in 1963 Althusser remarked that while everyone seemed to be talking about the human sciences, when asked what they were, the same people “have trouble coming up with an answer”; he added that, in his own estimation, “it is a field in search of its own definition.”³⁷ To be sure, there are plenty of projects and invocations of “the human sciences” as if it were a definite and existing intellectual formation. The aforementioned remarks from Lasswell exemplify the type of context in which the idea of human sciences often thrives in the United States: among experts putting knowledge of the human in the service of government and industry through improved techniques and data. This tendency, equally on display in France, led Lacan to comment in 1965 on his “lifelong repugnance for the appellation ‘human sciences’ . . . it strikes me as the very call of servitude.”³⁸ Indeed, something deep within the human sciences drives many of its most celebrated thinkers to question not only the term but the very “human” revealed by the systems, techniques, data, and enclosures its researchers cultivate.

For these reasons, with the term *human sciences* I denote an ongoing effort at reform, always underway, never realized. Like the colony, the asylum, and the camp, it strives for but never achieves closure. The aspiration to contain and order difference is stymied, not least by the social and political contradictions that set its systematization in motion. *Code* describes one particularly decisive itinerary by which the project of the human sciences was done and undone in the course of the twentieth century. The additional term *behavioral sciences*, which closely overlaps with French usages of *les sciences humaines*, provides one more example of perpetual unraveling of these scientific forms as they cross borders.³⁹ While some semantic differences might be inventoried among the human sciences, behavioral sciences, and cybernetic social sciences, binding them together is a tendency to undermine the objects to which they refer. These scientific programs to define humans, behaviors, and social groupings tend finally to render their order of reality uncertain and inconsistent. These fields’ commitments to systematization position human beings in technical and scientific flows that no longer regard man as the measure of all things. The effort to institute a science of the human, much like the effort to reach a purified vision of “reason” or “culture” by means of the colony, asylum, or

camp, leads to endeavors defined chiefly by inhumanity and barbarism. This was no hypocrisy haunting the cybernetic apparatus; on the contrary, it was the horrifying paradox that its proponents chose to face head on, by reincorporating political and technical force within the sciences of humanity, if need be. Their struggle over the human sciences self-consciously coincided with the unbearable facts of genocide, pogroms, and colonization as threats intrinsic to the digital methods to which they also turned for a way out of these human catastrophes.

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Notes

Introduction

- 1 Margaret Mead, “The Study of Culture at a Distance,” in *The Study of Culture at a Distance*, ed. Margaret Mead and Rhoda Métraux (Chicago: University of Chicago Press, 1953), 40.
- 2 Gregory Bateson, *Naven: A Survey of the Problems Suggested by a Composite Picture of the Culture of a New Guinea Tribe Drawn from Three Points of View* (Stanford, CA: Stanford University Press, 1958 [1936]), vii. Cited comments from the newly written preface for the 1958 edition.
- 3 Norbert Wiener, *Cybernetics, or Control and Communication in the Animal and the Machine* (Paris: Hermann and Cie, 1948), 38.
- 4 Warren S. McCulloch, “A Recapitulation of the Theory, with a Forecast of Several Extensions,” *Annals of the New York Academy of Sciences* 50, no. 4 (1948): 264, <https://doi.org/10.1111/j.1749-6632.1948.tb39856.x>.
- 5 On the determinate situations of conceptual analysis, see Samuel Weber, “The Calculable and the Incalculable: Hölderlin after Kittler,” in *Media after Kittler*, ed. Eleni Ikoniadou and Scott Wilson (London: Rowman and Littlefield, 2015), 36.
- 6 Max Horkheimer, “Traditional and Critical Theory” (1937), in *Critical Theory: Selected Essays*, trans. Matthew J. O’Connell (New York: Continuum, 1972), 188–243.
- 7 Bruno Latour, “Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concern,” *Critical Inquiry* 30, no. 2 (Winter 2004): 225–48.
- 8 Roland Barthes, *s/z: An Essay*, trans. Richard Miller (New York: Farrar, Straus and Giroux, 1974 [1970]), 264.
- 9 Daniel Bell, “Notes on the Post-industrial Society: Part I,” *Public Interest*, no. 6 (1967): 28.
- 10 Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: MIT Press, 1996), 3–8; Oliver Belcher, “Sensing, Territory, Population: Computation, Embodied Sensors, and Hamlet Control in the Vietnam War,” *Security Dialogue* 50, no. 5 (October 2019): 416–36, <https://doi.org/10.1177/0967010619862447>.

- 11 On the informatics of domination, see Donna J. Haraway, “Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s,” *Socialist Review*, no. 80 (1985): 65–108. On the roots of the informatics of domination in the human sciences, see Donna J. Haraway, “The Biological Enterprise: Sex, Mind, and Profit from Human Engineering to Sociobiology,” *Radical History Review* 20 (Spring/Summer 1979): 206–37; and Donna J. Haraway, “Signs of Dominance: From a Physiology to a Cybernetics of Primate Society, C. R. Carpenter, 1930–1970,” in *Studies in History of Biology*, ed. William R. Coleman and Camille Limoges (Baltimore, MD: Johns Hopkins University Press, 1983), 129–219.
- 12 Peter Galison, “The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision,” *Critical Inquiry* 21, no. 1 (1994): 228–68; Andrew Pickering, “Cyborg History and the World War II Regime,” *Perspectives on Science* 3, no. 1 (1995): 1–48; Edwards, *The Closed World*.
- 13 Jennifer S. Light, *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America* (Baltimore, MD: Johns Hopkins University Press, 2003).
- 14 See, for example, Chris Hables Gray, ed., *The Cyborg Handbook* (London: Routledge, 1995); Mara Mills, “Deaf Jam: From Inscription to Reproduction to Information,” *Social Text* 28, no. 102 (Spring 2010): 35–58, <https://doi.org/10.1215/01642472-2009-059>; Jennifer S. Light, “Discriminating Appraisals: Cartography, Computation, and Access to Federal Mortgage Insurance in the 1930s,” *Technology and Culture* 52, no. 3 (2011): 485–522; Rebecca Lemov, *Database of Dreams: The Lost Quest to Catalog Humanity* (New Haven, CT: Yale University Press, 2015); Peter Sachs Collopy, “The Revolution Will Be Videotaped: Marking a Technology of Consciousness in the Long 1960s” (PhD diss., University of Pennsylvania, 2015); Ginger Nolan, *The Neocolonialism of the Global Village* (Minneapolis: University of Minnesota Press, 2018), <https://manifesto.umn.edu/projects/the-neocolonialism-of-the-global-village>; William Lockett, “The Science of Fun and the War on Poverty,” *Grey Room*, no. 74 (Winter 2019): 6–43; Morgan Ames, *The Charisma Machine: The Life, Death, and Legacy of One Laptop per Child* (Cambridge, MA: MIT Press, 2019); Joanna Radin, “‘Digital Natives’: How Medical and Indigenous Histories Matter for Big Data,” *Osiris* 32, no. 1 (2017): 43–64, <https://doi.org/10.1086/693853>; John Durham Peters, “Memorable Equinox’: John Lilly, Dolphin Vocals, and the Tape Medium,” *boundary 2* 47, no. 4 (2020): 1–24, <https://doi.org/10.1215/01903659-8677814>; and Jan Müggenburg, “From Learning Machines to Learning Humans: How Cybernetic Machine Models Inspired Experimental Pedagogies,” *History of Education* 50, no. 1 (2020): 112–33, <https://doi.org/10.1080/0046760X.2020.1826054>.

- 15 Lisa Nakamura, speaking on the roundtable “Systemic and Epistemic Racism in the History of Technology Organizer,” Society for the History of Technology Annual Meeting, November 19, 2021 (online).
- 16 In a number of instances, issues of sexual alterity seem also relevant, as in the commentaries of Mead, Barthes, and Foucault that bear on kinship, gender, and institutionalization.
- 17 N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999); Haraway, “Manifesto for Cyborgs”; Friedrich A. Kittler, *Gramophone, Film, Typewriter*, trans. by Geoffrey Winthrop-Young and Michael Wutz (Stanford, CA: Stanford University Press, 1999 [1986]); Rosi Braidotti, *The Posthuman* (Cambridge: Polity, 2013); Claus Pias, “The Age of Cybernetics,” in *Cybernetics: The Macy Conferences 1946–1953; The Complete Transactions*, ed. Claus Pias (Berlin: Diaphanes, 2016), 11–26. On cybernetics ties to the (post)structural critique of humanism, see Céline Lafontaine, *L’Empire cybernétique: Des machines à penser à la pensée machine* (Paris: Seuil, 2004); François Cusset’s response “Cybernétique et « théorie française »: Faux alliés, vraies ennemis,” *Multitudes Web* 22 (Autumn 2005); Lydia H. Liu, *The Freudian Robot: Digital Media and the Future of the Unconscious* (Chicago: University of Chicago Press, 2010); Warren Sack, “Une Machine à raconter des histoires: De Propp aux software studies,” trans. Sophie B. Rollins, *Les Temps Modernes*, no. 676 (November–December 2013); and Jérôme Segal, *Le zéro et le un: Histoire de la notion scientifique d’information au XXe siècle (Vol. I)* (Paris: Éditions Matériologiques, 2013, 485–532).
- 18 Pias, “The Age of Cybernetics,” 17, 18.
- 19 Claude Lévi-Strauss, *The Savage Mind* (Chicago: University of Chicago Press, 1966), 247.
- 20 Hayles, *How We Became Posthuman*, esp. 84–112; Mark B. N. Hansen, *New Philosophy for New Media* (Cambridge, MA: MIT Press, 2004).
- 21 Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1964); James W. Carey, “Technology and Ideology: The Case of the Telegraph” (1983), in *Communication as Culture: Essays on Media and Society* (New York: Routledge, 2009), 155–77; Laura Otis, *Networking: Communicating with Bodies and Machines in the Nineteenth Century* (Ann Arbor: University of Michigan Press, 2001); David E. Nye, *American Technological Sublime* (Cambridge, MA: MIT Press, 1994); Jeffrey Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television* (Durham, NC: Duke University Press, 2000).
- 22 Hall spoke of “American theories and models” that abolished contradiction in favor of “dysfunctions” and “tension management.” Stuart Hall, “Cultural Studies and the Centre: Some Problematics and Prob-

- lems,” in *Culture, Media, Language: Working Papers in Cultural Studies, 1972–79*, ed. Stuart Hall (London: Hutchinson and Centre for Contemporary Cultural Studies, University of Birmingham, 1980), 20.
- 23 Margaret Mead, “Cybernetics of Cybernetics,” in *Purposive Systems: Proceedings of the First Annual Symposium of the American Society for Cybernetics*, ed. Heinz von Foerster et al. (New York: Spartan Books, 1968), 2.
- 24 Steve J. Heims, *Constructing a Social Science for Postwar America: The Cybernetics Group (1946–1953)* (Cambridge, MA: MIT Press, 1991); Geoffrey Bowker, “How to Be Universal: Some Cybernetic Strategies, 1943–70,” *Social Studies of Science* 23, no. 1 (1993): 107–27; Ronald R. Kline, *The Cybernetics Moment: Or Why We Call Our Age the Information Age* (Baltimore, MD: Johns Hopkins University Press, 2015).
- 25 Kline, *The Cybernetics Moment*, 7.
- 26 For more on these overlaps see, for example, Ronald R. Kline, “What Is Information Theory a Theory Of? Boundary Work among Scientists in the United States and Britain during the Cold War,” in *The History and Heritage of Scientific and Technical Information Systems: Proceedings of the 2002 Conference, Chemical Heritage Foundation*, ed. W. Boyd Rayward and Mary Ellen Bowden (Medford, NJ: Information Today, 2004), 15–28; Claude E. Shannon, review of *Cybernetics, or Control and Communication in the Animal and the Machine*, by Norbert Wiener, *Proceedings of the Institute of Radio Engineers* 37 (1949): 1305; and Kline, *The Cybernetics Moment*, 7–8, 69–83.
- 27 Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communication* (Urbana: University of Illinois Press, 1949).
- 28 Dorothy Ross, *The Origins of American Social Science* (Cambridge: Cambridge University Press, 1991).
- 29 Harold D. Lasswell and Myres S. McDougal, “Legal Education and Public Policy: Professional Training in the Public Interest,” in *The Analysis of Political Behaviour* (London: Kegan Paul, Trench, Trubner, 1947), 33. On Lasswell’s communication research supported by the Rockefeller Foundation, see Rockefeller Foundation, *The Rockefeller Foundation Annual Report 1942* (New York: Rockefeller Foundation, 1943), 38–39; and Brett Gary, “Communication Research, the Rockefeller Foundation, and Mobilization for the War on Words, 1938–1944,” *Journal of Communication* 46, no. 3 (1996): 124–48. On its postwar development, see Fenwick McKelvey, “The Other Cambridge Analytics: Early ‘Artificial Intelligence’ in American Political Science,” in *The Cultural Life of Machine Learning: An IncurSION into Critical AI Studies*, ed. Jonathan Roberge and Michael Castelle (London: Palgrave Macmillan, 2020), <https://doi.org/10.1007/978-3-030-56286-1>.
- 30 Lasswell and McDougal, “Legal Education and Public Policy,” 33.

- 31 Jürgen Habermas, “Technology and Science as ‘Ideology’” (1968), translated by Jeremy J. Shapiro, in *Toward a Rational Society* (Boston: Beacon, 1970), 81–127.
- 32 Samuel Weber, *Institution and Interpretation* (Minneapolis: University of Minnesota Press, 1987), 25.
- 33 Weber, *Institution and Interpretation*, esp. 57.
- 34 Horkheimer, “Traditional and Critical Theory.”
- 35 Claude Lévi-Strauss, “Structural Analysis in Linguistics and Anthropology” (1945), in *Structural Anthropology* (New York: Basic Books, 1976), 31.
- 36 D. N. Rodowick, “An Elegy for Theory,” *October*, no. 122 (2007): 91.
- 37 Louis Althusser, “Philosophy and Social Science: Introducing Bourdieu and Passeron” (1963 lecture), trans. Rachel Gomme, *Theory, Culture and Society* 36, no. 7–8 (2019): 6.
- 38 Jacques Lacan, “Science and Truth, (1965 lecture, 1966 published), in *Écrits: The First Complete Edition in English*, trans. Bruce Fink (New York: W. W. Norton, 2006), 730.
- 39 For more on the behavioral sciences and cybernetically inflected rationalism, see Paul Erickson, Judy L. Klein, Lorraine Daston, Rebecca Lemov, Thomas Sturm, and Michael D. Gordin, *How Reason Almost Lost Its Mind: The Strange Career of Cold War Rationality* (Chicago: University of Chicago Press, 2013).

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Epigraph: Warren Weaver to W. F. Loomis, untitled memo, p. 2, November 28, 1950, RF, collection general correspondence, RG 2–1950, series 100, box 476, folder 3192, RAC.

- 1 Rockefeller Foundation, *The Rockefeller Foundation: Annual Report 1937* (New York: Rockefeller Foundation, 1938), 39. Note the communication funding reported on page 61. See also David Culbert, “The Rockefeller Foundation, the Museum of Modern Art Film Library, and Siegfried Kra-cauer, 1941,” *Historical Journal of Film, Radio and Television* 13, no. 4 (1993): 495–511; Gary, “Communication Research”; William Buxton, “Rockefeller Philanthropy and Communications, 1935–1939,” in *The Development of the Social Sciences in the United States and Canada: The Role of Philanthropy*, ed. Theresa Richardson and Donald Fisher (Stamford, CT: Ablex, 1999), 177–92; William Buxton, “From Radio Research to Communication Intel-ligence: Rockefeller Philanthropy, Communications Specialists, and the American Policy Community,” in *Communication Researchers and Policy-Making*, ed. Sandra Braman (Cambridge, MA: MIT Press, 2003), 295–346.
- 2 Rockefeller Foundation, *The Rockefeller Foundation: A Review for 1936* (New York: Rockefeller Foundation, 1937), 42.

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