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The Cybernetic Apparatus:
Media, Liberalism, and the Reform of the Human Sciences

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Abstract

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The Cybernetic Apparatus: Media, Liberalism, and the Reform of the Human Sciences examines efforts to reform the human sciences through new forms of technical media. It demonstrates how nineteenth-century political ideals shaped mid-twentieth-century programs for cybernetic research and global science sponsored by the Rockefeller Foundation. Through archival research and textual analysis, it reconstructs how and why new media, especially digital technologies, were understood as part of a neutral and impartial apparatus for transcending disciplinary, ethnic, regional, and economic differences. The result is a new account of the role of new media technologies in facilitating international and interdisciplinary collaboration (and critique) in the latter half of the twentieth century.

Chapter one examines how political conceptions of communications and technology in the United States in the nineteenth century conditioned the understanding and deployment of media in the twentieth century, arguing that American liberals conceived of technical media as part of a neutral apparatus for overcoming ethnic, geographic, and economic difference in the rapidly expanding nation. Chapter two examines the development of new media instruments as technologies for reforming the natural and human sciences from the 1910s through the 1940s, with particular attention to programs administered by the Rockefeller Foundation. Chapters three and four examine the rise, in the 1940s and 1950s, of cybernetics and information theory as an ideal of scientific neutrality and political orderliness. These chapters demonstrate how programs sponsored by the Rockefeller Foundation, MIT, and other institutions shaped linguist Roman Jakobson's and anthropologist Claude Lévi-Strauss's efforts to redefine their fields as communication sciences. Chapter five considers how critics of cybernetics, including Noam Chomsky, Claude Shannon, and Roland Barthes, critically re-evaluated the claims of cybernetics to redefine the relations between technical research and the human sciences.

Acknowledgments

"Lists of acknowledgments," Richard Sennett recently observed, "are becoming like phone directories."[1] This dry comparison between public directories and ever-expanding inventories of academic acknowledgements points towards a potential impoverishment of the latter, should indiscriminate recognition obscure the intimacy of dialogue and intellectual indebtedness. However, I see in these growing lists a laudable multiplication of the varieties of persons, societies, and impersonal networks acknowledged by contemporary scientific practice. A few centuries ago, recognition of a sovereign or lord, perhaps *the* Lord, was enough to satisfy a savant's debts. With the rise of experimental sciences, acknowledgement began to change: Scientific works began to identify not only benefactors and Providence but also colleagues, witnesses, and professional organizations. These recognitions attested to the multitude of actors involved in producing reliable knowledge and suggested earthly origins for even the most ethereal speculations. In time, instruments, laboratories, foundations, and on occasion even the family pet[2] were also accorded due representation. In this regard—and contrary to Sennett—academic acknowledgements have less in common with phone books than film credits:

1 Richard Sennett, *Together: The Rituals, Pleasures and Politics of Cooperation* (United States of America: Yale University Press, 2012), xi.

2 Colin Cherry, *On Human Communication: A Review, a Survey, and a Criticism* (Cambridge: MIT Press, 1957).

Combining recognition, gratitude, showmanship, and professional duties, their length and diversity is a tribute to a resolutely modern and collaborative style of production.

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Abbreviations

ELP Ecole Libre Papers, New School for Social Research Libraries, New York, New York

RAC Rockefeller Archive Center, Sleepy Hollow, New York

RJP Roman Jakobson Papers, Institute Archives & Special Collections, Massachusetts Institute of Technology, Cambridge, Massachusetts

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Introduction

This project began with the modest goal of understanding why terms associated with the early history of computing, and especially with the moribund field of research known as cybernetics, feature prominently in the language of some social and cultural theories. When I began my graduate studies, it seemed peculiar to me that a number of concepts associated with communication engineering—e.g., encoding, decoding, signal, message, information, feedback, and entropy—often appeared in semiotic and poststructuralist texts from the 1960s and 1970s. In works by authors as varied as engineers Claude E. Shannon and Norbert Wiener, semioticians Roland Barthes and Umberto Eco, anthropologist Claude Lévi-Strauss, and cultural theorist Stuart Hall, all these terms became manifest together, constituting a kind of critical technology that transformed such diverse phenomena as telephone conversations, artillery-control setups, press photographs, tribal rituals, and audience responses into analogous systems of data processing.[1] How and why did the narrow terminologies and techniques for improved data

1 See Claude E. Shannon, "A Mathematical Theory of Communication," *Bell Systems Technical Journal* 27 (October 1948): 379–423, 623–656; Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine* (New York: MIT Press, 1961); Roland Barthes, "The Photographic Message," in *Image, Music, Text*, trans. Stephen Heath (New York: Hill and Wang, 1977), 15–31; Umberto Eco, "Openness, Information, Communication," in *The Open Work* (Cambridge, Massachusetts: Harvard University Press, 1989), 44–83; Claude Lévi-Strauss, *The Savage Mind* (Chicago: The University of Chicago Press, 1966); and Stuart Hall, *Encoding and Decoding in the Television Discourse* (Birmingham, England: Centre for Cultural Studies, University of Birmingham, 1973).

transmissions become part of a general framework for the interpretation of social, political, and philosophical problems?

The interest of intersections among scientific terminologies and conceptual schemas extends beyond the narrow provinces of those texts or disciplinary history. As Ferdinand de Saussure put it, language is not reducible to nomenclature.[2] A term does not stand on its own as a symbol that expresses the one-to-one correspondence between word and thing, nor does it function as a neutral instrument that passively focuses or carries the intentions of a speaker (neither do instruments, for that matter).[3] Language and technology, as well as technique and method, structure myriad relationships among objects, observers, and communities. This is especially pertinent to the sciences, where terminologies, instruments, and methodologies are developed gradually, collaboratively, and through processes of reciprocal verification and control.[4] Infrastructures, instruments, and idioms embody or concretize these arrangements and become frameworks for tacit knowledge.

This capacity for an orderly and impersonal arrangement of tools, terms, and personnel is among the great merits of science as a way of life: In tandem with those "instrumental" benefits science confers upon society, its robustness as a method of coordinating difference and diversity has lent order and procedure to inquiry for centuries, endowing scientific verification with unique authority and appeal.[5] Personal disputes and chauvinisms are, through the scientific

2 See Ferdinand de Saussure, *Course in General Linguistics*, ed. Charles Bally and Albert Sechehaye, trans. Roy Harris (Chicago: Open Court, 1986), 16, 65, 112.

3 Don Ihde, *Instrumental Realism: The Interface Between Philosophy of Science and Philosophy of Technology* (Bloomington: Indiana University Press, 1991).

4 I am using the more Continental term "human sciences" (French: *les sciences humaines*, German: *Geisteswissenschaften*) rather than "humanities and social sciences" to designate better those scientific formations considered throughout this dissertation. Unlike the English term "humanities" that tends to isolate its field from the sciences, the term "human sciences" and the French and German equivalents underscore the place of scientific norms within the "humane" and "spiritual" areas of inquiry.

5 On the rise of science—and the experimental sciences in particular—as a privileged method for producing public knowledge and fruitful social arrangements, see Steven Shapin and Simon Schaffer, *Leviathan and the Air-*

apparatus, transposed onto a purportedly impartial, shared framework for verification. To hew to the impersonal rules of that apparatus is paradoxically, among scientists at least, a sign of personal virtue and strength of character. This is one of the reasons that science and its technical procedures have occupied a privileged place within the epistemology and ideals of liberal society.

An inquiry into the transposition of scientific and technical frameworks from engineering to the human sciences, therefore, is likely to cast light on the method by which a given society, or elements of that society, structure difference and bring order to the world. Such an inquiry confronts two interpenetrating questions: (1) *Why does this particular framework have legitimacy?* (2) *How is it that this particular framework is organized, maintained, and reproduced*? The first question is more general and its answer is not necessarily immanent to the phenomena under consideration, while the second demands a patient and close analysis of how diverse actors are distributed in a durable and coherent alliance.

Although a handful of critics, historians, and philosophers have previously argued that cybernetics and electronic media have played a leading part in the reordering of science and society, they have not done justice to the historiographic complexity or political stakes of the phenomena under consideration. Martin Heidegger, Friedrich Kittler, and Paul Virilio, for instance, have argued that sometime in the middle of the twentieth century cybernetics began to eclipse venerable distinctions between thought and automation, human and machine, vibrant lifeworld and the barren desert of technology.[6] To their numbers we may add a handful of

Pump: Hobbes, Boyle, and the Experimental Life (Princeton: Princeton University Press, 1985); and Simon Schaffer, "Public Experiments," in *Making Things Public: Atmospheres of Democracy*, ed. Bruno Latour and Peter Weibel (Cambridge: MIT Press, 2005), 298–307.

6 A frequent theme in the late Heidegger is the eclipse of philosophy by technology, and cybernetics in particular. See, for example, Martin Heidegger, "The End of Philosophy and the Task of Thinking," ed. David Farrell Krell, *Basic Writings* (San Francisco: Harper, 1977), 427–449. Kittler touches on this theme from the mid-1980s

historians, such James Beniger and Jerome Segal, or sociologist Céline Lafontaine, who see in cybernetics the march of universal science that has subsumed science, industry, and politics the world over.[7] These totalizing narratives preclude inquiry into the two aforementioned questions. In situating their analysis in a posthistorical moment of technological enframement, these accounts accepted as *fait accompli* precisely those claims and phenomena that seemed to merit critical investigation. They read more like manifestations of the problem under consideration—the attempt to construe cybernetics or electronic technologies as a rubric for global analysis—than critical reflections upon that problem.

The Technologies of Liberalism

This dissertation is organized into two parts, each of which concentrates on one of the aforementioned questions. Part I, *The Technologies of Liberalism*, examines how and why communication technologies have, since the eighteenth century, occupied a privileged place within liberal political practice in the United States. I argue that the fanfare over cybernetics in the latter half of the twentieth century can be traced to an earlier set of political, scientific, and institutional arrangements that credited communications technologies with the ability to transcend regional, ethnic, and economic differences and forge a more liberal society.[8] Chapter one details the attempt in the course of the nineteenth century to resolve social and political

onward. See, for example, the introduction to *Gramophone, Film, Typewriter* (Stanford: Stanford University Press, 1999); and Friedrich Kittler, "Signal-Rausch-Abstand," in *Draculas Vermächtnis* (Leipzig: Reclam Verlag, 1993), 161–181. See also Paul Virilio, *The Information Bomb* (London ; New York: Verso, 2000).

7 See James R. Beniger, *The Control Revolution: Technological and Economic Origins of the Information Society* (Cambridge: Harvard University Press, 1986); Jérôme Segal, *Le Zéro Et Le Un: Histoire De La Notion Scientifique D'information Au 20e Siécle* (France: Editions Syllepse, 2003); and Céline Lafontaine, *L'Empire Cybernétique: Des Machines à Penser à La Pensée Machine* (Paris: Seuil, 2004). Unlike Beniger and Segal, Lafontaine associates this process with the imperialism of American technology.

8 For more on liberal universalism and cybernetics, see Ben Peters, "From Cybernetics to Cyber Networks: Norbert Wiener, the Soviet Internet, and the Cold War Dawn of Information Universalism" (PhD Dissertation, Columbia University, 2010).

problems through improved technologies of communication. Chapter two examines attempts to implement an organized scientific and institutional program based on these ideals through programs support by the Rockefeller Foundation and its affiliates from the 1910s through the 1940s. "The technologies of liberalism," in this context, refers to the material technologies deployed in the name of liberalism as well as the belief that such technologies would produce a more liberal society.

In focusing on liberalism and technology, I am taking a note from German political theorist Carl Schmitt, who contended that liberalism mistakenly substitutes the fundamental agonism of politics with the false neutrality of technology. He saw in the celebration of technology the most radical and widespread expression of a much older liberal search for a neutral means of adjudicating and accommodating competing interests. Communications technologies, such as the radio and the postal service, presented one of the most vivid emblems for this dream.[9] He caustically described the liberal ideology of technology this way:

> the widespread contemporary belief in technology [*Technik*] is based only on the proposition that the absolute and ultimate neutral ground has been found in technology, since apparently there is nothing more neutral. Technology [according to this mistaken belief] serves everyone, just as radio is utilized for news of all kinds or as the postal service delivers packages regardless of their contents, since its technology can provide no criterion for evaluating them....[P]urely technical problems have something refreshingly factual about them. They are easy to solve, and it is easily understandable why there is a tendency to take refuge in technicity from the inextricable problems of all other domains. Here all peoples and nations, all classes and religions, all generations and races appear to be able to agree because all make use of and take for granted the advantages and amenities of technical comforts.[10]

9 It may seem counterintuitive to consider the postal system as a communication technology. For an in-depth account of postal services as technical media, see Bernhard Siegert, *Relays: Literature as an Epoch of the Postal System*, trans. Kevin Repp (Stanford: Stanford University Press, 1999).

10 Carl Schmitt, "The Age of Neutralizations and Depolitizations," in *The Concept of the Political*, trans. M. Konzett and John P. McCormick (Chicago: University of Chicago Press, 2007), 90–91.

With a signature compactness and perspicuity that has fascinated and disturbed generations of readers, Schmitt diagnosed in fascination with technology a corollary to the procedural operations of liberal, parliamentary politics. Schmitt's reading suggested likens the liberal state to a would-be republic of communication, where interests and well-being are conveyed across the land as easily as the postal service conveys packages. Just as radio engineers and postal masters endeavor to develop procedures and techniques for servicing many regions, the proponents of liberal politics imagine an ideal set of discursive and procedural mechanisms for accommodating all interests. As the existing and traditional mechanisms of political adjudication fail, the hope for unity and resolution is projected onto more perfect means of communication. In the name of tolerance and diversity, the multiplicity of the people is reduced to merely another problem of technical resolution.

Schmitt's barbed analysis should attract the attention of media historians and theorists of liberal communication. Writing in the 1920s, he provided a handy explanation for a familiar pattern, whereby the contradictions and failures of liberal political culture are perpetually displaced onto an ever more perfect set of technical communications. The railroad, broadcasting, cable television, and the Internet—each in turn has been a "new medium" credited with furnishing a the technical fix for the shortcomings of our democratic and civil society.[11] Schmitt aptly directs our critical attention to the type of political setting and system that looks for solutions in improved and technological communication and his work may provide clues for considering the widespread interest cybernetics and communication engineering excited from the

11 See, for example, Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1964); Jennifer S. Light, *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America* (Baltimore: Johns Hopkins University Press, 2003), chap. 3, 6; and Bret Maxwell Dawson, "TV Repair: New Media 'Solutions' to Old Media Problems" (PhD Dissertation, Northwestern University, 2008).

1940s through the 1960s. Yet his personal solution—which included an endorsement of National Socialism and the opposition of nationalist and fascist mythology to the neutrality of technique—serves as a tragic and horrifying lesson against any attempt to simply dismiss the liberal ideal or purify politics of its technical elements.[12]

A more cautious critique of technology and liberalism is found in the work of historian and political liberal Richard Sennett. Sennett argues that the degradation of modern liberal politics can be directly traced to the search for neutrality, immediacy, and unchecked communion with all. According Sennett, in the eighteenth and nineteenth centuries liberal politics demanded restraint, confrontation with difference, and a certain admirable—even agreeable—resignation about the limits of politics and the public sphere. For Sennett, modern communication technologies are both an emblem of and engine for the death of civil polity and practice:

> We deny, again, that there ought to be any barriers in communication between people. The whole logic of 20th Century communications technology has been bent to this openness of expression. And yet, though we have enshrined the idea of ease of communication, we are surprised that the "media" result in ever greater passivity on the part of those who are the spectators; we are surprised that under conditions of audience passivity, personality becomes more and more an issue on the air, especially in terms of political life. We do not connect our belief in absolute communicativeness to the horrors of the mass media because we deny the basic truth which once formed a public culture. Active expression requires human effort, and this effort can succeed only to the extent that people limit what they express to one another.[13]

In a swipe at media theorist Marshall McLuhan, Sennett suggests that "'the medium is the message' is a dictum sensible only when expression itself is reduced to a flow of messages."[14] Sennett's warnings are the reminder of another set of liberal values which seem increasingly unimaginable in an era of rampant neoliberalism and global flows of capital. This other

12 See John P. McCormick, *Carl Schmitt's Critique of Liberalism: Against Politics as Technology* (New York: Cambridge University Press, 1997).
13 Richard Sennett, *The Fall of Public Man* (London: Penguin Books, 1976), 262.
14 Ibid., 38.

liberalism, exemplified in Adam Smith's *Theory of Moral Sentiment* and valorized in a lifetime of work by John Dewey, insisted upon a certain heterogeneity in communications. In this tradition, the desire for full and complete access to one another was as obscene as the complete indifference to civil society was immoral. In counterpoint to Schmitt, this account associates the modern celebration of technical communications with the intemperate appropriation and perversion of its liberal tradition. Sennett reminds us that truer liberalism depends upon retaining heterogeneity, difference, occlusion, and even incommunicability.

While Part I draws on the work of both Schmitt and Sennett, my analysis ultimately departs from both of theirs. On the subject of technology, Sennett, like Schmitt, falls short. Along with other pragmatic liberals, he rejects the *logos* of communicative technique only to embrace another *logocentrism*—namely, that of the voice and the supposed immediacy of face-to-face dialogue. When Sennett asserts that "[e]lectronic communication is one means by which the very idea of public life has been put to an end,"[15] he seems to echo the same shortcoming that afflicted Schmitt: a fear that the presence of technical media in the articulation of the public sphere ultimately means the public sphere's dissolution into artifice, disconnectedness, and sterility. I will pursue a more cosmopolitical style of analysis[16] that rejects any attempt to reduce social or political order to a single master or purified figure (man, spirit, etc.). It celebrates the heterogeneity inherent in society and technology alike while retaining the right to critically investigate the structure and order of differences in a given social arrangement. Against the false neutrality of technology, this approach attends to sources of difference, inequality, heterogeneity, and desynchronization inherent in technology—what Jacques Derrida refers to as those

15 Ibid., 282.

16 See Isabelle Stengers, *Cosmopolitics*, trans. Robert Bononno (Minneapolis: University of Minnesota Press, 2010); and Bruno Latour, "Whose Cosmos, Which Cosmopolitics? Comments on the Peace Terms of Ulrich Beck," *Common Knowledge* 10, no. 3 (September 2004): 450–462.

ineradicable "*differences* of rhythm, heterogeneous accelerations which are closely related to the technical and technological developments."[17] These variations, intrinsic to technological development, are integral to the constraints structuring a given society as well as the possibilities for change within a given social order. To ignore these differences and heterogeneities is to consent to the derealization and neutralization imputed to technology.

The Cybernetic Apparatus

Part II, *The Cybernetic Apparatus*, provides a detailed examination of how one particular regime of liberal technologies—that associated with cybernetics—was implemented, maintained, and reproduced. This section details the rise of communities of researchers associated with cybernetic research and narrates the process by which elements of cybernetic analysis became part of social and critical theories. Part I provides the backdrop to understanding how and why new research in cybernetics is of particular interest to social and political theorists. Part II documents the diverse alliances—often contradictory, paradoxical, and fragile in nature—that organized themselves around cybernetic methods and terminologies from the 1940s through the 1970s.

With the term "apparatus," which I borrow from the vexed translations of Michel Foucault's concept of the *dipositif*, I have two interrelated phenomena in mind. The first of these is the process by which specific instruments and technologies were credited with the ability to resolve social and political difference. In this sense, I am interested in how concrete apparatuses [*appareils*] of cybernetics, including machines, diagrams, mathematical procedures, and

17 Jacques Derrida, "Nietzsche and the Machine," trans. Richard Beardsworth, *Journal of Nietzsche Studies*, no. 7 (April 1994): 57.

techniques of analysis, became epistemological and political ideals. Second, I examine the way in which researchers and technologies formed a strategic apparatus [*dispositif*]in response to urgent political problems. In particular, I consider how the events of World War II and the Cold War mobilized researchers from across disciplinary and national borders into an organized apparatus. I argue that the ambiguities in the first sense of the apparatus—the confusion of the concrete instrument and its properties with a more transcendental order of society or nature—enabled this second, strategic articulation of researchers around cybernetics.

In contrast to Part I, the second part presents a number of detailed case studies of particular scientific communities. Chapter three concentrates on Russian linguist Roman Jakobson and his reconceptualization of structural linguistics around cybernetic research at MIT during the 1950s and 1960s. Chapter four looks at the work of French anthropologist Claude Lévi-Strauss during the same period, with especial attention to the context of Franco-American scientific exchange. Both of these chapters consider the multitude of political agendas, institutional alliances, scientific assumptions, and conceptual elisions entailed in assimilating linguistics and anthropology into a cybernetic framework. In chapter five I analyze how critics of the cybernetic apparatus, including American information theorists, linguist Noam Chomsky, and French semioticians, used elements internal to the cybernetic apparatus to critique and ultimately disassemble its apparent unity and neutrality. I argue that this critique was not a reversal of cybernetic claims so much as a redeployment of cybernetics' techniques and assumptions around an alternate set of liberal values. In addition to offering a new account of the role of cybernetics in shaping the human sciences during the Second World War, part II provides resources for interrogating the supposition that technology can either replace or supplant politics.

One final note on the apparatus of my own research is in order: Much of this dissertation critically examines the concepts, programs, strategies, techniques, and styles of reasoning that animated transnational programs of scientific research and exchange. I hope the occasionally suspicious tone of my narrative will not be mistaken for a simple rejection or dismissal of these programs. On the contrary, nestled within my investigation is an encomium to programs and scholars that transformed scientific life by remixing and displacing hidebound intellectual traditions, often in the face of political and humanitarian catastrophes. To revisit and reevaluate these persons and programs—even critically or skeptically—is also to pay tribute to their efforts. I fear, however, that it may prove difficult to write such histories of our intellectual present. With great dismay, I discovered that during the final year I spent writing this dissertation, the Jacob K. Javits program that supported my studies in France was suspended by the U.S. government. So, too, the Fulbright Program was cut back, including the elimination of fellowships to study in Germany. These suspensions constitute a full-out assault on the efforts of generations of scholars, scientists, and politicians to construct a scientific or cultural public that, in the course of national service, might transcend national chauvinism. I hope that my present study, while critically historicizing that conception, might offer materials for someday reclaiming and rebuilding it.

One

Technologies of Liberalism:
The Press, the Railroad and Social Science (ca. 1776-1901)

The word *commun*-ications suggests *commun*-ity, *common*-ality, and *commun*-ion as conceptual kin. And these terms are related. Communications theorist James Carey notes, for example, that the framers and founders of the American Republic turned to communication—including the press, political association, and national transportation networks—as a way of "bind[ing]a vast distance and a large population into cultural unity...."[1] Even so, these early theorists of the American republic did not equate communications with social harmony or mutual understanding. Much less did they see in communications a vehicle for the standard and accurate conveyance of meanings. More often they saw in communications an ensemble of activities—commerce, the press, political agitation—whose robustness depended on its ability to instigate rivalries amongst private and factional interests. It was this very partiality that made communications a powerful technique of liberal governance whose immanent mechanisms undermined tyranny, factions, and individualism without recourse to state violence. The freedom to form alliances around self-interest overcame the solipsistic tendencies of possessive individualism and could counter government tyranny. Meanwhile, the weakness of the word

1 James W. Carey, *Communication as Culture: Essays on Media and Society* (New York: Routledge, 2009), 4.

"communications" and the irreconcilability of individual interests encouraged these same associations to falter before becoming factions in their own right. As Alexis de Tocqueville wrote, admiringly, of the unregulated press in the United States, "liberty cannot live without it and order can hardly be maintained with it."[2]

There was an alternative conception of communication as spiritual transcendence,an ethereal union of minds. Catholics had long designated the receipt of Holy Communion as a "communication." But the dominant construct in the Anglo-American political thought, which John Durham Peters traces to John Locke and Adam Smith, conceived of discretion, distance, and individualism as ineradicable (and productive) features of earthly communication.[3] According to this view, the fragility of language, the fallen nature of mankind, and simple moral discretion imposed limits on communication. As that inveterate and tireless pamphleteer of the early American republic Thomas Paine put it: "Human language is local and changeable, and is therefore incapable of being used as the means of unchangeable and universal information."[4] According to the classic liberal conception this weakness carried political implications and promise. It set a natural limit on the role of the government and but also demanded the earnest efforts of individual citizens to constantly engage and discuss the stakes of civil society.

The rise of technological media such as the telegraph, railroad, and photography in the 19th century changed this. A new notion emerged, one that linked association, the accuracy and efficiency of communications, and social harmony, and it quickly gained widespread currency in

2 Alexis de Tocqueville, *Democracy in America: Historical-Critical Edition of De La Démocratie En Amérique*, ed. Eduardo Nolla, trans. James T. Schleifer (Indianapolis: Liberty Fund, 2010), 293.

3 See John Durham Peters, "John Locke, the Individual, and the Origin of Communications," *Quarterly Journal of Speech* 75, no. 4 (November 1989): 387–399; and John Durham Peters, "Publicity and Pain: Self-Abstraction in Adam Smith's Theory of Moral Sentiments," *Public Culture* 7, no. 3 (Spring 1995): 657 –675. On the spiritual and transcendent conception of communications, see John Durham Peters, *Speaking into the Air: a History of the Idea of Communication* (Chicago: University of Chicago Press, 1999), chap. 2.

4 Thomas Paine, *The Age of Reason* (London: Freethought Publishing Company, 1880), 21.

American thought. This had a variety of incarnations: the technological sublime, the belief in haunted media, and an aesthetic of astonishment. But its defining aspect was a belief in the powers of technical media to transcend the limits of the space, time, and the individual body.[5] Uniting these varied conceptions was a technicist concept of communications as something universal, metaphysical, even spiritual. It was characterized by an aspiration to overcome the limits of time, space, and the human body and turned to technology to overcome the most capricious delays, deferrals, and constraints of individual and embodied life.

With this new technicist framework there also emerged a new theory of national unity as being intimately tied to the development of standardized, ubiquitous, and rational communications. This new concept found its emblem in the new technical media but its origins cannot be reduced to them. Rather, it selectively and strategically transposed liberal ideals of association and communications onto an apparatus of modern communications. The task of articulating and adjudicating the public and its interests was thereby displaced onto an impartial and technical apparatus—as well as the expanding bureaucratic apparatus of experts, engineers, and professional identities charged with its maintenance— and credited it with the power to resolve difference through technological solutions.[6]

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5 Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America* (New York: Oxford University Press, 1964); David E. Nye, *American Technological Sublime* (Mass: MIT Press, 1994); Carolyn Marvin, *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century* (New York: Oxford University Press, 1988); Tom Gunning, "An Aesthetic of Astonishment: Early Film and the [In]Credulous Spectator," in *Viewing Positions: Ways of Seeing Film*, ed. Linda Williams (New Brunswick: Rutgers, 1995), 114–133; Tom Gunning, "Phantom Images and Modern Manifestations," in *Fugitive Images: From Photography to Video*, ed. Patrice Petro (Bloomington: Indiana University Press, 1995), 42–71; and Jeffrey Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television* (Durham: Duke University Press, 2000).

6 On the rise of media technologies as a political ideal see the works cited in the previous footnote, as well as James W. Carey and John J. Quirk, "The Mythos of the Electronic Revolution," in *Communication as Culture: Essays on Media and Society* (New York: Routledge, 2009), 87–108. On the crisis of legitimacy in the latter half of the nineteenth century, see Dorothy Ross, *The Origins of American Social Science* (Cambridge: Cambridge University Press, 1991).

In this chapter I will provide a provisional answer to a question that animates this entire dissertation: How and why did the idea of communications in the United States gradually shift towards this more technicist notion? I propose to treat this transition as a shift between two political strategies, which I term *the techniques of liberalism* and *the technologies of liberalism*. The passage between these two modes correlates with the rise of a new technical, industrial, and scientific apparatus. But that which defines them as strategies—or in other terms, responses to a crisis—cannot be reduced to that apparatus. This shift I identify finds its origins in a nineteenth century crisis of legitimation in American politics. Amidst growing economic, ethnic, regional, and religious divisions in the body politic, the older notion of an agonistic public sphere organized around rival groups lost credibility among elites. Among the disenfranchised, there was growing recognition of being excluded or marginalized by the existing social compact. The largely white and Protestant middle- and upper-classes, by contrast feared the very prospect that "self-interest" might shape or direct disenfranchised groups'—whose identifications often pivoted around racial, ethnic, linguistic, or regional difference—coming participation in public life. Growing participation and representation in public life also meant fear of organization around distinct interests.

By focusing on liberal political strategy I reinterpret a critique of liberalism made by the German jurist Carl Schmitt (and discussed in the introduction to this dissertation).[7] Observing the cult of technology from 1920s Germany, Schmitt argued that the nineteenth century celebration of *Technik* was the manifestation of an older liberal search for a neutral domain that would

7 On this point I am deeply indebted to John McCormick's important text John P. McCormick, *Carl Schmitt's Critique of Liberalism: Against Politics as Technology* (New York: Cambridge University Press, 1997).

accommodate all forms of difference in a common system. He described the appeal of technology to liberalism thus:

> The evidence of the widespread contemporary belief in technology is based only on the proposition that the absolute and ultimate neutral ground has been found in technology, since apparently there is nothing more neutral. Technology serves everyone, just as radio is utilized for news of all kinds or as the postal service delivers packages regardless of their contents, since its technology can provide no criterion for evaluating them...[P]urely technical problems have something refreshingly factual about them. They are easy to solve, and it is easily understandable why there is a tendency to take refuge in technicity from the inextricable problems of all other domains. Here all peoples and nations, all classes and religions, all generations and races appear to be able to agree because all make use of and take for granted the advantages and amenities of technical comforts.[8]

His trenchant analysis applies not only to the rise of the new religious faith in technology during the nineteenth century—what Leo Marx has termed the technological sublime[9]—but also to the rise of experts, engineers, scientists, and professional administrators that evolved in conjunction with the technology, and that gradually organized into that twentieth century political technology known as "technocracy." Leaving the task of discrimination and judgment to political hacks and demagogues, these experts committed themselves to refashioning social conflicts as "refreshingly factual" technical problems for expert resolution.

The typical translation of Schmitt's *Technik* as technology is misleading, insofar as the term may also designate "technique" or "technics" in German. The rendering of *Technik* as technology tends to obscure or take for granted the very distinction Schmitt historicized: that is, the political strategy that identifies technique with the transcendent properties of *logos*. Indeed, for Schmitt the task of a true politics was to expel such false mechanisms of adjudication from political decision-making and found a society bound together by a truer spirit or *logos*, hence his

8 Carl Schmitt, "The Age of Neutralizations and Depolitizations," in *The Concept of the Political*, trans. M. Konzett and John P. McCormick (Chicago: University of Chicago Press, 2007), 90–91.

9 See Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America*.

harsh critique of technology. As John McCormick has shown, this same notion was also implicated in his disastrous collaboration with National Socialism. In this regard, a small difficulty in translation may also serve a certain productive purpose. The term, technology, which was introduced into American English in the 1820s and gained common usage by the 1860s, philologically marks out and thematizes the the emergence of a theologically-tinged belief in a techno-logos. Perhaps it can also confer a certain sense of reality upon the phenomena that Schmitt, in rejecting technology, denied to *Technik*.

Against the Schmittian solution than expels *Technik* as a projection of false beliefs, or that false liberalism that reduces society to its technological articulation, we may see technology and its constituents—material, semiotic, instrumental, organizational—as lively and heterogeneous forces that take part in constructing, but are not reducible, to the social.[10] In that regard my analysis builds upon recent Germanophone scholarship on *Kulturtechnik*—translatable as cultural techniques or cultural technology—that recognizes a constructive relationship among human techniques, material technologies, and the systematization of technics.[11] With a little reading-against-the-grain, one might even elicit from *Kulturtechnik* a new and vibrant political sensibility that invites technologies, instruments, materials, and other nonhuman actors to participate in the constitution of the *polis*.[12] By rejecting purifying procedures set on reducing society to one pure and unified spirit—be it liberal, humanist, or fascist in disposition—it may become possible to

10 On this point see Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005).

11 See, for example, Bernhard Siegert, "The Map Is the Territory," *Radical Philosophy*, no. 169 (October 2011): 13–16; Harun Maye, "Was Ist Eine Kulturtechnik?," *Zeitschrift Für Medien- Und Kulturforschung*, no. 1 (2010): 121–137; Erhard Schüttpelz, "Körpertechniken," *Zeitschrift Für Medien- Und Kulturforschung*, no. 1 (2010): 101–120; and Thomas Macho and Christian Kassung, eds., *Kulturtechniken Der Synchronisation* (Fink, 2012).

12 In this regard, these theorists of *Technik* have much in common with contemporary theorists of *la technique* in France. See, for example, Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge: Harvard University Press, 1993); and Bernard Stiegler, *Technics and Time, Vol. I: The Fault of Epimetheus*, trans. Richard Beardsworth and George Collins (Stanford: Stanford University Press, 1998).

describe and even take a small step towards constructing what Stengers and Latour have termed a cosmopolitics.[13]

With those problems in mind, this chapter will provide a politically attentive reading of the shifting configurations of technique, technology, and technics within American liberalism, through case studies of one *technique* of liberalism (the printing press in the late eighteenth and early nineteenth century) and two *technologies* of liberalism (the railroad in the mid- and late-nineteenth century and the rise of social science in late nineteenth century). My analysis aims to understand their places as factors that constitute and are constituted by specific social and political arrangements. This history will lay a conceptual and historiographic foundation for subsequent chapters by examining the interrelation of politics, technology, and science in the twentieth century, and the attempt to produce and social and political order through the strategic deployment of communications technologies.

Techniques of Liberalism in the Early American Republic

Architects of the early American republic identified the private, self-possessing individual as the lynchpin of liberal society and appointed techniques of communication—most notably the free press, political associations, and free commerce—for connecting this individual to the rest of society. The same private interests that acted as an engine for driving these agonistic associations also offered a mechanism for displacing overweening interests. An ever-widening gyre of associations, parties, and commercial opportunities cultivated immanent mechanisms for regulating entrenched interests without the intervention of the government or state. In this sense,

13 Isabelle Stengers, *Cosmopolitics*, trans. Robert Bononno (Minneapolis: University of Minnesota Press, 2010); and Bruno Latour, "Whose Cosmos, Which Cosmopolitics? Comments on the Peace Terms of Ulrich Beck," *Common Knowledge* 10, no. 3 (September 2004): 450–462.

communication was a privileged political technique that founded liberal association. It introduced de-personalizing mechanisms for bringing forth and regulating the body politic without state intervention.[14]

In 1788 James Madison offered perhaps the most succinct account of the emerging federalist strategy of liberal communications in Federalist Number 10. He wrote:

> Extend the sphere and you take in a greater variety of parties and interests; you make it less probable that a majority of the whole will have a common motive to invade the rights of other citizens; or if such a common motive exists, it will be more difficult for all who feel it to discover their own strength, and to act in unison with each other. Besides other impediments, it may be remarked, that where there is a consciousness of unjust or dishonorable purposes, communication is always checked by distrust, in proportion to the number whose concurrence is necessary.[15]

For Madison, a union that bridged diverse interests provided a means for securing disunity among the people. Rather than providing a mechanism for resolving many interests into one, the Federalist strategy of association and communication encouraged perpetual division between and within interests. Communications was not the mere absence of noise in any technical sense, nor was it an activity defined simply by the accurate exchange of representations and beliefs. It was instead a liberal technique that articulated and associated divergent interests as a mechanism of instigating *and* regulating diversity. By extension, the relative non-regulation of speech, political association, and economic transactions guaranteed by the American Constitution and Bill of

14 On the agonistic features of liberalism, see Michael Dillon and Julian Reid, *The Liberal Way of War: Killing to Make Life Live* (London: Routledge, 2009). On the grounding of classic liberalism in a problematic of exchange (which it may be noted Adam Smith alternately referred to as "communication"), see Steven Shaviro, "The Bitter Necessity of Debt: Neoliberal Finance and the Society of Control" (2011): Unpublished manuscript. I also see my comments as a supplement and corrective to Michel Foucault's observations on liberalism in *Security, Territory, Population*, ed. Michel Senellart, Francois Ewald, and Arnold Ira Davidson, trans. Graham Burchell (New York: Palgrave Macmillan, 2007). Foucault's analysis applies to eighteenth- and nineteenth-century contexts where centralized state and scientific apparatuses are already in place, such as Prussia and France. It is less apt for characterizing the contemporary situation in the English colonies and the United States.

15 James Madison, "Federalist No. 10," in *The Federalist*, ed. Terence Ball (Cambridge: Cambridge University Press, 2003), 45. See also the discussion of this section of the Federalist in Carey, *Communication as Culture*, 6–7.

Rights, was not an absence of control, but rather a liberal technique for enabling self-regulation within the population. In the absence of any universalizing sovereign, church, or centralized state apparatus, these rights established immanent yet liberal forces of control. In essence, framers of the constitution saw communications as an impersonal mechanism for enabling the constant association of unlike self-interests, whose mutual agitation would undermine a monopolization of forces by state institutions, political factions, or regional chauvinism.

Communications were such priority within the emerging schema that they were afforded premiere place within the Bill of Rights, a guarantor of liberal rights. According to the First Amendment:

> Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

In the oblique mode of proposition that characterizes much of the Bill of Rights, the amendment affirms the *absence* of a government privilege. The activities of assembly, agitation, and association are appointed to "the people." Yet the need for freedoms to exercise these rights, and the prohibition against a government monopoly upon them, implies that "the people" cannot be a homogeneous or united group. In stark contrast to Hobbes' population, united beneath the universalizing powers of the sovereign empowered to suspend conflict, here the people are composed of private individuals whose divergent interests necessitate communication and agitation. Through competition and rivalry amongst themselves this "people" enforced the regulations that the state abstained from imposing. Much as branches of government and the states of the republic agitated against one another, freedom of press and association sowed a

perpetual distribution of dissent among the citizenry. These were techniques—constituting and constituted by— liberalism in the early United States.

This strategic disposition of discord introduced a certain heterogeneity into the liberal body politic. While rhetoric emphasized the freedom and autonomy of the individual—so-called "negative liberty" or freedom from interference—the robustness of that liberty rested upon the assumption that its exercise imposed limits and constraints, not only on others, but also on the self. Individual or self-interest was perpetually disrupted and deferred from identification with the self, through its need to be articulated through others. Self-interest, even in its most unbridled expression and pursuit, was articulated through the alterity and constraints of collaboration and communication. The techniques and strategic disposition of rights constituting this system, likewise, comprised part of this body politic. Individuals, and their associations, as well as juridical regimes that identified possession with individuals and exclusivity, also comprised part of this body politic. Within such a schema, the "self" and the "body politic" are not simply given and available, but are ongoing productions of individuation, differentiation, deferral and re-articulation.[16] Perhaps this is obvious but it is worth noting nonetheless, if only to distinguish the practice and ideology of early American liberalism from latter-day neoliberalism that has made nostalgic virtue of an imaginary, unrestrained individualism based on free-acting, frontier-ing selves.

16 On individuation see Gilbert Simondon, "The Genesis of the Individual," in *Incorporations*, ed. Sanford Kwinter and Jonathan Crary, trans. Mark Cohen and Sanford Kwinter, vol. 6 (New York: Zone (MIT Press), 1992), 297–319. My thoughts on this point are indebted to conversations with Bernard Stiegler.

The Printing Press as a Technique of Liberalism

The rivalrous, heterogeneous, and uncanny forces of alterity in early American did not simply express themselves as principles and rights: They also acted through technical media of the day, such as the newspaper and the pamphlet, and the monologue. The absence of state-based licensing or accreditation to printers and the presence of copyright laws encouraged the development of a robust printing industry in the early American republic. In contrast to the town hall and village green which favored face-to-face interactions, the new press encouraged the prurient circulation of voices and opinions independent of any verifiable face or human body. It supported the cultivation of parties and political alignments whose commonality was articulated by shared interest as well as shared literature. Far from fashioning an imaginary community that bridged or standardized people across time and space, the early printing press favored the organization of factional and rivalrous publics whose commonality were no longer bound simply to shared time and space. The subject-citizen, private press, and the political cause cultivated new styles of political subjects, political movements, and political writings. Founded upon the ostensible freedom to speak and exchange, it became a cultural technique for agitation, alignment, and inculcation that produced liberal citizens and a liberal political sphere.

These techniques found an early expression in the work of Tom Paine, whose pamphlet “Common Sense” (1776) George Washington credited with fueling the cause of revolution against the British. In Paine's pithy forty-five page pamphlet we find the emergence of a number of techniques that exploited the logic and form of the colony and the cause. Eschewing the refined styles of rhetoric favored among educated gentlemen as an distasteful relic of British

elitism, he composed the text in the frank and unadorned language of the colonial tavern. By surrendering copyright and ownership of the text, Paine further created an additional economic incentive for publishers throughout the colonies to reprint the tract. His strategy succeeded: Within its first year more than 500,000 copies had been printed and the text was widely read as a monologue in public halls and private homes. Debates raged over the disputed authorship of the text and its peculiar style, which seemed at once entirely distinct and yet framed in the frank discourse of everyman. Paine's text promoted and exemplified an emerging and characteristically American configuration of subject-citizen, private press, and the political cause, where passion, interest, and stripped-down rhetorical style circulated pruriently, animating face-to-face dialogues with far-away words while uniting the people around passionate opposition—occasionally to foreign governments, more often to one one another. Over the course of the next fifteen years this pattern would be progressively encoded in the juridical, political, and economic framework of the nascent state.[17]

The cosmopolitical composition—of words, printing instruments, juridical regimes of copyright and ownership, public and private halls for reading and discourse—was founded upon the technical media that disrupted, deferred and delayed discourse, at once undermining and articulating the possibility of a free-speaking subject. To appreciate this composition, and the peculiar place of the press and the First Amendment within its operation, it is helpful to consider communication theorist Harold Innis's astute but misguided critique. Innis faulted the First Amendment for impeding the establishment of a truly free and liberal sphere. According to Innis, giving special rights to the press reinforced the pernicious and imperializing properties of the

17 On the history of the publication and circulation of "Common Sense," see Isaac Kramnick, ed., "Editor's Introduction," in *Common Sense* (New York: Penguin, 1982), 7–56; Gordon S. Wood, *The American Revolution: A History* (New York: Modern Library, 2002), 55–62; Harvey J. Kaye, *Thomas Paine and the Promise of America* (New York: Hill and Wang, 2006), 40.

printed word. As he put it, "A guarantee of freedom of the press in print was intended to further sanctify the printed word and to provide a rigid bulwark for the shelter of vested interests."[18] This critique presumes there are two forms of "bias" that act upon freedom of the press. The first was economic: Innis objected to special rights associated with one industry, that of printing. Innis feared that this amounted to a state-sponsored privilege that sheltered a private industry. Innis' second and more damning objection was ontological in nature. He argued that the relative fixity of the printed letter enabled printers to disseminate uniform and homogenizing texts across time and space, undermining the fragile and local oral cultures (i.e. the town hall meeting) that constituted the essence of liberal, democratic self-governance. In both cases, Innis advanced a naïve liberalism, based on the notion of free and spontaneous associations among individuals bound together in face-to-face communication. At the basis of Innis' critique was a skepticism of technique that dated back to Plato's attack on the Sophists. Absent free and spontaneous speech, there could be no freedom of expression. As he memorably summarized this intersection of economical and material biases, "Time has been cut into pieces the length of a day's newspaper."[19]

However as Alexis de Tocqueville recognized, the First Amendment was not a protection of free and spontaneous speech in the individual. Nor was it a set of "rights" or "freedoms" that could be successfully deployed or exercised according to their attachment to the free individual subject of liberalism. If anything, these protections and the individual they gave rise to were attributes of liberal technique that strategically arrayed biases—human and nonhuman alike—

18 Carey, *Communication as Culture*, 125.

19 See James W. Carey, *Communication as Culture: Essays on Media and Society* (New York: Routledge, 2009), 125. For a critique of these Platonic premises that is attuned to the problematics of *Kulturtechnik* and media theory that inform my comments below, see Barbara Cassin, "Who's Afraid of the Sophists? Against Ethical Correctness," trans. Charles T. Wolfe, *Hypatia* 15, no. 4 (2000): 102-120.

against one another. As suggested by Madison's comment concerning the extension of the sphere, the liberty of the individual resulted from liberal technique of communication that forged productive rivalries among rivalrous biases and factions in the body politic. The basis of these articulations were not the intimate bodies of citizens, squaring off face to face in the public square, but rather the foreign bodies of words, pages, and printers acting at a distance and disrupting the chauvinisms of human presence. Instead of building the public up into a unified whole, the techniques of liberal communications deployed the citizenry—through recourse to technical media— into perpetual antagonism and conflict. As de Tocqueville ruefully put it in a passage excerpted above:

> I do not see freedom of the press in the same way that I consider *patriotism* or *virtue,* for example. I love it much more from consideration of the evils it prevents than for the good things that it does....Liberty cannot live without [Freedom of the Press] and order can hardly be maintained with it.[20]

In contrast to values such as "patriotism" and "virtue" that called upon the individual citizen to disavow personal interest in order to recognize and submit to a greater good, communities sustained by the press—which, he claimed, were operated by mercurial private owners and staffed by second-rank writers of ill-repute—lacked loyalty to a higher or more general good. He characterized the result as a "division of forces." Yet, by stirring up disorder and factionalizing publics around the biases of printed letter and private interest, these printers gave liberty occasion and space to live.

The same biases that Innis charged with undermining free expression—private ownership and the fixity of print—de Tocqueville credited with countering tyranny. He noted that in the absence of rules for licensing or registering publishers, local and rival papers were perpetually

20 Tocqueville, *Democracy in America*, 290.

setting up and folding. Even small villages might have multiple papers, each representing diverse interests. But these interests could assemble into a vast body tilting against tyranny:

> [The press] makes political life circulate in all parts of this vast territory....It rallies interests around certain doctrines and formulates the creed of parties. Through the press, interests speak together without seeing each other, agree without having contact. When a large number of the organs of the press manage to follow the same path, their influence eventually becomes nearly irresistible; and public opinion, always struck from the same side, ends by yielding to their blows.[21]

In de Tocqueville's analysis, fixed print, delay and deferral in delivery, private ownership, and vested interests undermined the biases of presence and provincialism. Public opinion, perpetually in danger of falling into local islands of ignorance, had to contend with voices and doctrines of remote and uncertain origins. Such interruptions dispelled the faction and fought tyranny by undermining national and local monopolies alike. Perhaps it was admiration for the bias of the printed word and its unseen interests that lead de Tocqueville to refer to the liberties of the press as “liberté d'écrire,” or freedom to write, rather than freedom of expression. Though there was little sign of “free expression” amidst the din of democratic dissent, the multiplicity of private printers, the uncontrolled circulation of their texts, and the printed fixity of print itself enabled “political life [to] circulate in all parts of this vast territory.” In this respect, the “freedom to write” embraced perpetual conflict for the benefit of all and none.

Transition Between Techniques and Technologies

Hardly a decade into the nineteenth century the political leadership in the United States was chafing under the limited scope and power of liberal techniques. The absence of a national infrastructure to facilitate the circulation of goods, words, and human bodies obstructed the

21 Ibid., 297–298.

efficacy of these techniques. Continued suspicion of the state and centralization militated against the development a national network of highways. A novel solution—in some ways characteristic of the existing liberal framework—was handed down by Thomas Jefferson, who maintained that an improved national infrastructure would extend and amplify the autonomy of regions and local communities.[22] In a 1808 report explaining why internal improvements should be under the control of the federal government, his administration reported:

> Good roads and canals will shorten distances; facilitate commercial and personal intercourse; and unite by a still more intimate community of interests the most remote quarters of the United States. No other single operation within the power of government can more effectively tend to strengthen and perpetuate that union which secures external independence, domestic peace and internal liberty.[23]

The Jefferson administration's claim for the exercise of Federal authority was made in the name of individual and local interests that, if furthered, would promote national and collective well-being. Good roads and canals facilitated the pursuit of commercial interests and interpersonal exchange. Unity through civil engineering furthered the ideals of local, private, and regional autonomy, rather than abridging them within a central state.

Gradually the possibility of a new disposition of the nation became imaginable: Through the imposition of massive technological wonders, such as the Erie Canal, the freedom of the individual and community would be secured. Historian David Nye singles out the Erie Canal, constructed between 1817 and 1825, as one of the most potent early expressions of the belief that "sublime technological objects...were active forces working for democracy."[24] In this ostensibly secular state, new works of technological wonder stood in as quasi-religious objects that affirmed

22 See also Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America*, chap. 4.
23 Carey and Quirk, "The Mythos of the Electronic Revolution," 6.
24 Nye, *American Technological Sublime*, 33.

the exceptionalism of the people and the prospects of democratic cooperation. Built in the name of private exchange and personal travel, they resounded not with the powers of the government, as such, but rather with the promise of semi-private and democratic labors. Nye quotes a newspaper which claimed that the canal's opening provided proof "of the capabilities of a free people, whose energies, undirected by the absolute authority, have accomplished...a work of greater public utility than the congregated forces of Kings have effected since the foundations of the earth."[25] The key to this new power, and the public it revealed, was its strategic enlistment of engineering: between the state, the people, and the public, technology intervened to express the will and interest of all.[26]

It is tempting to attribute to the emerging belief in a systematization of interest to the emergence of machines. But historiography here affirms Carl Schmitt's (and Martin Heidegger's) suggestions about the origin of technologies have less to with machines than with a modern and technical iteration of logos.[27] Harvard Professor Jacob Bigelow's 1828 book *Elements of Technolog*y, which introduced the term "technology" into American English, did not cite machines as the most significant or even primary example of technology.[28] By "technology" he designated a systematic and synthetic application of the practical arts, guided by the rationalizing powers of modern science. As suggested by the word "elements" in the title, this was a synthetic process that brought various domains into continuity and coordination with one another. Examples of such elements included writing, printing, engraving, lithography, architecture,

25 Ibid., 36.

26 There were those who objected to the canal and other technological projects of the era, but they did not occupy the dominant place in the emerging conversations around communications, technology, and the nation.

27 See Martin Heidegger, "The Question Concerning Technology," in *The Question Concerning Technology and Other Essays* (New York: Harper & Row, 1977), 3–35.

28 Jacob Bigelow, *Elements of Technology: Taken Chiefly from a Course of Lectures Delivered at Cambridge, on the Application of the Sciences to the Useful Arts: Now Published for the Use of Seminaries and Students* (Boston: Hilliard, Gray, Little and Wilkins, 1831).

building, heating, ventilation, illumination, locomotion, horology and metallurgy. The realization of these various elements within a single logic amounted to the discovery of transcendent principles. As he wrote in the introduction, "Whenever we attempt to draw a dividing line between the sciences...and the arts, it results in distinctions, which are comparative, rather than absolute." Striking a theological note, he said this division was particular to "human knowledge,"[29] and his treatise began the task of overcoming these artificial distinctions and moving at least a few steps closer to that *absolute*. Bigelow traced the possibility of these elements' integration to the modern *logos par excellence*: writing and the printing press. Writing, he argued, had liberated knowledge from the individual body and made it available to a community of practitioners distributed across space and time.[30] Printing, in turn, enabled the first steps towards a science. "This art [printing], which was to give permanency to all the rest...seems to be at the root of all human knowledge," Bigelow averred. He predicted that the nineteenth century would realize the final systematization of science, art and industry.[31] Technology, then, embodied at once the application of science to technique, the bootstrapping of science itself from the ur-technology of writing, and also the fulfillment of a human destiny that enabled communications across time, space, bodies and which took gradual steps towards achieving the "absolute."

The Technologies of Liberalism

Between the 1850s and the turn of the twentieth century, faith in traditional liberalism and the autonomous, private individual waned.[32] Dorothy Ross describes the gradual alienation and

29 Ibid., 1.
30 Ibid., 2–3, 54.
31 Ibid., iiv–v, 1–5.
32 he following analysis is deeply indebted to Dorothy Ross's account of what she terms "the Gilded Age" crisis,

balkanization of the population into divided and opposed groups. Throughout much of the early nineteenth century the efficacy of the American public sphere was based on the exclusion and marginalization of vast segments of the population: Blacks, slaves, Catholics, women, native Americans and the poor were systematically denied recourse through main vehicles of communication (suffrage, literacy, representation, freedom to carry on business, freedom to sell labor and travel, etc.) In this context, more and more citizens from all classes came to view the existing liberal schema—organized around competing interests—as a potential liability to their personal and collective interests. Some advocated revolution, others reform, still other violent suppression, but the inadequacy of existing political techniques was widely agreed upon.

The shifting composition of the population not only shaped conceptions of communication and liberalism; it was also the result of existing and emerging schemes of liberalism. In his superb history of the progressive era historian Robert Wiebe has described the gradual emergence in the latter half of the nineteenth century of a "distended society" that gutted individuals', towns', and regions' capacities for self-reliance and independent action.[33] Remote interests driven by towering corporations, national markets, and national communications networks overwhelmed the calculus, autonomy, and foresight of the autonomous individual. Industrialization and immigration gave rise to ethnic and economic ghettoes and an organized labor movement, as well as a small class of inconceivably wealthy industrial magnates. White middle- and upper-class Protestants identified both groups with the threat of factionalism and tyranny. Those same classes were increasingly absorbed into a bureaucratic machinery that subordinated their livelihood to remote decision makers and unknown shareholders, portending

and its impact upon the Protestant intellectual elite in the United States. See, in particular, Ross, *The Origins of American Social Science*.

33 Robert H. Wiebe, *The Search for Order, 1877-1920* (New York: Hill and Wang, 1967).

an uncertain transformation in their own political status. The net result was the gradual unification of the nation into a set of divided and opposed communities of interests. This was, depending on your perspective, either the realization or the undoing of the techniques of liberalism.

Enter the technologies of liberalism. The rise of railroads, telegraphy, radio, telephony and other means of industrial communications promised to "extend the sphere" sufficiently to take in the "greater variety of parties and interests" generated by modern liberalism. Binding the new belief in technology to the longstanding liberal commitment to communications, a new dream of national unity enabled by electricity, rails, and transmission entered popular consciousness and political practice.[34] *Deus ex machina*: where politics had failed, technology would descend, godlike, to elevate a fallen mankind. So it was that American philosopher George Herbert Mead could write in June, 1892 that

> The telegraph and the land motive are the great spiritual agents of society because they bind man and man so close together that the interest of the individual must be more completely the interest of all day by day. And America in pushing this spiritualizing of nature is doing more than all in bringing the day when everyman will be neighbor and all life shall be saturated with the divine life...when our functions and acts shall be not simply ours but the processes of the great body politic which is God as revealed in the universe.[35]

As with Madison's account in the Federalist papers, communications was defined first and foremost by as a technique of articulating and conjoining diverse interests within the population. Apparently representational technical media such as the telegraph as well as non-representational forms such as the locomotive equally qualified as techniques of communication. But Mead's ideal of communication quickly parted with Madison on the problem of individual difference and

34 See Nye, *American Technological Sublime*; Marvin, *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century*; and Carey, *Communication as Culture*, chap. 5 and 8.

35 Cited in Ross, *The Origins of American Social Science*, 169.

interest. His call for a great body politic substituted agonistic, privatized, and Protestant communications with Christian millenarian themes that submitted private interests to the unifying powers of the industrial spirit. In this vision of social redemption, a society divided and balkanized by the fall into history and politics would be subsumed within a spiritual apparatus that bound interest and mentality into one continuous body. Politics disappeared from Mead's "great body politic" as the engines of Gilded Age economic growth and dislocation—namely, scientific management and technology applied to the development of industrial means of production and distribution—were transformed into the agents of spiritual reconciliation. In the place of state intervention or a massive reconceptualization of the American social contract—proposals gaining ground among anarchist, socialist, and labor movements—communications, rationalization, and expanding means of productions enabled by industrial capitalism furnished a technical fix to social ills.

The key aspect of the new technologies of liberalism was their ability to bring heretofore fallen or divided bodies, places, and times into union through transcendent communications organized by a *logos* of technique. The result was a purportedly more liberal society, realized through the free circulation of laborers, goods, and ideas within a rational network.[36] Even where workers did not actually travel, the standardization of labor and production provided an efficient means for de- and re-territorialization among disparate sites and bodies. In this way the formation of distinct political interests and demands—what might be called factions—was regulated by abstract techno-logics. This was not entirely alien to the earlier techniques of liberalism. Both the techniques and the technologies of liberalism referred social conflict and

36 Regarding the railroads as a force for liberal economic development see Leland H. Jenks, "Railroads as an Economic Force in American Development," *The Journal of Economic History* 4, no. 1 (May 1, 1944): 1–20.

governance to impartial mechanisms of communications sustained by non-state activities. This was not an entirely radical break: Madison's techniques of communication and the press considered by Innis and de Tocqueville, were each characterized by their tendency to displace personal interests onto networks of communication. The self-identify and self-interest of liberal politics in the United States was, from early on, decentered and distributed. But classic liberal techniques pivoted around the gap between and within individuals.[37] By contrast, the new technologies imparted a *logos* to technique, characterized by the attempt to transcend conflict and private interest thorough a new apparatus of communications charged with sustaining free and immediate communications. This new logos of technique superseded the skeptical conception of communication that predominated in the early American Republic and replaced it with an evangelical theme of unity and community that cut across the continent and class. This transformation was not restricted to technique: Liberalism, too, had changed. The private self-possessing individual of traditional liberalism was replaced by the corporation and the stockholder.

The Railroad as a Technology of Liberalism

Consider the case of the railroads: in the latter half of the twentieth century the railroads went from an erratic series of private and unsystematized operations into a highly integrated national network. Industrialization, the national railroad networks, and national communications drove the growth of national and financial markets that undermined the local communities and

37 German has a word for this: *mitteilein*. Ostensibly meaning "to communicate" or "to disclose," etymologically it is closer to "impart," putting a an emphasis on the privative and divisive features. See Samuel Weber, "Going Along for the Ride: Violence and Gesture: Agamben Reading Benjamin Reading Kafka Reading Cervantes," *The Germanic Review: Literature, Culture, Theory* 81, no. 1 (January 2006): 67.

local markets as intelligible sites of discernible interests.[38] In shifting authority, power, and control away from local communities they also drove the development of centralized bureaucracies, national markets, standardized labor rates, and professions charged with governing labor. Each in its own way encouraged the substitution of individual and personal rivalries with a supposedly impartial and technical apparatus of regulation and control. Even so, in the name of freer trade, more rational and standardized communications, and the bridging of a nation scarred by regional differences, the professional political class, educated classes, and managers celebrated the railroad for its liberal promise.

Speaking at the opening of the Northern Railroad in New Hampshire on August 28th, 1847, Daniel Webster declared unabashedly that in "the history of human inventions there is hardly one so well calculated as that of railroads to equalize the condition of men."[39] By cramming the richest and poorest together in one vehicle that maximized speed while minimizing cost, and abridging distant locals, the railroad, Webster asserted, "brought [us] together as neighbors and acquaintances."[40] Webster admitted that he sometimes heard

> idle prejudices expressed against railroads because they are close [sic] corporations, but so from the necessity of the case they necessarily must be, because the track of a rail way cannot be a road upon which every man may drive his own carriage.[41]

The personal liberty afforded by federal roads would be ceded to the economy of private networks and the technical constraints of this new medium of communication. Sweetheart

38 Carey, *Communication as Culture*, 166–171.

39 Leo Marx offered a brilliant analysis of Webster's railroad talks in *The Machine in the Garden: Technology and the Pastoral Ideal in America* While my analysis is indebted to Marx's work, I am also trying here to push that analysis in a slightly different direction.

40 Daniel Webster, *The Works of Daniel Webster, Volume II* (Boston: Charles C. Little and James Brown, 1851), 410.

41 Ibid., 411–412.

concessions, particularly the authorization for railroads to appropriate public and private lands, was the just reward for private technological initiative undertaken on behalf of the commonweal.

Industrial laborers, farmers, townships, and others would have likely taken exception to descriptions of their discontent as "idle prejudices." Particularly during the great railroad boom and bust of the 1870s, railroad companies regularly exploited or failed to meet the conditions of their agreements with localities and landowners.[42] Farmers' profits and livelihood were subject to capricious price gouging practiced by the railways that shipped their merchandise.[43] Workers for the railroads themselves, from Chinese immigrants in the West to engineers in the East, were aggrieved. Cruel working conditions and miserable wages prevailed. One obvious solution to these many problems was the nationalization of the rails. This maneuver would have standardized the railroad technologies and pricing, and offered recompense for public subsidies as well as the possibility of minimal rights for workers. Yet the intervention would have violated the basic premises of liberalism: the sacrosanct status of private property. That same principle that prevented state intervention on behalf of labor provided a rationale for intervention against labor. In response to the shutdown of the private rails during the great strikes of 1877, local police as well as state and federal troops were ordered to break up the strikes.[44] President Hayes' decision to send in the national army effectively identified striking workers with insurrectionists warring against the state itself. The strike ground to a halt and workers' demands were implicitly

42 Railroads were widely subsidized by the public. Due to overconstruction and unscrupulous owners more concerned with sitting on access rights until a larger concern bought them out, promised projects were often not delivered. See Samuel Eliot Morison and Henry Steele Commager, *The Growth of the American Republic* (New York: Oxford University Press, 1930), chap. 18; and Wiebe, *The Search for Order, 1877-1920*, chap. 1. This also extended to other communications industries, such as telegraphy and telephony. See Ray Ginger, *Age of Excess; the United States from 1877 to 1914* (New York: Macmillan, 1965), 33–34.

43 See Arthur M. Schlesinger, *Political and Social History of the United States, 1829-1925* (New York: The Macmillan Company, 1930), 286; and Morison and Commager, *The Growth of the American Republic*, 678–682.

44 Howard Zinn, *A People's History of the United States* (New York: Longman, 1994), 240–246.

referred back to that industrial apparatus whose progress and productivity, it was said, would eventually furnish them with security and felicity.

However the railroad, as a technology of liberalism, was not limited to its activities in transporting goods and people across the United States. It was the supposedly supplemental features of the railroad that more directly impacted everyday life. Technological innovation in the railroads provides a concise illustration.[45] Through the growth of the railroad, "innovation" itself became an organized technology disseminated and circulated according to a new and definite set of juridical, professional, and spatial practices crafted around free market. This was not always the case. Well into the 1870s railroad innovation developed in a patchwork fashion. Inventors, engineers, salesmen, and railway corporations worked in parallel and overlapping systems of innovation, often duplicating one another's efforts. Yet patent laws were still based on the concept of an individual inventor who exercised complete ownership and propriety over his labors. This juridical notion of invention and ownership modeled on the ideal private individual of liberal techniques did not correspond with the reality of collective labor and technical innovation in an age of techno-industrial communications. One result was that from the 1870s and 1880s court docks were clogged with lawsuits charging railroad corporations with patent infringement. These cases threatened to bankrupt entire corporate enterprises and shut down regional railways. The resolution involved a re-deployment of labor and law alike. First, in response to the lawsuits railroad corporations shifted innovation to closed laboratories. Professional associations were established to license and disseminate these innovations in a systematic way. Second, patent laws were reformed to account for the interests and practices of

45 My comments here are based on the research of Steven Usselman, "Patents, Engineering Professionals, and the Pipelines of Innovation: The Internalization of Technical Discovery by Nineteenth-Century American Railroads," in *Learning by Doing in Markets, Firms, and Countries*, ed. Naomi R. Lamoreaux, Daniel M. G. Raff, and Peter Temin (Chicago: University of Chicago Press, 1999), 61–102.

large technical systems and protect corporations against the costly claims lodged by individual inventors. Only after these innovations could the railroads be correctly labeled technologies of liberalism. Intensively, the railroad industry itself had become a rapid and logical system for standardized transmission (of innovations). Extensively, the haphazard patchwork of regional railways began a new process of national standardization that enabled the standardized integration of time and space via a single network integrated according to shared technologies of communications.

If the railroad was the most obvious technology of liberalism, it was far from the only one to emerge during this period. The rise of professions, the development of a modern commercial press, new patterns of bureaucracy and management, and even spiritual practices were articulated as technologies of liberalism.[46] The hallmarks of a technology of liberalism was the re-organization of the relevant field or practice into a disciplined series of techniques that, under the banner of free communications and rational or systematized techniques, re-aligned the individual with a technical logos that transposed the contradictions of social and political life. This transcendent apparatus was credited with the power of impartially resolving said contradictions. Jeffrey Sconce's and John Durham Peters's accounts of late nineteenth century spiritual telegraphy—that is, the communication of spiritualist mediums with the nether world through techniques of rapping)—provides an instance of a "popular" technology of liberalism.[47] Through

46 For more on professionalism as a middle-class strategy developed to provide control through impersonal and regimented technique, see Samuel Weber, *Institution and Interpretation* (Minneapolis: University of Minnesota Press, 1987), chap. 2. For an account of bureaucracy particularly attuned to the rise of modern technologies of communication as well as the sciences, see Bernhard Siegert, *Passage Des Digitalen: Zeichenpraktiken Der Neuzeitlichen Wissenschaften 1500-1900* (Berlin: Brinkmann & Bose, 2003); and Kevin Robins and Frank Webster, *Times of the Technoculture: From the Information Society to the Virtual Life* (London: Routledge, 1999), chap. 4. On the rise of the commercial press, see Jürgen Habermas, *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society*, trans. Thomas Burger (Cambridge: MIT Press, 1991), 184–187.

47 Sconce, *Haunted Media: Electronic Presence from Telegraphy to Television*, chap. 1; Peters, *Speaking into the Air*, 94–101.

spiritualist communications disenfranchised women-mediums were given the power to transcend the confines of their situation and become instruments of the divine. Tom Gunning's account of an aesthetic of astonishment that gathered crowds (often urban, migratory, and from the working class) together in rituals and observances that exceeded reason and sense of individual bodies, and Carolyn Marvin's accounts of astonished urban crowds gathered in ritualistic union before the sight of electrical lights, enacted this same techo-logic.[48] The constraints imposed by industry, history, class, and technique were displaced unto technologies that enabled liberal communication across time and space, as well as transcendence of the individual and fallen body. This re-aligned the individual subject of liberalism according to a new technical logos, or technology, that enabled communication unchecked by the mortal coil.

Social Science as a Technology of Liberalism

To briefly recap: In the early American Republic press comprised a decisive technique of liberalism. With growing scale and complexity in society national infrastructure and technology emerged as material, semiotic, and conceptual played an increasingly important role in binding and regulating the nation. The press did not fade away. Its importance as a local and situated technique of sustaining and producing a liberal order persist to this day, albeit supplemented by a modern commercial press whose series of wire services, collating and distributing news across regions, and patterns of hierarchy and ownership comprise a parallel technology of liberalism.[49] By the mid-nineteenth century the railroad—as a material-semiotic link, an instrument for the standardization of labor, prices and technical development, and an engine for the growth of new

48 Gunning, "An Aesthetic of Astonishment: Early Film and the [In]Credulous Spectator"; Marvin, *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century*, chap. 3.

49 See Habermas, *The Structural Transformation of the Public Sphere*, 184–187; and Ben H. Bagdikian, *The New Media Monopoly* (Boston: Beacon Press, 2004).

national industries and markets—came to play a predominant role in shaping American life. An ever-wider array of social and political problems were being referred to its transcendent properties and powers. And yet the railroad, like those techniques and technologies that preceded it, did not simply solve or resolve contradictions in the social order. It also generated new ones. Where railroad tracks advanced a host of new social ills seemed to follow: labor strife, corruption, and ethnic antagonisms, class inequity, "moral decay," social dislocation, the de-centering or distention of local life—problems that the railroad was often expected to fix—seemed instead to multiply. In fact, these seem the law, rather than exception to technological advance: Under the premise of uniting and systematizing, it introduces new scales of dissonance and difference that become the basis or material for new forms of technical, technological, and economic "development."

Amidst the growing factionalism in society, the social sciences developed in the United States as another technology of liberalism charged with resolving difference through technical, impartial procedures that improved communication and circulation. This was not exclusive to the United States, but as a professional class American social scientists' development and purpose was distinct from their peers in Europe. As noted by historian Dorothy Ross, the rise of sociology, psychology, anthropology, economics, and other fields of social science was driven by the search for a professionalism and impartial technique that would furnish liberal solutions to pressing social issues.[50] Protestants dominating the educational elite recoiled at the the violence of left-wing activism among the working class and minorities, as well as the avarice and power of industrial barons. Members of this class found solace the emerging conception of society as

50 See Ross, *The Origins of American Social Science*, chap. 3. For more on professionalism as a middle-class strategy developed to provide control through impersonal and regimented technique, see Weber, *Institution and Interpretation*, chap. 2.

allied or driven by techno-logic amenable to description and adjustment by professional experts. Academic societies for the systematization of social scientific technique sprang up. Leaders championed the development of empirical methodologies devoid of partisan rancor. Social scientists were to be engineers that studied societies as rational system suitable for technical and harmonious optimization.[51] In addition, American social science developed in a much closer relationship to private capital and industry. Researchers themselves gleaned modes of reasoning, analysis and representation from industrial management, while elite universities found their funding in the deep pockets of robber barons.

What distinguished social science as a technology of liberalism, was a peculiar double-articulation. The disciplines and professions themselves effectively consolidated the production of social scientific knowledge around an "impartial" apparatus that referred social and political problems to technocratic reflections. Those who fell afoul of its neutral procedures and techniques—John Dewey during his ill-fated experiment with the radical "Thought News" press in the 1890s, for example[52]—faced the possibility of professional ostracization and the loss of their teaching posts. This apparatus successfully captured, then, an intellectual class that felt uncomfortably caught between a radical and ethnic working class and an ethically bankrupt financial elite. "Neutral" and "technical" social science provided a venue for critique and social reform that neither offended the political views of the wealthy nor openly endorsed the political

51 This coincides with a wider tendency in nineteenth century science to substitute personal sentiment, observation, and experience with instruments that imposed an artifactual objectivity and order upon phenomena. See Lorraine Daston and Peter Galison, "The Image of Objectivity," *Representations* 40 (Autumn 1992): 81–128. See also my discussion in the next chapter of this text and its problematic in the context of scientific philanthropy and media instrumentation.

52 Robert Brett Westbrook, *John Dewey and American Democracy* (Cornell University Press, 1991), 50–56. The case of E. A. Ross (a social scientist discussed below) is also notable. After critiquing policies associated that had a bearing on the Stanford family, he lost his job at Stanford University. See Naomi Schaefer Riley, *The Faculty Lounges: And Other Reasons Why You Won't Get the College Education You Paid For* (United Kingdom: Rowman & Littlefield, 2011), 23–24.

demands of disenfranchised radicals. In this sense, social science articulated intellectuals into a kind of apparatus.

The knowledge produced by social science also articulated society itself as a liberal technology. Late nineteenth-century social scientists often conceived of society as technological and communicative in nature, and tended to view themselves as technicians charged with helping it realize its full potential. This radicalized the propositions put forth by the likes of Webster and Mead. Rather than treating modern communications technologies as a force for the spiritualization of the nation, they conceived of society itself as constituted in and through its communications. For politically progressive liberals, the resolution to societies' ills could be realized through improved communication. Violence, strife, and conflict were the expression of a failure of communication—deviances and inefficiencies in communications, rather than contradictions in the social order.[53] The solution to such failures lay in the development of social apparatuses and social technologies that improved communication among individuals, often through the development of institutions that acted as an improved relay for knowledge and sympathy. These theories and methods cultivated by American social scientists were only partially realized in their lifetime but, in the course of the twentieth century, were gradually incorporated into governmental, educational, and scientific procedure. During times of economic, social, and security crisis these theories were deployed on an experimental basis by a new technocratic apparatus.

The emerging social scientific spirit found partial expression in the work of philosopher C. S. Peirce. His interest in professionalism, science, experimentation, and communications was

53 My analysis has taken some cues from Hanno Hardt, *Critical Communication Studies: Communication, History and Theory in America* (London: Routledge, 1992), chap. 1.

very much in the mold of the late nineteenth-century social scientific mindset. Peirce is often remembered for founding semiotics but the industrial, scientific, and political context for that project is often ignored. Peirce, a mathematician, defined himself as a experimentalist and presented his philosophy as an attempt to develop a rational, scientific, and professional alternative to the dominant ideologies of the day.[54] In an age when a baffling array of images, signals, and forces seemed to confer complete disorder on the everyday, Peirce believed in the possibility of a practical, applied science of signs, beliefs, and images. His project in semiotics was only a small part of this project. He advocated for the cultivation of an apparatus of laboratories, experimental methods, and scientific communities bound by technical vocabulary as an alternative, or at least a supplement, to the blinkered reflections of these traditional and contemporary authorities.[55] And like his peers, he despaired of popular or traditional forums—e.g. democracy, religion, politics—in making much sense of society or signs. Going somewhat further than his colleagues, he also expressed disdain for industry and showed disrespect towards the professional institutions and norms of the day. His marginality and poverty —despite patronage from William James and a few eminent others—related to this ultimate indifference towards the emerging social and institutional norms of the academic profession.

In fields like sociology and economics a more radical rethinking of society and communication took place. American sociologist E. A. Ross's seminal 1901 book *Social Control* aptly articulated this project.[56] Although his work is sometimes read as a proto-fascist or authoritarian statement on "control" of the masses, this is a misunderstanding. Ross based his

54 Charles S. Peirce, "Concerning the Author," in *Philosophical Writings of Peirce*, ed. Justus Buchler (New York: Dover Publications, 1955), 1–2.

55 See, in particular, Charles S. Peirce, "The Fixation of Belief," in *Philosophical Writings of Peirce*, ed. Justus Buchler (New York: Dover Publications, 1955), 5–22.

56 See Edward Alsworth Ross, *Social Control; a Survey of the Foundations of Order* (New York: The Macmillan Company, 1901).

analysis on the French concept of *contrôle*, which has a much less insidious connotation than the English *control*.[57] Rather than constituting an infringement on negative liberty, it is, in a sociological or political context, the condition of positive liberty. For Ross, "social control" , designated varieties of communication and feedback that played a productive role in social life. He was not interested in the control of society, but rather how society itself was composed of immanent mechanisms of control. Aberrancy was to be corrected by strengthening the internal and communicative bonds *in society* rather than through the imposition of authoritarian or violent controls by a sovereign or police force that acted external to society. In his interpretation, liberal society was founded upon a "technique of enlightenment" characterized by "freedom of meeting, freedom of speech, freedom of the press, the inviolability of the mails, the autonomy of institutions of learning, the liberty of investigation, the freedom of teaching, the free public university, [and] the free open library."[58] In the modern era, the abstract mechanisms of control enabled by liberal communications would gradually subsume traditional controls, such as state violence, religion, and morals. As he put it:

> As the means of communication improve, as the school and the press grow mighty, and as man dares to look up a little from his engrossing daily task, the ease of comprehending distant persons and situations enables fellowship to overleap the limits of personal contact. The man of the street understands the far men of the field or the mine or the sea. Sentiment, ignoring latitude and longitude, wields men into vast bodies and facilitates the growth of orderly relations.[59]

In Ross's schema "[improved] means of communication," embodied liberalism itself: uncovered by the "free" scientific inquiry, furnished by "free" market forces, these means were to enable ever "freer" communications among the populace. These communications, in turn, enabled

57 On the distinctions between controle and contôle, see Georges Gurvitch, "Social Control," in *Twentieth Century Sociology*, ed. Georges Gurvitch and Wilbert E. More (New York: Philosophical Library, 1945).
58 Ross, *Social Control; a Survey of the Foundations of Order*, 390–391.
59 Ibid., 435.

society itself to act as what Ross termed a "social-equilibrating apparatus."[60] According to Ross, the rapid circulation of sentiment unleashed homeostatic forces whereby society itself consolidated into a unified body that regulated all activities in accord with the common well-being.

Charles Henderson, a sociologist at the University of Chicago, offered a variation on this theme in his text "The Scope of Social Technology," also published in 1901. Henderson defined social technology as "a system of conscious and purposeful organization of persons in which every actual, natural social organization finds its true place...."[61] He identified technology with the systematization of technique for the purpose of binding and regulating a liberal society. Echoing the work of Bigelow more than seventy years earlier, he defined technology as a natural unity among techniques applied towards a practical purpose. Examples of social technologies included public sanitation, free markets, organized communities for the appreciation of art and marriage.[62] Deviancy, crime, and class struggle, by contrast, were signs of malfunctioning social technologies. It was the task of the sociologists to develop technical methods that would enable the recast society in the form of a true social technology. He identified the industrial working class as a group ideally suited for readjustment via social technology, arguing that their differentiation as a class was the result of an unfortunate "division of labor in industry, the rise of cities, and the resulting geographical and cultural separation of the operatives from the managers....The conditions of life and culture in this group offer a fairly well-defined field for a

60 For two instances of this term's use see, for example, Edward Alsworth Ross, *Social Control; a Survey of the Foundations of Order* (New York: The Macmillan Company, 1901), 410; and Ross, *The Origins of American Social Science*, 238.

61 C. R. Henderson, "The Scope of Social Technology," *American Journal of Sociology* 6, no. 4 (January 1, 1901): 472.

62 Ibid., 473, 475.

branch of social technology.[63] While recognizing the hazards of economic inequality and ghettoization, the concept of social technology extracted these problems from the domain of politics and re-inscribed them within the sanitized space of social scientific theory and reflection. Because no train or telephone could transport this group into spiritual unity with the population (indeed, many strikes and riots took place at railroads, Pullman factories, and the like), it became the task of "social technology," realized in the form of rational sociology directed towards the development of new institutions, to alleviate differences.

The concepts of a social-equilibrating apparatus and social technology transposed the often diffuse and speculative claims associated with the technologies of liberalism unto a concrete program for scientific and social reform. No longer were technologies mere instruments for articulating society: society itself was a technology. The professionalization of social science —based upon the intensive redevelopment of sociology upon a system of uniform and scientific techniques freely communicated among supposedly partial practitioners—enabled the sciences to take part in the extensive redevelopment of American society as a liberal technology. Rational social scientists could commit themselves to re-engineering society into a system of frictionless communications that dissolved class, ethnic, and regional difference within a system of unhindered, rational communications. The techniques of liberalism that founded the American Republic, and operated according to a strategic association and perpetuation of private interests, were hereby displaced unto an impartial apparatus charged suspending difference. Whereas the earlier techniques of liberalism relied upon antagonism and private interest to motivate and bind society into a dynamic whole, the technology of liberalism pathologized conflict as a form of technical dysfunction.

63 Ibid., 479.

Towards new Technologies

The printing press, the railroad, and the social sciences are features of many national, industrial, and political contexts and settings, but in the United States they were given a distinct articulation. They conceived, deployed, and adapted with an eye to extending and inculcating particular liberal values—in particular, the circulation of words, goods, and bodies in the interest of civil society, commerce, and liberty—and forming populations whose interest was tied to the system of communication and exchange that embedded and organized them. As well will see in coming chapters, it was possible to export these to other political and national contexts, but such deployments entailed a refitting to the new setting. This points towards another aspect of the technology of liberalism: It is not the essence of the technique or technology that defined its liberal orientation, but rather the manner in which it was fit into and articulated with a variety of other industrial, semiotic, conceptual, and technical systems. Examined in greater detail, each technology, instruments, apparatus, or disposition was conceived of as part of an ever finer array of components, none of which could be reduced to a political or industrial "base." The ongoing contradictions between developing institutions, industries, classes, practices, discourses, instruments and technical methods expressed, obliquely, their reality and irreducibility.

It was only through the ongoing intervention of new cultural technologies that each was maintained and re-articulated as a liberal technology: the early American printing press was supplemented by the modern commercial press that subsumed many earlier functions and invented new ones; early American federalism was supplemented by a national infrastructure that invoked regional autonomy but created a new logic of national and technical unity; upon the fault-lines of national and technical unity came the railroad, which promised to bind a divided

nation; upon the inequities associated with the railroads came social science, whose experts attended to the new working classes. At each level there was a reflective appropriation and re-disposition of earlier techniques and technologies. It was the continued re-articulation of each of these levels in liberal terms, according to complementary conceptions of technique and communication, that constituted them as liberal technologies.

As the twentieth-century dawned, however, the United States was not yet a well-oiled liberal technology. The projects of Ross and Henderson were as much fanciful speculations as programs for political practice. In this regard, the narrative might be reversed: Just as each new liberal technology seemed to transpose and re-arrange the faults of its predecessors, it might also be said that every technology of the present dreams into being successors that would perfect it. For Ross, Henderson, and even Peirce, those successors were a more perfect set of institutions, technologies, laboratories, and scientific communities that would complete the articulation of a more liberal, rational, scientific, and communicative order. They were not alone in their fancy: Throughout the 1880s and 1890s countless Americans, many of them belonging to the educated class, came to embrace the dream of technological and political progress as two interwoven agendas. Their dreams—as well as their experiences of dislocation and powerlessness—gave rise to new fantasy technologies for binding the nation and bridging its differences. Recalling an earlier dream of Thomas Jefferson, this more perfect union would return authority and identity to the individual and local community. But who would build the institutions, technologies, and apparatuses for such a vast effort?

Enter scientific philanthropy. At the dawn of the twentieth century the nation's wealthy industrial magnates—most notably John D. Rockefeller and Andrew Carnegie—committed

themselves to founding a new form of social philanthropy that would redistribute the benefits of industrialization without resorting to state intervention. In consultation with experts in science, industry, and government, they founded an apparatus of diverse institutions; libraries, universities, museums, laboratories, and centers for social work. Founders embraced these institutions for their ability to re-adjust a troubled population, and their efforts—as well as a growing interest in the instruments of communication and control—are the subject of the next chapter.

Two

Science as Communication and the Communication of Science: The Rockefeller Foundation Initiatives in Order, Impersonality, and Instrumentation (ca. 1913–1950)

In the first three decades of the twentieth century the United States was jolted into modernity. Railroads, industry, urbanization, economic stratification, and technological systems swept the nation, as part of what historian Robert Wiebe has termed "the search for order" and others have characterized as the Progressive Movement.[1] A defining aspect of the movement was the search for machines, technologies, techniques, rules, procedures, and instruments suited to imposing that order. This shift toward the apparatuses of order implemented and extended trends apparent in the technologies of liberalism. The overriding emphasis rational sorting, ordering, aligning, and classifying (rather than simply uniting and bridging) added something new.[2] The movement took many forms: the rise of an impersonal and bureaucratic "scientific philanthropy," reforms of policing, the formation of an expert apparatus for propaganda and the "manufacture of consent," and the increasing displacement of social and political problems into the space of

1 See Robert H. Wiebe, *The Search for Order, 1877-1920* (New York: Hill and Wang, 1967). Regarding the rise of national technical systems, see Thomas Parke Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983).

2 For three histories that emphasize relevant media histories of this development (albeit not exclusively in the United States), see Kevin Robins and Frank Webster, *Times of the Technoculture: From the Information Society to the Virtual Life* (London: Routledge, 1999), chap. 4; Mary Ann Doane, *The Emergence of Cinematic Time: Modernity, Contingency, the Archive* (Cambridge: Harvard University Press, 2002); and Markus Krajewski, *Paper Machines: About Cards & Catalogs, 1548-1929*, trans. Peter Krapp (Cambridge: MIT Press, 2011), sec. 2. An immensely valuable text that tells a complementary story, from the perspective of shifting conceptions of information, can be found in John Durham Peters, "Information: Notes Toward a Critical History," *Journal of Communication Inquiry* 12, no. 2 (July 1988): 9–23.

the laboratory. This chapter will consider each of these phenomena, as well as the later rearticulation of this conceptual, scientific, and material apparatus into research associated with cybernetics and information theory after World War II. To simplify the analysis of such a diverse array of phenomena, I will focus on one institution, the Rockefeller Foundation, and its synthetic elaboration of policies and programs with regard to each of the aforementioned phenomena. The result is not so much an institutional history as a kind of actor-network describing the heterogeneous composition and transversal developments of the policies and procedures that translated the nineteenth-century technologies of liberalism into a mid-twentieth-century cybernetic apparatus.

Scientific Philanthropy

The Rockefeller Foundation and other foundations of the Progressive Era, such as the Carnegie and Russell Sage foundations, were established on the premise that private philanthropy for science could promote non-state solutions to contemporary social inequality and political unrest. In the face of ethnic strife, economic stratification, and the development of labor, anarchist, and socialist movements, these wealthy institutions proposed solutions for curbing the worst inequities while leaving existing economic and political structures intact.[3] Critics have typically identified these projects as hegemonic or ideologic, suggesting that they redirected the forces, values, and resources of a wealthy industrial elite towards social reform, while masking or suppressing critical politics through recourse to a technocratic elite.[4] This critique is true

3 See, for example, Edward H. Berman, *The Ideology of Philanthropy: The Influence of the Carnegie, Ford, and Rockefeller Foundations on American Foreign Policy* (Albany: State University of New York Press, 1983).

4 See, for example, ibid.; Mark Dowie, *American Foundations: An Investigative History* (Cambridge: MIT Press, 2001); Lily Kay, *The Molecular Vision of Life: Caltech, the Rockefeller Foundation, and the Rise of the New Biology* (New York: Oxford University Press, 1993); and Giuliana Gemelli, ed., *The "Unacceptables": American Foundations and Refugee Scholars Between the Two Wars and After* (Brussels: P.I.E.-P. Lang, 2000).

enough in its broad outlines, but its focus on culture, values, and hegemony often obscures the defining feature of these efforts: an emphasis on effecting reform via an apparatus of impersonal mechanisms that nominally substituted ideological for technical content. It is the goal of this dissertation to critique this substitution. Even so, to hastily construe that operation according to a base-superstructure model of class dominance obscures a more reflective consideration of its mechanics or machinery—the way it enlisted impersonal and technical elements within social, cultural, and political arrangements—as well this strategy's relation to complementary scientific ideals. Much as Lorraine Daston and Peter Galison have shown that nineteenth-century notions of mechanical objectivity associated the use of impersonal machinery and instrumentation with scientific virtue,[5] so too in the early twentieth century, proponents of "scientific philanthropy" sought to exemplify their own moral rectitude in an impersonal apparatus of gift-giving.[6] The result was a cultural technique of giving that transformed benefactor and beneficiary alike through the construction of new sociotechnical ensembles.[7] Theories of hegemony and ideology play a part in describing the assembly of these ensembles, but do not tell the whole story. In fact, insofar as the present chapter is concerned with a set of techniques and technologies used to redistribute and constitute the social, it would probably better refer to these arrangements as technosocial ensembles.[8]

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5 Lorraine Daston and Peter Galison, "The Image of Objectivity," *Representations* 40 (Autumn 1992): 81–128.

6 Judith Sealander, *Private Wealth & Public Life: Foundation Philanthropy and the Reshaping of American Social Policy from the Progressive Era to the New Deal* (Baltimore: Johns Hopkins University Press, 1997), chap. 1; and Laura Bufano Edge, *Andrew Carnegie* (Minneapolis: Twenty-First Century Books, 2004), chap. 11.

7 See Wiebe E. Bijker, *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge: MIT Press, 1995); and Wiebe E. Bijker, Thomas Parke. Hughes, and T. J. Pinch, eds., *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge: MIT Press, 1987).

8 Bruno Latour makes the same point in observing "the social" is a phenomenon to be explained, rather than an explanation in itself. See Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005). For an earlier and complementary analysis of the "techno-social," see Wanda J. Orlikowski and Stephen R. Barley, "Technology and Institutions: What Can Research on Information Technology and Research on Organizations Learn from Each Other?," *MIS Quarterly* 25, no. 2 (June 2001):

Andrew Carnegie outlined this emerging philanthropic technique in his widely cited essay "Gospel of Wealth,"[9] which argued that the wealthiest in society had an obligation to use their wealth and superior powers of administration to counter the undue influence of passionate leftists, dissolute drunkards, and irrational socialists who threatened to sap society of its productive powers. Carnegie implored each of his fellow millionaires to become "trustee and agent for his poorer brethren, bringing to their service his superior wisdom, experience, and ability to administer, doing for them better than they would or could do for themselves."[10] His preferred beneficiaries were institutions such as libraries, hospitals, universities, and galleries. Staffed by experts and technicians, these institutions doled out measured quantities of education, enlightenment, or scientific treatment to the public. Yoked to private capital, the result was a flexible apparatus that took public and political problems, such as suffering and inequity, and turned them into semi-private and technical problems to be handled by an array of experts (I addressed part of this array last chapter in my discussion of social science as a technology of liberalism). This array—Carnegie hoped—would cultivate a new class of citizen that was entrepreneurial, rational, industrious. Committed to the well-being of the existing society, this new political subject would yield to the ministrations of experts rather than to the call of radical politics.

Carnegie is credited with inventing "scientific philanthropy," but the charities endowed by the Rockefeller family perfected it.[11] While Carnegie's gift-giving practices remained idiosyncratic and unpredictable, John D. Rockefeller established an unrivaled apparatus of

145–165.

9 Andrew Carnegie, *The Gospel of Wealth, and Other Timely Essays* (New York: The Century Co., 1900), 1–46.

10 Carnegie, *The Gospel of Wealth, and Other Timely Essays*.

11 See, in particular, Sealander, *Private Wealth & Public Life*, chap. 20–22; and Raymond B. Fosdick, *The Story of the Rockefeller Foundation* (New York: Harper, 1952).

administrators, institutions, endowments, public-private partnerships, and "expert" givers and receivers of funding who remade philanthropy and policy, as well as the personal and collective practices (educational, hygiene, agricultural, etc.) of populations throughout the United States and abroad. In 1909, Rockefeller endowed his main instrument of giving, the Rockefeller Foundation, with a then-astronomical $50,000,000 worth of stocks. The new institution was to aid "in the acquisition and dissemination of knowledge, in the prevention of and relief of suffering, and in the promotion of any and all of the elements of human progress."[12] A 1913 charter charged the Rockefeller Foundation with further "promot[ing] the well-being of mankind throughout the world," and programs put a priority on solving "realistic" and "practical" problems such as hygiene via the efficient administration of social programs. By the mid-twentieth century, through additional gifts and the establishment of complementary institutions, the family of Rockefeller Foundation charities had expended more than $821,000,000 on research and public programs.[13] Support for science, and in particular for exceptional and entrepreneurial scientific researchers, was embraced as a mechanism for globally communicating market-friendly values of progressivism, tolerance, and openness.[14] Before considering those programs in greater detail it is useful to consider the work of two administrators in particular, jurist Raymond Fosdick and mathematician Warren Weaver, who decisively shaped the Rockefeller Foundation agenda and ethic during that period.

12 Fosdick, *The Story of the Rockefeller Foundation*, 15.
13 Ibid., x.
14 Dowie, *American Foundations*, 27–28, 56–7, 107.

Policy and Policing

Raymond Fosdick advised or directed Rockefeller-affiliated charities for more than three decades, including a term as president of the Rockefeller Foundation from 1936 to 1948. Although English speakers might describe him as a jurist or legal theorist, the German term *Polizeiwissenschaftler*—connoting a scientist of policing, policy, and the problem of the polis—more aptly captures his peculiar expertise.[15] Fosdick played a leading role in molding the Rockefeller Foundation's diverse agendas into a synthetic and global program of reform. His professional biography provides insight into the trajectories of the Progressive Movement and scientific philanthropy, and their common search for impartial mechanisms for promoting social order. Born in 1883, Raymond was the younger brother of Harry Emerson Fosdick, a renowned minister of the Progressive Era who used his pulpit at Riverside Church in Manhattan to agitate for liberal causes. Raymond was cast in much the same mold as Harry, but chose law as his professional vocation. Following his studies in 1913, the younger Fosdick undertook a sweeping and seminal series of comparative studies of policing in the United States, Germany, France, and England on behalf of the Rockefeller-funded Bureau of Social Hygiene.[16] Historian of science Lily Kay has labeled Fosdick's disposition authoritarian in nature. If "authoritarian" means an endorsement of strict obedience to the state or to a strong sovereign at the expense of personal freedom, then the critique is misplaced.[17] For Fosdick and his patrons, studies in policing were part of a broader effort to determine the mechanisms that enabled individual autonomy. For

15 On *Polizeiwissenschaft*, see Michel Foucault, *Security, Territory, Population*, ed. Michel Senellart, Francois Ewald, and Arnold Ira Davidson, trans. Graham Burchell (New York: Palgrave Macmillan, 2007).

16 See, in particular, Raymond B. Fosdick, *European Police Systems* (New York: The Century Co., 1915). Additional personal information on Fosdick obtained from the website for his personal papers online at http://findingaids.princeton.edu/getEad?eadid=MC055&kw= (accessed 1 March, 2012).

17 British physician and social reformer Havelock Ellis, for example, opposed authoritarian and statist regimes to the realization of progressive "social hygiene." See Havelock Ellis, *The Task of Social Hygiene* (Boston: New York, 1912), chap. 9.

example, Fosdick identified the term "police" with that body charged with protecting personal property and the constitutional rights of the individual[18]—but notably made allowance for the violent suppression of union laborers occupying factories or otherwise challenging industrial production. The rational and scientific study of police was seen as a method for promoting a rational and scientific police force that would help society and industrious individuals reach their full potential without interference from their fellow man or the government.

Fosdick's reflections on policing gravitated to some of the same themes that exercised nineteenth-century American social theorists and liberals: How does one facilitate and enable society in communities characterized by regional, ethnic, and religious diversity? Fosdick extolled virtues such as efficiency, rationality, and consistency, which governed European policing systems; but argued that European procedures, tailored to racially, linguistically, and religiously homogeneous societies, were unsuited for the United States:

> Homogeneity [in European nations] simplifies the task of government. Long-established traditions of order and standards of public conduct, well-understood customs and practices which smooth the rough edges of personal contact, a definite racial temperament and a fixed set of group habits by which conflicting interests are more readily comprehended and adjusted....[which are] so interwoven in French and English community life, and so essential in facilitating the maintenance of law, are utterly unknown in many of the towns and cities of the United States.[19]

Sharing the racist predispositions of his nineteenth-century predecessors, Fosdick asserted that in the United States a direct correlation existed between the "large numbers of foreign races, uprooted and often adrift," and elevated rates of crime.[20] American police, Fosdick contended, had to develop techniques to recognize, navigate, and discriminate among ethnic and racial proclivities without resorting to prejudicial or nativistic impulses.

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18 Fosdick, *European Police Systems*, 3–4.
19 Raymond B. Fosdick, *Crime in America and the Police* (New York: The Century Co., 1920), 7–8.
20 Ibid., 20.

The problems of ethnic and idiosyncratic differences were compounded, in Fosdick's analysis, by the lack of a rational policing technique or technology in the United States. The "police machinery in the United States," he noted with disapproval, "has developed no effective technique to master the burden which modern social and industrial conditions impose."[21] In another text he wrote that

> [c]linging to old traditions, bound by old practices which business and industry long ago discarded, employing a personnel poorly adapted to its purposes, [the American police] grinds away on its perfunctory task without self-criticism, without imagination, and with little initiative.[22]

The reform of the police and the search for what Rockefeller officers termed "social hygiene" were part of a broader Progressive Era effort to root out the irrationality of prejudices organizing social institutions and put in their place efficient and systematic techniques that reflected the science of the age. The impersonal and rational efficiency of these procedures would demonstrate their modernity and integrity. In this respect, the Rockefeller Foundation's ambitions for the study and reform of the police resembled its ambitions for the reform of philanthropy itself.

During the 1920s and 1930s Fosdick gained recognition as a public intellectual. In frequent public addresses he elaborated themes from his earlier studies of policing into a broader analysis of global social order.[23] His tenure as Under Secretary General of the League of Nations from 1919-1920 and the Senate's refusal to ratify the Treaty of Versailles (which would have brought the United States into the League) provided an impetus for these reflections. In content, his thoughts resembled other contemporary and eminent liberals of the era, such as Walter

21 Ibid., 3.
22 Raymond B. Fosdick, *Police Administration* (Cleveland: The Cleveland Foundation, 1921), 3.
23 See, for example, Raymond B. Fosdick, *The Old Savage in the New Civilization* (New York: Doubleday, Doran & Company, Inc., 1929), chap. 7; and Raymond B. Fosdick, *Letters on the League of Nations, from the Files of Raymond B. Fosdick* (Princeton: Princeton University Press, 1966).

Lippmann and John Dewey, who saw global order and global communications as intimately linked. Like them, Fosdick worried that the proliferation of global communications undermined local autonomy and subjected individual citizens to the capricious effects of remote political events,[24] and he saw the League as both the outgrowth and embodiment of rational and technical developments. He labeled the League "the logical outcome of the mechanical development of the Nineteenth Century,"[25] and argued that it provided at the level of international affairs a rational machinery for adjudicating the increased "propinquity" that brought together—and destabilized—nations and peoples in the modern age. "Our machine civilization," he said in one speech, "has wired the world together in a vast, intricate circuit; the electric spark that starts anywhere on the line will travel to the end.[26] He likened modern civilization to a "vast nervous system," warning that "[w]hen shock comes it grows in the process of transmission, carrying its reactions to all the cells of the body....It is this very unity, this solidarity, that threatens the future."[27]

The paradoxes of progressivism manifested themselves in the concepts of global communications and public opinion. Fosdick distrusted the "unity" and "solidarity" of mass and global communications, perceiving anti-liberal tendencies that threatened any model of democracy organized around self-possessive individualism. Despite a general fondness for systems, he viewed the systematization of communications ambivalently. He feared that the standardization of news and entertainment, for example, could not help but produce standardized people. "On all sides," he warned, "there is the pressure for standardized thinking."[28] Of World War I propaganda he said, portentously, "Individual opinion having been ruthlessly brushed

24 See Walter Lippmann, *The Phantom Public* (New Jersey: Transaction Publishers, 1993); and John Dewey, *The Public and Its Problems* (Athens: Swallow Press, 1954).
25 Fosdick, *The Old Savage in the New Civilization*, 206.
26 Ibid., 143.
27 Ibid., 144.
28 Ibid., 73.

aside, the public mind presented a smooth surface for inscription."[29] But like other so-called realist progressives,[30] he rejected the possibility of turning control or decision-making over to the masses. Public opinion, once usurped from the individual and the demagogue and refashioned as a device for social control, was to remain an important tool for elites and an object for scientific investigation.[31] Elites would act as the stewards of the public will, while expert scientists enabled by every modern technique of investigation and instrumentation would identify the best way to optimize a truer democracy.

In this respect, communications proved integral to the emerging programs of social, scientific, progressive, and Rockefeller-funded reform in multiple ways. For those educated progressives who saw in the rise of mass communications a source of instability in society, "social hygiene" and improved "social control" would intervene to produce harmony. Propaganda (or the "manufacture of consent," as Lippmann termed it) suggested the possibility of rationally controlling and directing public opinion.[32] The commitment to a supposedly non-ideological, orderly, and technical style of administration—embodied in scientific philanthropy and the broader "search for order" during the Progressive Era—entailed a turn towards social science. Public opinion's subject matter, circulation, and reproduction were to be investigated with dispassionate restraint and technical precision. As Fosdick put it:

> Our views of property, our conceptions of government, our systems of education, our churches, our laws, our philosophies, our notions of right and wrong, our conventional relationships with each other—these are legitimate subjects of analysis, the laboratory

29 Ibid., 7.
30 See Robert Brett Westbrook, *John Dewey and American Democracy* (Cornell University Press, 1991), 280–282.
31 Fosdick, *The Old Savage in the New Civilization*, 50–51.
32 On progressives' ambivalence towards communications as a source of promise and peril, see John Durham Peters, "Satan and Savior: Mass Communication in Progressive Thought.," *Critical Studies in Mass Communication* 6, no. 3 (1989): 247–263.

> materials of the new [social scientific] inquiry. There is no refuge where a human institution can escape our questioning.[33]

Communication, technique, and social control, having been broached in nineteenth-century political thought and social science, were to be made part of an organized scientific program by the Rockefeller Foundation, the foundation's affiliates, and foundation directors such as Fosdick.

The Techniques of Science

Although an exceptional mathematician in his own right, it was as an administrator at the Rockefeller Foundation that Warren Weaver displayed his brilliance. As director of the natural-sciences division of the Rockefeller Foundation from 1932 until 1955, Weaver played a major role in inventing the styles of patronage, collaboration, and policy advising that came to define much of postwar American science.[34] But unlike Fosdick, who had gradually moved from the analysis of legal and social affairs to broader reflections about the role of science in reforming society, Weaver developed a theory of society and social order based on science. Echoing the claims of early British experimentalists and sensationalists, Weaver saw in science an ideal technique for establishing certainty and social order and for forging democratic and reasonable societies.[35] Use of the scientific method cultivated a particular kind of citizen and subject: restrained, reflective, and circumspect, open to input from others and resistant to passion and demagoguery. He argued that the scientific method cultivated "objectivity, mental honesty,

33 Fosdick, *The Old Savage in the New Civilization*, 59.

34 On Weaver's administrative prowess and its importance, see in particular Robert E. Kohler, "The Management of Science: The Experience of Warren Weaver and the Rockefeller Foundation Programme in Molecular Biology," *Minerva* 14, no. 3 (1976): 279–306; and Kay, *The Molecular Vision of Life*. On postwar scientific patronage, see Hunter Crowther-Heyck, "Patrons of the Revolution: Ideals and Institutions in Postwar Behavioral Science," *Isis* 97, no. 3 (September 2006): 420–446.

35 This was a venerable conceptual tradition in liberal political thought. For one historical overview especially germane to communications research, see John Durham Peters, *Courting the Abyss: Free Speech and the Liberal Tradition* (Chicago: University of Chicago Press, 2005), chap. 5.

tolerance for other view points, a calm suspension of judgment, a willingness to abandon tradition, a desire to scrutinize basic assumptions, an unprejudiced passion for verifiable relationships...."[36] In an age characterized by political instabilities and threatened liberalism, scientific method acted as a prophylactic against social disorder. In a 1933 memorandum entitled "The Benefits from Science," Weaver maintained that

> [n]o thoughtful person expects that all the perplexities of individual life or all of the ills of society are to be banished by means of the techniques of science. It is claimed, however, that in the record of history nothing is more typical of or more closely associated with the emergence of intelligence than the growth of the scientific spirit. It is claimed that there is no more effective enemy of passion and prejudice than the calm temper of the scientific mind.[37]

Support for science and the scientific method, then, also constituted a subtle form of social engineering. The development of cadres of scientists encouraged the development of a different kind of society. In the face of "passion and prejudice," the scientist responded with cool detachment. Fearful of an unruly mass society ruled be licentious passions and left-wing demagogues, officers embraced the "technique" as a method of dispassionate evaluation and control. Built into the Rockefeller Foundation's agenda was a scheme for fashioning a new global society guided by the techniques of science and supported by private capital. As Weaver continued in that same memorandum on the "Benefits of Science,"

> [i]t is claimed that by slow absorption into the intellectual habits of large groups of individuals, science is a leading influence in the development of a factual outlook, of a healthy and flexible skepticism, and of objectivity and tolerance in the appraising of evidence....[In addition] there is the contribution to international friendliness and understanding that results from a world-wide fraternity of scientists with their unifying bond of impersonal and unselfish interest and understanding.[38]

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36 Warren Weaver, "The Aims of Science Teaching," p. 11, Collection RF, Record Group 3.1, Series 915, Box 1, Folders 6-7. RAC.

37 Weaver, Warren. "The Benefits from Science and Foundation Programs," p. 6. 27 January 1933. Record Group 3.1, Series 913, folders 6-7. RAC.

38 Weaver, "The Benefits from Science and Foundation Programs," pp. 6-7.

Calming the temper of the individual mind and countering the prejudices of regional, ethnic, or national belonging promoted a stoic overcoming of the self. The result was not only a different kind of self, but also a new kind of body politic: Scientists, united in impersonality and understanding, woven together in "a world-wide fraternity," would become part of a new apparatus for enlightened governance. In this regard, Weaver's arguments drew upon one of the Rockefeller charities' founding principles: that science offered the surest mechanisms for global governance. As a 1920s memorandum announcing some of the charities' earliest initiatives for global science put it, "all important fields of activity, from the breeding of bees to the administration of an empire, call for an understanding of the spirit and technique of modern science....Promotion of the development of science in a country...affects the entire system of education and carries with it the remaking of a civilization."[39]

The Science of Control

Following an impressive inventory of accomplishments during the 1910s and 1920s, such as stamping out hookworm in the American South,[40] in the 1930s the Rockefeller Foundation made its first broad efforts for a synthetic reform of science and society. Officers and agents launched an organized effort to reconstitute all the sciences around a unified program. Fosdick explained:

> There is...an essential unity in the program of the Foundation, although it covers wide and diverse fields. The underlying interest is in the general problem of individual and social living, with the aim of progress through understanding. While, necessarily, the old classifications are employed, such as medical science, natural science, and social science,

39 Original quote excerpted from a 1923 memorandum concerning the International Education Board. Cited in "Natural Sciences – Program and Policy: Past Program and Proposed Future Program," 11 April 1933, p. 28. Collection RF, Record Group 3.1, Series 915, Box 1, Folders 6 and 7

40 Fosdick, *The Story of the Rockefeller Foundation*, 30–43.

> an endeavor is being made to think of the objective in coordinated and synthetic terms and to shape the program toward what has been called the science of man.[41]

Through fellowships, grants for interdisciplinary research, the cultivation of an elite and international network of scientists and administrators, and the engendering of new forms of technology-enabled research, the Rockefeller Foundation contributed to the emergence of a new style of scientific inquiry: interdisciplinary, allied with engineering and instrumentation, developed in tandem with national interests and agendas, and funded by industry but nominally independent from private and public sources of financial support.

Between 1930 and 1940, the major programs of the Rockefeller Foundation redefined the natural and human sciences as part of an impartial apparatus for transcending cultural, biological, and political difference. Administrators supported programs that applied technical media and instrumentation towards the study of natural, social, and cultural phenomena as mechanisms of feedback, control, and communication. An early memorandum outlining the new program of research placed particular emphasis on the notion of control, explaining:

> The salients of concentration, as they are to be proposed here, are directed to the general problem of human behavior, with the aim of control through understanding. The Social Sciences, for example, will concern themselves with the rationalization of social control; the Medical and Natural Sciences propose a closely co-ordinated study of the sciences which underlie personal understanding and personal control. Many procedures will be explicitly co-operative between divisions. The Social Sciences and the International Health Division, for example, may have common interest in the expansion of health control units and the broader service of community centers. The Medical and Natural Sciences will, through psychiatry and psychobiology, have a strong common interest in the problems of mental disease. The details will be presented by the separate officers, but it should be recognized that the program is pointed toward a structural unity.[42]

41 *The Rockefeller Foundation: A Review for 1936* (New York: The Rockefeller Foundation, 1937), 8.

42 Untitled Memo, 11-12 April 1933, pages 33074-33075. Folder "Program and Policy 1928," Record Group 3.1, Series 910, Box 1, Folder 1. RAC.

As discussed in the last chapter, "control" and the concept of "social control" did not imply control *of* the social so much as control *by* the social. Theorists such as E. A. Ross, who developed the concept of social control, based their analysis on a French sociological tradition, in which *contrôle* often designated impartial and non-coercive mechanisms (rather than, say, authoritarian control imposed from above).[43] The elaboration of this concept in the United States —by John Dewey in his work on circular feedback processes, and by Walter Canon in his work on homeostasis—built upon that idea of impartial *contrôle*, while placing additional emphasis on the communicative basis of control procedures.[44] As the Rockefeller Foundation applied these ideas towards a synthetic approach to the sciences, social, technical, and communicative connotations emerged.

In the natural sciences, for example, Warren Weaver focused the Rockefeller Foundation's efforts around a new style of research termed experimental biology (later termed molecular biology), which apprehended life as a process of communication-driven cellular transmission and reproduction. The introduction of instruments further promoted the communicative reconstruction of life itself. Cellular processes came to resemble the communication-like instruments used to study them, and ultimately reading and writing processes modeled on information processing.[45] On the decision to focus the natural sciences on biology in particular, Weaver said, "We have chosen this activity because of a conviction that

43 See Georges Gurvitch, "Social Control," in *Twentieth Century Sociology*, ed. Georges Gurvitch and Wilbert E. More (New York: Philosophical Library, 1945); and Joseph S. Roucek, "The Development and Status of Social Control in American Sociology," *The American Catholic Sociological Review* 20, no. 2 (July 1959): 107–123.

44 For his canonical essay on the topic, see John Dewey, "The Reflex Arc Concept in Psychology," *Psychological Review* 3, no. 4 (1896): 357–370. Weaver's diaries indicate that he occasionally met with Cannon on professional visits to Harvard and MIT but I haven't found any evidence that the Rockefeller Foundation supported his work directly. For Cannon's classic work on homeostasis, see W. B. Cannon, *The Wisdom of the Body* (New York: W. W. Norton & Co., 1932).

45 Kay, *The Molecular Vision of Life*, 5; and Lily Kay, *Who Wrote the Book of Life?: A History of the Genetic Code* (Stanford: Stanford University Press, 2000).

such studies will in time lay the (only?) sure foundation for the understanding and rationalization of human behavior."[46] The understanding of cells as self-regulating mechanisms provided social planners devoted to efficiently controlling society with a scientific basis for understanding citizens as self-controlling individuals.

In the social sciences, control-oriented research combined the goal of generating data for technocratic planning with the effective communication of scientific methods across society. One memorandum explained:

> The general purpose of the programs is to (1) increase the body of knowledge which in the hands of competent technicians may be expected in time to result in substantial social control; (b) enlarge the general stock of ideas which should be in the common possession of all intelligent members of civilized society; and (c) spread the appreciation of the appropriateness and value of scientific methods in the simplification and solution of modern social problems.[47]

Through empirical studies and the promotion of what officers termed "social technologies"[48] (i.e., "business, law, public administration, and social service"[49]), Rockefeller programs aimed to develop rational mechanisms for adjusting the population and servicing society's propensity for self-regulation, a propensity the foundation's adherents regarded as natural but distorted by modernity. Knowledge of the conditions, mechanisms, and institutions that enabled these processes of adjustment and regulation served private individuals and social planners alike. As one longtime director of Rockefeller activities in the social sciences put it:

> All who work toward the general end of social welfare are embarrassed by the lack of that knowledge which the social sciences must provide. It is as though engineers were at

46 Kay, *The Molecular Vision of Life*, 49.
47 Memorandum, 3 January 1929, p. 29039. Folder "Program and Policy 1928," Record Group 3.1, Series 910, Box 1.
48 "Staff Conference," p. 3. 14 January, 1930. Folder "Program and Policy 1929-32," Record Group 3.1, Series 910, Box 1, Folder 2. RAC.
49 Ibid.

> work without an adequate development of physics and chemistry, or as though physicians were practicing in the absence of the medical sciences.[50]

Research funded under the rubric of social technologies emphasized the applications of instrumentation, observation, and mathematical analysis towards the study of "realistic" problems in society.[51] If mass society were reduced to a system of quantitatively defined inputs, outputs, and levers, its management by benevolent administrators would become more rational. Echoing the mutual construction of science and its objects as instruments of communication and control, another Rockefeller advisor counseled focusing research on "improvement of the social sciences as instrumentalities for attainment and diffusion of knowledge," with an especial emphasis on improving methodology because "[i]mprovement of techniques is the key to real advance in all sciences."[52]

Humanities in the Mechanized Age

But it was in the humanities that the shift in research was most marked. Because of the longstanding experimentalist tradition in the natural sciences and the technocratic programs of nineteenth-century sociology, the Rockefeller programs' turn towards technology, communications, and new theories of control or feedback reinforced and continued already-visible research traditions. In the humanities, however, the Rockefeller Foundation sought to fundamentally overturn hermeneutic inquiry in favor of instrumental, experimental, and technical research. Between 1930 and 1935 the Rockefeller Foundation humanities programs increasingly

50 Beardsley Ruml cited in Fosdick, *The Story of the Rockefeller Foundation*, 194. Note that this comment was made in the 1920s, when Ruml directed Rockefeller-funded Laura Spelman Rockefeller Memorial, which was nominally autonomous from the Rockefeller Foundation. The two organizations subsequently merged.

51 Ibid., 202.

52 Robert T. Crane, "Discussion of Social Sciences Program and Suggestions for Future Development," 27 October 1938. Folder "Program and Policy—Reports 1938-41," Record Group 3.1, Series 910, Box 3, Folder 16. RAC.

conceptualized cultural practices and artifacts as vehicles for the transmission of information. The search for scientific and informational regularities within culture, facilitated by the informed study of media, corresponded with an understanding of society as amenable to scientific and rational ordering. Research extracted culture and communication from the realm of agonistic and historical struggle and reinscribed it within a technical discourse based on the transmission of information and the diffusion of values. Texts, performances, archives, images, and performances were reconceived as material to be ordered, sorted, and explained through technoscientific enterprises.

In 1936, then-President Raymond Fosdick explained the importance of pulling humanities funding from traditional priorities such as philology, archaeology, and the preparation of annotated texts, and sinking money into media and communications research instead:

> There is undoubted value for scholars in a dictionary of Indo-European synonyms and in an exegetical commentary on the fourth book of Virgil's Aeneid...but this kind of work gives us facts, not necessarily followers. In this mechanized age, something more than this is needed, some method by which the esthetic and spiritual meanings of human life can be interpreted over wider areas.[53]

Fosdick's announcement set the stage for shifting the substantial resources of the foundation away from the localized and specialized hermeneutic activities of a library-bound classicist and towards the expanded horizon enabled by technical media. The work now supported by Rockefeller funds would focus, he explained, "not so much on the content of humanistic studies as on the techniques by which cultural levels are affected"—techniques such as radio broadcasts; technical approaches to staging and documenting live drama; museum practices; and new indexing technologies for libraries, based on microphotography and associated methods.[54]

53 *The Rockefeller Foundation: A Review for 1936*, 42.
54 Ibid., 5.

Techniques like these were framed by the same ambivalence that had long characterized the views of Fosdick and other American liberals towards the mass media: Despite widespread fear that mechanical and electrical media undermined reason and promoted a mob mentality, proponents believed communications research guided by sage social science could restore democratic values and, in the words of one Rockefeller advisor, promote "spiritual stabilization."[55] Technology, long accused of despiritualizing logos and numbing art and audiences alike, was to furnish the means for cultivating spiritual and aesthetic values on a mass scale.

As part of this new initiative, leading researchers such as I. A. Richards, Harold Lasswell, Paul Lazarsfeld, Theodor Adorno, and Siegfried Kracauer would found archives of cinema and photography, develop techniques of "content analysis" for interpreting broadcasts, deploy microphotography technologies at American and European libraries, and develop programs to educate the public via film and radio. Participants were encouraged to turn away from the philological and interpretive values of hermeneutics and embrace technical, rational, and scientific conditions for mass enlightenment. The focus on new media gadgetry troubled some participants' intellectual sensibilities, as Fosdick dismissively acknowledged: "[F]oreign scholars in the humanities, as well as scholars here in the United States, occasionally show some impatience with what they think is the overemphasis of American students on the tools of research...[But] where is the line that can be sharply drawn between technology and content?"[56]

These programs were frequently orientated towards propaganda, coinciding with the broader mission to establish experimental and instrumental sciences of control, and often

55 "Humanities—Program and Policy. Past Program and Proposed Future Program," 11 April 1933, Collection 3.1, Record Group 911, Box 2, Folder 9. RAC.

56 Fosdick, *The Story of the Rockefeller Foundation*, 245.

borrowing conceptual resources from neighboring disciplines. The director of the Rockefeller humanities division praised the research on communications and public appreciation for "bringing [the] Humanities [division] into relationship with other divisions of the Foundation, particularly in the field of [natural] science,"[57] while Fosdick labeled propaganda and communications research part of an "experimental approach to this problem of popular appreciations."[58] The director of these efforts, John Marshall, identified their goal as an investigation of the "pathology of influences" pervading modern media and charged participants with developing "a genuinely democratic propaganda," by which he meant a shaping of media content by elites so as to realize control both of the self and of society.[59]

Latter-day histories have obscured or disavowed the continuity among these programs and researchers, encouraging a Whiggish justification of present-day disciplinary arrangements. For example, a now-legendary rift between statistician Paul Lazarsfeld and musicologist Theodor Adorno in the course of their research for the Rockefeller Foundation has attained the status of legend and is widely credited with founding vying traditions of "administrative" and "critical" communications research.[60] But when the anecdote is viewed from a synthetic perspective, the

57 D. H. Stevens, "The Humanities Program of the Rockefeller Foundation: A Review of the Period 1934 to 1939," p. 49. Collection RF, Record Group 3.1, Series 911, Box 2, Folder 2. RAC.

58 *The Rockefeller Foundation: A Review for 1936*, 43.

59 John Marshall, Memo, 13 September 1938, Folder "Program and Policy – Radio and Motions Pictures 1914-1940." Record Group 3.1, Series 911, Box 5, Folder 50. RAC. See also 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.

60 The notion of a radical distinction between critical and administrative research is widespread among would-be "administrators" and "critics" alike. For a recent example, see Timothy Richard Glander, *Origins of Mass Communications Research During the American Cold War: Educational Effects and Contemporary Implications* (Mahwah: Taylor & Francis, 2000), 134. One of the original texts on this, which is actually more nuanced than later commentaries, is David E. Morrison, "Kultur and Culture: The Case of Theodor W. Adorno and Paul F. Lazarsfeld," *Social Research* 45, no. 2 (July 1978): 331–355. Two recent studies have shown in greater detail how the methodological rift between the Frankfurt School theorists-in-exile and their American colleagues (or at least "social" and "critical" traditions) has been exaggerated or misconstrued. See Thomas Wheatland, *The Frankfurt School in Exile* (Minneapolis: University of Minnesota Press, 2009); and David Jenemann, *Adorno in America* (Minneapolis: University of Minnesota Press, 2007).

affinities (not only between Lazarsfeld and Adorno, but even between their work and Weaver's experimental biology) come into view. Adorno arrived in the United States sharing many of the same fears of his patrons—for example, Fosdick's concern that standardized media creates standardized people, as well as a concern for tracing out the political and cultural logic of media technologies.[61] His posthumously published writings from the project also reveal his almost obsessive preoccupation with establishing an authentic, living (indeed, "biological") relationship between listeners and performers—what Adorno termed "an actual living relation with music."[62] He expressed the familiar concern that artifice and technique perverted listeners' reason (although unlike his patrons, he attributed this to commodification). His relentless critique of the inadequacy of musical broadcasts and their listeners in *Current of Music*[63] complemented the Rockefeller agenda in many respects. And indeed, this was the strength of the Rockefeller's programs: Without fully dictating agendas, the foundation's officers were experts at identifying relevant themes and locating entrepreneurial researchers who could amalgamate diverse projects around strategic and well-defined problems.

Adorno's participation points us towards another aspect of these programs in the 1930s. Often hitching humanitarian to strategic agendas, they crafted an multinational network of international researchers who, it was hoped, would repatriate after the war and contribute towards Weaver's global fraternity of scientists. Many displaced scholars, such as Kracauer and

61 Theodor Adorno, "On Popular Music," *Studies in the Philosophy of Social Science* 9 (1941): 17–48; and Theodor Adorno, "On the Fetish-Character in Music and the Regression of Listening," ed. Andrew Arato and Eike Gerhardt, The Essential Frankfurt School Reader (New York: Urizen Books, 1977), 270–298. For a useful historical and critical overview see Thomas Y. Levin, "For the Record: Adorno on Music in the Age of Its Technological Reproducibility," *October* 55 (December 1, 1990): 23–47; and Thomas Y. Levin and Michael von der Linn, "Elements of a Radio Theory: Adorno and the Princeton Radio Research Project," *The Musical Quarterly* 78, no. 2 (July 1, 1994): 316–324.

62 Theodor Adorno, *Current of Music: Elements of a Radio Theory*, ed. Robert Hullot-Kentor (Frankfurt: Suhrkamp, 2006), 249.

63 Adorno, *Current of Music: Elements of a Radio Theory*.

Kris and Hans Speier, were absorbed into a wartime apparatus of researchers contributing to psychological warfare and propaganda programs directed against the Axis powers. As I discuss in chapters three and four, such programs combined a humanitarian agenda and wartime exigencies with longer-range plans to promote more practical, experimental, and useful research among European scholars. Enthusiasm and support for the Basic English project at the Rockefeller Foundation followed the same principle.[64] Comprised of 850 essential English words described as suitable for encapsulating all English meanings—*disembark*, for example, was replaced by *get off*—Basic English embodied the dream of establishing a global order and fraternity bound together by simple and efficient communication. Communication theorist John Durham Peters aptly notes that each of the words in the acronym *Basic* (**B**ritish **A**merican **S**cientific **I**nternational and **C**ommercial) was an empire.[65] Officers at the Rockefeller Foundation saw in those empires the promise of global order.

Textual Instruments Beyond the Human Sciences

Within the natural-sciences division, however, there was earnest—albeit speculative—thought about the nature of communication and language in the humanities. Efforts to capitalize on these thoughts were often relegated to proposals, speculations, and suggestions, discarded for lack of practical or immediate value—yet even these rejected ideas had a way of returning, sometimes in identical form, sometimes with major revisions, in later years. Weaver, for example, had long speculated on the application of mathematics and technical media to the

64 See Rodney Koeneke, *Empires of the Mind: I. A. Richards and Basic English in China, 1929-1979* (Stanford: Stanford University Press, 2004), chap. 4.

65 John Durham Peters, *Speaking into the Air: a History of the Idea of Communication* (Chicago: University of Chicago Press, 1999), 13. The discussion of Basic English on pages 11-13 offers an excellent overview of its philosophical stakes and place within theories of communication.

human sciences. As early as 1933 he predicted in internal memoranda that "the more concrete, natural philosophy will play an increasingly important role in the development of the more abstract moral philosophy," citing statistical research and logic as a particularly promising source for developing "a sound moral philosophy."[66] Two years later, he broached the topic again in a letter to Charles Morris of the Unity of Science Movement. Morris had written to request financial support for his group's efforts to produce a unified and logical scientific language that would protect and promote "scientific habit and technique."[67] Weaver responded that the natural science division's focus on experimental biology prevented the sponsorship of Morris and his colleagues, but expressed his profound interest in their attempt to develop a language that would unite the sciences. In a probable reference to the differential analyzer developed by Vannevar Bush, dean of engineering at MIT, Weaver opined that "many of the subtle and perplexing problems of language and of meaning are perhaps best approached through the use of...logical machinery."[68] Weaver further advised Morris to get in touch with Ogden and I. A. Richards of the Basic English project.

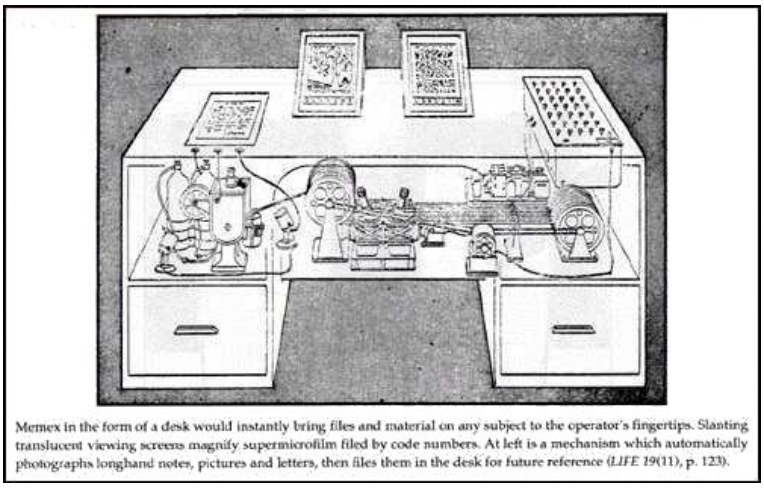
Consider also Warren Weaver's notes from a 1937 meeting with Bush. Weaver regularly consulted with Bush and other MIT officials about the prospects for establishing a program in biological engineering,[69] although World War II ultimately derailed those efforts. The Rockefeller Foundation had lavishly sponsored the construction of Bush's differential analyzer, which was in turn maintained and theorized by Claude Shannon (at the time a graduate student and research

66 Weaver, "The Benefits from Science," 202-203.
67 Morris to Weaver, 18 January 1935, RG 1.1, Series 100, Box 35, Folder 279. RAC.
68 Weaver to Morris, 5 February 1935, RG 1.1, Series 100, Box 35, Folder 279. RAC.
69 See, for example, Warren Weaver's diary entries from 15 February 1937 and 12 April 1937, 16 October 1937 and 4 March 1938. RAC.

assistant).[70] It was during a discussion of the differential analyzer that Bush reported his idea for another device. According to Weaver's diary entry:

> Sometime ago federal authorities asked [Bush] to consider the problem of devising mechanical aids for rapidly locating finger prints. Several million of these are now on file. Their present procedure allows approximately 400 per minute to be examined. [Bush] worked out a system which would permit the examination of approximately 1,000 per second. It then occurred to him that this same scheme was possible of development into a new technique for making available the stored literature of the past.[71]

This appears to be among the first mentions of the famed "memex" project, a microfilm-driven desk [Figure 1] which Bush described in greater detail in 1945 in essays published in *Atlantic Monthly* and *LIFE.*[72] He described the device as a reference tool of unimaginable power that



Memex in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference (*LIFE* 19(11), p. 123).

Figure 1: Depiction of the Memex
Source: "As We May Think" by Vannevar Bush, *LIFE*, September 1945

70 Before Shannon produced a rational theory of the machine, it was configured on an ad hoc, trial and error basis. Shannon demonstrated how Boolean algebra could guide the design. See David A. Mindell, *Between Human and Machine: Feedback, Control, and Computing Before Cybernetics* (Baltimore: Johns Hopkins University Press, 2002), 170–171; and N. J. A. Sloane and Aaron D. Wyner, "Biography of Claude Elwood Shannon," in *Claude Elwood Shannon: Collected Papers*, ed. N. J. A. Sloane and Aaron D. Wyner (New York: IEEE Press, 1993), xi–xvii.

71 Warren Weaver diary entry, 12 April, 1937. RAC.

72 Vannevar Bush, "As We May Think," *Atlantic Monthly* 176, no. 1 (July 1945): 101–108; Vannevar Bush, "As We May Think," *Life* 19, no. 11 (September 1945): 112–124.

would use new media technologies to put millions of pages of texts at users' fingertips, thereby providing a technical solution to the specialization and balkanization of knowledge. Latter-day new media theorists claim the memex was born of wartime computing research and directly inspired the development of hypertext and the World Wide Web.[73] But the passage from Weaver's diary suggests an earlier, biopolitical origin. Inspired by the dream of indexing biological data with modern technical media and applying the result to the more effective policing of the state, Bush did not at first conceive of literary and humanistic applications for the device—not to mention wartime and militaristic applications. The memex's actual origins relate to the Rockefeller Foundation's efforts to develop technical media that would bridge and overcome diversity and disorder in culture and communications.

World War II provided an unexpected catalyst for Bush's speculations. In 1940 Franklin D. Roosevelt appointed him to the head of the National Defense Research Committee (NDRC), and Bush recruited Weaver to oversee mathematical research. MIT mathematician Norbert Wiener (a friend of Weaver) and Bush's former student Claude Shannon were appointed to the mathematical committee. Both Wiener and Shannon began research focused on improving anti-aircraft artillery control, a problem that involved complex predictive mathematics as well as the ability to treat human and machine feedback as analogous "information" flows.[74] Wiener, who

73 See, for example, Noah Wardrip-Fruin, "Introduction: As We May Think," in *The New Media Reader*, ed. Noah Wardrip-Fruin and Nick Montfort (Cambridge: MIT Press, 2003), 35–36; and Janet Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (New York: Free Press, 1997), 90–91, On Bush's other efforts to build a Memex-like device in the 1930s, see Colin Burke, "The Other Memex: The Tangled Career of Vannevar Bush's Information Machine, The Rapid Selector," *Journal of the American Society for Information Science* 43, no. 10 (December 1992): 648–657.

74 See David Mindell, Slava Gerovitch, and Jérôme Segal, "From Communications Engineering to Communications Science," in *Science and Ideology: A Comparative History*, ed. Mark Walker (New York: Routledge, 2002), 66–96; and Mina Rees, "The Mathematical Sciences and World War II," in *A Century of Mathematics in America*, ed. Peter Duren (American Mathematical Soc., 1989), 275–290.

was attracted to the physiological aspects of this problem, gradually elaborated his wartime studies into a general science of "communication and control in the animal and the machine" that he termed "cybernetics."[75] Shannon, who was in the employ of Bell Labs, shifted from fire control to cryptography, ultimately developing the fundamental methods of mainstream American information theory, which focused on the most efficient encoding and transmission of signals.[76] Both methods treated communication in terms of control, feedback, and statistical series. The patterns of postwar scientific policy and patronage would catapult these nascent and obscure methods into prominence.

The Restoration of Communications

The postwar conceptualization of communications at the Rockefeller Foundation conjoined humanitarian agendas with a concerted effort to counter Soviet influence. Consider efforts in Western Europe: Memoranda routinely described postwar efforts in terms such as the "restoration of communication."[77] Funding privileged the dissemination of recent American

75 Wiener's foundational essay on the cybernetic problematic, prepared with colleagues during the war, can be found in Arturo Rosenblueth, Norbert Wiener, and Julian Bigelow, "Behavior, Purpose, Teleology," *Philosophy of Science* 1 (January 1943): 18–24. His elaboration of cybernetics into a broader interdisciplinary method can be found in Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine* (New York: MIT Press, 1961); and Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (USA: Da Capo Press, 1988); For critical accounts of the development of cybernetics and its interdisciplinary aspirations see Steve J. Heims, *Constructing a Social Science for Postwar America: The Cybernetics Group (1946-1953)* (Cambridge: MIT Press, 1991); Geof Bowker, "How to Be Universal: Some Cybernetic Strategies, 1943-70," *Social Studies of Science* 23 (1993): 107–127; Peter Galison, "The Ontology of the Enemy," *Critical Inquiry* 21 (1994): 228–268; Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge: MIT Press, 1996); Claus Pias, ed., *Cybernetics - Kybernetik: The Macy-Conferences 1946-1953* (Berlin: Diaphanes, 2004); and Erich Hörl and Michael Hagner, eds., *Die Transformation Des Humanen: Beiträge Zur Kulturgeschichte Der Kybernetik* (Frankfurt: Suhrkamp, 2008).

76 Claude E. Shannon, "A Mathematical Theory of Communication," *Bell Systems Technical Journal* 27 (July and October 1948): 379–423, 623–656.

77 Although I am using this phrase to describe a range of initiatives, I take it from the description of one particular initiative in Western Germany found in "The Foundation's Program to Help Europe, in "The President's Annual Review," in *The Rockefeller Foundation Confidential Monthly Report for the Information of the Trustees*, 1 November, 1948, esp. pp 2-14. RAC.

scholarship in Europe, trips by elite scholars between the United States and Europe, and grants to inculcate German journalists and politicians in American norms of press freedom and civil society. Barely concealed in this program was an assault on Soviet influence. As the Iron Curtain restricted access to Eastern European scientists and society, and set the stage for an ideological battle in Western Europe and the Third World, Rockefeller programs sought to unify perceived allies, particularly in Western European and South American universities. Hence, for all the rhetoric about free and open communications, the design of programs systematically privileged a one-way communication channel: American expertise was exported throughout Europe and the Third World while select experts and officials were occasionally brought to the United States to experience directly, and thereby better reproduce, the techniques of scientific inquiry in the United States.[78] In this way the rubric of freer and restored communications engineered an asymmetrical network of global relays and collaboration.

Experts and policymakers in the United States had other reasons for distrusting free and open communications. Throughout the late 1940s, Weaver, Bush, and other elite scientists were in continued negotiations over what wartime research could and should be declassified. While they regarded the sharp restrictions the Soviet state put on scientists' travel and communication as antiscientific and antiliberal, there was a growing consensus that many wartime findings could not be freely exchanged and that, indeed, American scientists' new power in the postwar period

78 This is touched on in a number of texts. See, for example, Dowie, *American Foundations*, 109–123; and Bruce Cumings, "Boundary Displacement: Area Studies and International Studies During and After the Cold War," *Bulletin of Concerned Asian Scholars* 29, no. 1 (1997): 6, 11, 14; Another useful text on this tendency, albeit one focused on the Ford Foundation, is Kathleen D. McCarthy, "From Cold War to Cultural Development: The International Cultural Activities of the Ford Foundation, 1950-1980," *Daedalus* 116, no. 1 (January 1987): 93–117; Interestingly, there were also accusations at the time that the Rockefeller Foundation programs of undermining the American state and supporting left-wing social scientists. See Daniel Lee Kleinman and Mark Solovey, "Hot Science/Cold War: The National Science Foundation After World War II," *Radical History Review* 1995, no. 63 (September 21, 1995): 120.

would also come with limits on their intellectual freedoms. (The Oppenheimer controversy presented another, more public setting for these debates.) In a 1948 memorandum concerning the postwar situation for science and the foundation, Weaver explained some of the stakes surrounding communications and science:

> Modern travel and communication operate so incredibly rapidly that the older situation no longer holds, in which we could afford to wait while the time and space averages to work themselves out. And the forces which science has loosed are so terrible and so sudden that social control of them must itself be capable of swift decision and swift action.[79]

Echoing the fear of a space-time compression articulated by Fosdick in the 1920s and anticipating the general insecurities that would lead to preemptive military doctrines some decades later, the accelerated communication and power of science increased the prewar need for social control. Although framed in terms of the problems of heterogeneity—an inability to wait for "the time and space average" to work itself out—the solution did not entail its simple elimination. In a pattern already evident with the technologies of liberalism, a new, more structured distribution of difference was to be imposed: the creation of new hierarchies of control, the distribution of scientific community and communication so as to maximize productivity while curtailing the risk of leaks, and the general elaboration of a new scientific apparatus that would promote liberal freedoms while also acting as a weapon against the Soviet state.

The Rockefeller Foundation's major push for communications research, from 1948 onward, was predicated on the definition of free and open communication as the strategic relay of knowledge, techniques, and technologies from an American center to a Western European and

79 Weaver to Fosdick, 16 January 1948, Collection Rockefeller Foundation, Record Group 2-1948, Series 100, Box 402, Folder 2714. RAC.

Third World periphery (with allowance for adherents to those techniques to travel from the periphery to the center). The 1948 review of the foundation's activities announced that the new focal points for research and funding would be "population, communication, and cooperation."[80] These were conceived of as mutually constitutive fields: Science proceeded through cooperation and communication, which in turn shaped, bound, and sustained populations. At the outset, the program expressed Weaver's and Fosdick's prewar interest in language and communication:

> The perfecting of mechanical means of communication—telephone, telegraph, transportation—far outruns our progress in the essential means of communication. These are first of all the construction, utilization and translation of languages. Thus far the most universal language is that of mathematics. Some approach to universality is made in physics and chemistry and in the more abstract branches of biology. But these abstract languages are common to but an infinitesimal portion of mankind, and the very specialization they require tends to limit understanding even among scientists. Thus, the unity of science, as yet a metaphysical assumption or hope, and the popularization of science from a cultural standpoint both become of increasing importance in a technological world.[81]

Technology, as in the interwar period, continued to embody the outpacing of humans by machines: Global relay of messages, a tribute to human invention, operated as a pace exceeded the scope of reason. Science, a possible solution, remained out of the reach of everyday citizens, but would attain greater importance in the postwar "technological world."

The celebration of science as the nearest equivalent to a universal language had two implications: (1) communication itself was recognized as an important object of research, and (2) communication became identified with the essence of science itself. New Rockefeller programs directly identified with communications included grant-giving for the Unity of Science Institute in Cambridge, Massachusetts; Carl Hovland's studies of persuasion; support for public health

80 *The Rockefeller Foundation: Annual Report 1948* (New York: The Rockefeller Foundation, 1949), 12.
81 Ibid., 20.

initiatives (which officers termed "centers of communication"[82]); and support for the training of German and Austrian journalists and broadcasters. But it was the broader concept of science as an ethic of communication that predominated throughout. As the 1948 review stated:

> [T]he extension of science is itself a means of improving communication. Scientific knowledge provides a fund of exact ideas which form the basis for a *common* world.... Hence, the Foundation's interest in the study and teaching of languages, cultural anthropology, political science, history and all that the arts convey of human attitudes and experience.[83]

Science not only described the world; it produced the "common" world. Through the cultivation of standardized and rule-bound discourses, techniques of reasoning, instruments, and technologies, it united cultures and built common worlds. Echoing the classic liberal conceptions discussed in the previous chapter, the report also recognized the binding power of communication: "Our vast industrial plants and our power, transportation and communication systems," it asserted, "not only facilitate but also enforce cooperation..."[84] Inscribing personal, individual, and regional practices within an organized system of relay and regulation compelled cooperation. In an age of ascendent American industry and power, such cooperation would, it was hoped, benefit the United States.

In private, Weaver, the rigorous theorist of communications and of scientific method, admitted that the commonality of this scientific world did not coincide with its universality. In a 1950 note to a colleague, he wrote:

> Science is a human activity; and I think that profit rather than loss results from recognizing that science is really in the stress of human affairs....I think that it is necessary to realize that some of these ideals of science are deeply imbedded in assumptions unconsciously associated with our language, our culture, our philosophy, and our ethics....[T]he "facts" of science, which we honor as being so objective and so

82 Ibid., 32.
83 Ibid., 20–21.
84 Ibid., 21.

> indisputable, are...“the facts” because our Western scientific philosophy has developed a language, a logic, a culture, and an ethics which, all taken together, have led us to describe nature in one particular set of abstractions. Every scientific profession...has such well-established traditions of language, thought, and procedure that it tends to throw out, as “unscientific,” the ideas which do not conform to the pattern. And yet, there may well be other patterns which lead to just as consistent interpretations—perhaps to even more consistent behavior![85]

To admit the all-too-human basis of science constituted, for Weaver, a tribute to the efforts of its practitioners to weave a common world through scientific language, instruments, and procedures. Abstractions, created by shared professional norms, expressed community *and* bound communities. In other words, good science produced good abstractions—not the laws of nature, nor the thoughts of God, but shared abstractions conducive to the production of consistent observations and, ultimately, a stable, shared way of life. While the Rockefeller Foundation consistently emphasized the inclusive and common nature of the scientific way, Weaver’s comments were unusual in recognizing its exclusivity as well: The community was constituted, not only by its shared norms, but also by its rejections—not of error, but of aberrance.

Babel’s Basement

The sciences and methods of technical media provided the Rockefeller Foundation with the most concrete and enduring expressions of scientific ideals. Here was communication incarnate: The inscriptions, tools, formulas, models, and technologies associated with cybernetics, information theory, digital computing, and game theory seemed to embody a “language, a logic, a culture, and an ethics” all in one. Theorists discerned in them universal laws of communication operating at the level of speech, telephony, economics, weather patterns, the

85 Weaver to W. F. Loomis, 28 November 1950, collection general correspondence, Record Group 2-1950, Series 100, Box 476, Folder 3192. RAC.

unconscious, and the state. Technologists and engineers saw the promise of a more efficient society, wired together by efficient machines deployed on a global scale. And Weaver, more than anyone else, was persuaded by their promise for establishing, if not scientific universalism, certainly a new kind of global technics that cut across ethnic, disciplinary, and national borders.

The Rockefeller Foundation's especial interest in this media partially reflected its postwar personnel. In 1948, Chester Barnard, a systems theorist and former president of the New Jersey Bell Telephone Company, succeeded Raymond Fosdick as the foundation's president. Charles Fahs, a linguist and participant in wartime propaganda research, took over as associate director of the humanities division in 1949, and the following year he became full director. Unlike Marshall, Fahs was decidedly functionalist in his thinking, which complemented the emerging interest in cybernetic (as opposed to mass) communications research. Weaver remained at the helm of the natural-sciences division, but his wartime supervision of Wiener, Shannon, and John von Neumann profoundly impacted his interests. An earlier and passing curiosity in machine-aided communications was replaced by an unswerving faith in the revolutionary powers of computing and informatics. As the case of Fahs and Weaver suggests, this emerging orientation was not incidental or specific to the Rockefeller Foundation: From radar and cryptography to psychological warfare and linguistics, scientists from across the natural and human sciences had been mobilized in communications research during the war, an experience that profoundly shaped their postwar agendas.[86] Engineers, physicists, mathematicians, linguists, sociologists, and anthropologists who had contributed to such activities were eager to build upon those efforts

86 See, for example, Christopher Simpson, *Science of Coercion: Communication Research and Psychological Warfare, 1945-1960* (New York: Oxford University Press, 1994), chap. 1–2; Galison, "The Ontology of the Enemy"; and Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America*, chap. 6–7.

in the postwar period, and the officers at the Rockefeller Foundation were no exception to this trend.

Between 1944 and 1956 the Rockefeller Foundation and its officers played a seminal role in launching the new research in technical media. During this time they sponsored or promoted Norbert Wiener's seminal collaborations with physiologist Arturo Rosenblueth, the publication of Claude Shannon's *The Mathematical Theory of Communication*, the publication of John von Neumann and Oskar Morgenstern's *The Theory of Games and Economic Behavior*, MIT's seminal program in machine translation, John McCarthy's and Claude Shannon's conferences on artificial intelligence, and Gregory Bateson's first studies in psychiatry and cybernetics.[87] The appeal of these projects was, in a sense, varied: While the more technological focus of Wiener and Shannon seemed to offer technical and mathematical demonstrations of the rational and communicative systems underpinning biology and language, more formal and analogical efforts by von Neumann, Morgenstern, and Bateson suggested promising generalizations of these methods to the human sciences. Consistent in these multifarious projects was the promise of a

87 On Rockefeller support for Wiener and cybernetics, see Jérôme Segal, *Le Zéro Et Le Un: Histoire De La Notion Scientifique D'information Au 20e Siécle* (France: Editions Syllepse, 2003), 179; and, of course, Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine*, 21–22. Weaver's promotion of Shannon's work is discussed below. See also Weaver's two texts originally published in 1949 that launched broad interest in information theory, "The Mathematics of Communication," *Scientific American* 181 (1949): 11–15; and "Recent Contributions to the Mathematical Theory of Communication," in *The Mathematical Theory of Communication* (Urbana: University of Illinois Press, 1949), 1–28. The Rockefeller Foundation provided Morgenstern with a fellowship in the 1930s that aided his immigration to the United States. On John D. Rockefeller III's support for the publication of Morgenstern's and von Neumann's groundbreaking text on game theory, see Urs Rellstab, "New Insights into the Collaboration Between John Von Neumann and Oskar Morgenstern on the 'Theory of Games and Economic Behavior'," in *Toward a History of Game Theory*, ed. E. Roy Weintraub (USA: Duke University Press, 1992), esp. 92. On Weaver's role in launching the field of of machine translation, see W. John Hutchins, "Warren Weaver and the Launching of MT," in *Early Years in Machine Translation: Memoirs and Biographies of Pioneers*, ed. W. John Hutchins (Philadelphia: John Benjamins Publishing Company, 2000), 17–20. On Rockefeller support for the first major conference in artificial intelligence, see Ronald Kline, "Cybernetics, Automata Studies, and the Dartmouth Conference on Artificial Intelligence," *IEEE Annals on the History of Computing* 33, no. 4 (October 2011): 5–16. On Bateson's grant from the Rockefeller Foundation, see Gregory Bateson, *Steps to an Ecology of Mind* (New York: Ballantine Books, 1972), x–xi.

unified approach to nature and society in terms of communication of control. Where programs of the 1920s and 1930s operated on analogical or homological findings across the natural and human sciences, these new projects suggested a single, unified set of formulas applicable to biological, linguistic, sociological, psychiatric, anthropological, and economic phenomena. Moreover, they tended to presume that processes of feedback, homeostasis, or control were immanent to the systems under analysis, and to seek out ways to optimize the efficient and reliable performance of said systems.

At the request of Barnard, Weaver penned an introduction to Shannon's "A Mathematical Theory of Communication" that quickly became a founding document for the transdisciplinary cybernetic ambitions of the Rockefeller Foundation.[88] Initially printed in *Scientific American* as "The Mathematics of Communication" and later appearing in an expanded version as the introduction to the republication of Shannon's work in book form, Weaver's interpretation radically expanded (some would say undermined) the tenets of Shannon's information theory.[89] Early in the twentieth century, Russian mathematician Andrei Markov had, through an analysis of a poem by Pushkin, demonstrated the semi-predictable distributions of alphabetic characters in natural language, findings which proved important for his wartime attempts to conceal (and reveal) cryptographically encoded signals for the Allies.[90] After the war, Shannon expanded this

88 Regarding Barnard's request, see Everett M. Rogers, "Claude Shannon's Cryptography Research During World War II and the Mathematical Theory of Communication," 28th Proceedings of the Conference on Security Technology (Carnahan: Institute of Electrical and Electronics Engineers, 1994), 3. Shannon initially published his study in 1948 in Shannon, "A Mathematical Theory of Communication". It appeared again as a book introduced by Weaver in 1949, later republished as Claude E. Shannon, "The Mathematical Theory of Communication," The Mathematical Theory of Communication (Urbana: University of Illinois Press, 1964), 29–125.

89 See Weaver, "The Mathematics of Communication"; and Weaver, "Recent Contributions to the Mathematical Theory of Communication."

90 See A. Markoff, *Demonstration Du Second Théorème-Limite Du Calcul Des Probabilités Par La Méthode Des Moments* (St. Petersburg: The Imperial Academy of Sciences, 1913). For a critical discussion and review of this work, including its implications for media and communications research, see Philip von Hilgers and Wladimir Velminski, eds., *Berechenbare Künste: Mathematik, Poesie, Moderne* (Berlin: Diaphanes, 2007).

research to identify systematic patterns (now termed Markov processes) in diverse forms of communication such as natural language, telephone signals, vocoder transmissions, etc. Shannon demonstrated that semi-predictability could be used to devise more efficient codes for the abridgment of messages. Weaver transposed these findings beyond communication engineering. In his introduction he argued that information theory was

> so general that one does not need to say what kinds of symbols are being considered—whether written letters or words, or musical notes, or spoken words, or symphonic music, or pictures. The theory is deep enough so that the relationships it reveals indiscriminately apply to all these and to other forms of communication. This means...it is dealing with the real inner core of the communication problem—with those basic relationships which hold in general, no matter what special form the actual case may take.[91]

He also went beyond Shannon's original argument by alleging that semantics and human conduct could likely be explained in terms of information theory.[92] This opened the door to reconstructing freedom and the polis as yet another media form. According to Weaver, all human actions unfold as semi-predictable Markov processes, much like letters in a sentence or wavelengths in a telephone conversation. While he believed that individual actions remained "free," the general ensemble constantly returned to statistical norms and patterns.[93] Weaver's analysis pointed the way towards a massive assimilation of the humanities, social sciences, and nature into a technocratic framework whose orderliness reflected the design of the machine systems from which it had been abstracted.

The essays on information theory and human freedom spelled out a possible program for the refashioning of the human sciences, but it was in his writings on machine translation that Weaver explicitly pondered the political and ethical dimensions of this work. Struck by

91 Weaver, "Recent Contributions to the Mathematical Theory of Communication," 25.
92 Ibid., 24.
93 See Warren Weaver, "Statistical Freedom of the Will," *Reviews of Modern Physics* 20, no. 1 (January 1, 1948): esp. 33.

Shannon's identification of patterns in language, he believed that it would require only a small step to develop fully computer-driven translations. He reached out to Norbert Wiener for guidance, writing in a letter from March 1947 that

> [a] most serious problem, for UNESCO and for the constructive and peaceful future of the planet, is the problem of *translation*, as it unavoidably affects the communication between peoples....I have wondered if it would be unthinkable to design a computer which would translate.[94]

Despite Wiener's doubts, Weaver prepared a memorandum on the matter and circulated it among some scientists working in mathematics, computing, and related disciplines. In it he noted that "the multiplicity of language impedes cultural interchange between the peoples of the earth, and is a serious deterrent to international understanding," and suggested that "the world-wide translation problem [could be solved through]...the use of electronic computers of great capacity, flexibility, and speed."[95]

In the translation memorandum Weaver suggested a novel alternative to the myth of the tower of Babel: Perhaps the problem was not that a fall to earth had divided one man from the next, but instead had to do with the fact of the tower's successful construction. As each civilization built its tower towards the heavens, it lost sight of the common ground supporting both its own ascension and that of other cultures. The solution, therefore, involved returning to the basement:

> Think, by analogy, of individuals living in a series of tall closed towers, all erected over a common foundation. When they try to communicate with one another they shout back and forth, each from his own closed tower. It is difficult to make the sound penetrate even the nearest towers, and communication proceeds very poorly indeed. But when an individual goes down his tower, he finds himself in a great open basement, common to all the towers. Here he establishes easy and useful communication with the persons who

94 Weaver to Wiener, 4 March, 1947. Box 5, Folder 76, Wiener Papers. MIT Archives, Cambridge, Massachusetts. Also reproduced online at http://www.mt-archive.info/Weaver-1949.pdf (accessed March 2012).

95 Warren Weaver, "Translation Memorandum" (July 1949). Original in Rockefeller Archives. Reproduced online at http://www.mt-archive.info/Weaver-1949.pdf (accessed March 2012).

> have also descended from their towers. Thus may it be true that the way to translate from Chinese to Arabic, or from Russian to Portuguese, is not to attempt the direct route, shouting from tower to tower. Perhaps the way is to descend, from each language, down to the common base of human communication—the real but as yet undiscovered universal language—and then re-emerge by whatever particular route is convenient.[96]

Information theory, logic, and computing might, he suggested, lead to that great basement of Babel where all linguistic diversity was restored to a lost original unity.

Weaver's solution both revisited and reinvented the tradition of the Rockefeller Foundation, echoing themes dating back to the 1910s and 1920s. In his model, the very technologies responsible for destabilizing cultures, driving differences among peoples, and undermining the autonomy of the individual would be repurposed and refined to adjudicate difference and mechanize interaction. Displacing discussion of ideology, politics, spheres of influence, or inequity from the conceptual picture, difference was reduced to the mere failure of communication. This turned out to be a persuasive model. Technology, described by Fosdick and his peers in the Progressive Era as an agent of alienation and reconciliation, fulfilled its destiny. The Rockefeller Foundation, having in the 1930s rejected philology, multilingual dictionaries, and translations as dusty work that could never win followers in a mechanized world, now accepted these ideas in their modern incarnations, complete with mysterious vacuum tubes. So too the technologies of liberalism returned, not as steam engines or telegraphs uniting the world, but rather as a sort of superior indexing technology charged with substituting the superficial differences of individuals, traditions, and civilizations for an original and logical unity perceptible only to machines. Revolution was in the air—not the kind that overturned institutions and political regimes, but the kind that overturned politics itself.

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96 Ibid.

What became of Weaver's proposals and the Rockefeller Foundation's projects? MIT quickly launched a machine-translation program around Weaver's vision.[97] Scientists in sociology, anthropology, political science, and the emerging field of communication studies began adapting the findings of information theory, cybernetics, and game theory for the reinterpretation of social conflict as a communicative phenomenon in need of rational adjustment.[98] Reform-minded psychologists, psychoanalysts, and economists found in these adaptations a set of definitions of fundamental rules, limits, and ideal mental and societal states.[99] In the chapters that follow, I will consider two such reformers in particular: Russian linguist Roman Jakobson and French anthropologist Claude Lévi-Strauss. Rather than simply examine their embrace of the new cybernetic methods, I will take a step back and put their scientific efforts in a broader historical context. In the final chapter, I will consider critical responses to their work.

97 Machine translation became part of research at the RLE. For an early document from these efforts, see the published papers from a major conference held on the topic at MIT in 1952, in Andrew Donald Booth and William N. Locke, eds., *Machine Translation of Languages; Fourteen Essays,* (Cambridge: MIT Press, 1955).

98 See, for example, Gregory Bateson and Jurgen Ruesch, *Communication, the Social Matrix of Psychiatry* (New York: Norton, 1951); Alex Bavelas, "Communication Patterns in Task-oriented Groups," *Journal of the Acoustical Society of America* 22 (1950): 725–730; and Wilbur Schramm, "Information Theory and Mass Communication," *Journalism Quarterly* 32 (Spring 1955): 131–146. For two historiographic accounts, see Everett M. Rogers, *A History of Communication Study: A Biographical Approach* (New York, N.Y: The Free Press, 1994); and Alan A. Needell, "Project Troy and the Cold War Annexation of the Social Sciences," in *Universities and Empire: Money and Politics in the Social Sciences During the Cold War*, ed. Christopher Simpson (New York: The New Press, 1998), 3–38.

99 Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America*, chap. 6–7; N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), chap. 3; and Philip Mirowski, *Machine Dreams: Economics Becomes a Cyborg Science* (Cambridge: Cambridge University Press, 2002).

Three

Encoding Structuralism:
Roman Jakobson and the Cybernetic Apparatus

As a precocious student of philology at Moscow University in the 1910s, Roman Jakobson stumbled upon a peculiar document in the library: an essay by the Russian mathematician Andrei Markov demonstrating that the distribution of consonants in Alexander Pushkin's poem "Eugene Onegin" comprised semi-predictable series.[1] Thirty-five years later, by which time Jakobson had become one of the most noted linguists in Europe, known for his daring reinterpretation of Saussurean structural linguistics, he rediscovered these "Markov chains" in cybernetics, information theory, and aspects of game theory. Both Norbert Wiener and Claude Shannon, the putative founders of cybernetics and information theory, had adapted Markov's work to describe the semi-predictable patterns that appear in systems as diverse as artillery control, cryptography, weather patterns, and telephone transmissions. Noting this intersection of poetics and communication theory,[2] Jakobson set out to revolutionize the study of language. Writing to Charles Fahs, a linguist at the Rockefeller Foundation, he approvingly

1 See Roman Jakobson, *My Futurist Years*, ed. Bengt Jangfeldt, trans. Stephen Rudy (New York: Marsilio Publishers, 1997), 30; and A. Markoff, *Demonstration Du Second Théorème-Limite Du Calcul Des Probabilités Par La Méthode Des Moments* (St. Petersburg: The Imperial Academy of Sciences, 1913).

2 See, for example, Roman Jakobson, Gunnar Fant, and Morris Halle, *Preliminaries to Speech Analysis: The Distinctive Features and Their Correlates* (Cambridge, Mass: M.I.T. Press, 1963), 45; E. Colin Cherry, Morris Halle, and Roman Jakobson, "Toward the Logical Description of Languages in Their Phonemic Aspect," *Language* 29, no. 1 (March 1953): 36.

quoted a recent claim by mathematician Warren Weaver that "one is now, perhaps for the first time, ready for a real theory of meaning," suggesting that "an efficacious cooperation of linguistics with representatives of...mathematics, logic, communication engineering, acoustics, physiology, psychology and the social sciences...will mean a new epoch indeed…."[3]

This chapter is dedicated to documenting and analyzing that "efficacious cooperation" and its facilitation by the Rockefeller Foundation. The history of Jakobson's efforts to reform the study of language using the instruments and techniques of communication engineering fits squarely within the history of technocratic reforms and technological fantasies discussed in previous chapters. The support Jakobson received, not only from the Rockefeller Foundation but from a host of other institutions including MIT, the Research Laboratory of Electronics, and the Wenner-Gren Foundation, was based upon the enduring hope that a more liberal, rational society would be reached through improved techniques and technologies of communications. But Jakobson's story differs from that of American liberals such as Raymond Fosdick, Warren Weaver, or even Walter Lippmann. Jakobson was not incorporated into American scientific institutions until the 1940s, by which time he was in his forties and already invested in philosophical, epistemological, and political programs developed independently from the peculiar stakes of American liberalism. The previous chapter touched on the goal (and difficulties) of elaborating a "global fraternity" of scientists, absorbing displaced scholars into scientific programs in the United States, and developing new programs of research around an ideal of global communications. This chapter offers an in-depth analysis of exactly how that was done, through Jakobson's enlistment in what I term the "cybernetic apparatus."

3 Roman Jakobson to Charles Fahs, 22 February 1950. Box 6, Folder 37, RJP.

With the concept of a cybernetic apparatus I have two interrelated phenomena in mind.[4] First, from the 1940s through the early 1960s, leading scholars in the natural and human sciences celebrated the potential of recently developed media instruments and techniques to validate and modernize linguistic research. In this regard, the cybernetic apparatus refers to instruments and techniques—including mathematical procedures, diagrammatic strategies, and technologies—that acted as material aids or guides to research. Second, this term calls attention to how the politics of knowledge enabled these material instruments and techniques to morph into ostensibly immaterial ideals that furnished researchers with procedures for investigations unhindered by historical, political, or disciplinary difference.[5] This transmutation strategically allied researchers and institutions across disciplinary, political, and national borders—thereby instrumentalizing research communities—through reference to the quasi-transcendental powers of cybernetic instruments.[6]

The concept of a cybernetic apparatus also resolves two difficulties facing recent studies on cybernetics and the human sciences. First, most of these studies have focused on cybernetic or informational "discourse." As a result, a vast apparatus of scientific production—including instruments, laboratories, and institutional arrangements—has disappeared from the historical

4 I have developed this argument elsewhere, with a more detailed discussion of how English conflates the French "appareil" and "dispositif" in the term apparatus, in Bernard Dionysius Geoghegan, "From Information Theory to French Theory: Jakobson, Lévi-Strauss, and the Cybernetic Apparatus," *Critical Inquiry* 38, no. 1 (2011): 98–101.

5 On the ideological development of cybernetics as a "neutral" conceptual framework for unifying research across disciplines see Steve J. Heims, *Constructing a Social Science for Postwar America: The Cybernetics Group (1946-1953)* (Cambridge: MIT Press, 1991); Geof Bowker, "How to Be Universal: Some Cybernetic Strategies, 1943-70," *Social Studies of Science* 23 (1993): 107–127; Slava Gerovitch, *From Newspeak to Cyberspeak: A History of Soviet Cybernetics* (Cambridge: MIT Press, 2002); and Michael Hagner, "Vom Aufstieg Und Fall Der Kybernetik Als Universalwissenschaft," in *Die Transformation Des Humanen: Beiträge Zur Kulturgeschichte Der Kybernetik*, ed. Michael Hagner and Erich Hörl (Frankfurt am Main: Suhrkamp, 2008).

6 On the strategic aspects of cybernetics, particularly its covert militarism, see Peter Galison, "The Ontology of the Enemy," *Critical Inquiry* 21 (1994): 228–268; Paul N. Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge: MIT Press, 1996); Jennifer S. Light, *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America* (Baltimore: Johns Hopkins University Press, 2003), 55–91.

picture, replaced instead by hermeneutics and language.[7] In the case of Jakobson's research this disappearance proves especially unsatisfactory, as it evacuates an entire apparatus of research communities, methods, and the instruments that shaped his work at Harvard and MIT, and replaces it with a story of conceptual translation.[8] The result is an impoverished vision of science as merely a collection of ideas and language. There is also a lingering implication that scientific research is simply a conceptual projection extractable, in its essence, from the material basis of its production.[9] The positing of an apparatus calls attention to the various components—conceptual, discursive, practical, institutional, experimental—that fabricate modern sciences.

The second, related shortcoming of existing research on cybernetics and the human sciences concerns the thorny issues of influence and conceptual coherence. Historiographers have often stumbled or leaped over the gap between natural scientists' and human scientists'

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7 See John Johnston, *The Allure of Machinic Life: Cybernetics, Artificial Life, and the New AI* (Cambridge: MIT Press, 2008), 65–103; and Lydia Liu, "The Cybernetic Unconscious: Rethinking Lacan, Poe, and French Theory," *Critical Inquiry* 36, no. 2 (January 2010): 288–320. Both brilliantly explicate Lacan's commentaries on cybernetics in "The Seminar on 'The Purloined Letter'" but speculate widely on the origins of Lacan's commentaries rather than directly discussing the well-known cybernetic automata built by Claude Shannon and David Halgelbarger, which inspired Lacan's comments. This neglect of concrete instruments (appareils) is complemented by largely overlooking the concrete strategic, historical, and institutional arrangements (dispositifs) that introduced Lacan to cybernetics: that is, research programs funded by the CIA and the Rockefeller Foundation (discussed below). Such omissions of instruments and institutional arrangements are typical of a more general tendency in literary studies and philosophy to reduce technologies to figures of writing. On this tendency see, Mark B. N Hansen, *Embodying Technesis: Technology Beyond Writing*, In Literature and Science (Ann Arbor: University of Michigan Press, 2000). For a notable exception to this tendency within the historiography of cybernetics see Lily Kay, *Who Wrote the Book of Life?: A History of the Genetic Code* (Stanford: Stanford University Press, 2000), 294–325.

8 See for example Erhard Schüttpelz, "Quelle, Rauschen Und Senke Der Poesie: Roman Jakobsons Umschrift Der Shannonschen Kommunikation," in *Schnittstelle: Medien Und Kulturwissenschaften*, ed. Georg Stanitzek and Wilhelm Voßkamp (Cologne: Dumont, 2001), 187–206; and Slava Gerovitch, "Roman Jakobson Und Die Kybernetisierung Der Linguistik in Der Sowjetunion," in *Die Transformation Des Humanen: Beiträge Zur Kulturgeschichte Der Kybernetik*, ed. Erich Hörl and Michael Hagner (Frankfurt: Suhrkamp, 2008), 229–274.

9 In recent decades a number of scholars have examined in detail and depth the role of instruments, technology , experimental setups, and institutions in fabricating science. See for example Don Ihde, *Instrumental Realism: The Interface Between Philosophy of Science and Philosophy of Technology* (Bloomington: Indiana University Press, 1991); Andrew Pickering, "Cybernetics and the Mangle: Ashby, Beer and Pask," *Social Studies of Science* 32, no. 3 (2002): 413–437; and Hans-Jörg Rheinberger, *Toward a History of Epistemic Things : Synthesizing Proteins in the Test Tube*, Writing Science (Stanford: Stanford University Press, 1997). Despite efforts on the part of some media and literary theorists (for example in recent research on the "digital humanities") there has been relatively serious work of this kind on the constitution of the humanities.

respective understandings of cybernetics. More cautious scholars have inventoried insurmountable contradictions between engineers' and human scientists' contributions to cybernetics,[10] while scholars of a more synthetic mindset have run roughshod over these distinctions to argue that the dissemination of cybernetic terminology across the disciplines in the 1950s and 1960s marked the global consolidation of knowledge within a unified cybernetic or informational paradigm.[11] The problem inherent in both these approaches—i.e., the focus on discourse and the search for regularity (or lack thereof)—stems from an underlying quest for unity or identity within the language and material of cybernetics. As recent literature in media studies, the history of science, and literary studies has shown, however, it was disunity and heterogeneity—discursive, conceptual, material, artifactual, ideological—that constituted cybernetics' peculiar strength and attraction in diverse contexts.[12] What is needed, then, is a

10 See Ronan Le Roux, "Lévi-Strauss, Une Réception Paradoxale De La Cybernétique," *L'Homme*, no. 189 (2009): 165–190; and Jürgen Van de Walle, "Roman Jakobson, Cybernetics and Information Theory: A Critical Assessment," *Folia Linguistica Historica* 29, no. 1 (December 2008): 87–123. For a scrupulous and comparative account of Lévi-Strauss's structural anthropology and cybernetics, see Christopher Johnson, *Claude Lévi-Strauss: The Formative Years* (New York: Cambridge University Press, 2003), esp. 93–97. I owe a special debt of gratitude to Johnson for his helpful suggestions on my arguments here.

11 See, in particular, Jérôme Segal, *Le Zéro Et Le Un: Histoire De La Notion Scientifique D'information Au 20e Siécle* (France: Editions Syllepse, 2003); and Céline Lafontaine, *L'Empire Cybernétique: Des Machines à Penser à La Pensée Machine* (Paris: Seuil, 2004). Whereas the former celebrates the consolidation of global knowledge around the figure of information, the latter decries it as evidence of global oppression.

12 This expansive literature can only be selectively represented here. On diversities internal to cybernetics itself, see Ronald Kline, "Where Are the Cyborgs in Cybernetics?," *Social Studies of Science* 39, no. 3 (June 2009): 331 – 362, and Kline's unpublished manuscript "The Disunity of Cybernetics"; and Claus Pias, "Zeit Der Kybernetik," in *Cybernetics - Kybernetik 2: The Macy-Conferences 1946-1953*, ed. Claus Pias (Berlin: Diaphanes, 2004), 9–41; On the diverse definitions of information and shifting problematics within cybernetics, see N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), 50–83 and 131–59. Regarding the diversity of definitions of information specifically, see Ronald Kline, "What Is Information Theory a Theory Of? Boundary Work Among Scientists in the United States and Britain During the Cold War," ed. W. Boyd Rayward and Mary Ellen Bowden, The History and Heritage of Scientific and Technical Information Systems: Proceedings of the 2002 Conference, Chemical Heritage Foundation (Medford, New Jersey: Information Today, 2004), 15–28; and Mark B. N. Hansen, *New Philosophy for New Media* (Cambridge: MIT Press, 2004), 47–92. On the intersections of scientific, militaristic, and countercultural forces within cybernetics, see Fred Turner, *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism* (Chicago: University of Chicago Press, 2006); and Andrew Pickering, *The Cybernetic Brain: Sketches of Another Future* (Chicago: University of Chicago Press, 2010). On diverse origins and deployments of cybernetics, see David A. Mindell, *Between Human and Machine: Feedback, Control, and Computing Before Cybernetics* (Baltimore: Johns Hopkins

method that designates this diversity as an ensemble of differences without reducing these differences to any master term (e.g., situatedness, the literary, the corporeal, the discursive). The concept of an "apparatus" serves the purpose, as it calls attention to how a diversity of elements are articulated around a unifying action or goal (as in the term "apparatus of control" or *dispositif de contrôle* used elsewhere to refer to industrial and political arrangements).[13]

The concept of the cybernetic apparatus also marks a shift in this dissertation's focus and style of critique. Part I, "The Technologies of Liberalism," is largely synthetic in perspective, based on extrapolating the development of a general political strategy and tracing that strategy's implementation in various programs, institutions, and endeavors. Part II of this dissertation, by contrast, offers a more situated analysis of scientific communities and their articulation within scientific programs. In a very general sense, the cybernetic apparatus is one among other technologies of liberalism. Many themes familiar from earlier chapters—communication and control, scientific technique as a liberal alternative to passion and politics, antisocialist endeavors implemented through technoscientific regimes, and an attempt to transcend difference through

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University Press, 2002); Philip Mirowski, *Machine Dreams: Economics Becomes a Cyborg Science* (Cambridge: Cambridge University Press, 2002); Orit. Halpern, "Dreams for Our Perceptual Present: Temporality, Storage, and Interactivity in Cybernetics," *Configurations* 13, no. 2 (2007): 283–319; and Eden Medina, *Cybernetic Revolutionaries : Technology and Politics in Allende's Chile* (Cambridge: MIT Press, 2011). The most comprehensive portraits of cybernetic diversity can be found in two edited collections: Erich Hörl and Michael Hagner, eds., *Die Transformation Des Humanen: Beiträge Zur Kulturgeschichte Der Kybernetik* (Frankfurt: Suhrkamp, 2008); and Claus Pias, ed., *Cybernetics - Kybernetik: The Macy-Conferences 1946-1953* (Berlin: Diaphanes, 2004).

13 As I argued in the introduction to this dissertation, emphasizing this diversity also acts as a way to reconsider apocalyptic accounts of cybernetics and electronic media as a force of homogeneous and universalizing technological enframement or dehumanization. See, for example, Martin Heidegger, "The End of Philosophy and the Task of Thinking," ed. David Farrell Krell, Basic Writings (San Francisco: Harper, 1977), 427–449; the introduction to Friedrich Kittler, *Gramophone, Film, Typewriter* (Stanford: Stanford University Press, 1999); Paul Virilio, *The Information Bomb* (London ; New York: Verso, 2000); and Bernard Stiegler, *Technics and Time, 3: Cinematic Time and the Question of Malaise*, trans. Stephen Barker (Stanford: Stanford University Press, 2011); Stiegler's early defintion of the human as constituted through technical supplementation, and therefore as essentially self-differing and hybrid, suggests another method of emphasizing this diversity. See Bernard Stiegler, *Technics and Time, Vol. I: The Fault of Epimetheus*, trans. Richard Beardsworth and George Collins (Stanford: Stanford University Press, 1998).

perfected technologies of communication—reemerge here. However the cybernetic apparatus itself was largely a phenomenon of the 1950s and 1960s, with distinguishing scientific, political, and technical features. This closer analysis casts lights on specificities, exceptions, and contradictions that may not have been apparent in earlier chapters. The next chapter will continue the story by examining the work of Jakobson's student and friend Claude Lévi-Strauss in the 1940s and 1950s, and specifically in light of a number of Franco-American scientific exchanges.

Restructuring Structural Linguistics

One of the paradoxical features of structural linguistics is the irremediably unstructured character of its doctrines. The work of the structural linguists seems—much like the structuralist conception of language itself—interminably interrupted and divided against itself, as if the circumstances that animate the passion for structuralist thought militate against the realization of the endeavor. Viewed in retrospect, the collapse of these movements does not appear incidental to their development but rather inscribed within the very circumstances that gave their efforts urgency and purpose. The trouble started with Ferdinand de Saussure, the purported founder of structural linguistics. He died without producing a written and explicit account of his doctrines, leaving the task to his students. They compiled their notes of his lectures into a volume entitled *Course in General Linguistics,* which they then attributed to their late mentor. The patently incomplete, allusive, and occasionally inconsistent character of this conceptual palimpsest provided a stimulus for its proliferation among would-be structuralists across Europe, who sought to elaborate, correct, and complete the master's thoughts. Among those interpreters was Roman Jakobson, who discovered Saussure's work in the 1910s, when he was a founding

member of the Moscow Linguistic Circle. However, Russian formalism and its allies in Moscow fell afoul of Soviet policies, and Jakobson wisely decamped for Prague in the 1920s. There he obtained a PhD and cofounded the Prague Linguistic Circle, one of the major centers for structural linguistics. The rise of National Socialism and the invasion of Prague forced Jakobson into exile, first in Copenhagen, then Oslo, followed by Uppsala, Sweden.

Jakobson's eventual emigration to America traces out the peculiar institutional mechanisms by which his work, and structural linguistics as a whole, secured a measure of stability. Entering the United States, gaining employment, and ascending the academic hierarchy: each step involved an almost innumerable number of miniature adaptations, reformulations, and reorientations of his research agenda and epistemological premises. His early appeals for a fellowship from the Rockefeller Foundation were rejected due to fears that his methods and his politics might not be a match for American interests. Leo Spitzer, an eminent literary critic of Austrian extraction who taught at Johns Hopkins University, wrote to Rockefeller officials to describe Jakobson as "a really outstanding scholar" who, "being a Jew with very democratic ideas[,]...is gravely threatened." He added that "he is an exile from Bolshevist Russia and... [t]here are no ties whatever between J. and the communists."[14] This and other enthusiastic endorsements were overruled by one exceedingly harsh evaluation from Samuel Hazzard Cross, a Slavicist at Harvard University. In a letter to his friend John Marshall, the humanities officer charged with evaluating Jakobson's candidature, Cross wrote:

> I do not see why there should be all this bother about Jakobson....[T]here is certainly not an awful lot to show for all his [publishing] activity....[S]ome of us who are now training up young Americans [in Slavic Studies]...do not want their careers blocked by casual immigrés who may be learned but have no notion of our techniques of elementary and

14 Leo Spitzer to Alvin Johnson, 19 July 1940. RF, RG 2-1940, Series 200, Box 192, Folder 1369. RAC.

> introductory instruction....I am doubtful of the advisability of subsidizing foreign scholars of medium capacity or [illegible] on the basis of promise.[15]

Marshall decided against offering Jakobson support. Jakobson, however, was nothing if not resourceful. Perhaps with the aid of his brother Sergius, who had immigrated to the United States the year before, Jakobson secured money and the legal permission to come to America.

Despite the initial rebuff by the Rockefeller Foundation, Jakobson was appointed to the faculty of the Ecole Libre des Hautes Etudes in 1941, and in 1943 he received a second appointment in the Slavic Studies department of Columbia University. In a sense, both appointments were political. At Columbia, Jakobson became part of a push to cultivate a program in Slavic Studies suited to serving the strategic needs of the United States in the postwar period.[16] As I elaborate in greater detail in the next chapter, the Ecole Libre, a Francophone university in exile, hosted by the New School for Social Research and funded by the Rockefeller Foundation, acted as a strategic crucible for concentrating and directing scholars displaced during the war. Its faculty and students provided wartime counsel and service for the Rockefeller Foundation, the U.S. State Department, General de Gaulle's government in exile, and other anti-Axis agencies.

Jakobson's courses on structural linguistics became a central attraction for junior and senior scholars. He gave the first in-depth lectures in the United States on structural linguistics as developed by Saussure and elaborated by the Prague School of Linguistics.[17] That approach,

15 Samuel Hazzard Cross to John Marshall, 16 Sept 1940, RF, RG 2-1940, Series 200, Box 192, Folder 1369. RAC.

16 I have elaborate on the strategic dimensions of Slavic Studies in an article forthcoming in 2013 from the *Russian Journal of Communications*. For more on the Rockefeller Foundation's programs in Slavic Studies, see "A conference on Slavic Studies," Confidential Report to the Trustees, April 1943, p. 13. RAC; *The Rockefeller Foundation: Annual Report 1945* (New York: The Rockefeller Foundation, 1946), 13–14; and report by Ernest J. Simmons sent to David H. Stevens on 10 October 1949. Located in Collection Rockefeller Foundation, Record Group 1.1 Series 200R, Box 319, Folder 2945 ("Columbia University – Slavic Studies (general support)"). RAC.

17 Some of these lectures were later published as Roman Jakobson, *Six Lectures on Sound and Meaning* (Cambridge: MIT Press, 1978) The preface by Claude Lévi-Strauss provides an account of the atmosphere of the

based on *Course in General Linguistics*, defined language as a "tool of communication" and proposed a functionalist interpretation of language. In order to overcome Saussure's placement of synchronic and diachronic speech in opposition to each other, Jakobson and his Prague colleague Nicholai Troubetzkoy developed a definition of phonemes—fundamental units of sound—as organized into binary, opposing relations, or "distinctive features", such as vocalic, consonantal, nasal, strident, and stressed. Diachronic changes over time could, in this analysis, be explained as adaptations serving synchronic homeostasis. While the material of language might change, the formal and structural relations in the whole system remained constant. According to Jakobson, to offer a structural explanation of language demanded an account of how elementary patterns of oppositions among phonemes organized a system of language and shaped the genesis of meaning.

Among Jakobson's regular auditors were the French anthropologist Claude Lévi-Strauss, the Hungarian linguist Thomas Sebeok, and American structural linguist Charles Hockett. With his Ecole Libre colleagues Jakobson cofounded the Linguistic Circle of New York and the journal *Word* to promote a new synthesis of European and American linguistics. The contours of this community hint at the emerging geopolitical contours for structural research. Two members of *Word*'s editorial committee held appointments at the U.S. War Department and Lévi-Strauss was a consultant for Voice of America and the U.S. State Department (see next chapter). After the war Sebeok and Hockett also consulted for the State Department. Their contributions were part of a broader mobilization of linguistics and intellectual refugees into wartime service, a mobilization that reshaped the contours of global science. In his introduction to the first issue of *Word*, the editor explained that

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lectures.

> [i]n the New York of today, the intimate co-operation between American and European linguists of different schools had found its most striking expression—a definite trend toward joint and harmonious labors on urgent problems which imperatively demand co-ordinated collective efforts....In present-day linguistic thought there should be no room for either European or American isolationism that merely betrays in its protagonists a circumscribed scientific horizon and a harmful complacency.[18]

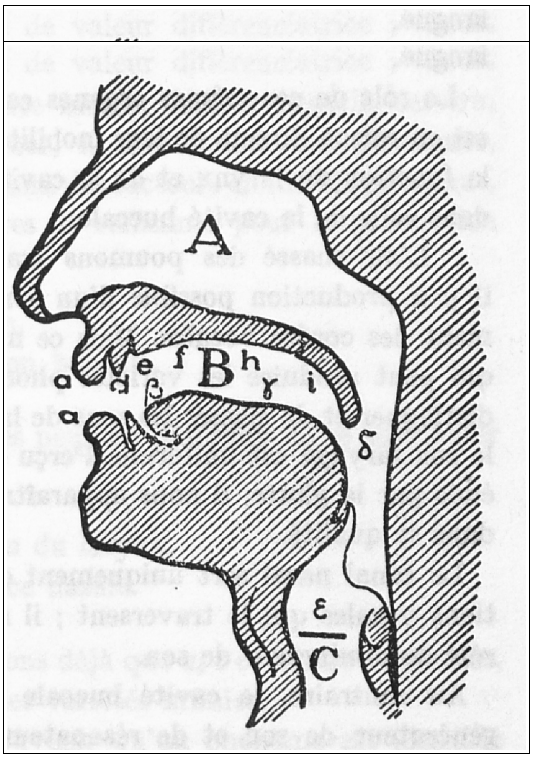
These comments made an intellectual virtue of the circumstances of war. Members of the community that crisis and strategy united in New York recognized the makings of a new transnational scientific community that would overturn many of the oppositions and isolations between the United States and Europe. They did not yet realize that the alliance would be between the United States and Western Europe, rather than Europe as a whole. Cambridge, New York, Paris, and Frankfurt, among a handful of other cities, would act as the chief intellectual relays. Prague, Budapest, Vienna—to a certain extent the entire Central and Eastern European milieu that defined the Prague Circle—would retreat from prominence. Research was gradually reorienting around the polarizing alliances gathered under the Pax Americana and the Soviet Union. The promising efforts of Jakobson and his colleagues in New York would soon fall in line with this emerging order.

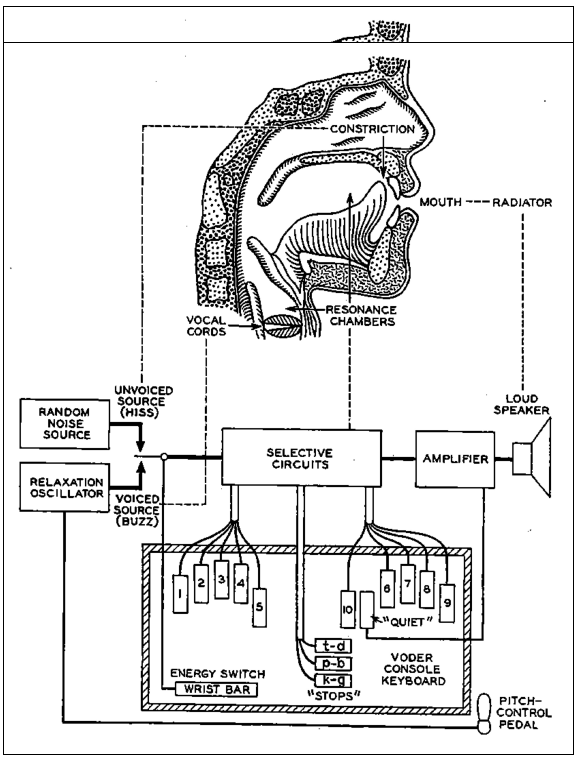
Instrumental Knowledge

Jakobson's stay in New York enabled him to elaborate a fully technicist approach to language concretized and corroborated by the instruments of communications engineering. This amounted to both an extension and revision of structural linguistics, as it had developed in Europe. Already in the *Course in General Linguistics* (1916) Saussure had characterized the organs for the production of speech as a "vocal apparatus [*appareil*]" [figure 1] and promoted the

18 Henri F. Muller, "Word," *Word* 1, no. 1 (April 1945): 3.

use of film to develop a scientific technique to study the articulations of sounds.[19] However, Saussure balanced these instrumental overtures with a sharp delineation between the apparatus for the production or study of speech and the material of speech itself. As Saussure put it in one lecture, the "vocal organs are as external to language [*la langue*] as the electrical apparatus which is used to tap out Morse code is external to that code."[20]





Figures 1 and 2
Figure 1: the Vocal Apparatus according to Saussure
Source: *Cours de Linguistique Générale*, 1916

Figure 2: The Vocal Apparatus in comparison to the VODER
Source: AT&T pamphlet (RJP)

19 Ferdinand de Saussure, *Course in General Linguistics*, ed. Charles Bally and Albert Sechehaye, trans. Roy Harris (Chicago: Open Court, 1986), 42.

20 Trans. mod. Ibid., 18. Robert Brain has shown that in fact, Saussure's program owed quite a debt to new technical media. See Robert Brain, "Standards and Semiotics," in *Inscribing Science: Scientific Texts and the Materiality of Communication*, ed. Timothy Lenoir (Stanford: Stanford University Press, 1998), 249–284.

Jakobson, by contrast, elevated modern media technologies to an epistemological precondition of structural linguistics. In his celebrated course *Six Lectures on Sound and Meaning*, he declared that new research related to "telephony, radio, and the sound film . . . and the new precision apparatuses [appareils] this research has engendered" had trained researchers to recognize speech itself as an object of investigation.[21] By creating durable inscriptions of ephemeral sound, these instruments presented speech as a physical object appropriate for study in its own right. Jakobson supplemented these in-class pronouncements with extracurricular field trips: in 1944, members of the Linguistic Circle visited the AT&T auditorium in Manhattan for an exhibition of the VODER (Voice Operation DemonstratoR) by Bell Labs engineers. The VODER synthesized speech by breaking it down to a series of sounds [figure 2] that could be assembled into sentences via a phonetic keyboard [figures 3-4**]**. Reflecting the technological design of the instruments as well as the Labs' concerns with transmitting speech as packets of telephonic sound, these devices represented speech as discrete units distributed in time. Another Bell Labs engineer later came to the École Libre to demonstrate Bell Labs' "visible speech" studies, which mapped out speech according to frequencies.[22]

The most impressive aspect of the VODER and the Visible Speech Studies was their ability to translate research across technical, scientific, and economic frontiers. By conflating the economic dictates of AT&T with scientific techniques of linguistics, phonology, and psychoacoustics, the VODER furnished scientists with a new kind of human voice: scientific and efficient as well as calculable and orderly. Designers of the device explained it this way:

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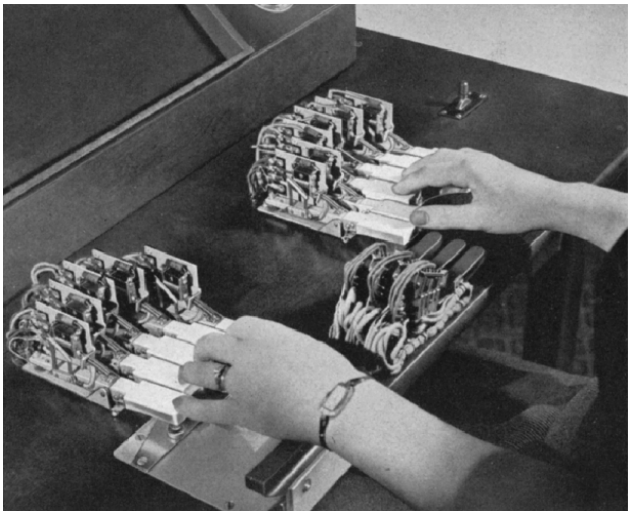
21 Roman Jakobson, *Six Leçons Sur Le Son Et Le Sens* (Paris: Éditions de Minuit, 1976). My translation.

22 See invitation cards and announcements for events held in 1944 and 1946 in Jakobson's file on the Linguistic Circle of New York, box 6, folder 74, RJP. On the Visible Speech research, see Mara Mills, "Deaf Jam: From Inscription to Reproduction to Information," *Social Text* 28, no. 102 (Spring 2010): 35–58.

> The immediate background of this synthetic speaker is the large amount of fundamental work on the physical nature of speech which has been required for the most efficient application of Bell's invention, the telephone. After one believes he has a good understanding of the physical nature of speech, there comes the acid test of whether he understands the construction of speech well enough to fashion it from suitably chosen elements.[23]

Through the separation of elementary and sequential sounds into a sequence—what Jakobson and his colleagues termed phonemes—the VODER purported elemental laws governing the



Figures 3 and 4: Images of the VODER keyboard during a January 1939 exhibition at the Franklin Institute in Philadelphia. Source: "A Synthetic Speaker," 1939

distribution of sound and modern communications networks. Though cloaked in the most modern machinery—the presenter, Dr. Perrine, was very much at the cutting edge of research and had even joined Alan Turning and Claude Shannon in designing the Allies' cryptographic communications systems—his machine self-consciously harkened back to the earlier and less-

23 Homer Dudley, R.R. Riesz, and S.S.A. Watkins, "A Synthetic Speaker," *Journal of the Franklin Institute* 227, no. 6 (June 1939): 740.

perfected machines built by Alexander Graham Bell and Wolfgang von Kempelen before him. What began as a device for efficient transmission became an emblem of nature's own economical procedures.[24]

Lévi-Strauss may have been the first to recognize the power of these instruments not only to provide durable and empirical inscriptions of sound but also to create formal models and objects for organizing research communities into a strategic apparatus. He later wrote:

> in the realization of apparatuses [appareils] to synthesize speech, such as the famous Voder (the predecessor of a line of more perfect apparatuses [dispositifs]), as well as in the theoretical form [mise-en-forme, literally "put-in-form"] of intellectual methods that regulate the work of communication theorists (first presented systematically by the engineer and mathematician Claude Shannon), one recognizes some of the great interpretive theories reached by linguistics. These include the recognition that communication between men rests upon the combination of ordered elements, that in each language the possibilities of combination are regulated by an ensemble of compatible and incompatible combinations, and finally, that the freedom of discourse, such as it is defined within the limits of its own rules, is restrained in time to certain probabilities.[25]

While he claimed to *recognize* the findings of structural linguistics within the instruments and theories of Bell Labs engineers, a conceptual movement in the other direction manifested itself: Lévi-Strauss and his colleagues came to argue that the durable instruments, inscriptions, and theoretical forms of telephone engineers revealed the essential nature of language. As these instruments and theories had regulated the work of engineers, they now transformed language itself into a technologically-ordered series around which a new apparatus of human scientists could be convened.

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24 For more on this transition, see Mara Mills, "Medien Und Prothesen: Über Den Künstlichen Kehlkopf Und Den Vocoder," in *Klangmaschinen Zwischen Experiment Und Medientechnik*, trans. Daniel Gethmann (Bielefeld: Transcript, 2010), 129–154.

25 Claude Lévi-Strauss, "Les Mathématiques De L'homme," *Bulletin International Des Sciences Sociales* 6, no. 4 (1954): 644 My translation.

Jakobson's interest was countered by a skepticism that recalled Saussure's warnings, against confusion the conventions of inscription with language itself. He gave voice to these concerns during a meeting with E. F. D'Arms of the Rockefeller Foundation in June 1948, when he expressed interest in the work at Bell Labs as well as his continuing doubt about their understanding of language. In notes from the meeting, D'Arms reported that

> Jakobson is pleased at the prospect of developing special work in linguistics in combination with the Bell Laboratories. This matter is still confidential and negotiations are proceeding. In any case, there is no possibility of action before 1949-1950, but J[akobson] sees in this combination great possibilities for the combination of theoretical and practical work. The equipment developed by the Bell Laboratories during the war is unique and makes possible greater linguistic and phonetic description and classification than is possible anywhere else in the world. Unfortunately, the Bell laboratories [sic] are not sure what language is, according to J[akobson], and need the advice and assistance of expert linguists.[26]

That same year, the annual meeting of the Macy Conferences on Cybernetics devoted its attention to the subject of language. Although no records of the meeting were kept, in contrast to many other guests Jakobson was not invited back, suggesting another failure to see eye to eye with the engineers. What happened between then and the 1950s, that caused him to fully embrace cybernetics?

Communications and the Postwar World

After World War II, the Rockefeller Foundation suspended its support for communications research dedicated to mass media and mechanical reproduction in favor of that modeled on cybernetics and communication engineering. Funding for textual, historical, and critical inquiries, such as those developed by Adorno and Kracauer, was halted in favor of

26 E. F. D'Arms Diary, 21 June 1948. Located in Collection Rockefeller Foundation, Record Group 1.2, Series 200R, Box 319, Folder 2945 (“Columbia University – Slavic Studies (general support) 1947-1950). RAC.

functionalist and computational research. This fit within the broader shift in agendas detailed in last chapter, whereby Barnard, Weaver, and Fahs (a linguist by training) reorientated the research towards technical media. Against the backdrop of these changes, officers at the Rockefeller Foundation identified linguistics as a field not only ripe for reform but also of emerging geopolitical interest. As a preliminary step, administrators commissioned a number of surveys and conferences to assess the current state of linguistics. At a meeting held on June 18, 1948, the executive committee approved $25,000 to support "surveys, studies and conferences" devoted to re-evaluating the humanities.[27] Charles Fahs, himself a specialist in Southeast Asian languages, helped direct these efforts. Surveys were initiated with one eye toward rebuilding programs in Europe and the other toward reorienting research in light of the Soviet presence across Central and Eastern Europe. Indeed, a general consensus was emerging among leading policymakers and scholars that science (broadly conceived to include the humanities and social sciences), so successfully militarized during World War II, would be both an instrument against the Soviets and a sign of American superiority. Officers intended these surveys to gauge the progress in postwar science, take stock of neglected changes that took place in Europe during the war, promote renewed dialogue with European scholars, and identify opportunities for strategic initiatives that would contribute to anti-Soviet activities. They called on some of the former beneficiaries of the Rockefeller Foundation's refugee fellowship—those who had been carefully vetted and cultivated during the war to assist with these postwar efforts through the contribution of findings from current research, and guidance in how the Foundation could contribute to science and research in a postwar world.

27 See notes in "Surveys, Studies, and Conferences," 5 October 1948. Located in Collection Rockefeller Foundation, Record Group 1.2, Series 200R, Box 370, Folder 3323, RRAC.

In August 1948, Charles Fahs of the Rockefeller Foundation officially invited Jakobson to offer a report "outlining [his] idea as to what may prove to be the most fruitful lines of development of linguistics research during the next decade or two."[28] Fahs further requested that Jakobson provide an overview of linguistics research in Europe.[29] Jakobson enthusiastically agreed to take on the assignment and to travel Europe to gather findings, which thus presented him the opportunity not merely to cultivate specialized reports on Slavic grammar and mythology but also to take part in shaping the postwar internationalist agendas of the Rockefeller Foundation. Sensitive to the emerging geopolitical arrangements and the special role science would play as an ambassador for American interests, Jakobson assured Fahs that his trip to Europe would be "a very important [opportunity] for informing the international scholarly world about the intensive American scientific activity."[30]

Communism and Communications

The Rockefeller Foundation's turn towards communication and anticommunism, and the attendant invitation for Jakobson to report on linguistics coincided with the latter's re-evaluation of his circumstances at Columbia University. According to one source, "[a]s one Eastern European government after another became Communist after 1948, the political ties and loyalties of emigres in the United States were questioned. The controversies that enveloped Columbia led to [Jakobson's] resignation in 1949."[31] Jakobson had the great fortune of receiving an offer to replace Samuel Hazzard Cross at Harvard University, but this opportunity, too, came with a

28 Charles Fahs to Roman Jakobson, 23 August 1948. Located in Collection Rockefeller Foundation, Record Group 1.2 Series 200R, Box 370, Folder 3323, RAC.
29 RJ to Charles Fahs, 30 August 1948, Box 6, Folder 37, Jakobson Papers, MIT Archives.
30 Jakobson, letter to Fahs, 9 Oct. 1948, box 6, folder 37, RJP.
31 *RJP Finding Aid*, 20. MIT Archives.

penetrating inquiry into Jakobson's political agenda. The scope of that examination was not made public until three years later when Jakobson, like many other leading scholars in Slavic Studies, was subpoenaed by the red hunting House Committee of Un-American Activities. Jakobson arrived with a letter from an administrator at Harvard's Russian Research Center, which verified that

> [B]efore inviting Professor Jakobson to join its faculty, Harvard University had made many inquiries as to his loyalty to this country and its government-a procedure that is always followed in cases where the appointment of a man who is not an American citizen is involved. Professor Jakobson's election to the chair at Harvard took place only after the university administration was fully satisfied that there was nothing in Professor Jakobson's record that would permit any doubts as to his loyalty.[32]

On a more personal note, the administrator added that he knew Jakobson to be nothing other than "a determined opponent of Communism or any other totalitarian ideology."[33]

As Jakobson began his report in September, 1948, he still worked at Columbia under the shadow of suspicions about his loyalties. The subsequent spring, he resigned his post there. In August of 1949, the final report "Notes On General Linguistics: Its Present State and Crucial Problems" reached the Rockefeller Foundation with a cover letter written on Harvard letterhead. Whereas appraisals by other Rockefeller consultants offered a modest (nearly timid) summary or suggestion for current and emerging concerns in linguistics, Jakobson's brilliant report offered an account of structural linguistics as an event within the world-historical progress of science. At the center of this drama were the machinations of a movement inspired by science but perpetually displaced and threatened by politics. In Jakobson's account, the proponents of structural linguistics, from Moscow to Copenhagen, exemplified the same scientific spirit that

32 Jordan E. Kurland, "Review: Keeping Tabs on Our Slavic Scholars: McCarthyism Endured," *Slavic Review* 52, no. 1 (April 1993): 120.

33 Ibid.

gave rise to the theory of relativity and recent advances in atomic physics.[34] Political crisis and intrigue punctuated this story of scientific striving, as the liberal abodes of scientific reason fell under the sway of communist and fascist rule:

> If in the early 'twenties in most fields of Russian scholarly life were characterized by a certain degree of liberty of scientific opinion and only the political credos of the scholars were censured, the late 'twenties were a period of violent discussions about which trends in any given science were closest to Marxist ideology. Every discussion had to finish with a victory of a single trend, recognized as impeccably Marxist, and with the condemnation of all other dissenions [sic], accompanied either by repressions of their adherents or by repentance and change of scholarly bias.[35]

Against the provincialism and isolation of the USSR, Jakobson presented the diversity and promise of American liberalism:

> [A]s far as America is concerned, the prospects for the progress of the science of language on the whole, and of general linguistics in particular, are well founded. The necessary, typically American, prerequisite for this progress is the multiformity of linguistic preoccupations and currents in this country. The episodic attempts to monopolize linguistic activities in the United States by one bias have proven to be entirely futile.[36]

In an unveiled jab at Soviet science, he added that any attempts to reject one or another method of research "as un-American activities are condemned to failure."[37] (33) The United States, in cooperation with its European friends, was to become the center of a dynamic and "multiform" scientific approach that mirrored the liberal tendencies Jakobson attributed to the culture itself.

Yet questions remained as to how this multiform difference could be coordinated. If one strength of American culture and science was its openness to diversity, another was its penchant for assimilation. Taking a page from Francis Bacon and the traditions of experimental science,

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34 Roman Jakobson, "Notes on General Linguistics: Its Present State and Crucial Problems," *Collection RF, RG 1.2, Series 200R, Box 370, Folder 3323* (July 1949): 45–6. RAC.
35 Ibid., 10–11.
36 Ibid., 33.
37 Ibid.

Jakobson focused on the role of instruments in ordering scientific practice and progress. Central to "progress in the exact sciences," Jakobson claimed,

> was the painstaking control of the tools of investigation and the most precise verification of the degree of inaccuracy due to the imperfection and peculiarities of the instruments. The comprehension of the dependence of our knowledge upon our instruments and our frame of reference was the basic premise for the progress of the modern sciences in overcoming the complacent egocentricism of the past.[38]

In this account, the rise of scientific instrumentation coincided with a Copernican revolution that displaced knowledge from the human subject into an apparatus of observations, experiments and perfected tools that exceeded ordinary human perception. In a movement as original for structural linguistics as it was typical of postwar American science, Jakobson had erased the metaphorical distinctions between "language as a tool of communication" and the tools themselves, thereby securing a place for linguistic theory alongside research in cybernetics and information theory. He added to his previous comments,

> But if language is the fundamental tool of our entire thinking, the systematic, minute, methodologically impeccable control of this tool becomes the central task of all our knowledge.[39]

Accordingly, the mastery of language as a "tool of communication" coincided with the drive of the natural and experimental sciences to develop an instrumental mastery over nature and the self.[40]

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38 Ibid., 36–37. Underlining in original.

39 Ibid., 36–7.

40 Considered from a broader history of experimental science, and in light of the aforementioned reference to Bacon, it may be observed that while Jakobson's claim echoed an English and Scottish experimental tradition that conjoined the mastery of instruments with the mastery of language. But practitioners of that tradition often identified the reliability of the experimental apparatus with the cultivation of a plainspoken language that enabled the scientist to witness and express results to peers. The de-subjectifying scientific apparatus aligned with a style of language that authorized the scientist to bear witness. But Jakobson's structural linguistics actually pushed in a very different direction, insofar as it displaced expression away from the individual witness and unto the system of language itself.

Jakobson suggested a future program of research in support of "[i]nterdepartmental inquiry into sound and meaning in their interrelations and the structural classification of language," arguing that

> there is is still insufficient information about the sound essence of phonemes and underlying distinctive features. This situation is paradoxical indeed in view of the amazing progress of acoustics, particularly of the revealing results of the Bell Telephone Laboratories' research, and in view of the growing X-Ray and sound film techniques enabling us to penetrate still deeper into the make-up of speech sounds, but the almost complete lack of coöperation between technicians and linguists has prevented acoustics from raising questions and tackling experiments vital for the science of language and from obtaining answers, adequate for linguistic purposes and impeccable from the point of view of linguistic methodology....[S]tartling results could be swiftly achieved if the sound patterns of various languages were systematically subjected to acoustic analysis jointly guided by linguists, researchers in physical acoustics, and experts in problems of sound perception.[41]

The appeal to a collaboration recalls Jakobson's habit, dating back to the 1910s, of assimilating structural linguistics to and aligning it with emerging techniques of research from across the natural and human sciences. But with the newfound emphasis on communications engineering and an anti-Soviet American empire, the scope of structural analysis itself made an unexpected shift toward the universal. Jakobson predicted that this change

> could speedily lead to the most exact answer concerning the sound properties of all phonemic features functioning in the languages of the world and finally to a precise phonemic typology of languages. An essential complementary work would be a phonemic atlas, revealing the world distribution of isophones.[42]

Recalling a pattern that seemed to accompany the introduction of technical media into social, cultural, and political thought from the nineteenth century, Jakobson identified the arrival of technology with the possibility of universality itself. Much as nineteenth century railroads and telegraphs were charged with uniting the United States and binding the French empire, new

41 Jakobson, "Notes on General Linguistics: Its Present State and Crucial Problems," 57–8.
42 Ibid., 57–58.

technical media would leap across the frontiers of discipline, language, and nation. Phonemes themselves could be mapped into an “atlas” spanning the world's languages.

The Cybernetic Apparatus

In the world of scientific funding, few species flourish like the extravagant and unrealized grant proposal. Jakobson's was the uncommon proposal that, for all its extravagance, realized something resembling what it promised: It created a new style of laboratory collaboration that brought together engineers, linguists, and instructors around a laboratory that took Saussurean structural linguistics and submitted it to the demands and rigor of technological instrumentation.

Jakobson's arrival in Cambridge, Massachusetts, brought him to the heart of the postwar complex of academic research in cybernetics, communications engineering, and operations research. MIT's Research Laboratory of Electronics and Harvard's Psychoacoustics Laboratory were among the leading centers of cybernetic inquiry in the United States and home to eminent participants in the Macy conferences, including Norbert Wiener (MIT) and Clyde Kluckhohn (Harvard). Fahs organized a meeting on December 22, 1949, so Jakobson could meet with officers of the natural, human, and social sciences. Despite his work's warm reception, both ambivalence and doubt arose concerning his proposals more broadly. In mid-December, Warren Weaver, who had been invited to attend because of his interests in communications theory and mechanical translation, mailed Jakobson a copy of *The Mathematical Theory of Communication*, a book that included Shannon's basic work on information theory along with Weaver's proposals for its application to the human and social sciences.

The book and the conferences had an immediate impact on Jakobson. In a subsequent letter, he wrote to Weaver, "[A]s I continue to work on the problems of sound and meaning I realize still more the decisive influence of your and Shannon's book."[43] At his request, Weaver mailed copies of *The Mathematical Theory of Communication* to Lévi-Strauss and Franco-Russian philosopher of science Alexandre Koyré, with whom Jakobson had already discussed the text.[44] In a December 19th letter to Fahs, his main contact at the Rockefeller Foundation, Jakobson explained that his participation in the conferences had led to a "much more mature" analysis of the problem than that found in his previous proposal. Jakobson introduced a new focus on cybernetic instrumentation and conceptual categories associated with information theory (information, redundancy, encoding, decoding), which he placed at the fore of his analysis. As Jakobson explained it,

> The essence of the problem is the consistent study of the information contained in signs of various levels and patterns...For instance, when analyzing the usual language, both students in linguistics and symbolic logic as well as communication engineers tackle at the present times the same questions of 1) the basic variants within the variables, 2) the information core, and redundancy.[45]

Jakobson promised that the results of his study, if implemented, would contribute to linguistics, symbolic logic, and the general theory of communication. "[T]he basic thing," he wrote, "is the necessity of a common effort to uncover the essence of communication and the possibility of solving this problem by using the refined devices which different branches of science offer at the present time."[46]

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43 Roman Jakobson to Warren Weaver, 14 February 1950. Box 6, Folder 37, RJP, MIT Archives, Cambridge, Massachusetts.

44 Warren Weaver to Roman Jakobson, 24 February 1950. Box 6, Folder 37, RJP, MIT Archives, Cambridge, Massachusetts. See also the correspondence between Jakobson and Weaver at the Rockefeller Foundation archives.

45 Roman Jakobson to Charles Fahs. 19 December, 1949. Collection Rockefeller Foundation, Record Group 1.2, Series 200R, Box 370, Folder 3323, RAC.

46 Roman Jakobson to Charles Fahs, 19 December 1949. Box 6, Folder 37, RJP. See also the correspondence

A few days later at the group meeting attended by Jakobson, Lotz, Harvard philosopher William Quine, Weaver, Fahs, Marshall, and other officers, Jakobson unflinchingly proclaimed that his new approach came about through his encounters with the Unity of Science Movement and Weaver's "Recent Contributions to the Theory of Communication." According to notes from the meeting, Jakobson "agrees with W[arren] W[eaver] that communication theory has wide generality and requires the concerted investigation of many different sciences. He considers the contribution of linguistics to lie in the study of language as a means for conveying meaning or information."[47] In a subsequent letter to Fahs, Jakobson elaborated:

> I fully agree with W. Weaver that "one is now, perhaps for the first time, ready for a real theory of meaning," and of communication in general. The elaboration of this theory asks for an efficacious cooperation of linguistics with representatives of several other fields such as mathematics, logic, communication engineering, acoustics, physiology, psychology and the social sciences. Of course when this great collective work will be fulfilled it will mean a new epoch indeed….[48]

Jakobson named Wiener, MIT's Research Laboratory of Electronics, and Harvard's Psycho-Acoustic Laboratory as collaborators on a new project to employ Shannon's statistical approach for analyzing the distribution and frequency of phonemes in Russian.

Whereas earlier proposals often suggested a variety of subjects for actual study—from poetics to mythology to the world atlas of phoneme—Jakobson refocused his entire project on an informational analysis of the Russian language. This focus transformed Jakobson's proposal from what one might otherwise term a nascent actor-network enrolling various actors, into a common program, what Foucault termed a *dispositif*, an ensemble of relations strategically ordered to address an urgent problem. In this case, the Soviet threat provided that organizing problem.

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between Jakobson and Weaver at the Rockefeller Foundation archives.

47 C. Gilpatric Diary. 22 December 1949, located in Collection Rockefeller Foundation, Record Group 1.2, Series 200R, Box 370, Folder 3323. RAC. Underlining in the original.

48 Roman Jakobson to Charles Fahs, 22 February 1950. Box 6, Folder 37, RJP.

Jakobson promised that in addition to furnishing a new understanding of Russian for students and diplomats, this study would offer a rebuke of communist ideology on the international stage of science. He contended,

> An exhaustive description and analysis of present-day standard Russian, using all the achievements of the Modern American and West European science of language and neighboring disciplines, would show to the international cultural world an achievement which Soviet Russian scholarship, terrorized by doctrinary purges and paralyzed by a narrow-minded unproductive official bias, is unable to accomplish. We consider this a dignified answer to the empty national self-congratulations of Moscow official sciences and to its furious attacks against the alleged impotent scholarship of the present-day West.[49]

By leveraging American and European scientific communities around emerging methods and instruments in cybernetics, Jakobson promised to meet a multitude of Rockefeller Foundation objectives including the cultivation of a world-wide fraternity of scientists, the reform of the human sciences through media research and instruments, and the public defeat of anti-capitalist ideological threats.

The Rockefeller Foundation responded affirmatively to Jakobson's mixture of scientific universalism and partisan politics. In 1950, he received a $50,000 five-year grant under a new foundation humanities program in "Language, Logic, and Symbolism." In a report to the Foundation's trustees, President Barnard maintained that "such an analysis may facilitate the application to living languages of the mathematical theory of communication worked out by Mr. Claude E. Shannon and Mr. Warren Weaver."[50] Jakobson's project was part of a renewed Foundation effort to promote scientific practices of experimentation, observation and objectivity as well as the use of theory in analysis. These practices themselves were embraced as the

49 Roman Jakobson to Charles Fahs, 22 February 1950. Box 6, Folder 37, RJP.

50 Chester Barnard, *The Rockefeller Foundation: A Review for 1950 and 1951* (New York: The Rockefeller Foundation, 1951), 74. RAC.

repositioning of scientific research against Soviet influence. Accordingly, Barnard further explained that given the world's present circumstances, "the ivory tower attitude [of detached and theoretical inquiry] would be as unreasonable as the iron curtain attitude."[51]

The Noisy Laboratory

Jakobson's grant inaugurated the convention and assembly of mechanisms for articulating a strategic convergence between what might be called second-wave structuralism (post-Prague, Saussurean, Francophone leaning, and non-Bloomfieldian), the emergent cybernetic movement, and anti-Soviet political agendas. These elements were not entirely foreign to one another, though: Jakobson's flight from Moscow on the heels of the Russian revolution, his early interest in research at Bell Labs, and a passing acquaintance with Norbert Wiener served as a prologue. However, the grant from the Rockefeller Foundation organized and intensified involvements that, until then, had been left to chance. Once Jakobson put his research apparatus in place, the hallmarks of Rockefeller programs—technocratic and instrumental inquiry, transnational and transdisciplinary collaboration, anti-Soviet dispositions in the guise of rational inquiries—all developed without the active intervention of the Rockefeller Foundation officers and took root within an axis of Harvard-MIT-European collaboration. The models and objects of knowledge resulting from these partnerships encoded, rationalized, reproduced, and expanded the terrain for collaborations between linguists and engineers, which in turn generated further models, objects, and joint projects for scientific research. Whereas US-based efforts will remain the focus of this chapter, the next one will investigate specifically European undertakings.

51 Ibid., 12.

With the the Rockefeller Foundation's grant money in hand, Jakobson initiated contact with researchers at MIT's Research Laboratory of Electronics (RLE) and Harvard's Psychoacoustics Laboratory, assembling a multilingual and multidisciplinary team that spanned the two institutions. Among them was Morris Halle, a linguist born in Latvia who had started his graduate work at Columbia University before following Jakobson to Harvard.[52] While preparing his dissertation and working with Jakobson on the Rockefeller-funded project in 1951, Halle accepted an appointment as assistant professor of linguistics at MIT. The work and working conditions of Halle during this time provide a glimpse into the milieus conditioning and conditioned by emerging linguistic and communications research. Halle was assigned a "bench" in a laboratory at MIT's famed Building 20, constructed to house the wartime Radiation Laboratories that invented aircraft radar. After World War II, Building 20 became a ramshackle structure for the incubation of experimental efforts at the intersection of engineering, physics, and the communication sciences broadly conceived.

Halle singled out this experimental milieu and its laboratory setting as a key factor in his work. As he explained it, he shared his laboratory bench with a

> graduate student in electrical engineering who was also immersed in speech. The student had set up some equipment to measure various acoustic properties of speech, I did nor know the first thing about this equipment, nor did I have much of an understanding of the acoustics of speech. But my laboratory mate and others in Building 20 turned out to be excellent teachers from whom I was able to learn a great deal, especially since somebody always seemed to be available to answer questions or carry on discussions.[53]

Here, research proceeded through experimentation, dialogue, and comparison across disciplinary specialities, with instrumentation and collaboration superseding deduction, specialization, and

52 Morris Halle, "[Untitled]," in *A Tribute to Roman Jakobson, 1896-1982* (Berlin: Mouton, 1983), 74.
53 Morris Halle, "Rooms to Grow In," *Preservation* 51, no. 5 (October 1999): 52.

dialogue with the ancients. Halle credited this enterprise with the reformation of linguistics and the foundation of a new research method. According to him,

> Linguistics has been part of the humanities or liberal arts since the Middle Ages, when grammar, rhetorica, and logic formed the trivium, the set of studies required of all who would obtain the bachelor's degree. Study in the humanities has traditionally involved much reading and thinking and relatively little doing. A library reading room is typically where students do much of their work, and conversation there is discouraged, if not altogether prohibited....This approach is very different from the way advanced is conducted in the sciences and engineering. In these fields the main site of activity is the often noisy laboratory [populated by students, faculty and visitors].... In such a setting learning frequently results from interactions with others. Characteristically, new students in a laboratory are taught much of what they need to know by their colleagues and the teaching is largely informal.[54]

The graduate student sharing his bench sought to build—under the direction of Norbert Wiener—an electronic glove that would "transduce" or "trans-code" aural signals in tactile sensations, thereby giving ersatz hearing to the deaf.

Among the first major projects launched with the Rockefeller Foundation's funding was an experimental study of the distinctive features led by Jakobson, Halle, and an engineer by the name of Gunnar Fant, who had recently left the Swedish telecommunications firm Ericsson to study at Harvard's Psycho-Acoustic Laboratory. Fant said of their collaboration that "Roman posed the questions, I acted as a scientific medium suggesting feature correlates, and Morris was the secretary."[55] Their results, published in *Preliminaries to Speech Analysis*[56] (1951), offered a reconceptualization of structural linguistics and distinctive features from the perspective of information theory and communication engineering. This amalgamated three types of analysis into one conceptual frame: the Jakobson/Prague approach to structural linguistics and phonemic

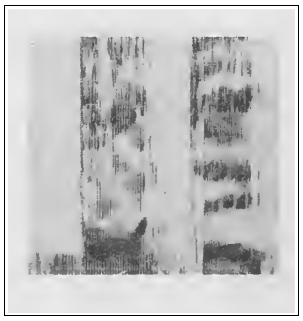
54 Ibid.

55 Gunnar Fant, "Phonetics and Phonology in the Last 50 Years" (presented at the Sound to Sense: 50+ Years of Discoveries in Speech Communication, MIT: Research Laboratory of Electronics, 2004), http://www.rle.mit.edu/soundtosense/conference/pdfs/invitedspeakers/fant%20paper.pdf.

56 Jakobson, Fant, and Halle, *Preliminaries to Speech Analysis: The Distinctive Features and Their Correlates*.

analysis, physiological analyses of the "vocal apparatus" from AT&T's "Visible Speech" system, and the analytical framework of communication-as-economic-transmissions offered by recent advances in information theory (especially the work Shannon and Weaver). In this tripartite conceptual collaboration, information theory furnished techniques for measurement while physiology offered a new account of the body as a productive apparatus suitable to conceptual dis-assembly and explication with X-rays, spectrograms, and associated technologies.

One result of this research was a first-of-its kind inventory of the full range of phonemes available to all languages. Jakobson, Fant, and Halle X-rayed native speakers of a variety of languages—including the grandson of Ferdinand de Saussure (figure 5) for French and an actor (figure 6) from Constantin Stanislavsky's famed Moscow Theater for Russian—as they articulated sounds, all with an effort to provide the fullest possible empirical account of the vocal apparatus in action. This undertaking produced a sequential series that visually charted articulation into a series of differential phonemes whose distributions were reduced to simple



Figures 5 and 6 (Source: *Preliminaries to Speech Analysis*, 1952)

Figure 5: Spectrogram (visual representation of an audio signal distributed over time) of Ferdinand de Saussure's grandson articulation of the word "bonté"

Figure 6: Diagram of the vocal apparatus and spectrogram representing an actor trained by Constantin Stanislavsky articulating the sharpened Russian consonant " /tot/ "

binary patterns. Information theory suggested methods for eliminating the "redundancies" in these "messages," leaving only a measure of the "meaningful" distinctions articulated among the phonemes themselves. As the authors explained in one such analysis, "the sole information carried by the distinctive feature is its distinctiveness. The listener distinguishes the word /gib/ from the word /gid/ by one feature: the grave character of /b/ as opposed, ceteris paribus, to the acute character of /d/" (Preliminaries, 9). According to their research, the number of such distinctions—based on the presence or absence of a phonemic trait rather than the actual sound itself—was relatively few. The authors asserted,

> The inherent distinctive features which we detect in the languages of the world and which underlie their entire lexical and morphological stock amount to twelve binary oppositions: 1) vocal/non-vocalic, 2) consonantal/non-consnoantal, 3) interrupted/continuant, 4) checked/unchecked, 5) strident/mellow, 6) voiced/unvoiced, 7) compact/diffuse, 8) grave/acute, 9) flat/plain, 10) sharp/plain, 11) tense/lax, 12) nasal/oral.[57]

These binary oppositions could, in turn, be measured and diagrammed economically and then mapped out as distributions and patterns with physiological and informatic tools. That such an analysis required a reduction of language to "code" and a redefinition of language as a system for delivering "information" excited, little if any interest within the group.

Exactitude

Jakobson's reduction of the world's languages into a handful of variants was complemented by interdisciplinary networking and globe-trotting aimed at eliminating the terminological and methodological redundancies that divided disciplinary and national communities. These efforts were bolstered by the support of postwar institutes that sought to

57 Ibid., 40.

deploy science and technology as resources for adjudicating disciplinary and national difference. For example, the Wenner-Gren Foundation, established after World War II to promote anthropology as a resource for world peace, sponsored a 1952 international conference of anthropologists and linguists attended by Jakobson, his former students Sebeok and Lévi-Strauss, his former colleagues Alf Sommerfelt (from Oslo) and Louis Hjelmslev (from Copenhagen), and Yehoushua Bar-Hillel of MIT's RLE, among others. In a closing address, Jakobson celebrated the conference as a triumph over difference and alterity through the liberal dialogues enabled by science and technology, arguing that the result of the conference had been

> a clear-cut liquidation of any kind of isolationism, and isolationism is just as hateful in scientific as it is in political life. There were no longer any such slogans as Linguistics *versus* Anthropology, Linguistics of the Western Hemisphere *versus* Linguistics of the Eastern Hemisphere, Formal Analysis versus Semantics, Descriptive Linguistics versus Historical Linguistics, Mechanistic View *versus* Mentalism and so on.[58]

The agent of this reconciliation was the language of communication engineering. In place of the peculiar discourses of linguistics and anthropology or American and Western European science, cybernetics organized their presentation and dialogue:

> For the study of language in operation, linguistics has been strongly bulwarked by the impressive achievements of two conjoined disciplines – the mathematical theory of communication and information theory...[I]t is indeed symptomatic that there was almost not a single paper uninfluenced by the works of C. E. Shannon and W. Weaver, of N. Wiener and R. M. Fano.... We have involuntarily discussed in terms specifically theirs, of encoders, decoders, redundancy, etc.[59]

Elaborating these proposals into a new interdisciplinary program, Jakobson argued that "structural linguistics and the research of communication engineers converge in their destinations"[60] and should provide conceptual material to improve one another. Conscientious

58 Roman Jakobson, "Results of a Joint Conference of Anthropologists and Linguists," in *Selected Writings II: Word and Language* (The Hague: Mouton, 1971), 554.
59 Ibid., 556.
60 Ibid.

not only to borrow from the hard sciences but also to give back to them, Jakobson added, "Communication theory seems to me a good school for present-day linguists, just as structural linguistics is a useful school for communication engineering."[61]

But it was not merely the introduction of a common language that enabled scholars to communicate so well: Jakobson singled out the exactness of that language for particular praise. "I must confess," he declared,

> that the Code-Message concepts of communication theory are much clearer, much less ambiguous, and much more operational than the traditional presentation of this dichotomy in the theory of language [by terms such as *langue-parole*, language-speech, type-token, etc]. I believe that it is preferable to work at present with these well-defined, measurable and analyzable concepts....

According to Jakobson, the use of such terminologies enabled the human scientists to take advantage of "a more exact and unambiguous formulation, a more efficient control of the technique used, as well as a promising possibility of quantification."[62]

Simultaneously, Jakobson rose quickly within the MIT hierarchy. He developed plans with communication engineer Leo L. Beranek and linguist William Locke, both of the RLE, for a new book series promoting the concepts of communication engineering within the humanities and social sciences, with Lévi-Strauss, Jacques Lacan, and W. V. Quine among those who promised to prepare contributions.[63] He also accepted appointments to a professorship at the RLE, an editorial position on the interdisciplinary journal *Information & Control*, and a seat on the steering committee of MIT's Center for Communications Sciences.[64] (MIT engineers

61 Ibid..
62 Ibid.
63 See Box 50, Folder 29, RJP, MIT Archives, Cambridge, Massachusetts.
64 For the invitation to join the MIT faculty, see J. A. Stratton to Roman Jakobson, 28 March 1957, Box 3, Folder 67, Jakobson Papers, MIT Archives, Cambridge, Mass. For the invitation to join the *Information and Control* editorial board, see Jerome B. Wiesner to Roman Jakobson, 29 May 1956, Box 50, Folder 29, RJP, MIT Archives, Cambridge, Mass. For the invitation to join the Center for Communication Sciences, see J. A. Stratton to Roman Jakobson, 2 December 1957, Box 3, Folder 63, Jakobson Papers, MIT Archives, Cambridge, Mass.

Shannon, Fano, and Jerome Wiesner, as well as MIT linguist Noam Chomsky, held appointments on these boards contemporaneously with Jakobson.) Indeed, MIT President Julius Stratton expressed the Institute's confidence in and hopes for Jakobson in a 1957 letter: "We share fully your conviction that the problems of communication and language will occupy a place of increasing importance in all modern science."[65] Well into the 1960s, Jakobson reported to MIT administrators that he was continuing to publicize the work of the RLE on trips throughout Europe—including intermittently meeting with Lacan and Lévi-Strauss—and to take public stands against the Soviet apparatchik during academic meetings in Eastern Europe.[66]

Informatics and Poetics

Jakobson's efforts established an approach toward the treatment of linguistic material as bits, data, transmissions, and code. His earlier work with the Moscow and Prague Circles became relevant in relationship to cybernetic retro-fitting. The binary analysis of distinctive features found its corollary in the bit (or binary digit) as a unit of measurement.[67] Displacements of meaning among terms in an enunciation were made visible through the re-structuring of language as serial operations among discrete series of encoders and decoders. Speech, perhaps the original measure of human communication, was considered an illustration of communicative procedures best defined by modern machinery. It excited little interest when Jakobson asserted, in one paper from 1956, that

> [a] message sent by its addresser must be adequately perceived by its receiver. Any message is decoded by its sender and is to be encoded by its addressee. The more closely

65 J. A. Stratton to RJ, 28 March 1957, Box 3, Folder 67, Jakobson Papers, MIT Archives.
66 Roman Jakobson to Jerome Wiesner, 23 November 1960, Jerome Wiesner Papers, Box 9, Folder 284, MIT Archives.
67 Roman Jakobson, "Linguistics and Communication Theory," in *On Language*, ed. Linda R. Waugh and Monique Monville-Burston (Cambridge: Harvard University Press, 1990), 490.

> the addressee approximates the code used by the addresser, the higher is the amount of information obtained.[68]

The orderliness of the prose, modeled on the orderliness of engineering instruments, conferred an orderliness on that synchronic dimension of speech which Saussure defined as the true object of linguistic science. As communication engineering became a frame for linguistic analysis, its own terms seemed exempted from critique. Communication was a technology for critique, not a technology to be critiqued.

Jakobson consolidated these efforts in his most well-known and, to this day, widely cited paper, entitled "Closing Statement: Linguistics and Poetics." In this essay, Jakobson argued that series of sounds comprised the central concern of linguistics and poetics alike and that the two fields were, in this respect, complementary epistemic endeavors. The claim itself was not novel. Variations of it dating back to Jakobson's early writings as a teenager in the Moscow Circle and young scholar in Prague. What distinguished this particular exposition, however, was Jakobson's appropriation of communication engineering to frame scientific and linguistic difference.

As the title indicates, the essay originated from closing comments he made at a 1958 conference dedicated to *Style in Language* and sponsored by the Social Science Research Council (SSRC).[69] Participants included the Czech literary theorist René Wellek (formerly of the Prague Circle), American cognitive psychologist George Miller, British literary critic I. A. Richards, American communications theorist Charles Osgood, and Sebeok. The meeting exemplified the interdisciplinary agendas of postwar science and private foundations, much of which focused on reducing disciplinary and national difference through the establishment of

68 Roman Jakobson, "Shifters, Verbal Categories, and the Russian Verb," in *Selected Writings II: Word and Language* (The Hague: Mouton, 1971), 130.

69 Partial transcripts published as Thomas A. Sebeok, ed., *Style in Language* (Cambridge: MIT Press, 1960).

common scientific procedures. The three-day affair was marred by contention, bickering and confusion. A critic writing in the *Times Literary Supplement* likened the atmosphere of the conference to that of Paris during a public transport strike.[70]

Such contentiousness was a hallmark of the interdisciplinary conferences that proliferated throughout the 1950s under the generous largesse of benefactors such as the SSRC, the Rockefeller Foundation, and the Carnegie Foundation,[71] This quarrelsome interdisciplinarity engendered the specificity of Jakobson's intervention and accounts for the tremendous afterlife of the essay. Who better than Roman Jakobson, the Prince of the Prague Linguistic Circle, equally at home in conversation with French psychoanalysts, Russian aristocracy, and American behaviorists, to bridge the seemingly disparate partners gathered that day? His opening comments to those closing remarks described the circumstances of his speech with such concision they are worth citing at length:

> Fortunately, scholarly and political conferences have nothing in common. The success of a political convention depends on the general agreement of the majority or totality of its participants. The use of votes and vetoes, however, is alien to scholarly discussion where disagreement generally proves to be more productive than agreement. Disagreement discloses antinomies and tensions within the field discussed and calls for novel exploration. Not political conferences but rather exploratory activities in Antarctica present an analogy to scholarly meetings: international experts in various disciplines attempt to map an unknown region and find out where the greatest obstacles for the explorer are, the insurmountable peaks and precipices. Such a mapping seems to have been the chief task of our conference, and in this respect its work has been quite successful. Have we not realized what problems are the most crucial and the most controversial? Have we not also learned how to switch our codes, what terms to expound

70 Andor Gomme, "A Confusion of Tongues," *The Times Literary Supplement*, no. 3096 (June 30, 1961): 404.

71 For discussions of the tendency of postwar social scientific conferences to devolve into confusion and debate, see Heims, *Constructing a Social Science for Postwar America: The Cybernetics Group (1946-1953)*; Paul Erickson, "The Measurement of Values and the Paradox of Behavioral Science" (unpublished manuscript); and Philippe Fontaine, "Natural Science Meets Social Science: Bridging Gaps at the Mental Health Research Institute, 1955-1968" (unpublished manuscript); On the patronage system of these conferences, with particular reference to the SSRC, see Hunter Crowther-Heyck, "Patrons of the Revolution: Ideals and Institutions in Postwar Behavioral Science," *Isis* 97, no. 3 (September 2006): 430; and David C. Engerman, "Social Science in the Cold War," *Isis* 101, no. 2 (June 1, 2010): 397.

> or even to avoid in order to prevent misunderstandings with people using different departmental jargon? Such questions, I believe, for most of the members of this conference, if not for all of them, are somewhat clearer today than they were three days ago.[72]

Jakobson's comments made the days' dissent an expression of scientific virtue—an expression of the modest differences that characterize a liberal scientific community. He counterposed this ethos to the false neutrality and consensus of politics, where the counting of heads and repression of difference determined decisions. Apart from their immediate value to that specific gathering, his comments expressed a dynamic that animated postwar social sciences in the U.S.—the hope that the false political consensus, especially the sort authoritarian socialism embodied, would find a faithful alternative in scientific discourse.

Jakobson then reframed the personal difference among members in terms of an impersonal set of codes that were only technical in their distinction and, as such, neutral in terms of their distinctions' meaningfulness. Jakobson asked: "Have we not also learned how to switch our codes, what terms to expound or even to avoid in order to prevent misunderstandings with people using different departmental jargon?" In this way, on the heels of celebrating science as as a site of antinomy and difference, he reduced those differences to mere technical conventions without substantive content. As science became the site for articulating meaningful differences, the language and techniques of communication furnished a method for reducing those differences to epiphenomenal conventions.

This neutralization of oppositions among scientists corresponded to a neutralization of language itself. Adapting Shannon's diagrammatic account of communication [Figure 7], Jakobson re-conceived Saussurean linguistic categories as a matter of engineering procedures.

72 Roman Jakobson, "Closing Statements: Linguistics and Poetics," in *Style in Language* (Cambridge: MIT Press, 1960), 350.

Suddenly the speaker of *parole*, subsumed in a web of amorphous differences and oppositions, became an engineer of discourse consulting "codes" to efficiently communicate. The resulting diagram organized linguistics according to conceptual categories and a division of labor developed for the efficient management of engineers and instruments; in this regard, it was what Deleuze described as "a display of the relations between forces which constitute power" in his gloss on Foucault's account of diagrams.[73] These diagrammatic strategies of communication engineering imposed an orderly set of distributions and series upon the unruly multiplicity of language-performances; thus, language itself became part of an economically distributed series of technical tasks within an assembly line of communications. This scheme was most evident in Shannon's economic exclusion of semantics from analysis, which he memorably described in *The Mathematical Theory of Communication*:

> The fundamental problem of communication is that of reproducing at one point either exactly or approximately a message selected at another point. Frequently the messages have meaning; that is they refer to or are correlated according to some system with certain physical or conceptual entities. These semantic aspects of communication are irrelevant to *the engineering problem.*[74]

Shannon defined "communication" and "information" as appropriate for engineering technical systems relaying electrical or electronic data. By condensing these operations within a schematic series—each specified according to equations characterizing its operations—Shannon plotted a new series of functions that formed the basis for future professional specialties and specialized instruments, the distributions of these tasks corresponding to the most efficient distribution of labor among humans and machines alike. Shannon sharply excluded "meaning" from his

73 Gilles Deleuze, *Foucault*, trans. Seán Hand (Minneapolis: University of Minnesota Press, 1988), 36.

74 Claude E. Shannon, "The Mathematical Theory of Communication," The Mathematical Theory of Communication (Urbana: University of Illinois Press, 1964), 31 Italics added.

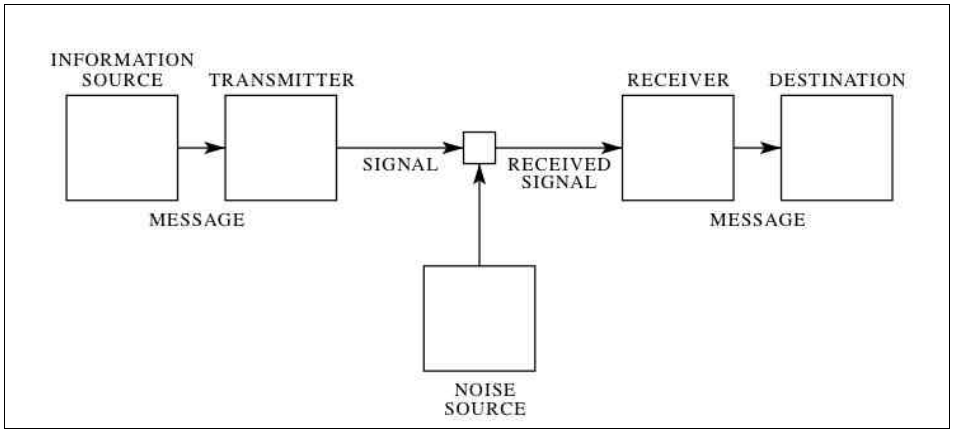


Figure 7: Schematic Diagram of a Communication System by Claude Shannon
Source: *The Mathematical Theory of Communication*, 1949

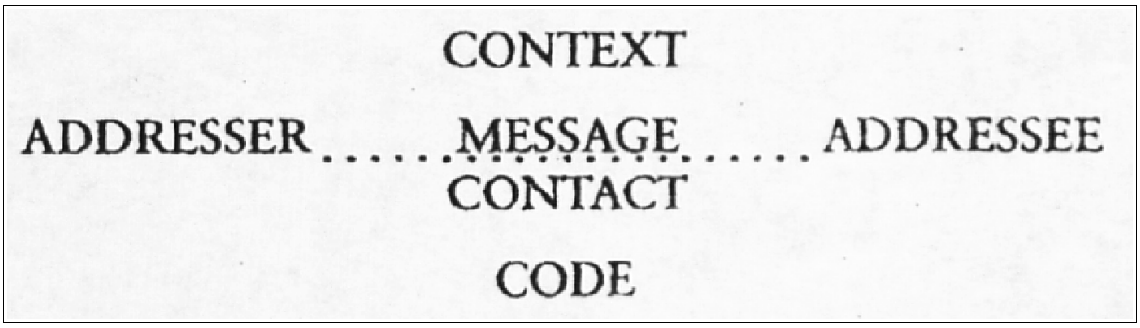


Figure 8: Schematic Diagram of Poetic Situation by Roman Jakobson
Source: *Style in Language,* 1960

definition of communication to specify more clearly the task of the AT&T, namely, the reliable transformation of speech into a well-defined commodity for management, distribution, and reproduction.

The power of a diagram such as the schematic account of communication, however, ultimately rests less upon the ability to trace relations than to mobilize those relations and insert them into a tissue of social assemblages within other contexts. Jakobson redefined Saussure's celebrated concept of *la langue* (language-system) and *la parole* (speech or speech act) as “code”

and “message” [figure 8]. According to Jakobson's theory, speakers consulted the “codes” at their disposal and composed a “message” according to its rules. In particular instances, “sub-codes” could be invoked for stylistic purposes. With Jakobson's proposals in place, a new type of knowledge of the human sciences could be produced: one emboldened by the methods of mathematics, refined and restricted by the technological instruments, and empowered by the lavish resources and aspirations accumulating around engineering in postwar America. Therefore, linguists could join an apparatus of engineers in the laboratory, rubbing elbows and sharing ideas, and their research could take part in not only wrenching language and culture from the amorphous domain where Saussure had left it but also reinstalling it within a modern scientific program. Participants in this program joined a worldwide fraternity of scientists who also coincided with capitalist production itself. Jakobson colorfully illustrated this last possibility for his students when he entered a Harvard lecture hall only to discover that the economist Vassily Leontieff, who had just finished using the classroom, had left an economic diagram of production on the blackboard. As Jakobson's students moved to erase the board, he declared, "Stop, I will lecture with this scheme," pronouncing, “the problems of output and input [in linguistics and economics] are exactly the same.”[75]

Today Jakobson's schematic diagram of communication and its account of language as a matter of “encoding” and “decoding” provide an iconic shorthand for introductory courses in linguistics and literary studies alike and serve as a conceptual keystone for fundamental texts in linguistics, cognitive science, literary criticism, media studies, semiotics, art criticism, and human-computer interaction, and cultural studies, to name only a few fields. In a career that

75 Cited in Gerovitch, “Roman Jakobson Und Die Kybernetisierung Der Linguistik in Der Sowjetunion”. I thank Professor Gerovitch for furnishing me with the original, English version of this quote.

produced well over a thousand texts authored in half a dozen languages, “Closing Statement” remains Jakobson's most widely cited and republished essay. More than any other of his works, this essay approaches Jakobson's ideals of bridging national and disciplinary difference around a a unified formal and structural program of research, where linguistics acts as the relays between natural, technical and human sciences. But the further one recedes from the text, and the more it is re-articulated within the apparatus of its production, the more uncertain its unity appears. First there are the transcripts from the conference, where the unruliness banished by Jakobson's masterly discourse returns. Miller confesses confusion. Wellek suggests a retreat to traditional terminologies might clear up the discussion.[76] I. A. Richards complained that terms such as “encoding” and “decoding” may designate under one nomenclature radically unlike phenomena, declaring:

> an operation as writing down a spoken sentence, or tapping it out in Morse, is extremely different from compositing a sonnet, and that again from finding a tactful phrase, and that agin from formulating an argument. How much that is useful and not misleading are we saying by calling any of these last encodings?...[I]n more than a little of the talk about coding and decoding that goes on there is present, I fear, a suggestion that Morsing and composing are closely alike. I have listened to “communication theory” being offered to teachers-to-be in such a way that you would suppose that to speak or write well is no more than to emit—in parallel with strings of received notions—the clichés that have the highest probability. What is odd is that some have a difficulty in seeing why such a degradation of crude usage theory should be debilitating. An account well suited to the purposes of the communication engineer may be highly misleading as an instrument in teaching writing and reading.[77]

In this analysis, the retreat to a neutral mode of analysis based on technical terminology constituted an erasure of the values, meanings, and situated meanings that motivated composition and reading. One well-meaning respondent suggested the answer could be found in informatics:

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76 René Wellek, “Closing Statement,” in *Style in Language*, ed. Thomas A. Sebeok (Cambridge: MIT Press, 1960), 415–416.

77 I. A. Richards, “Variant Readings and Misreading,” in *Style in Language*, ed. Thomas A. Sebeok (Cambridge: MIT Press, 1960), 244.

By better distinguishing between redundant and non-redundant data, perhaps through statistical analysis, more certain comparisons and analyses could be produced.[78] This comment, rather than clearing up the confusion, seemed to confirm Richards' analysis.

Wellek's and Richards's interventions suggested one solution: Doing away with cybernetic analysis and returning to traditional terminological distinction. The course of history furnished another solution: Radicalize and extend the program. Allow a fuller and broader community of theorists and scientists to take part in analysis, revealing the heterogeneities internal to their common program. The next two chapters, by considering the rise of cybernetic structuralism in France (chapter four) and the subsequent collapse of cybernetic analysis in engineering, linguistics, and semiotics (chapter five), will consider that history.

78 Fred W. Householder, "Opening Statement," in *Style in Language*, ed. Thomas A. Sebeok (Cambridge: MIT Press, 1960), 342.

Four

The Difficulties of Gift-Giving: Lévi-Strauss, Cybernetics, and Structuralism-in-the-Making

Roman Jakobson's efforts to integrate structural linguistics and cybernetics tells one story of how politics and technology remade the human sciences after World War II. The rapid assimilation of structuralism in postwar France tells yet another. Most accounts of French structuralism's wartime origins concentrate on a single event to the exclusion of all others: Lévi-Strauss' decisive encounter with Roman Jakobson in New York and the former's subsequent embrace of structural linguistics as a model for anthropology. François Dosse's history of the structuralist movement in France, *The Rising Sign*, is exemplary of this kind of narrative. The few short pages devoted to Lévi-Strauss' time in America center on comments he made to an interviewer nearly forty years after leaving New York City:

> At the time [I arrived in New York] I was a kind of naïve structuralist. I was doing structuralism without even knowing it. Jakobson showed me the corpus of a doctrine that had already been constituted in linguistics, and that I had never studied. It was an illumination for me.[1]

Under Jakobson's tutelage, so the story goes, Lévi-Strauss abandoned his effort to develop a detailed analysis of the factual variations in kinship systems among tribes in favor of producing an analysis of the elementary relationships that characterized all kinship systems. Viewed from

1 Cited in Francois Dosse, *History of Structuralism; The Rising Sign 1945-1966*, trans. Deborah Glassman (Minneapolis: University of Minnesota Press, 1998), 22.

the structuralist perspective, the prohibition on incest encouraged the circulation of women within a tribe, thereby fostering diversity and communication within the tribal relations themselves. As Lévi-Strauss theorized, " exogamy and language... have fundamentally the same function—communication and integration with others."[2] In the coming decades Lévi-Strauss leveraged this premise into an ever-widening array of analyses that reconstructed social, linguistic, and economic arrangements as communication composed of elementary but universal patterns.

As in many origin stories, this account of structuralism's birth derives appeal from that which it tactically obscures.[3] The narrative evacuates multifarious institutional and political operations to retroactively constitute 1942 as the origin of a new science. Through a purportedly chance meeting of minds, a new idea is born. What is needed is a quasi-structuralist approach to the history of structuralism that could expound upon the concepts of structuralism while also recognizing their role in facilitating a kind of intellectual exogamy, whereby the introduction of a foreign element facilitated communication and integration among distinct intellectual clans.

Why not, then, begin the story of structuralism *in media res*, putting aside origins to tell the story of structuralism in-the-making?[4] This new approach—which following the suggestion of anthropologist Marshall Sahlins, may be called *infrastructuralism*[5]—would trace out the

2 Claude Lévi-Strauss, *The Elementary Structures of Kinship*, trans. James Harle Bell et al. (Boston: Beacon Press, 1969), 493. In the cited passage Lévi-Strauss was paraphrasing a comments from William Isaac Thomas, *Primitive Behavior: An Introduction to the Social Sciences* (New York: McGraw-Hill, 1937).

3 On the place of such histories, especially within the history of science, see Georges Canguilhem, "The Various Models," in *A Vital Rationalist: Selected Writings from Georges Canguilhem*, ed. François Delaporte, trans. Arthur Goldhammer (New York: Zone Books, 1994), 42–48; Michel Foucault, "Nietzsche, Genealogy, History," in *Language, Counter-Memory, Practice: Selected Essays and Interviews*, ed. D. F Bouchard (Ithaca: Cornell University Press, 1977), 139–164; and Bernard Dionysius Geoghegan, "The Historiographic Conception of Information: A Critical Survey," *The IEEE Annals on the History of Computing* 30, no. 1 (2008): 66–81.

4 As done in Bruno Latour and Steve Woolgar, *Laboratory Life: The Social Construction of Scientific Facts*, Sage Library of Social Research (Princeton: Princeton University Press, 1986); and Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge: Harvard University Press, 1987).

5 Marshall Sahlins, "Infrastructuralism," *Critical Inquiry* 36, no. 3 (March 2010): 371–385.

network of institutions, methods and instruments allied with structuralism. Grant applications, professional positioning, and political procedure would play as decisive a role in structuring structuralism, as would the rules of academic and political exchange enabled by structural research methods. Within such a story structuralism not only inventories the structuring of difference; it also articulates and structures those differences.

This chapter will make a provisional effort at this infrastructural accounting of structuralism-in-the making, wherein a new structural method and approach emerges out of an inchoate mix of disciplines, institutions, ideologies, instruments, and intellectuals all thrown into uncertain combinations by World War II and its aftermath. An especial focus on the history of efforts to reconfigure the distribution of scientific and political collaboration across and between national borders—the United States and France, in particular—will characterize this inquiry, and I will elaborate on a number of points from earlier chapters: the role of structuralism in reweaving concepts of liberal and scientific practice through recourse to communication sciences; the role of the Rockefeller Foundation, since the 1920s and 1930s, in shaping French-American scientific exchange; the material and conceptual heterogeneity of structuralism as a communication science, which casts light on the multiple possibilities inherent within it; and the role of communications in binding and regulating populations.

American vs. French Technocracy

When Lévi-Strauss came to the United States in 1942 and accepted a post at the Ecole Libre des Hautes Etudes he also became part of a larger program for the strategic reform of French social science. With approximately one hundred faculty members and nine hundred

students in the 1942–1943 academic year, this small school operated as an experimental laboratory for concentrating and redirecting Francophone science.[6] Throughout the 1920s and 1930s, the Rockefeller Foundation had made abortive and unsuccessful attempts to reform the human and social sciences in France.[7] One of the major problems was methodological. In internal memoranda, T. B. Kittredge, who oversaw the Rockefeller Foundation's projects in Paris, complained bitterly of the theoretical and speculative methods that prevailed within French social science, which remained detached from concrete social problems.[8]

Kittredge's comments resembled the classic Anglo-American complaint that French science and philosophy relied too heavily on deductive styles of reasoning. The typical critique was that French science accounted for the individual and particular as an example of more universal or abstract laws. As John Stuart Mill wrote in his nineteenth-century treatise *System of Logic*:

> This is the habitual error of many of the political speculators whom I have characterized as the geometrical school; especially in France, where ratiocination from rules of practice form the staple commodity of journalism and political oratory; a misapprehension of the functions of Deduction which has brought much discredit...upon the spirit of generalization so honorably characteristic of the French mind.[9]

Mill, one of the most important theorists of liberal freedom in the nineteenth century, concisely expressed the wider belief of English liberals that political form and scientific method were

6 The entire history of the Ecole Libre remains woefully undocumented, despite detailed archival records of the institute currently held by the New School for Social Research. The best published account of the Ecole Libre can be found in Aristide R. Zolberg and Agnès Callamard, "The Ecole Libre at the New School, 1941-1946," *Social Research* 65, no. 4 (Winter 1998): 921-951. See also the account of Lévi-Strauss's time in New York found in Jeffrey Mehlman, *Émigré New York: French Intellectuals in Wartime Manhattan, 1940-1944* (Baltimore: Johns Hopkins University Press, 2000).

7 Brigitte Mazon, *Aux Origines De L'École Des Hautes Études En Sciences Sociales: Le Rôle Du Mécénat Américain (1920-1960)* (Paris: Les Editions du Cerf, 1988).

8 Kittredge, T. B. "General policy affecting the future of social sciences programs in Europe." Folder "Program and Policy 1933-1936," RG 3.1, Series 910, box 1, folder 3. 23 January 1935. Rockefeller Archive Center.

9 John Stuart Mill, *A System of Logic, Ratiocinative and Inductive: Being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation* (New York: Harper & Brothers, 1850), 590 (in other editions, see chapter 11, section 4).

closely linked. For Mill and other political liberals, a preference for the individual case study and concrete evidence—indeed, empiricist or sensationalist methods in general—complemented the broader effort to secure liberal freedoms, a mindset corresponding to the emphasis on the individual as the fundamental unit of liberal politics discussed in chapter one. From Mill's perspective, generalizations regarding the universal rights of man tended to create general formulas ill suited to any particular individual, and the preference (so disdained by Kittredge) for theory over fact correlated with a disregard for evidence and individualism. Political philosopher Larry Siedentop points out, however, that the French tendency also embodied an alternate liberal strategy, exemplified by Condillac, Rousseau, and de Tocqueville, in which the conditions of social action were a precondition for advancing liberal reforms and individual freedoms.[10] Although robustly liberal and progressive, this approach considered collective well-being as a condition of individual freedom—a prospect that to English liberals and the Rockefeller Foundation appeared to be complicit with creeping tyranny. This distinction between Anglo-American and French methodologies, which itself was part of vying political strategies, seemed to play a part in the Rockefeller Foundation's difficulties in France. In contrast to the foundation's efforts in Germany and England, efforts to promote "concrete" social science in France were consistently bedeviled in the interwar period.[11]

From a certain perspective, the Rockefeller Foundation's mission of resolving social and political strife with a cadre of scientific and technical elites seemed ideally suited for French life. Historian Theodore Porter once noted, "[t]he United States gave us the word 'technocracy,' but

10 See Larry Siedentrop, "Two Liberal Traditions," in *The Idea of Freedom: Essays in Honour of Isaiah Berlin*, ed. Alan Ryan (Oxford: Oxford University Press, 1979), 153–174.

11 Brigitte Mazon, "La Fondation Rockefeller Et Les Sciences Sociales En France, 1925-1940," *Revue Française De Sociologie* 26, no. 2 (1985): 311–342.

France seems to have some claim on the thing itself."[12] Although higher education in the United States was largely the province of states and private capital, in France science, education, and technology were bound up with the fate of the nation and, as such, centralized in Paris. The Ecole Polytechnique, an elite university for engineers, was born of the French Revolution and founded upon the dream that engineers could build a better, more rational society.[13] Indeed, the positivism of Auguste Comte and Saint-Simonianism celebrated the power of engineering, technology, and reason to reform society. When the Ecole Pratique des Hautes Etudes was established in 1868 to conjoin scientific research and educational practice in a single institution,[14] the founders hoped to institute a faculty that would rival Teutonic colleagues and further consolidate French national power. It was there that Ferdinand de Saussure and his colleagues, charged with consolidating and promoting the French language in the 1880s and 1890s, would collaborate with physiologists and develop the rudiments of structural linguistics, in part as an alternative to German neogrammarian methodologies.[15]

The very factors that wed science to technocracy in France, however, also militated against the activities of the Rockefeller Foundation there. Well in to the 1930s the social sciences were a somewhat neglected field in French universities. Engineering, mathematics, and even linguistics had received strong support, but social and economic sciences occupied a marginal place at the Ecole Pratique des Hautes Etudes by comparison with these other disciplines or

12 Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton: Princeton University Press, 1996), 114.

13 For an especially rich (and early) illustration of how science, the state, and scientific rationalization were tied up in France, see Ken Alder, *The Measure of All Things: The Seven-Year Odyssey and Hidden Error That Transformed the World* (New York: Free Press, 2002).

14 Mazon, *Aux Origines De L'École Des Hautes Études En Sciences Sociales*, 22–26; Marcel Fournier, *Marcel Mauss: A Biography* (Princeton: Princeton University Press, 2006), 40–43.

15 Robert Brain, "Standards and Semiotics," in *Inscribing Science: Scientific Texts and the Materiality of Communication*, ed. Timothy Lenoir (Stanford: Stanford University Press, 1998), 249–284.

contemporary work in Germany and the United States. The state had consistently chosen to favor more "applied" sciences in its program of national scientific development.[16] More importantly, vying liberal strategies informed the programs of the scientific initiative in France and the United States, complicating efforts simply to "translate" research from one context to the next. As Porter has shown, the authority of universities and science in France, and their charge to free the provinces from backward beliefs and sectarian identifications, depended on their alliance with a republican state that spoke on behalf of all citizens' equality. The state was guarantor in the production of a freer, more liberal Republic, and when it acted—as in promoting "French" philological activities at the Ecole pratique in the 1880s and 1890s—it did so with the authority and mission of the republic's interests at large. Technocracy, in this context, meant the authority of a coterie of centralized experts credentialed and underwritten by the state.

The American conceptualization of technocracy, by contrast, related to the beneficent effects of private initiative. As chapter one discussed, within the United States the turn towards technologies such as the railroad as agents of national reconciliation presumed the power of private capital and industry would transcend regional differences. Built on the industrial fortunes of John D. Rockefeller, the Rockefeller Foundation celebrated science as an alternative to state governance and interference. Particularly in the social sciences, its officers endeavored to develop entrepreneurial scientists who would write grants, assemble teams, and keep careful track of accounts while developing practical methods for promoting "social-control" independent of the state. This enterprise was quite the opposite of the French tradition of technocracy and social engineering. If liberalism in this context meant freedom *from* the state, science and technology became tools for securing that freedom. From this perspective, it is perhaps not

16 Mazon, *Aux Origines De L'École Des Hautes Études En Sciences Sociales*, 17–21.

surprising that the Rockefeller Foundation made relatively slow progress in France. Whereas its model of privately funded research and ad hoc institutes was ill-adapted to the entrenched forms of French scientific research, its hope of establishing institutes and research topics autonomous from the university and existing institutions rejected the dominant logic of French science.

The Difficulties of Gift-Giving

The Rockefeller Foundation's vexed relationship with eminent sociologist and anthropologist Marcel Mauss provides an instructive example of the American agency's difficulties in France. In 1917, an early incarnation of the Rockefeller Foundation's social sciences division, the Laura Spelman Rockefeller Memorial (LSRM), established an office in Paris as the seat of operations for reforming European social sciences and cultivated relations with Mauss, the favored nephew of Emile Durkheim. Born in 1872, Mauss studied religious sciences at the Ecole Pratique in the 1890s and had taught there since the early 1900s. By the 1920s, he was among the most distinguished names in French sociology. The LSRM paid for his travels to the United States in 1926, so that he could learn about social scientific methods in the United States and lecture on French ethnography.[17] This was part of the Rockefeller Foundation's interwar programs for "cross-fertilization" among national scientific communities. Among his various activities, he gave a lecture on "The Unity of the Human Sciences and Their Mutual Relationship: Anthropology, Psychology, Social Science," which he delivered at Harvard University and the University of Chicago.[18] Building on the traditions of Henderson and Dewey (as discussed in chapters one and two) and with the support of the Rockefeller Foundation, the

17 Fournier, *Marcel Mauss*, 246.
18 Ibid., 247.

University of Chicago at that time had become one of the world's leading centers for the integration of scientific, theoretical, and practical social science. Mauss was impressed, in particular by social scientists' influence in policy circles,[19] hailing the achievement of the "great" American people that had placed

> its entire social system, its entire demographic composition, as well as its destiny and its full individuality under the jurisdiction of a practical reason finally enlightened by science and, in any case, rationally managed by scientists and by the people themselves.[20]

In 1929, at the invitation of the Rockefeller Foundation, Mauss prepared an application to found a new center for social science in Paris.[21] He proposed the establishment of a faculty of social science at the Ecole Pratique des Hautes Etudes—a so-called "Sixième Section," since it would have been the sixth faculty housed at the Ecole. Mauss argued such a center would gather the scattered activities of French social science under one roof, fostering a form of unity befitting their object of study. "The unity of the social sciences," he wrote in his application, "will be demonstrated only when all teachers and all students, whatever their area of specialization in that vast field, are obliged to meet, and do meet, in a place where the material means for work and contact have been expanded."[22] The officers of the Rockefeller Foundation, however, balked at his proposal, invoking a number of empirical and methodological concerns: they complained his plans were too vast, too vague, too abstract, and unlikely to make serious contributions to social control.[23] They rejected his proposal and instead offered a lavish subvention of $350,000 to Charles Rist, an economist who also served on the governing board of the Bank of France, to

19 Ibid., 247–8.
20 Ibid., 248.
21 For excerpts from this proposal see Marcel Mauss, "Les Sciences Sociales à Paris Vues Par Marcel Mauss," *Revue Française De Sociologie* 26, no. 2 (1985): 343–351 The original proposal in its entirety can be found at the Rockefeller Archive Center.
22 Fournier, *Marcel Mauss*, 256.
23 Ibid.; and Mazon, "La Fondation Rockefeller Et Les Sciences Sociales En France, 1925-1940," 323–327.

establish an institute of economics and social science. The Foundation designated additional funds for training students and smaller grants for more modest initiatives to "familiarize the younger elements at the university with the methods of observation and the work necessary to solve economic, sociological, and political problems" and develop "true methods for social control."[24] Among those who benefitted from this largesse was Lévi-Strauss, at that time a young ethnographer whose missions in the Brazilian jungle (later recounted in *Tristes Tropiques*) were underwritten by the Rockefeller-funded *Institut d'Ethnologie*.[25] The general paucity of fieldwork funding meant these investigations were the first, and ultimately the only, ethnographic fieldwork Lévi-Strauss had the opportunity to carry out early in his career. In fulfillment of the Rockefeller strategy, however, those individualistic and concrete observations became a cornerstone of Lévi-Strauss's subsequent social, political, and ethical reflections.

The rejection of Mauss's application hints at methodological and political distinctions alluded to above in the discussion of Mill and Kittredge. Rockefeller-funded initiatives routinely delimited specific problems among specific populations—e.g., literacy among rural African-Americans, appreciation of "American" traditions at universities, the promotion of "Basic English" at select Chinese universities, the cultivation of political science in London—and convened committees to promote these ventures. This strategy of intervention corresponded with a rational and technical style of reasoning that studied phenomena in parts (or more precisely, viewed the individual as more foundational than collectives or relations). Mauss's search for "the unity of the social sciences," by contrast, expressed a holistic conception of society that, by

24 Fournier, *Marcel Mauss*, 293.
25 Mazon, *Aux Origines De L'École Des Hautes Études En Sciences Sociales*, 57.

definition, rejected the underlying logic—individualistic, atomizing, and oriented towards private initiative—that guided Rockefeller-funded social science of the 1920s and 1930s.

Mauss's ideas derived from the aforementioned tradition of political philosophy that took the collective as the basis for the individual. From this perspective, the free, autonomous, and calculating subject theorized by English philosophers of mind looked suspiciously like the entrepreneur-subject of a free-market society.[26] Mauss viewed this individualist, calculating type —and the methods that produced and guided his reason—with patent suspicion. *Essai sur le don* (published in English as *The Gift*[27]), Mauss's best known work, presented a polemical contribution to political theory in the guise of ethnographic analysis. He analyzed how the most local and isolated acts of gift-giving in primitive society produce cycles of reciprocity and debt that gradually impoverish entire tribes. This analysis offered an elegant portrait of how economic, legal, and moral obligations belong to a "total social fact" whose reality exists in the binding relations that encompass the social collective and determines even minute local activities. Mauss' conclusions suggested the inadequacy of any social scientific measurement extracted or abstracted from the social whole. Yet the study also carried with it a trenchant political critique. Mauss contended that modern societies had tamed wildly fluctuating patterns of gift-giving by refashioning humanity as *homo oeconomicus*, whose commitment to "science and reason" reduced ethics and responsibility to a cold actuarial calculations. "For a very long time," he observed, "man was something different, and he has not been a machine for very long, made complicated by a calculating machine."[28] As liberal juridical constructs based on self-

26 Siedentrop, "Two Liberal Traditions," 154.
27 Marcel Mauss, *The Gift: The Form and Reason for Exchange in Archaic Societies*, trans. W. D. Halls (New York: Routledge, 1990).
28 Ibid., 98.

possessive individualism, natural and social sciences were complicit in the transformation of humanity into an object of actuarial analysis.

Mauss's inquiry expressed a skepticism about liberalism in general and individualism in particular that defined an entire tradition of French political thought, from de Tocqueville to Durkheim.[29] The Rockefeller Foundation's initiatives, by contrast, were grounded in a commitment to modernization based on improved technocratic and rationalist social engineering, the division of social problems in tractable data sets, and ultimately the cultivation of liberal-individualist subjects who—through their bootstrapping enterprise—would contribute to community, economy, and nation. Their very program of grant-giving presumed that experts in the United States, empowered by the largesse and reason of their American benefactor, could freely identify "sectors" for scientific reform and as such empower exceptional scientific individuals to liberate reason from tradition. Though quite suited to the privatized, localized, and de-centralized networks of American higher education, this research program proved (and, to some extent, proves) unsuited for the rigid, centralized, and techno-bureaucratic-statist framework of French education. Moreover, couched within these activities were covert political and philosophical assumptions about the constitution of science and the framework for reason itself. While Mauss' reflections on the gift brought these philosophical differences into relief, they also furnished an oblique critique of the presumptions (or presumptuousness) of Rockefeller initiatives. To facilitate a true reform, a much more thoroughgoing rearrangement of French and American scientific, educational, and philosophical priorities was in order.

29 Mary Douglas, "Preface," in *The Gift: The Form and Reason for Exchange in Archaic Societies* (New York: Routledge, 1990), xiii–xv.

The Ecole Libre as Methodological Crucible

The few inroads the Rockefeller Foundation made in France came to an abrupt halt when the Vichy Regime came to power in 1940. Continued activities in France were then deemed impractical and undesirable. Mauss and Lévi-Strauss, both secular Jews, were compelled to surrender their posts (at the Collège de France and a lycée, respectively).[30] Adding insult to injury, Mauss's well-appointed Paris apartment was requisitioned for use by a German general, exiling the sociologist and his wife to a cramped and shadowy apartment. His pension was put on indefinite hold. Still in his early thirties, mobile, and relatively free from professional and familial commitments, Lévi-Strauss had better options. In 1940 he received an invitation to assume a faculty post at the New School for Social Research under the auspices of the Rockefeller Foundation program for intellectuals of note threatened by National Socialism and the Vichy Regime. He began packing his bags.

In the catastrophe of National Socialism the Rockefeller Foundation recognized scientific and political opportunity. Support for exiles and refugees presented an unprecedented chance not only to align the Foundation's intertwined humanitarian and political missions but also to implement scientific reforms with relative independence from European educational bureaucracies. In 1941 Alvin Johnson, the president of the New School for Social Research in New York City, approached the Rockefeller Foundation with the proposal to establish a university for French scholars imperiled by the Vichy Regime. The New School was already hosting an eminent community of Germanophone scholars who, in addition to their intellectual merit, were contributing to the American war effort through studies of German society and

30 For a brief overview of Mauss' and Lévi-Strauss' respective Vichy-era professional circumstances in France, see Fournier, *Marcel Mauss*, 335–345; and Patrick Wilcken, *Claude Lévi-Strauss: The Poet in the Laboratory* (New York: Penguin Press, 2010), 116–119.

psychology. Johnson felt that the Vichy Regime justified a Francophone faculty. Sensitive to the broader agenda of the Rockefeller Foundation beyond wartime humanitarian activities, he cast the program as an opportunity for initiating younger French scholars into an axis of Franco-American collaborations. T. B. Kittredge, who had directed the foundation's abortive efforts in social science in Paris, became an advisor on Johnson's efforts in New York. He wrote in a memo at the time,

> Johnson...hopes that, by the development of collaborative research programs related to world problems of economic, political, legal and social character, a greater opportunity will be given to younger scholars to participate in such programs through close contact with both the American and European leaders in the various fields of social science research....[31]

French and Belgian scholars embraced the occasion for reform. French theologian Jaques Maritain, an early proponents of these efforts, argued for establishing a Francophone university modeled on the Ecole des Hautes Études pratique but free from the stifling bureaucratic inertia that characterized French education.[32]

The fate of this reform effort depended on the success of repatriating participants after the war. Officers at the Rockefeller Foundation initially supported Johnson's mission but expressed misgivings about his tactics. In the event the Allies were successful, they asked him, would it not be better to assimilate the French scholars into existing faculties, where they could familiarize themselves with American scholars and scholarship up close? And in the event the Allies were unsuccessful, should they not simply Americanize at once?[33] Johnson persuaded the officers of

31 Kittredge, 6 October 1941, Collection Rockefeller Foundation, RG 1.1, Series 200, Box 54, Folder 63, RAC.

32 Peter M. Rutkoff and William B. Scott, "The French in New York: Resistance and Structure," *Social Research: An International Quarterly* 50, no. 1 (1983): 187–188; The final character of the Ecole Libre owed much to the experimental and hybrid character of the Ecole Pratique, from which much of its faculty were drawn. For more on the social scientific and philosophical milieu in Paris between the wars, see Stefanos Geroulanos, *An Atheism That Is Not Humanist Emerges in French Thought* (Stanford: Stanford University Press, 2010).

33 John Marshall to D. H. Stevens, 19 September 1941. Folder "Launching/Inauguration of the Ecole Libre," Box 3, Ecole Libre Papers, New School for Social Research Libraries (henceforth ELP).

the merits of his approach. An agreement emerged, whereby Johnson would select candidates for fellowships to teach at the Ecole Libre and officers at the Rockefeller Foundation would approve or reject funding for these candidates. Support would be limited to a few years, at which time professors would return to Europe or assume normal professorships in the American universities.

The Ecole Libre became a unique laboratory for concentrating, gathering, and redirecting Francophone scholarship. Its association with the New School for Social Research, an institution founded upon the premise that progressive social science could drive humane social reforms, reinforced such an agenda. The humanitarian mission of the program—scholars who demonstrated they were in a situation of real and present danger from the Vichy Regime received priority—was supplemented by a series of methodological tests and evaluations. Chief among them was the candidates' value and appropriateness for the American university. As seen with Jakobson in the last chapter, this stipulation often translated into whether or not candidates had methodologies that fit the norms of American science and the professional needs of American universities. Candidates who did not fit this description—such as Jacques Lacan, who was summarily rejected for a fellowship in 1942—were deemed unlikely to integrate or unworthy of sponsorship.[34] The coincident privilege for Jewish scholars most threatened by Vichy on the one hand and social scientific methodology on the other led to a proportionately high representation of scholars from the Ecole Pratique and among them scholars born outside France and trained in Germany or Central Europe. This trend included a contingent of Russian-born intellectuals who fled their homeland after the 1917 revolution and, following sojourns in Central Europe or Germany, made Paris their home. In addition to Jakobson, this enclave of sorts included sociologist Georges Gurvitch, constitutional theorist Mirkine-Guetzevitch, and philosopher of

34 See correspondence in Collection Rockefeller Foundation, RG 2-1942, Series 200, Box 232, Folder 1608, RAC.

science Alexandre Koyré. Their studies abroad and Jewish origins—and in the case of Koyré a particular familiarity with the phenomenology of Husserl and Heidegger—promoted skepticism towards the vaguely Catholic, humanist universalism that shrouded talk of science and humanity among the grand old men of French letters at the *École normale supérieure* and other elite French schools.

The Ecole Libre as Political Crucible

The conditions of wartime exile and service shaped the faculty's political acumen and their ability to align scientific, administrative, and national service. On this point they differed sharply from their German colleagues. As Hannah Arendt observed in 1943, the German intellectuals shied away from the label "refugees" and preferred to identify themselves as "newcomers" and "immigrants" eager to assimilate the language and political ways of their newly adopted homelands. "We were told to forget; and we forgot quicker than anybody could ever imagine."[35] Not so among the French refugees, who retained righteous and nationalist indignation and often saw themselves as aliens abroad only temporarily. The cause of Charles de Gaulle's government in-exile and the Free France movement openly dominated the school. The faculty and administration was packed with leading statesmen, such as the former Belgian Prime Minister Paul van Zeeland, as well as confidantes of de Gaulle, such as the the jurist Raoul Aglion. Lévi-Strauss and Koyré were among two of the eminent Gaullists, the latter having volunteered to serve the Free French forces only to be directed by the General himself to serve *la France* by emigrating to America and agitating in his capacity as professor at the Ecole Libre. In

35 Hannah Arendt, "We Refugees," in *Altogether Elsewhere: Writers on Exile*, ed. Marc Robinson (Boston: Faber and Faber, 1996), 110.

a 1942 letter to Koyré, Franklin D. Roosevelt praised scholars at the Ecole Libre for maintaining the "purity and honor of French thought" and thereby working "for the liberation of France."[36] During the war, Koyré and other faculty members intermittently returned to Algeria, England, and France to consult with and serve de Gaulle's government: indeed, they saw their service to *La France* and *la science* as interwoven commitments to truth itself. Commenting on this political spirit, Kittredge—the one-time director of the Rockefeller efforts in Paris who had complained of a French proclivity for speculative fancy over hard facts—bemoaned the "tragically pathetic" character that dominated the faculty during its inaugural meeting. He described the evening's speeches as a series of encomium to France, French culture, and why "the world cannot do without French thought + science."[37]

An official prohibition against partisan political activities at the Ecole Libre refined and concentrated its political purpose. When the school was conceived in 1941, the United States still recognized the Vichy Regime as the legitimate government of France; moreover, the Rockefeller Foundation officially abstained from supporting any activities of political nature. At the behest of the Rockefeller Foundation and the New School, the charter to the Ecole Libre thus stipulated that all faculty members "specifically bind themselves not to propagate or favor any ideology of parties or groups or of institutions that profess or practice intolerance, violence or spiritual constraint."[38] Far from excluding political partisanship, this constraint promoted the identification of scientific neutrality with the causes of democracy and anti-fascism. Ecole Libre course catalogs, for example, informed the students that "les professeurs de

36 Roosevelt to Koyré, 5 November 1942, folder "Ecole Libre Papers," Box 3, ELP.
37 T. B. Kittredge, 24 February 1942, notes in folder "Launching/Inauguration of the Ecole Libre," Box Three, Ecole Libre Papers, ELP.
38 "Agreement Between the New School for Social Research and the Ecole Libre des Hautes Etudes," folder "Ecole Libre – Agreement between N. S. + Ecole Libre," Box 5, ELP

l'Ecole Libre des Hautes Etudes s'engagent à vouer leur enseignement à la recherche de la vérité et au triomphe de la grande cause humaine pour laquelle leurs compatriotes continuent à lutter et à mourir."[39] Whatever discontent Rockefeller officers felt over invocations of *la France*, they and their French colleagues agreed that liberal scientific discourse was, by definition, non-political and non-partisan.[40] Founded upon a struggle against passionate ignorance and constraint, this style of non-partisanship easily aligned with the cause of democratic theory, support of the Allied cause, and even direct service on behalf of the United States or French government.

Although public and partisan political appeals were not unheard of among the faculty of the Ecole Libre, scholars more often coordinated their efforts around philosophical critiques of the Vichy Regime and technocratic plans for postwar reconstruction. The faculty of law and politics led courses on the illegality of the Vichy Regime as well as the juridical grounding for the resistance movement within Vichy-controlled France.[41] While psychoanalyst Raymond de Saussure (the nephew of Ferdinand de Saussure) taught courses training French women to serve as social workers during the reconstruction of France,[42] Lévi-Strauss presented proposals for establishing a postwar planned economy in France, and[43] Boris Mirkine-Guetzevitch, an eminent constitutional scholar, convened a committee for the reform of the French constitution in view of American legal practice.[44] Furthermore, a committee summary prepared for the Rockefeller

39 Ecole Libre des Hautes Etudes 1942 Course Catalog, folder "Ecole Libre Papers," Box 3, ELP.
40 Some faculty members such as Koyré were critical of the identification of scientific knowledge with neutrality, but even in these cases the practical demands of war tended to separate these "theoretical" reservations from their interwoven activities on behalf of the school, de Gaulle, and the Free French movement.
41 For records of these and other seminars see Collection Rockefeller Foundation, RG 1.1, Series 200, Box 54, Folder 634. RAC.
42 Ibid.
43 Ibid.
44 "Statement on the Commission for the Study of the Reforms of the French State," Untitled Folder, Box 3, ELP.

Foundation at the war's end reported that their findings had shaped the final framing of the constitution for the Fourth Republic; it also explained that the committee's initial focus on constitutional problems gradually expanded to ask what some members considered a more fundamental question: “Why is America so efficient?” As the Allies jostled for influence in Europe, making the answer to this question known in France would have decisive consequences for the United States as well. According to the same report,

> The war has shown the tremendous economic strength of America and its ability to maintain a high standard of living even in wartime. No other nation can offer such an example. If France wants to reach a reasonable level of well-being, she must know why and how the United States achieved such good results....It is not necessary to dwell upon the benefits which France can draw from such studies in the long run. But their usefulness from an American point of view is also obvious; when so many people in France are looking toward Great Britain and Russia, at least some information about the accomplishments of the United States should also be available.[45]

This emphasis on efficiency underscored the success of the Rockefeller Foundation in nudging French scholars away from a concern social equity. In identifying well-being with a high-standard of living, the committee had overtaken core assumptions of Rockefeller reforms, which saw a robust economy—rather than direct state intervention—as preferred mechanism for resolving inequity. This shift in focus did not overturn or supplant the ideals of French social science, liberalism, or technocracy, but, reorientated their goals towards the American patrons. Amidst an early scramble for postwar influence among the victorious Allies, including the Russia and Great Britain, the United States was given extra attention.

45 Ibid.

From the United States to Latin America, by way of the French

Lévi-Strauss' time in New York paralleled that of many of his colleagues insofar as he cultivated and aligned methodological empiricism and political service. He came to the Ecole Libre, charged with directing its Center in Latin American Studies, a major initiative at the New School that enlisted French scholars in service of Franklin Roosevelt's "Good Neighbor policy" towards Latin America. According to the premise of the Good Neighbor policy, the promotion of reciprocal relations—in the form of cultural and scientific exchange as well as economic cooperation—would provide a mechanism for establishing American hegemony in Latin America even superior to intervention. President Johnson of the New School had recognized that the French faculty, in addition to establishing new bonds between the United States and France, would be suited for promoting cultural exchange with the United States' neighbors to the south. As Johnson wrote in a letter to Belgian historian Henri Grégoire, one of the founders of the Ecole Libre, two socio-political missions were to guide the establishment of the Francophone faculty,

> 1. This is America, a land of immigration, in which the status of a temporary visitor is little regarded. The Free French School, to command wide interest, must present at least the potentiality of a permanent institution, a sort of bridge between French culture and American.
> 2. The lasting function of such an institution should include the attraction of students from Latin America, for whom French is the great language of culture.[46]

Plans for a *Centre d'études et d'informations pour les relations avec l'amérique centrale et l'amérique centrale du sud* were drawn up with Lévi-Strauss as its director. Although Lévi-Strauss did not yet have a Ph. D., he had taught for three years in São Paulo and conducted two ethnographic missions in the jungles of Brazil.[47] In his capacity as director, he coordinated

46 Johnson to Grégoire, 30 September 1941, Folder "Ecole Libre Papers / Archives: Alvin Johnson & Zambelli Project, Alexandre Koyré" in Box Three, ELP.

47 For the fullest account of these voyages see John Russell and Claude Lévi-Strauss, trans., *Tristes Tropiques* (New York: Criterion, 1961); and for a brief chronological overview see Marcel Hénaff, *Claude Lévi-Strauss and the Making of Structural Anthropology* (Minneapolis: University of Minnesota Press, 1998), 247–249.

courses on Latin America, convened panels and lectures on Latin American countries' relations to one another and with the United States, and maintained active correspondence with universities and scholars in Latin America.

These various activities brought Lévi-Strauss to the attention of the United States government, which alternately coordinated with and investigated the activities of the young anthropologist. According to wartime records on exiled scholars by the Rockefeller Foundation,

> Professor Levi-Strauss has been cooperating actively with various Government bodies. The chief of the Bureau of American Ethnology called him to Washington in November, 1941, to confer with him concerning the Handbook of South American Indians. He has supplied the Coordinator of the Inter-American Affairs with reports on the University of Sao Paolo, French Scholars in Brazil, Political Trends in Brazil, etc. In addition, he has made a report to the Coordinator of Information on the Fifth Column in Brazil, to the National Research Council on various Brazilian questions.[48]

He also consulted with the Office of Strategic Services (predecessor of the CIA) and recorded French translations of Roosevelt's speeches for broadcast into France by Allied propaganda services.[49] This flurry of activities, as well as an anonymous informant from Poughkeepsie, New York, who wrote a postcard to J. Edgar Hoover identifying Lévi-Strauss as part of a cabal of "Jewish international communists," brought Lévi-Strauss to the attention of the FBI.[50] As Lévi-Strauss undertook the management of the center at the Ecole Libre, FBI agents began intercepting his mail and making inquiries in New York. They scrupulously inventoried Lévi-Strauss' prewar undertakings in South America, his work at the Ecole Libre, and his various activities consulting and broadcasting speeches for the U. S. government. Hoover did not like

48 "Claude Levi-Strauss," Collection Refugee Scholars—New School, RG 1.1, Series 200, Box 54, Folder 632, RAC.

49 See Mehlman, *Émigré New York*, 181–182; and Stephen Rudy, "Jakobson Et Lévi-Strauss à New York (1941-1945), and Then Those Infamous Cats," in *Claude Lévi-Strauss*, ed. Michel Izard (Paris: Herne, 2004), 120–124.

50 Hoover to Special Agent in Charge, 17 April 1941. FBI Archives. Special thanks to John Cook of gawker.Com, who kindly furnished me with copies of Lévi-Strauss' files he secured through a Freedom of Information Act request.

what he saw. In one ominous memo, he noted a recent informant's claim that Lévi-Strauss and one of his colleagues in the propaganda services, surrealist André Breton, were "closely connected with a group in Mexico which is very bad, having something on their minds different from what the rest of us have on our minds."[51]

As the war came to an end, Lévi-Strauss reoriented from promoting a cultural exchange between Latin America and the United States to promoting cultural exchange between France and the United States. Following the landings in Normandy in 1944, de Gaulle's government summoned Lévi-Strauss to Paris to represent the state in helping French intellectuals visit the United States. War had left the French universities in disrepair and isolation from colleagues abroad, and Lévi-Strauss—by dint of his wartime experience and avid loyalty to de Gaulle—was deemed ideally suited to re-articulate relations and exchanges between the two nations' universities. In 1945, he returned to the United States as Cultural Attaché to the French Embassy, where he continued in a similar capacity, assisting the likes of Jean-Paul Sartre, Simone de Beauvoir, and Albert Camus as they made their way to and in the United States.[52]

In short, by 1945 Lévi-Strauss had become something of a professional facilitator of intercultural exchange. The Good Neighbor Policy and the Franco-American exchanges operated under a logic of non-partisan, liberal, and "free" exchange between nations on the assumption that this engagement would establish the grounds for collaboration and mutual understanding. His last major effort in this area before returning to France indefinitely came through his position as representative of the French government and the Ecole Libre, where he was commissioned to negotiate the Ecole Libre's future with the Rockefeller Foundation. A vocal faction of the faculty,

51 Hoover to SAO (New York), 3 March, 1942. FBI Archives.
52 Wilcken, *Claude Lévi-Strauss*, 154.

chief among them the French information theorist Léon Brillouin, hoped to see the Ecole continue indefinitely as a Francophone university abroad but the de Gaullists, including Koyré and Lévi-Strauss, strongly opposed this plan.[53] They believed reconstruction's primary interest lay in the repatriation of the faculty, along with its repertoire of methodologies and contacts expanded by the war, back to the French homeland.

Along with physicist Pierre Auger, Lévi-Strauss met with Rockefeller Foundation officers to discuss plans for the future of the Ecole Libre. In a memorandum prepared for Humanities Officer John Marshall (the driving force between Rockefeller support for mass communications research), Lévi-Strauss proposed re-establishing l'École Libre as a new center in Paris to be called "the French-European American Foundation."[54] As recounted in the previous chapter, Marshall spearheaded Rockefeller-supported communications research, and Lévi-Strauss' proposal seemed to reflect this interest. In response to concerns expressed by Marshall, Lévi-Strauss promised that this new center would eschew "frozen categories handed over by academic tradition" and instead mold itself to "the living reality and that natural groups which are shaping themselves inside French and American societies...."[55] He further advocated for the inclusion of research on "the diffusion of thought," which included "movies, theater, press, edition, libraries, and radio" in its new curriculum.[56] Lengthy negotiations, and additional support secured from the Ford Foundation, resulted in the establishment of the long-sought but never before realized *Sixième Section* of the *Ecole Pratique*, later renamed *L'École des Hautes Études en Sciences Sociales* (EHESS).

53 Mehlman, *Émigré New York*.
54 Lévi-Strauss to John Marshall, August 1944, Collection Rockefeller Foundation, Record Group 1.1, Series 200, Box 52, Folder 610, RAC.
55 Ibid.
56 Ibid.

Why did Lévi-Strauss succeed where his eminent predecessor Mauss had failed? Commenting on the origins of the school, latter-day faculty member Pierre Bourdieu once complained that the EHESS was little more than an instrument of "social control" deployed by American foundations to counteract Marxist criticism.[57] This is not wholly incorrect. The predominance of empirical, historical, and economic research as well as new attention to statistics and communications research marked a motivated departure from other possible traditions of thought. Yet such an analysis downplays the more transformative and reciprocal relationship established during the war, that changed the nature of collaboration and exchange between France and the United States. Lévi-Strauss and a large contingent of colleagues had cultivated relationships, methods, and purposes throughout the war that established the possibility for a new partnership. French universities, meanwhile, had not quite collapsed, but they—like much of France—had fallen into poverty and neglect by the late 1940s. This state of affairs recast the entire circumstances of patronage in France. No longer was the Rockefeller Foundation landing from abroad with checkbook in hand to remake France's ivory towers; instead, their gifts reciprocated and expanded upon an intimate relationship cultivated throughout the war.

Structural Exchanges

Lévi-Strauss's more theoretical scientific activities during the wartime period attached themselves to a thematics of exchange that echoed his applied and institutional endeavors. Much of this interaction concerned his embrace of structural linguistics and work with Jakobson. As

57 Pierre Bourdieu, "Préface," in *Aux Origines De L'école Des Hautes Études En Sciences Sociales* (Paris: Le Cerf, 1997), i.

recounted in the previous chapter, Jakobson's reconceptualization of structural linguistics on American soil during the 1940s emphasized the creation of strategic collaboration and exchange between European and American scholars and, gradually, the creation of anti-Soviet scientific alliances. The last chapter, as well as the introduction to the present chapter, downplay dominant accounts of this period in structuralism's history as one of scientific "invention" or "discovery" in favor of considering how it established strategic relays among disciplines, national communities, scientists, and wealthy institutions. This is the history of structuralism as a movement towards a "global technics" that strategically bound and regulated transnational scientific activities. Though tempted to see a narrative of imperial interest (or positivist achievements) imposing non-striated patterns of global uniformity, the previous chapter sought to consider the diversity of interests and purposes that articulated the universality and reach of this cybernetic apparatus.

At the level of articulating and bridging scientific community through shared methodology, Lévi-Strauss' structuralist activities resembled those of Jakobson. After Koyré introduced Lévi-Strauss to Jakobson in 1942, the two developed a fast friendship based on articulating new forms of disciplinary exchange around structural analysis. The two men also audited one another's courses and traded conceptual insights. In 1943, after Jakobson offered a course on Saussure's *Linguistique Génerale,* Lévi-Strauss taught a course on what he entitled *Ethnographie Génerale*.[58] In response to Lévi-Strauss' ongoing lectures and writing on kinship *(parenté)* Jakobson lectured on *L'Affinité et la Parenté des Langues*.[59] They also joined psychoanalyst Raymond de Saussure to give a lecture on the elementary principles of structural

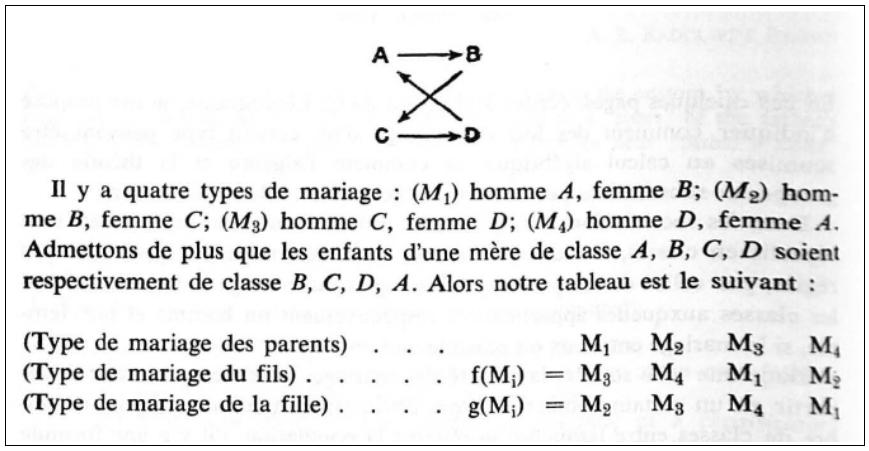
58 See course catalog "Ecole Libre des Hautes Etudes 1942-1943," p. 14, folder "Ecole Libre 1942-1943 Course Catalogs," Ecole Libre Papers, Box 3, ELP.
59 Ibid., p 18.

analysis.[60] These collaborations took part in encoding a style of interdisciplinary research and exchange characteristic of the Ecole Libre as a program of strategic and political reform.

Lévi-Strauss' doctoral thesis, *The Elementary Structures of Kinship*, completed in 1947, was an exemplar of the emerging structural enterprise and its synthesis of diverse disciplinary and methodological impulses.[61] The dissertation's ostensible subject matter was the elementary structures of communication and exchange erected by primitive kinship rules (such as the prohibition on incest), but on the level of scientific performance, it was also a testament to the success of the Rockefeller Foundation, the New School, and even Lévi-Strauss himself in facilitating new forms of methodological communication and exchange across borders. Relying in large part upon British and American ethnographic studies, Lévi-Strauss offered a new and concise account of kinship systems according to a "structural" perspective. He warmly credited Jakobson for theoretical inspiration and the Rockefeller Foundation for material support, dedicating the book itself to American anthropologist Lewis H. Morgan.[62] Whereas French intellectuals including Simone de Beauvoir and Georges Bataille wrote favorably of the text, American and British anthropologists heatedly debated its claims that ephemeral and factual kinship patterns could be reduced to universal and formal structures.[63] Within the text stood a mathematical appendix prepared by French mathematician André Weil [figure 1], another Rockefeller fellow who worked with Jakobson and Lévi-Strauss at the Ecole Libre during the war. His short algebraic and graphical interpretations provided a mathematical interpretation of Lévi-Strauss' claims. Although in later years Lévi-Strauss derided the excessive ambition of the

60 Regarding the course with Raymond de Saussure course, see "April 1946 Course Catalog," Collection RR, RG 1.1, Series 2000, Box 162, Folder 1991, RAC.
61 Lévi-Strauss, *The Elementary Structures of Kinship*.
62 Ibid., xxvi.
63 Hénaff, *Claude Lévi-Strauss and the Making of Structural Anthropology*, 253.

book, it provided a loose framework for his subsequent attempts to conjoin diverse methods and communities through mathematical analysis.



Il y a quatre types de mariage : (M_1) homme A, femme B; (M_2) homme B, femme C; (M_3) homme C, femme D; (M_4) homme D, femme A. Admettons de plus que les enfants d'une mère de classe A, B, C, D soient respectivement de classe B, C, D, A. Alors notre tableau est le suivant :

(Type de mariage des parents) . . .		M_1	M_2	M_3	M_4
(Type de mariage du fils)	$f(M_i) =$	M_3	M_4	M_1	M_2
(Type de mariage de la fille)	$g(M_i) =$	M_2	M_3	M_4	M_1

Figure One: Excerpt from André Weil's algebraic and graphical interpretation of kinship in "Sur l'étude algébrique de certains types de lois de mariage" Source: Appendix to *Les Structures Elementaire de la Parenté*

Cybernetics and Postwar France

After completing the dissertation, Lévi-Strauss resigned his post at the French embassy and returned to Paris. In 1948 he accepted posts at the *Centre Nationale de la Recherche* and *le Musée de l'Homme*, the major museum of ethnography in Paris. He brought with him concepts, relationships, and methods that were bound up with American wartime science and its more dispersed relations with government and governance. Indeed, Lévi-Strauss had been initiated into the norms of American and French technocracy and schooled in certain rudiments of media practice during his work for Voice of America. He had been accepted into elite networks of extra-governmental scientific financing. These circumstances alone would have been enough to change

the questions and approaches he was likely to promote upon his return to France, but changes in France itself would reinforce and compound his emerging orientation.

A chief asset in Lévi-Strauss's efforts in structuralism was the rising profile of cybernetics and technocracy in French life. Though much ink has been spilled on the extent to which the German occupation and German philosophy influenced "French theory" and poststructuralism,[64] the postwar reconstruction of the French economy according to industrial, technological, and economic models associated with American enterprise was arguably a more decisive reference for structural (and poststructural) thought. In her exceptional cultural history of postwar France, Kristin Ross, wrote of this period,

> The speed with which French society was transformed after the war from a rural, empire-oriented, Catholic country into a fully industrialized, decolonized, and urban one meant that the things modernization needed—educated middle managers, for instance, or affordable automobiles and other "mature" consumer durables, or a set of social sciences that followed scientific, functionalist models, or a work force of ex-colonial laborers—burst onto a society that still cherished prewar outlooks with all the force, excitement, disruption, and horror of the genuinely new.[65]

Ross insightfully notes that the program of industrial modernization went hand in hand with the modernization of science and the university. The rapidity of this modernization and the shock it induced multiplied the appeal and fascination of its emblems: In popular culture and film, the American automobile acted as a mysterious and allusive fetish. In the social and human sciences, research of technocratic origins and logic, such as operations research and game theory, excited and alarmed French researchers. Lévi-Strauss, whether he knew it or not, became such an emblem himself.

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64 See, e.g.,*The Heidegger Controversy: A Critical Reader* (Cambridge: MIT Press, 1993); and Werner Hamacher, Neil Hertz, and Thomas Keenan, eds., *Responses: On Paul De Man's Wartime Journalism* (Lincoln: University of Nebraska Press, 1989).

65 Kristin Ross, *Fast Cars, Clean Bodies: Decolonization and the Reordering of French Culture* (Cambridge: MIT Press, 1995), 4.

Christopher Johnson has noted that Lévi-Strauss was among the first major scientific figures in France to interpret and introduce both cybernetic and informational research in the French university,[66] but Lévi-Strauss was hardly the only intellectual calling attention to the pressing import these sciences would have for France's scientific and political destiny. This impact relates, in part, to the neglected Parisian origins of cybernetics itself. Shortly after the war, MIT mathematician Norbert Wiener traveled to France at the invitation of Szolem Mandelbrojt, an eminent French mathematician who had weathered the war in exile at the Ecole Libre in New York.[67] While there, Wiener was introduced to the dashing Monsieur Freymann, a former diplomat who directed the *Hermann et Cie* publishing house in Paris. The latter insisted that Wiener write up and his astonishing ideas about communications, technology, and society for Freymann's publishing house. Almost impetuously, Wiener agreed and began writing the book that would become *Cybernetics: Or Control and Communication in the Animal and the Machine*. Shortly thereafter, editors at MIT Press and Wiley & Co. learned of the book and sought to acquire sole rights to the text through a mixture of bullying and lucrative offers to buyout Wiener's contract. Freymann would not budge. As a result, English editions of the book were published simultaneously in France and the United States in October of 1948.[68]

When Wiener returned to Paris in 1950 to lecture at the Collège de France—again, thanks to an invitation from Mandelbrojt—his work had captured as much interest and attention in France as in the United States. Major reviews and commentaries in *Le Monde*, *Esprit,* and *La*

66 Christopher Johnson, *Claude Lévi-Strauss: The Formative Years* (New York: Cambridge University Press, 2003), 106.

67 On the trip to Paris, see Flo Conway and Jim Siegelman, *Dark Hero of the Information Age: In Search of Norbert Wiener, the Father of Cybernetics* (New York: Basic Books, 2005), 171–172.

68 Ibid., 171–176. Regarding the book contract see David Mindell, Slava Gerovitch, and Jérôme Segal, "From Communications Engineering to Communications Science," in *Science and Ideology: A Comparative History*, ed. Mark Walker (New York: Routledge, 2002), 75. Additional details drawn from correspondence in the Norbert Wiener Papers at the MIT Archives.

Nouvelle revue française, as well as attacks in the Marxist press, had brought cybernetics to the attention of a broader French public.[69] During his visit to France, Wiener, a fluent French speaker, lectured on Radio France and prepared further articles and interviews for the French press.[70] Cybernetics incited interest and commentaries by mathematician Georges Th. Guilbaud (who was working with Lacan and Lévi-Strauss), Nobel Laureat Louis de Broglie, mathematician Louis Couffingnal, and Szolem's nephew Benoît Mandelbrot (who had copyedited the original text of *Cybernetics*).[71] The latter co-organized a Rockefeller-funded conference on "Computing Machines and Human Thought" during Wiener's stay at the Collège de France, with computer scientist Howard Aiken, cybernetician Warren McCulloch, and information theorist Donald MacKay among those in attendance.[72] Beyond physics and mathematics, a broader swath of the scientific and literary public also took note. Cybernetic themes were expressed in engineer-turned-novelist Alain Robbe-Grillet's experimental writings,[73] Jean-Luc Goddard's dystopian depiction of a state run by computers, and real-life efforts by the French *Préfecture de Police* to automate their *fichiers* with IBM computers in order to identify and track Algerian terrorists.[74]

Dominican priest Dominique Durbarle's review of *Cybernetics*, published in *Le Monde* in 1948, was as influential on the ealry reception of cybernetics as the original book itself. Dubarle hailed *Cybernetics* as a prophetic and disturbing study that cast light upon the role mathematical

69 Mindell, Gerovitch, and Segal, "From Communications Engineering to Communications Science," 76, 79.
70 Norbert Wiener Papers, MIT Archives.
71 Mindell, Gerovitch, and Segal, "From Communications Engineering to Communications Science," 76, 80; Couffignal's interests in cybernetics were later summarized in Louis Couffignal, *La cybernétique* (Paris: Presses Universitaires de France, 1972).
72 Mindell, Gerovitch, and Segal, "From Communications Engineering to Communications Science," 80.
73 See Ross'*Fast Cars, Clean Bodies* and also Henning Schmidgen, "Inside the Black Box. Simondon's Parliament of Technical Objects," unpublished manuscript.
74 Neil MacMaster, "Identifying 'Terrorists' in Paris: A Police Experiment with IBM Machines During the Algerian War," *French Politics, Culture & Society* 28, no. 3 (2010): 23–45.

analysis and computing machines were poised to play in future world governance. According to Dubarle's reading of *Cybernetics*, "the human processes which constitute the object of government may be assimilated to games in the sense in which [John] von Neumann has studied them mathematically."[75] Durbarle added,

> We are running the risk nowadays of a great World State, where deliberate and conscious primitive injustice may be the only possible condition for the statistical happiness [calculated by cyberneticians] of the masses: a world worse than hell for every clear mind. Perhaps it would not be a bad idea for the teams at present creating cybernetics to add to their cadre of technicians, who have come from all horizons of science, some serious anthropologists, and perhaps a philosopher who has some curiosity as to world matters.[76]

Referencing Hobbes' *Leviathan*, Dubarle positioned *Cybernetics* as a contribution to natural and political science equally, meriting the attention and criticism of scientists in both fields.

Mendeleieff, Mathematics, and Mauss

From 1949 through 1954, Lévi-Strauss assimilated cybernetics and French ethnography into a program of transcultural and transdisciplinary communion. The earliest record of Lévi-Strauss' emerging interests in communication engineering comes from notes taken by officers of the Rockefeller Foundation during the 1949 Conference of Americanists held in Indiana.[77] Charles Fahs reported attending "primarily to hear the paper of Levy-Strauss on the relevance of cybernetics to research in linguistics."[78] Lévi-Strauss opened the talk by disputing Norbert Wiener's claim, made in *Cybernetics,* that social science lacked stable, reliable data sets for

75 Cited in Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston: Houghton Mifflin, 1950), 179.

76 Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (USA: Da Capo Press, 1988), 180.

77 Jakobson's attendance is recorded in E. F. D'Arms Diary, 7 September, 1949, in Collection Rockefeller Foundation, Record Group 1.2, Series 200R, Box 370, Folder 3323, RAC.

78 Charles B. Fahs Diary, 8 September 1949, Record Group 2, Series 500R, Box 483, Folder 3104, RAC. Lévi-Strauss occasionally changed the spelling of his name throughout his career; hence, Fahs' spelling of the name as "Levy-Strauss" was, at the time, correct.

cybernetic analysis. Taking a cue from Claude Shannon's recent statistical studies in English, Lévi-Strauss pointed toward written language as a rich store of material for such analysis.[79] He expanded this observation into his signature tripartite structural and cybernetic re-reading of linguistics, economics, and kinship. As Weaver had proposed in *Scientific American* two months earlier, Lévi-Strauss argued that engineering models of "communications" could be transposed onto all other fields of human activity—from linguistics to economic transactions to the circulation of women—within "primitive" systems of kinship. These activities comprised systems of communication whose circulating elements—phonemes, goods, wives—could be mathematically analyzed for structural relations.[80]

In the published version of this talk, Lévi-Strauss contended the computer would make these analyses tractable and practical:

> It is, in fact, difficult to see why certain linguistic problems could not be solved by modern calculating machines. With knowledge of the phonological structure of a language and the laws which govern the groupings of consonants and vowels, a student could easily use a machine to compute all the combinations of phonemes constituting the words of *n* syllables existing in the vocabulary....[O]ne would doubtless be able to obtain a computation of the totality of phonological structures for *n* oppositions (*n* being as one wished). One could thus construct a sort of period table of linguistic structures that would be comparable to the table of elements which Mendeleieff [sic] introduced into modern chemistry.[81]

Language, because of its discrete structure and the large samples ready for analysis (books and other written records), was the easiest system for computational analysis. According to the structural thesis, however, gender and economy should demonstrate similar patterning and therefore be amenable to computational analysis. The thesis was provocative. After all, if "linguistic problems" could be solved by modern computing machines, then why not gender

79 Ibid.
80 Ibid.
81 Claude Lévi-Strauss, "Language and the Analysis of Social Laws," in *Structural Anthropology* (New York: Basic Books, 1976), 58.

problems or economic problems? The implication seemed to be that science and technology could help recognize and restore order in the areas of life most contested in postwar France. At a time when the Marshall Plan was rebuilding the economy, when women had recently been granted suffrage, and when debates over the French language were being rekindled in the recently occupied country, structural analysis seemed suited to removing these topics from the heated discussion of public debate. Lévi-Strauss acknowledged that his claims excited some consternation among those who labeled him "antifeminist," but brushed off these critiques as shortsighted.[82]

The Rockefeller Foundation and Jakobson appear to have been the most immediate sources for his interest in cybernetics. In meetings with Rockefeller officers during 1949 and 1950, Lévi-Strauss and Jakobson reported sharing research with one another on cybernetics, Bell Labs, and mechanical translation.[83] Lévi-Strauss also mentioned contact with a representative of *Le Materiel Téléphonique*, the French homologue of Bell Labs, concerning acoustics and phonetics.[84] In early 1950 he received a copy of *The Mathematical Theory of Communication* from Warren Weaver (per Jakobson's request), and later that year Jakobson came to Paris—as part of his Rockefeller-funded mission—where he introduced Lévi-Strauss and Lacan to his work on information theory. Shortly thereafter, Lévi-Strauss and Lacan began meeting privately with Georges-Théodule Guilbaud, a French theorist of operations research and game theory.

Lévi-Strauss' first explicit essay to assimilate cybernetics with French social science appeared in his idiosyncratic introduction to the collected works of Marcel Mauss (1950). Lévi-

82 Ibid., 61–62.
83 See for example E. F. D'Arms diary entries from 23 Sept 1949 and 17 February 1950, Collection RF, RG [illegible]-1950, Series 500R, Box 44, Folder 3347, RAC.
84 E. F. D'Arms diary entry, 17 February 1950, Collection RF, RG [illegible]-1950, Series 500R, Box 44, Folder 3347, RAC.

Strauss described Mauss' *Essai sur le Don* and other works as revealing that "the ethnological problem is a problem of communication."[85] The definition of the gift as a function of the total economy suggested an understanding of economics as a cybernetic communication system. Mauss's reconstruction of an isolated act as a larger system of reciprocal exchange opened the door to a wider reconceptualization of ethnography as a communication science. In other words, the structure and rules of such everyday exchange should—like phonemes, in the example cited above—be suitable for informatic or computational analysis. But Lévi-Strauss also criticized Mauss for putting forth non-scientific notions, such as the fortuitous and the arbitrary, in explaining the origins of certain native practices and concepts.[86] Lévi-Strauss offered two distinct resolutions to Mauss' penchant for historical and cultural contingency. The first was to be found mathematics:

> [B]y associating more and more closely with linguistics, eventually to make a vast science of communications, social anthropology can hope to benefit from the immense prospects opened up to linguistics itself, through the application of mathematical reasoning to the study of phenomena of communication [such as cybernetics and information theory].... [A] large number of ethnological and sociological problems...are only waiting upon the goodwill of mathematicians who could enable ethnologists collaborating with them to take decisive steps forward, if not yet to a solution of those problems, at least to a preliminary unification of them, which is the condition of their solution.[87]

As in his studies of kinship, mathematics intervened to offer formal "solution" to intractable historical, social, and phenomenological manifestations. Cybernetics and information theory—devised for the purposes of recuperating or stabilizing communications in technical media—

85 Claude Lévi-Strauss, *Introduction to the Work of Marcel Mauss*, trans. Felicity Baker (London: Routledge, 1987), 36.
86 Ibid., 56.
87 Ibid., 44. The references inserted in the brackets stand in for a footnote Lévi-Strauss had referring to recent work on cybernetics and information theory by Wiener, Shannon, and Weaver.

became exemplars of the new mathematical methods that could recuperate disorder, noise, and contingency in human social systems.

Admitting that "some may reproach me for drawing [Mauss] too far in a rationalist direction,"[88] Lévi-Strauss offered justification for his evaluation in a now-famous analysis of *mana*, a kind of magical ether invoked by some tribal communities and studied by Mauss and other ethnographers. Lévi-Strauss argued that this multifarious and untranslatable term, capable of contradictory and broad invocations, acted as a "floating signifier" that, "somewhat like algebraic symbols,"[89] bridged gaps and resolved contradictions within a symbolic systems, further suggesting the terms *truc* or *machin* (loosely equivalent to "thingamajig") perform a similar role in colloquial French. Most significant for the chapter at hand, this interpretation—in tandem with the earlier appeal to mathematics—neutralized the most divisive and political aspects of Mauss' ethnography. Indeed, Mauss defined both native and modern cultural systems in terms of their immoderate tendencies towards imbalance and construction. Primitives exchange tended to produce large and unrepayable debts, it at least had the benefit of existentially acknowledging the irremediable indebtedness and sociality of human being. Modern liberal societies, however, relied on a rational system of calculative self-interest and possessive individualism that identified debt with an individual. This tended to de-realize the *Mitsein* or social and reciprocal essence of human being. For Mauss, it was the absence of symmetry—both internal to a given culture and in comparison to other cultures—that made comparative ethnography and ethical reflection possible. Rational scientific methodologies, insofar as they

88 Ibid., 49.
89 Ibid., 55.

preserved the calculative thinking of modern liberalism, reproduced the false symmetry Mauss opposed.

Lévi-Strauss's re-fabrication of Mauss around balance, symmetry, formalism, and coherency reflected the functionalism of his emerging structuralist program, and its affinities with contemporary cybernetic and social scientific methods in the United States. The re-reading of Mauss became a touchstone of Lévi-Strauss's work and the emerging structuralist approach to research. It also signaled a potential avenue towards reconciling an Anglo-American and French styles of research.

The Rise of Cybernetic Structuralism

In addition to his regular meetings with Guilbaud and Lacan to study cybernetics and mathematics, Lévi-Strauss sought to secure funding for a laboratory at the Ecole Pratique that could realize collaborations with mathematicians and social scientists. Among those he approached for aid was French mathematician Marcel-Paul Schützenberger, who was writing a dissertation on information theory. In November 1951, Schützenberger wrote to Wiener to explain the project:

> M. Levy-Strauss [sic] who is a very good ethnographist [sic] (he is further a personnal [sic] friend of André Weil) is trying to set up a center of research on the applications of the theory of communication to the study of musique [sic] and even mythologie [sic] etc. He has no personnal [sic] mathematical formation but he is really a sensible man and understands very well what cannot and what can [be done with] Cybernetics. I must say with some proudness that he put the thing more or less on my shoulders for he had heard that you trusted me.[90]

90 M. P. Schützenberger to Norbert Wiener, 10 November 1951, Folder 143, NWP.

Although Wiener ostensibly refrained from responding or endorsing the proposal, Schützenberger was subsequently appointed to a fellowship at MIT's Research Laboratory of Electronics.

Among Lévi-Strauss's regular interlocutors on this subject was Jakobson, who saw in Lévi-Strauss a valuable ally in the promotion of structuralism and cybernetics alike. With Jakobson's help, Lévi-Strauss secured a $2,000 grant from MIT's Center for International Study (CENIS), a center of cybernetic research covertly funded by the CIA, in order to organize an interdisciplinary seminar on cybernetics in Paris.[91] CENIS Director Max Millikan, formerly the Director of the CIA's Office of National Estimates, must have seen in the project an opportunity to cultivate the center's network of international researchers that tilted toward American science: Lévi-Strauss promised that psychologist Jean Piaget, physicist Pierre Auger, mathematician Georges Théodule Guilbaud, Schützenberger, Lacan, and Benveniste would participate and that the seminar would explore topics with a broad interdisciplinary pertinence including "kinship and group exchange," "structure of public opinion," "psychoanalysis considered as a process of communication," and "the study of myths as a special form of communications."[92]

The support Lévi-Strauss received from CENIS was supplemented by additional funding from UNESCO, where he was secretary general of its international council on social sciences. His agenda at UNESCO closely aligned with his endeavors to synthesize cybernetics and ethnography, in that he saw in international scientific institutions a mechanism to resolve

91 Lenneberg, letter to Lévi-Strauss, 15 Jan. 1953, Nov. 1952, box 50, folder 29, RJP. For more on CENIS's CIA- and communications-related activities, see Jennifer S. Light, *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America* (Baltimore: Johns Hopkins University Press, 2003), 166; and Alan A. Needell, "Project Troy and the Cold War Annexation of the Social Sciences," in *Universities and Empire: Money and Politics in the Social Sciences During the Cold War*, ed. Christopher Simpson (New York: The New Press, 1998), 3–38.

92 See Lévi-Strauss, letter to Millikan, 7 Jan. 1953, box 50, folder 29, RJP.

conflicts within and between cultures via symbolic means. Following a meeting with Lévi-Strauss in 1949, John Marshall wrote, "[Claude Lévi-Strauss'] thesis is that it is in the cause of peace for UNESCO to contribute to the development of the Social Sciences Section in strategic ways."[93] Lévi-Strauss' 1952 essay *Race and History*, prepared for UNESCO, argued that it was the task of international institutions to integrate diverse ethnic and national cultures.[94] After his appointment to the International Council for Social Sciences in 1953, he increasingly championed the application of cybernetics to that goal.

Lévi-Strauss' alignment of UNESCO, cybernetic, and structural anthropology fit within a broader media theoretical analysis of culture that combined a celebration of electronic communications with a profound skepticism over the effects of Western media practices upon upon cultural coherence and equilibrium. He expressed this skepticism—a sort of McLuhanism avant la lettre—with unusual directness and candor in a 1954 essay prepared for the UNESCO volume The University Teaching of the Social Sciences, where he elaborated on these items:

> ...it is essential to realize that writing, while it conferred vast benefits on humanity, did in fact deprive it of something fundamental. The international organizations, and particularly UNESCO, have so far entirely failed to appreciate the loss of personal autonomy that has resulted from the expansion of the indirect forms of communication (books, photographs, press, radio, etc.). But the theorists of the most modern of the social sciences (that of communication) treat this as a major question, as is shown by the following passage from Wiener's *Cybernetics*: "It is no wonder that the larger communities…contain far less available information than the smaller communities, which is to say nothing of the human elements from which all communities are built up."[95]

In a footnote to the same passage, he advocated the insertion of excerpts from cybernetics into

93 Marshall notes from interview with Lévi-Strauss, 30 September 1949. Record Group 2, Series 500R, Box 483, Folder 3104. RAC.

94 Claude Lévi-Strauss, "Race and History," in *Structural Anthropology, Volume II* (New York: Basic Books, 1976), 361.

95 Claude Lévi-Strauss, "The Place of Anthropology in the Social Sciences," in *Structural Anthropology* (New York: Basic Books, 1976), 367.

UNESCO's Constitution.

Lévi-Strauss sought and received support from UNESCO for the seminar on cybernetics. The first published results of these meetings appeared in a 1954 issue of UNESCO's *International Social Science Bulletin*, edited by Lévi-Strauss, which was dedicated to mathematics and the social science. Lévi-Strauss' rarely re-published introduction to that volume, "The Mathematics of Man," is a unique portrait of structuralism-in-the-making by its bricoleur-in-chief. He described the seminar as a bold effort to rationalize the human sciences through their re-alignment with the natural sciences and engineering.

> One-way collaboration is not enough. On the one hand, mathematics will help the advance of the social sciences but, on the other, the special requirements of those sciences will open up new possibilities for mathematics. Viewed in this light, a new form of mathematics therefore has to be developed. This cross-fertilization has, for the past two years, been the main object of the Seminar on the Use of Mathematics in the Human and Social Sciences, organized at UNESCO House in 1953 and 1954 under the auspices of the International Social Science Council, in which mathematicians, physicists and biologists (on the natural science side) and economists, psychologists, sociologists, historians, linguists, anthropologists and psycho-analysts (on the human and social science side) have taken part.[96]

The structuralist theory that presented exchange as a series of binary and reciprocal relations was here realized as a conception of science as binary and reciprocal exchanges among the natural and human sciences.

At the center of this new program of exchange was instrumentation. Lévi-Strauss claimed that physical instruments and conceptual models associated with cybernetics, information theory, and game theory provided durable frameworks for organizing and regulating exchange across disciplines, ideologies, and nations. Referring to the Voder (a speaking machine exhibited at the

96 Claude Lévi-Strauss, "The Mathematics of Man," *International Bulletin of Social Sciences* 6, no. 4 (1954): 590.

Linguistic Circle of New York—see last chapter), Lévi-Strauss identified a decisive moment in the reconciliation of natural and human sciences:

> In the realization of apparatuses [*appareils*] to synthesize speech, such as the famous Voder (the predecessor of a line of more perfect apparatuses [*dispositifs*]), as well as in the theoretical form of intellectual methods that regulate the work of communication theorists (first presented systematically by the engineer and mathematician Claude Shannon), one recognizes some of the great interpretive theories reached by linguists [such as Ferdinand de Saussure]. These include the recognition that communication between men rests upon the combination of ordered elements, that in each language the possibilities of combination are regulated by an ensemble of compatible and incompatible combinations, and finally, that the freedom of discourse, such as it is defined within the limits of its own rules, is restrained in time to certain probabilities...For the first time in the history of the sciences of man, it becomes possible, as in the natural sciences, to set up laboratory experiments and to check hypotheses by empirical means.[97]

Lévi-Strauss's conflation of cybernetic instruments or theories with the material being studied was characteristic of research in the cybernetic apparatus. The methods charged with regulating and binding communication systems also, in Lévi-Strauss's interpretation, "regulate[d] the work of communication theorists." Originally devised for the engineers at Bell Labs, these methods would now become part of a laboratory setup that would shape the routines and logic of the human sciences. While Lévi-Strauss claimed to recognize the findings of structural linguistics within the instruments and theories of Bell Labs engineers, a conceptual movement in the other direction manifested itself: Lévi-Strauss and his colleagues came to argue that the durable instruments, inscriptions, and theoretical forms of telephone engineers revealed the essential nature of language. Just as these instruments and theories had regulated the work of engineers, they now transformed language itself into a technologically ordered series around which a new apparatus of human scientists could be convened.

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97 Claude Lévi-Strauss, "Les Mathématiques De L'homme," *Bulletin International Des Sciences Sociales* 6, no. 4 (1954): 644. My translation.

Undergirding this technical and scientific synthesis are features and factors familiar from previous chapters: the rise of technology enabled the transcendence of local differences and the neutralization of political difference:

> For the first time, so-called bourgeois and capitalistic economics and Marxist economics have a common language at their disposal....[I]t is the mathematical approach [found in cybernetics, information theory, and game theory] which has made this surprising development possible.[98]

Lévi-Strauss elaborated this notion into a rhetoric that reverberated with that spirit of harmony, unity, and transcendence that characterized earlier appeals to the technologies of liberalism. Responding to would-be critics who might put cybernetics and social science beyond UNESCO's global cultural agenda, he maintained that

> [b]y working for the co-ordination of methods and thought, which cannot for ever remain entirely unrelated in the various spheres of knowledge, we are helping in the quest for an inner harmony which may be, on a efficient rent level from that with which Unesco is concerned but no less truly, the real condition for wisdom and peace.[99]

Instrumentation, precision, exactitude, and calculability became central to a new political order that would establish neutrality, collaboration, and elements of a common language among disciplines and nations.

Asymmetrical Exchanges

Lévi-Strauss' attempts to resolve difference instigated unanticipated disputes. In June 1952, he flew to New York to participate in the international Anthropology Today Conference held in New York. The event was sponsored by the Wenner-Gren Foundation, an international and private foundation based in the United States that advanced anthropology as a device for

98 Lévi-Strauss, "The Mathematics of Man," 586–587.
99 Ibid., 590.

avoiding future world wars through the promotion of cross-cultural dialogue and understanding.[100] The roster of participants consisted of a number of eminent contributors to Norbert Wiener's Macy Conferences on Cybernetics, such as Margaret Mead, Clyde Kluckhohn, and F. S. C. Northrop, as well as Jakobson. They gathered to discuss essays circulated in advance, including "Social Structure," Lévi-Strauss' most programmatic statement of structuralism (and structuralism as a cybernetic science). In it he asserted that this unifying framework would enable a fundamentally new approach to study culture: as a series of data and signs distributed in time and suitable for statistical analysis.[101] He claimed that structural studies were "the indirect outcome"[102] of recent research in information theory, cybernetics, and game theory and, even further, that these studies' "ultimate end is to override traditional boundaries between different disciplines and to promote a true interdisciplinary approach."[103] In this respect, anthropology was not merely beneficiary or recipient of cybernetic research but actual participant in the broader "consolidation of social anthropology, economics, and linguistics into one great field, that of communication...."[104]

When time for colloquy came, Lévi-Strauss' colleagues were less than impressed. Tactfully informing Lévi-Strauss, along with the other attendees, that she herself had collaborated with Wiener, Mead suggested Lévi-Strauss' methods diverged significantly from their work.[105] In what seemed like a rebuke of Jakobson's invocation of information theory,

100 Axel L. Wenner-Gren, "Address of Welcome," in *An Appraisal of Anthropology Today*, ed. Sol Tax et al. (Chicago: University of Chicago Press, 1953), xiii–xiv.
101 Claude Lévi-Strauss, "Social Structure," in *Anthropology Today*, ed. A. L Kroeber (Chicago: University of Chicago Press, 1953), 549.
102 Ibid., 528.
103 Ibid., 529.
104 Ibid., 538.
105 Conference transcripts found in Sol Tax et al., eds., *An Appraisal of Anthropology Today* (Chicago: University of Chicago Press, 1953), 111.

Northrop later objected to attempts at envisioning all cultures in terms of a single highly-refined mathematical approach, and to wit, an approach developed in Western cultures.[106] Lévi-Strauss countered that the current work of Jakobson and communication engineers offered a technique to treat the pre-cultural material of culture itself: the phoneme. Moreover, he dismissed the entire debate as a terminological confusion of that exact sort which recent scientific endeavors would soon overcome—presumably through a shared discourse and scientific account of meaning and semantics. Yet his assurances did little to assuage his detractors, and the debate itself highlighted an intractable incongruity between Lévi-Strauss's attempts to define "communications" as an idealized homogeneous scientific-technical enterprise that transcended culture and history on the one hand, and the reality of "communications" as a highly politicized problem inextricable from the sites, communities, and media advancing it on the other hand.

In the 1950s, French Marxist and leftist intellectuals, particularly those associated with the *Cahiers Internationaux de Sociologie,* also expressed opposition to Lévi-Strauss's alignment of structural linguistics, French ethnography, and cybernetics. Chief among the opponents was George Gurvitch, who had taught with Lévi-Strauss at the Ecole Libre and had invited him to write the introduction to the work of Mauss. Although displeased with Lévi-Strauss's introduction, he allowed its publication.[107] However, relations between the two men faltered and the *Cahiers,* edited by Gurvitch, became the most prominent scientific venue for counterstructuralist, Marxist criticism. In an essay entitled "The Concept of Social Structure," Gurvitch harshly suggested that Lévi-Strauss's recourse to mathematics tended to efface the social and internal contradictions of the societies he studied.[108] Using the work of Marcel Mauss

106 Ibid., 315–316.
107 See Wilcken, *Claude Lévi-Strauss*, 177–178; and Johnson, *Claude Lévi-Strauss: The Formative Years*, 15.
108 Georges Gurvitch, "Le Concept De Structure Sociale," *Cahiers Internationaux De Sociologie* 19 (December 1955): 3–44.

to justify his criticism, Gurvitch produced an unflattering portrait of structuralism that contrasted the venerable traditions of French social science with more recent imports passed through the sieve of American cybernetics. Essays by Alain Touraine and Henri Lefebvre on American social science and the concepts of totality radicalized the critique by introducing a stronger emphasis on the role of class domination in social-scientific reason.[109] These theorists argued that the Marxist (and French) conception of totality remained sensitive to contradictions and totality but the newer approaches associated with American methods invoked styles of calculation and analysis that neutralized conflict and a true sense for the social totality.

Throughout the 1950s and 1960s, Lefebvre in particular would refine this critique into a damning indictment of structuralism and those whom he identified with structuralism, including Lévi-Strauss, Louis Althusser, and Michel Foucault. In "Marxism and the Theory of Information" (1958), for example, he ridiculed structuralists' claim that techniques for measuring telegraph transmissions provided suprahistorical procedures for understanding anthropological and sociological arrangements. He dismissively labelled cybernetics and information theory as a science of "apparatuses [*dispositifs*] that maintain and consolidate a *structure* which has been determined within and by an information machine."[110] In other words, Lefebvre suggested that structuralists ontologized and universalized the artifactual and contingent structures of machines. In a response to his Marxist critics, Lévi-Strauss insisted that it was necessary to "distinguish scientific findings, strictly speaking, from the political and ideological uses to which they are put, all too frequently, in the United States and elsewhere...."[111]

109 See Alain Touraine, "Le Traitement De La Société Globale Dans La Sociologie Américaine Contemporaine," *Cahiers Internationaux De Sociologie* 16 (June 1954): 126–145; and Henri Lefebvre, "La Notion De Totalité Dans Les Sciences Sociales," *Cahiers Internationaux De Sociologie* 18 (January 1955): 55–77.

110 Henri Lefebvre, "Marxisme Et La Théorie De L'information," in *Au-Delà Du Structuralisme* (Paris: Anthropos, 1971), 72.

111 See the notes to Claude Lévi-Strauss, "Postscript to Chapter XV," in *Structural Anthropology* (New York: Basic

Lévi-Strauss' private communications with Jakobson also gave expression to a division in their structuralist-cybernetic methodologies. Already in 1952, when he was first invited to prepare a collection of essays for Jakobson's series at MIT, Lévi-Strauss had responded, "Your proposition…leaves me perplexed: I can not indefinitely explain what could be done to expand the theory of communication to ethnology: it is necessary to start doing it."[112] He recounted efforts to classify marriage systems and variations in native American mythologies as communication systems for the relay of information but confessed he did know whether his results or methods were legitimate.[113] When he and Jakobson exchanged mail the following year concerning the development of the seminar in Paris, Lévi-Strauss was more upbeat, yet dissonance between the two was again manifest. Jakobson had sent a copy of his informational study on Russian phonemes to Lévi-Strauss, prepared in collaboration with Halle and Cherry. Lévi-Strauss expressed thanks for the copy of the text and, as befitting a student of Mauss, responded with a gift of his own: a re-evaluation of Jakobson's phonemic analysis according to a simplified system of binary schema of his own invention [figures two and three]. Setting aside Jakobson's concern with correlating sound and meaning, he reclassified Russian phonemes according to an internal and self-referential system of positive and negative patterns. Along the horizontal axis he listed various sounds, along the vertical axis a set of either/or qualifications of those sounds (vocalic/consonantal, compact/non-compact, etc.), and within the chart itself a series of "+" and "-" signs indicating the presence or absence of the given characteristic. With a modesty and deference that downplayed the ambitions of his reanalysis of the phoneme, Lévi-Strauss warned that "[a]ll that [I've done] is probably meaningless." He added, "[m]y only

Books, 1976).

112 Lévi-Strauss to Jakobson, 29 March [1952], Folder 45, Box 12, RJP. There was no year on the letter, but the contents suggest it was written in 1952.

113 Ibid.

excuse is that I replaced all the linguistic terms, which are beyond me, by symbols, and that the things seem to work on the basis of pure manipulation of symbols."[114]

This turn away from the problem of meaning and towards purely formal relations expressed the drift of Lévi-Strauss' own thought as well as his subtle but definite stray from Jakobson. As he transferred the structural principles from linguistic units to a cybernetic system of "communication" for kinship, clothing, and mythology—a subjective "systems" of internal relations—the theory of meaning that had motivated Jakobson fell by the wayside. Lévi-Strauss instead pursued anthropology according to "a general theory of communication,"[115] where communication referred to any circulation of goods, messages, knowledge, or, in the case of his own research, women. Lévi-Strauss' deviation from Jakobson fit with a broader tendency already hinted at in his descriptions of the Paris seminar and the disputes at the Wenner-Gren conference. As cybernetics came to consolidate a larger field of collaboration among researchers whose goals and material diverged, the language and techniques of cybernetics provided a common framework for theorists to articulate their differences from one another as much as their shared agendas (for more, see chapter five). This potential for cybernetics and structuralism to bridge "differences" within a common system—what Kline terms "the disunity of cybernetics"[116]—was a source of cybernetics's widespread application as well as its difficulties in establishing a set of exclusive and self-perpetuating disciplinary practices.

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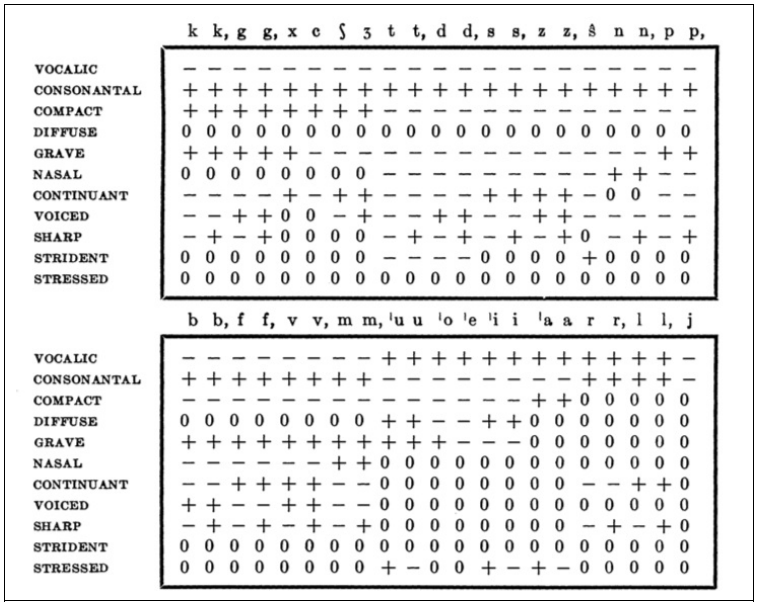
114 Ibid.

115 This was the title of a paper he pre-circulated for a Wenner-Gren-sponsored conference of anthropologists and linguists, with Jakobson and Sebeok among the participants, held in Bloomington, Indiana, in 1952. See Carl F. Voegelin and Thomas A. Sebeok, "Preface," in *Results of the Conference of Anthropologists and Linguists* (Baltimore: Waverly Press, 1953), vi.

116 Ronald Kline, "The Disunity of Cybernetics" talk at the Society for the History of Technology Annual Meeting, Lisbon, Portugal (2008).



	k	k,	g	g,	x	c	ʃ	ʒ	t	t,	d	d,	s	s,	z	z,	š	n	n,	p	p,
VOCALIC	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
CONSONANTAL	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
COMPACT	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−
DIFFUSE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAVE	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+
NASAL	0	0	0	0	0	0	0	0	−	−	−	−	−	−	−	−	−	+	+	−	−
CONTINUANT	−	−	−	−	+	−	+	+	−	−	−	−	+	+	+	+	−	0	0	−	−
VOICED	−	−	+	+	0	0	−	+	−	−	+	+	−	−	+	+	−	−	−	−	−
SHARP	−	+	−	+	0	0	0	0	−	+	−	+	−	+	−	+	0	−	+	−	+
STRIDENT	0	0	0	0	0	0	0	0	−	−	−	−	0	0	0	0	+	0	0	0	0
STRESSED	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	b	b,	f	f,	v	v,	m	m,	ᶦu	u	ᶦo	ᶦe	ᶦi	i	ᶦa	a	r	r,	l	l,	j
VOCALIC	−	−	−	−	−	−	−	−	+	+	+	+	+	+	+	+	+	+	+	+	−
CONSONANTAL	+	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−	+	+	+	+	−
COMPACT	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	0	0	0	0	0
DIFFUSE	0	0	0	0	0	0	0	0	+	+	−	−	+	+	0	0	0	0	0	0	0
GRAVE	+	+	+	+	+	+	+	+	+	+	−	−	−	0	0	0	0	0	0	0	0
NASAL	−	−	−	−	−	−	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0
CONTINUANT	−	−	+	+	+	−	−	0	0	0	0	0	0	0	0	−	−	+	+	0	
VOICED	+	+	−	−	+	+	−	−	0	0	0	0	0	0	0	0	0	0	0	0	
SHARP	−	+	−	+	−	+	−	+	0	0	0	0	0	0	0	0	−	+	−	+	0
STRIDENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
STRESSED	0	0	0	0	0	0	0	0	+	−	0	0	+	−	+	−	0	0	0	0	

Figure Two: Jakobson et al's binary analysis of Russian phonemes
Source: "Towards the Logical Description of Languages in the Phonemic Analysis"

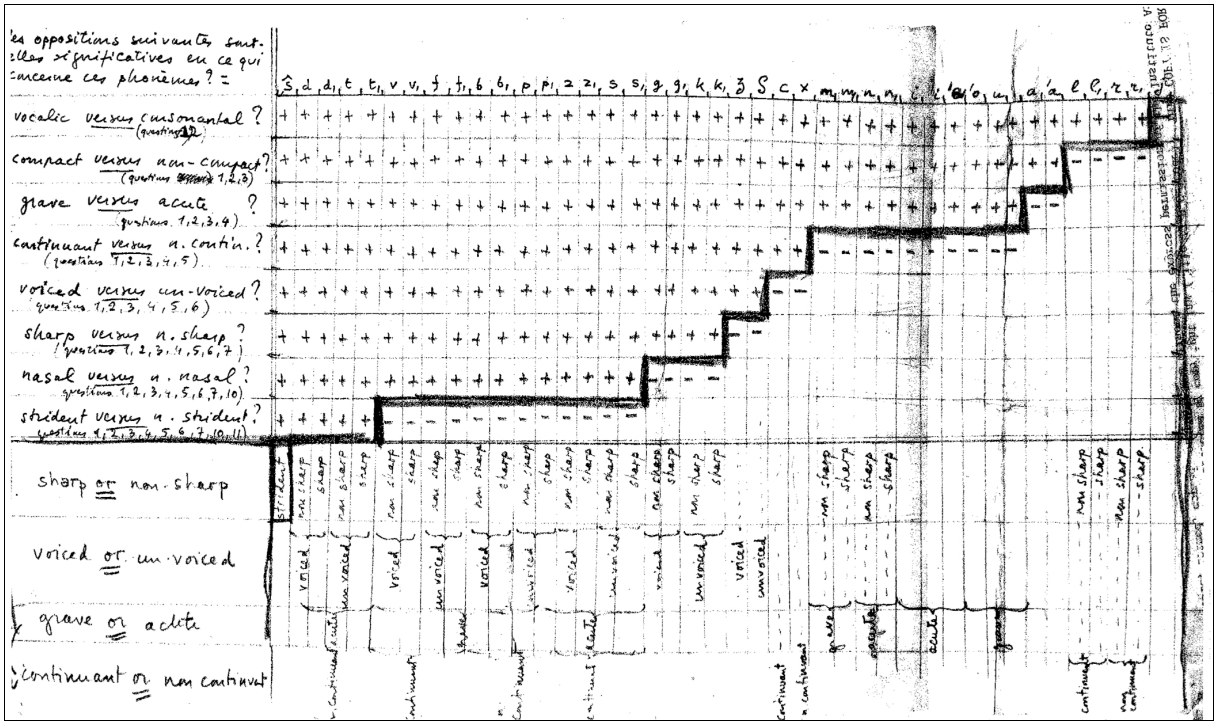


Figure Three: Claude Lévi-Strauss' revision of Jakobson's phonemic analysis chart, according to a simplified binary system of analysis (RJP)

Engineering Bricolage

Perhaps because of objections to his invocations of cybernetics or distinctions of terminology, Lévi-Strauss reduced his references to cybernetics and information theory from 1955 onward. As is often the case in transatlantic, transnational, and trans-disciplinary dialogues, popularization seemed to proceed in inverse proportion to the visibility of the problematics, contexts, and debates that shaped his research. By the time he assumed a prestigious chair in social anthropology at the Collège de France in 1960, Lévi-Strauss was celebrated as a leading figure in French social scientific thought. His dissertation, *The Elementary Structures of Kinship,* was a widely-lauded but little-read text, a fact that tended to obscure the depth of his commitment to re-reading British and American ethnographic methodology. Indeed, it was his original re-interpretation of "French" traditions of research, such as Saussure and Mauss, as well as his close connection to Jakobson—the Prince of Prague with Russian roots—that defined his intervention with the French academy and the grand traditions of social science. His 1962 masterpiece of structural analysis, *The Savage Mind,* reinforced this intellectual positioning through its dedication to Maurice Merleau-Ponty and a brilliant critique of Jean-Paul Sartre that dominated its conclusion. *The Savage Mind* presented the vision of a major thinker at home in French thought rather than a wartime exile returned from abroad.

But if cybernetic instruments and equations had receded from the center stage, informational analysis—now carried out poetically, connotatively, and allusively—remained the elusive *topos* of *The Savage Mind.* Recapitulating his earlier readings of Mauss on gift-giving and Jakobson on language as code, Lévi-Strauss contended modern and primitive cultures alike were organized around a complex system of informational "codes" that bridged logical

contradictions in symbolic systems. The celebrated contrast between the moderns and the primitive also recapitulated cybernetic themes: for Lévi-Strauss, moderns reasoned according to a "science of the abstract" based upon theoretical, instrumental, and mathematical precision as exemplified in the figure of the engineer, while primitives, in contrast, employed a "science of the concrete" embodied in a bricolage that fashioned from materials at-hand—flowers, plants, kinship arrangements—an alternate but equally valid form of reasoning. Lévi-Strauss not only "represented" this distinction, but also performed it by relying upon cybernetic and theoretical concepts of "code" to make "savage" cultures intelligible to the Western reader.

Anticipating objections to this extension of information theory to messages operating outside an engineered communication system, Lévi-Strauss explained that

> [i]t will be objected that there remains a major difference between the thought of primitives and our own: Information Theory is concerned with genuine messages, whereas primitives mistake mere manifestations of physical determinism for messages....Information Theory has been generalized [however], and it extends to phenomena not intrinsically possessing the character of messages, notably to those of biology....[117]

For those who would object to Lévi-Strauss' generalizations as speculative or non-scientific, he thus pointed back to information theorists who had found applications for their research in new domains such as molecular biology.[118] As for the legitimacy of molecular biology and information theory—and here was the most structuralist aspect of the reading—Lévi-Strauss referred back to primitive practices of organizing the world into messages and signs.

Behind Lévi-Strauss' poetry, synthetic ingenuity, and theoretical bravado was the condensed expression of more than two decades of scientific, institutional, and political activity.

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117 Claude Lévi-Strauss, *The Savage Mind* (Chicago: The University of Chicago Press, 1966), 268.

118 For more on this generalization see Lily Kay, *Who Wrote the Book of Life?: A History of the Genetic Code* (Stanford: Stanford University Press, 2000).

At the center of the entire text was a concept of cultures as singularly diverse systems constituted by an immanent and internal system of differences and defined in their specificity through contrast with other such systems-of-difference. Conflicts between systems could be reduced to (complementary) modes of intelligibility. This conceptualization itself resided upon his earlier construction of Maussian ethnography and American cybernetics as complementary modes of analysis. In this way, *The Savage Mind* suggested the possibility of reconciling "savage" and "modern" cultures while reconciling "traditional" French ethnography with the "modern" findings of information theory.

The results of Lévi-Strauss' procedure are paradoxical and enticing. At the very moment when models of information theory and cybernetics came to dominate his conceptual framework, he looked beyond them to find out precisely what they were and how it worked. In this regard, the "savage mind" was not merely revealed by information theory; much more, information theory itself came to be affirmed by the "savage mind." As Lévi-Strauss put it in his rousing conclusion—where he treats animals, plants, and other aspects of the natural world as a system of obscure signs—the "savage" mind had discovered "principles of interpretation whose heuristic value and congruence with reality have been revealed to us [Westerners] only recently through the invention of tele-communication, computers, and electronic microscopes."[119] Lévi-Strauss explained that after centuries of division between "civilized" and "savage" man, the tools of the former had at last verified the intuitions of the latter. "The entire process of human knowledge," he declared, "thus assumes the character of a closed system."[120]

119 Translation modified. Claude Lévi-Strauss, *La Pensée Sauvage* (Paris: Plon, 1962), 356; cf. the English translation, Lévi-Strauss, *The Savage Mind*, 268.
120 Lévi-Strauss, *The Savage Mind*, 269.

Instruments were gone, but the instrumentality of the cybernetic apparatus pervaded the analysis nonetheless. Mathematical procedures, diagrammatic strategies, and technologies serving as material aids or guides to research in the formative years of structuralism now morphed into immaterial ideals that transcended historical, political, and ethnic difference. But whereas Jakobson's cybernetic apparatus furnished order and exchange-ability across the disciplines, Lévi-Strauss had—following almost two decades of work facilitating governmental and non-governmental programs of international exchange—expanded the apparatus to bridge modern historical and prehistorical primitive cultures. The Rockefeller Foundation's and UNESCO's instrumentalization of research communities around global science was therefore, via cybernetic ethnography, transformed into a generalization of scientific reason to all cultures, even those that were pre- or non-scientific.

Lévi-Strauss' analysis would, however, be haunted by the asymmetry of the scientific programs it sought to assimilate. On the surface, he had wed the values of French and American technocracy. The universality of reason paired with technologies of communication was to give birth to a culture that transcended the very differences and alterities that founded the union. But he might have learned another lesson: much like the railroads that carved up American countryside in the 19th century, communications not only aimed to neutralize old antagonisms, but they also founded the possibilities of new antagonisms. The communities that convened around common conventions and techniques—be they scientific, economic, or political—found in their commonality opportunity and occasion for articulating new differences. It is to these differences and dissent enabled by Jakobson's and Lévi-Strauss' cybernetic structuralism that we now turn.

Five

Tirades in the Trading Zone:
Disarticulating the Cybernetic Apparatus

It would be a good thing to tidy up our vocabulary.
—Gregory Bateson speaking at the Macy Conferences on Cybernetics

In the problem of decoding, the most important information which we can possess is the knowledge that the message we are reading is not gibberish.
—Norbert Wiener, as quoted by Roman Jakobson *et al* in *Preliminaries to Speech Analysis*

Margaret Mead, one of the founding members of the Macy Conferences on Cybernetics once said of the group that attended the meetings:

> [We] were impressed by the potential usefulness of a [cybernetic] 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.[1]

Mead's description also characterizes the fate of cybernetics and information theory writ large from the mid-1950s through the mid-1960s. Following the initial enthusiasm over the possibility of founding a universal science based on cybernetics and theories of information, the major centers of cybernetic activity seemed to recoil from what collaboration had wrought. Journals such as the *IRE Transactions on Information Theory*, international conferences such as the

1 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, 1969), 2.

London Symposiums on Information Theory, and research centers such as MIT's proposed Center for Communication Sciences either collapsed or broke down into communities of mutually distrustful subfields and disciplinary specialties. With her reference to fragmentation, Mead signaled her own place within this story: Still faithful decades later to the dream of a universal science that transcended disciplinary and ethnic difference, she saw the failure of the cybernetic project as a process of breaking apart, as the fracturing and undoing of something that had been larger than any of its constituent parts.

This dissertation suggests another account of cybernetics: not as a grand unity that faltered, but instead as a tremendous diversity tenuously held together through strategic, political, and ideological factors. As World War II mobilization, technological change, and the Cold War redrew disciplinary, ideological, and ethnic boundaries, dislodging scholars from their traditional practices and environs, cybernetics provided a seemingly neutral apparatus for organizing a diversity of projects, scholars, and agendas around a common program. The instruments, theories, and procedures of communication engineering supplied technical resources. Private patrons such as the Josiah Macy, Jr. Foundation and the Rockefeller Foundation offered financial support.. The need to reorganize science in response to World War II and the Cold War generated an urgent political demand. Together these articulated what I have termed "the cybernetic apparatus," the legitimacy of which rested in part on older ideals of American liberalism that identified liberty and social cohesion with the orderliness of communication technologies. The constitutive disunity that characterized the cybernetic apparatus was counterbalanced by the new relations, exchanges, and identities conferred upon its components. Through cybernetics, American and French scientific communities, the natural

sciences, and the humanities—even the oppositions between technical instrumentation and the ineffable depths of the human spirit—were re-articulated, rearranged, and reconfigured.

This chapter will consider the fragmentation or disarticulation of the cybernetic apparatus from the mid-1950s onward. Because the actors relevant to this disarticulation are too numerous to treat individually, I will focus on three communities: American information theorists committed to Claude Shannon's definition of information, politically progressive theorists of language at MIT (especially Noam Chomsky), and French semioticians of a post-structural bent (including Jacques Lacan and Roland Barthes). Those groups' shared interest in scientific language and in the language of science makes for a fruitful comparison. Often these theorists—Shannon and Chomsky in particular—saw the disarticulation of cybernetics as a reassertion of local autonomy and disciplinary difference obscured by the exuberance of the cybernetic apparatus. While their comments and critiques often emphasized the recovery of an autonomy original to their research specialties, my account will emphasize a different aspect of the fragmentation: not the mere discovery or assertion of differences proper to the objects and domains under consideration, but rather the transvaluations which were enabled by the cybernetic apparatus, which in turn facilitated the articulation of these communities. I reject the claim occasionally propounded by information theorists, linguists, and proponents of French Theory that these movements never really had anything to do with one another. That claim is as damaging to our sense of history, science, and epistemology as cybernetics universalism was: In place of the false unity proposed by cybernetics, it retroactively constitutes the "origins" of fields in terms of their later achievements and distinctions.[2] Grappling with the diversity of cybernetics,

2 On this latter-day redefintion of cybernetics and information theory see Bernard Dionysius Geoghegan, "The Historiographic Conception of Information: A Critical Survey," *The IEEE Annals on the History of Computing* 30, no. 1 (2008): 66–81.

and developing a radical critique of techno-scientific discourses in which unity supplants diversity, demands conjoining a history of local differences with the more expansive context of the interrelations that ground and define those differences. How might these phenomena be considered in tandem, in order to provide a portrait of the transvaluations that occur between them?

As it happens, the problem of articulating and sustaining diversity in scientific communities has been an object of intense interest in the history, sociology, and anthropology of science and technology. Unfortunately most of these studies offer a richer account of cooperation than of the articulation and development (rather than "expression") of differences. Peter Galison's concept of the "trading zone," adapted from ethnographer Michael Taussig, is exemplary. Galison offers an account of admirable theorists, instrumentalists, and experimenters in physics establishing "shared meanings" through cooperation and collaboration in research that led up to and followed the Manhattan Project. But consideration of the cooperation established through shared technical means—use of digital computing is one example cited by Galison[3]—focuses our attention on research at the center of the laboratory, thereby limiting our consideration of the political apparatus invested in fabricating and deploying atomic weaponry. Taussig's original study, however, suggested a solution: misunderstanding. Specifically, Taussig examined how South American settlers' and natives' divergent beliefs about "neutral" financial currencies, particularly the fetishistic properties tribesmen attributed to currencies, illuminated the national and global patterns of capitalism active within a local trading zone. By focusing on mistake, dispute, and irrationality, it became possible to trace competing systems of meaning that

3 Peter Galison, "Computer Simulations and the Trading Zone," in *The Disunity of Science: Boundaries, Contexts, and Power*, ed. Peter Galison and David Stump (Stanford: Stanford University Press, 1996), 118–157.

extended beyond local and shared meaning. The result was a disarticulation of the faux neutrality of the trading zone and a new perspective for considering and critiquing global regimes in and through local considerations.

Taking this cue from Taussig, I suggest a modest supplement to the trading zone: The Tirading Zone.[4] This concept builds upon the existing literature while carving out a special place for the phenomena of conflict, complaint, and antagonism that mark the disarticulation of the cybernetic apparatus. If scientists in a trading zone put aside their distinct training and beliefs to locally agree on shared language, instruments, and practice, then scientists in tirading zones may be said to promote factional consolidation and assert the incompatibility of respective belief systems and research contexts.[5] The peculiar value of tirading zones, from a historiographic perspective, derives from participants' rejections of the neutrality of shared discourse and conventions. If normal science restricts its attention to the results made possible by an agreed-upon conceptual framework, tirading zones represent abnormal science: science that is characterized by an effort at discourse pertaining not only to results but to the general frameworks of analysis as well. Another characteristic that distinguishes a tirading zone from normal scientific practice is the tirading zone's frequent recourse to moral or ethical criteria as well as ironic, parodic, and derisive styles of discourse. Within the tirading zone opponents are

4 This concept also borrow's from Stuart Hall's essay on encoding and decoding, which was itself a critical or "negotiated" reading of the informatic and cybernetic discourse then prevalent in communication theory. See *Encoding and Decoding in the Television Discourse* (Birmingham, England: Centre for Cultural Studies, University of Birmingham, 1973).

5 Others have also gestured toward the potential of trading zones to promote dispute. On how NASA's "organizational processes, taking the form of trading zones designed to bridge differences, actually exacerbated them," see Diane Vaughn, "The Role of Organization in the Production of Techno-Scientific Knowledge," *Social Studies of Science* 29, no. 6 (1999): 218. On how transdisciplinary work in mathematics ultimately produced sharper alienation and delineation among research communities, see Walter G. Vincenti and David Bloor, "Boundaries, Contingencies and Rigor," *Social Studies of Science* 33, no. 4 (2003): 469–507. For a brief treatment of an "adversarial trading zone," see Michael E. Gorman, "Levels of Expertise and Trading Zone: A Framework for Multidisciplinary Collaboration," *Social Studies of Science* 32, no. 5/6 (2002): 933–938.

guilty of something that, in scientific terms, is worse than being false: They are unreasonable.[6] When developed within a larger trading zone, the tirading zone articulates regional, partisan, or local values against a purportedly false or inadequate neutrality of the broader trading zones. In this way, the tirading zone is neither independent from nor unilaterally opposed to the trading zone, but instead a kind of counterformation within or parasitical feature of the trading zone. Variant readings that simply articulate new subfields without calling into question the values of the broader field would not constitute tirades, but the presence of moral, ironic, or parodic rhetoric within a variant reading likely indicates the presence of a tirading zone.

Coordinating Action through Disbelief

Concepts of information emerged as a key site for conceptual divergence.[7] Terms such such as information and communication invited confusion and dispute, and methods of understanding or using a machine often varied, but no element in the cybernetic apparatus invited as much debate as the word itself, *information*. Its everydayness invited interest and commentary from all directions. Consider the 1950 London Symposium on Information Theory, which drew psychologists, linguists, and engineers from around the world, including Shannon, Colin Cherry (who worked with Jakobson and contributed to one of Lévi-Strauss's UNESCO publications), and Donald MacKay. Engineer Dennis Gabor, for example, opened the conference

6 To be more specific: Errors and falsehoods can be corrected so long as a shared concept of reason prevails. To err is human, to be unreasoning is (potentially) to fall afoul of the scientific community itself.

7 See, for example, N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), chap. 3; Ronald Kline, "What Is Information Theory a Theory Of? Boundary Work Among Scientists in the United States and Britain During the Cold War," ed. W. Boyd Rayward and Mary Ellen Bowden, The History and Heritage of Scientific and Technical Information Systems: Proceedings of the 2002 Conference, Chemical Heritage Foundation (Medford, New Jersey: Information Today, 2004), 15–28; and Mark B. N. Hansen, *New Philosophy for New Media* (Cambridge: MIT Press, 2004), chap. 2. See also Mathieu Triclot, *Le Moment Cybernétique: La Constitution De La Notion D'information* (Seyssel: Champ Callon, 2008).

by declaring that "coding theory," the branch of research with which Shannon was most closely associated, was only a minor and marginal branch of the "larger physico-philosophical framework, which [had] been given the general title of 'Information Theory,'"[8] and which included psychology, thinking machines, and human behavior. Cherry traced the genealogy of information theory through the habits of ancient Roman shorthand writing, the philosophy of Leibniz, and the research of Ivan Pavlov.[9] Phonetician Donald Fry related it to the work of Saussure.[10] In discussions Shannon gamely joined debates over the brain, language, and alternate definitions of communication, but in characteristic form sought to restrict and narrow the field for semantic debate, arguing that:

> In any branch of applied mathematics, the vague and ambiguous concepts of a physical problem are given a more refined and idealized meaning...."Information" here, although related to the everyday meaning of the word, should not be confused with it. In everyday usage, information usually implies something about the semantic content of a message. For the purposes of communication theory, the "meaning" of a message is generally irrelevant; what is significant is the difficulty in transmitting the message from one point to another.[11]

Shannon's comments—and the contextual debate and confusion regarding interdisciplinary and international trading zones more generally—revealed the somewhat ex-centric nature of definitions of information. While Shannon sought to define "meaning" as extrinsic to "information," the meaning of information itself was to be defined in opposition to and as distinct from other concepts of information. The meaning of information could not simply be asserted—instead, it had to be articulated, in contrast to everyday usages of the term.

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8 D. Gabor, "Communication Theory, Past, Present and Prospective," *I. R. E. Transactions on Information Theory* 1, no. 1 (1953): 4.

9 E. Cherry, "A History of the Theory of Information," *I. R. E. Transactions on Information Theory* 1, no. 1 (1953): 22–43.

10 Donald Fry, "Communication Theory and Linguistic Theory," *I. R. E. Transactions on Information Theory* 1, no. 1 (1953): 120–124.

11 Claude Shannon, "Communication Theory--Exposition of Fundamentals," *I. R. E. Transactions on Information Theory* 1, no. 1 (1953): 44.

Personal and professional relationships cultivated over the course of years, as well as shared institutional and national backgrounds, partially managed disputes at the Macy Conferences on Cybernetics (1946-1953). Despite that, debates over the definition of information and associated terms were commonplace. At one point Shannon declared, "I think perhaps the word 'Information' is causing more trouble in this connection than it is worth, except that it is difficult to find another word anywhere near right."[12] Literary critic N. Katherine Hayles has examined the debate at the Macy Conferences over Claude Shannon's definition of information (as an ideal entity for exact reproduction) versus engineer Donald MacKay's definition of information (as an embodied and contextual entity resulting from a transactional process). Limited to the laboratory of engineers at Bell Labs this might have remained a "technical" debate restricted to the practical dictates surrounding a common task. But as the concept of information was extracted from the laboratory and transformed into a "general" theory of communication, behavior, or ontology, it quickly grew into an object of philosophical, ethical, and social debate. Following one of Shannon's presentations, John Stroud of the US Naval Electronic Laboratory warned that any findings would be contaminated "by the particular set of decisions that were made...at the beginning, and it is rather dangerous at times to generalize," and noted that Shannon's initial distinction between noise and information might have distorting effects when generalized, for example, to human behavior. Hayles clarifies:

> As Stroud realized, Shannon's distinction between signal and noise had a conservative bias that privileges stasis over change. Noise interferes with the message's exact replication, which is presumed to be the desired result. The structure of the theory implied that change was deviation and that deviation should be corrected.[13]

12 In the discussions of Donald MacKay, "In Search of Basic Symbols," in *Cybernetics: The Macy-Conferences 1946-1953 = Kybernetik*, ed. Claus Pias (Berlin: Diaphanes, 2003).

13 Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*, 63.

More precisely, under conditions where technological conceptions of communication were de facto relevant for generalization to other domains, Shannon's theory may be construed to have a conservative tendency. From this perspective, Shannon's theory sought to preserve and restore an existing state of affairs. Likewise, Steve Heims argues that the reconstruction of human suffering in technocratic and functionalist terms had a conservative tendency.[14] According to cybernetic parlance, poverty, revolution, and inequality were problems of inadequate homeostasis, feedback, and exchange within a communication system.

Due to growing tensions (and ennui) among some of the members, the Macy Conferences held their final meeting in 1953 and the forums for cybernetic speculation shifted to other venues. Chief among those was MIT's Research Laboratory of Electronics (RLE), which hosted an elite community of engineers, sociologists, anthropologists, linguists, and administrators applying information theory and cybernetics to the natural and human sciences. Faculty, fellowships, conferences, workshops, and a stream of graduate students made the RLE into a engine for scientific networking and the development of new research programs. Among those who worked at the RLE during the 1950s were Wiener, Jakobson, Cherry, Gabor, M. P. Schützenberger (the French information theorist who reached out to Wiener on Lévi-Strauss's behalf), Bavelas and MacKay of the Macy Conferences, Benoît Mandelbrot, and Noam Chomsky, to name only some of the scholars whose names have come up in this and previous chapters. The engineer Jerome Wiesner, who directed the RLE before ascending to the presidency at MIT, described the labs during this period:

> Fired up by Norbert Wiener's cybernetics, we explored the far-ranging implications of the concepts of information and communication theory; our interests ranged from man-made

14 Steve J. Heims, *Constructing a Social Science for Postwar America: The Cybernetics Group (1946-1953)* (Cambridge: MIT Press, 1991).

> communication and computing systems to the sciences of man, to inquiries into the structure and development of his unique nervous system, the phenomena of his inner life, and finally his behavior and relation to other men.[15]

As part of an effort to make the RLE the leading center of communication sciences, MIT recruited Jakobson and Claude Shannon to join its faculty in the mid-1950s (a topic partially addressed in the previous chapter). Both men were appointed to the positions on the governing board for the proposed Center for Communication Sciences, a major initiative aimed at uniting the universities' myriad activities in communication research. But when Shannon arrived the great cybernetic synthesis was in decline. Laboratories, courses, journals, and lectures were clustering less at the grand intersections of thought and more around tractable alleys.

The Professional Group on Information Theory, an association of engineers with strong connections to MIT's Research Laboratory of Electronics, decided to solicit public opinions on the proper limits for information theory. Their call was made public in the Institute of Radio Engineer's *Transactions on Information Theory,*[16] a journal which until then had considered information theory in the context of engineering, linguistics, cybernetics, physiology, prosthetic research, and a host of related fields. L. A. De Rosa, chairman of the Professional Group on Information Theory (PGIT)[17] stated the concern in an editorial entitled "In Which Fields Do We Graze":

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15 Jerome B Wiesner, "The Communication Sciences—Those Early Days," R. L. E.: 1946+20 (Cambridge: Research Laboratory of Electronics, 1964), 12. Courtesy MIT Archives.

16 Note that this journal was later renamed *The IEEE Transactions on Information Theory* and articles from the early years are sometimes indexed or cited with the newer name.

17 Professional groups were small committees in the Institute for Radio Engineers (IRE) charged with cultivating and guiding research in an assigned area. Although the PGIT membership had a decided bias toward MIT- and Bell Labs-affiliated American research, Segal suggests that the 1950 London Symposium on Information played a part in motivating in American-leaning PGIT. See Jérôme Segal, *Le Zéro Et Le Un: Histoire De La Notion Scientifique D'information Au 20e Siécle* (France: Editions Syllepse, 2003), 309; and Omar Aftab and Neelima Yeddanapudi, *Information Theory: Information Theory and the Digital Age*, vol. 12 March, 2007, 2001, http://web.mit.edu/6.933/www/projects_whole.html.

> The expansion of the applications of Information Theory to fields other than radio and wired communications has been so rapid that oftentimes the bounds within which the Professional Group interests lie are questioned. Should an attempt be made to extend our interests to such fields as management, biology, psychology, and linguistic theory, or should the concentration be strictly in the direction of communication by radio or wire?[18]

The heated responses almost inevitably conjoined epistemological, ethical, and technical concerns. In an indignant letter to the editor of the journal, Max Hoberman of Bergen Laboratories wrote, "The argument that the applications of information theory to other fields be left to specialists in those other fields is further evidence of the parochial attitude of scientists who forget that their field began as the investigation of all knowledge."[19] Another irate reader defended the fields' more promiscuous tendencies by declaring, "We have as little right to disown our products as to disown our physical offsprings [sic]."[20]

These debates brought into relief two contrasting styles of research, associated with Shannon and Wiener respectively. Wiener's work on cybernetics was founded upon analogies between human and machine information-processing mechanisms, which allowed formal similarities to trump internal and material specifics.[21] These analogies, once set in motion, could gradually annex wider fields, such as sociology, anthropology, or even a topic such as disaster planning. Shannon, by contrast, had narrowly defined what he termed "an engineering problem" which could be quantitatively specified, measured, and controlled through improved coding. His exclusion of semantics and extra-engineering applications directed researchers toward the development of rigorous proofs, instrumentations, applications, and improvements valid within

18 L. A de Rosa, "In Which Fields Do We Graze," *I. R. E. Transactions on Information Theory* 1, no. 3 (1955): 2.
19 Max Hoberman, "Comments on 'In Which Fields Do We Graze?'," *I. R. E. Transactions on Information Theory* 2, no. 2 (1956): 96.
20 Samuel Bagno, "Comments on 'In Which Fields Do We Graze?'," *I. R. E. Transactions on Information Theory* 2, no. 2 (1956): 96; ibid.
21 Ben Peters, "From Cybernetics to Cyber Networks: Norbert Wiener, the Soviet Internet, and the Cold War Dawn of Information Universalism" (Columbia University, 2010), chap. 1 (dissertation).

their local field of practice. His unpublished texts from the early 1950s on topics including psychoanalysis, philosophy, game theory, and automata, as well as an enthusiastic interest in Dianetics and the ideas of L. Ron Hubbard, indicate that Shannon also made extensive efforts to generalize his research, but he ultimately refrained from publishing work conceived within this wider framework.

Shannon made his sentiments on the matter known in an *IRE Transactions* editorial entitled "The Bandwagon." His comments marked the tirades' height of rhetorical sophistication. In cool, measured tones Shannon produced an objective measure of the field's present state, warning against its more promiscuous linguistic and disciplinary practices. "It will be all too easy for our somewhat artificial prosperity to collapse overnight when it is realized that the use of a few exciting words like *information*, *entropy, redundancy, do not solve all our problems.*"[22] Identifying foreign traders who had come to liberally speculate with his theory, Shannon explained:

> Workers in other fields should realize that the basic results of the subject are aimed in a very specific direction, a direction that is not necessarily relevant to such fields as psychology, economics, and other social sciences....[T]he establishing of such applications is not a trivial matter of translating words to a new domain, but rather the slow tedious process of hypothesis and verification. If, for example, the human being acts in some situations like an ideal decoder, this is an experimental and not a mathematical fact, and as such must be tested under a wide variety of experimental situations.[23]

Shannon charged devotees of information theory with appreciating local disciplinary practices, beliefs, and rituals associated with the engineering theories of communication engineering. Although the language of information theory permitted a facile translation of its technique from one field to another, Shannon was at pains to indicate this did not in itself obtain mathematical or

22 Claude E. Shannon, "The Bandwagon," *I. R. E. Transactions on Information Theory* 2, no. 1 (1956): 3. Italics in the original.

23 Ibid., 3.

empirical results. In short, while information operated devoid of meaning and isolated from context, *information theory* required understanding.

Having addressed the matter of foreign traders running up information theory's currency abroad, Shannon turned his tirade upon domestic traitors devaluing its currency at home. Slyly hinting at what he considered their immoderate and unjustified opining, Shannon declared: "We should now turn our attention to the business of research and development at the highest scientific plane we can maintain. Research rather than exposition is the keynote, and our critical thresholds should be raised."[24] With regard to the disciplinary practices of both individuals and communities, Shannon asserted: "Authors should submit only their best efforts, and these only after careful criticism by themselves and their colleagues."[25] This "thoroughly scientific attitude" would create "real progress in communication theory and consolidate our present position." Shannon's invocations firmly inscribed a skeptical disbelief regarding promises and proposals freely circulating within informational trading zones.

In the next issue of *Transactions*, Wiener offered his own response, aptly titled "What Is Information Theory?"[26] Unlike Shannon, Wiener had developed information theory coextensively with biology and physiology, actively encouraged its application in other fields, and occasionally suggested the theory's broader continuity with such areas as philosophy, history, and literary criticism. Wiener couched his analysis in impassioned tones that immediately called to mind the conjunction of ethical and epistemological problems within the debate:

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24 Ibid.
25 Ibid.
26 Norbert Wiener, "What Is Information Theory?," *I. R. E. Transactions on Information Theory* (June 1956): 48.

> I am pleading in this editorial that Information Theory...return to the point of view from which it originated: that of the general statistical concept of communication....What I am urging is a return to the concepts of this theory in its entirety rather than the exaltation of one particular concept of this group, the concept of the measure of information into the single dominant idea of all.[27]

Strongly rejecting Shannon's narrow focus on differentiations distinct to the engineering problem, Wiener insisted that "information" remain part of a larger indissociable ensemble including all the sciences. In return, he offered the tantalizing promise that "all branches of science" might fall under communication theory. In typical Wienerian form, this became a problem of modern life and epistemologies: "In my opinion we are in a dangerous age of overspecialization...I hope that the *Transactions* may steadily set their face against this comminution of the intellect."[28] Equating specialization with intellectual degradation, Wiener sought to frame his opponents as mere technicians who substituted technical efficiency for ethical and holistic reflection.

Shannon's exclusionary counsel won the day. Members of the PGIT and the editors at *IRE Transactions on Information Theory* put aside the question "What is information theory?" in favor of "the slow tedious process of hypothesis and verification."[29] Editors urged authors toward narrowed research subjects that could be mastered through mathematically guided engineering. In subsequent years publishers occasionally returned to the topic in tones that mocked would-be universal information theorists. In an acidic 1958 editorial, Peter Elias, then a leading editor at the journal and a researcher at MIT's RLE, took the unusual step of describing two imaginary papers that "have been written so often, by so many different authors under so many different titles, that they have earned editorial consideration."[30] The first such paper, which he dubbed

27 Ibid.
28 Ibid.
29 Peter Elias, "Two Famous Papers," *IRE Transactions on Information Theory* 4, no. 3 (1958): 99.
30 Ibid.

"Information Theory, Photosynthesis, and Religion," cataloged the list of conceptual, discursive, and technical affinities between the fields named in its title and suggested directions for future research. With bitter irony he noted that the imaginary author "has been anxious not to clutter his mind with such details as the state of knowledge in the field, what the central problems are, how they are being attacked, et cetera, et cetera, et cetera."[31] According to Elias:

> There is a constructive alternative for the author of this paper. If he is willing to give up larceny for a life of honest toil, he can find a competent psychologist and spend several years at intensive mutual education, leading to productive joint research. But this has some disadvantages from his point of view. First, psychology would not be placed on a sound scientific base for several extra years. Second, he might find himself, as so many have, diverted from the broader questions, wasting his time on problems whose only merit is that they are vitally important, unsolved, and in need of interdisciplinary effort.[32]

Although Elias's ironic commentary sought to estrange and ridicule, it is worth recalling that it aimed not at strangers to the field but close collaborators. At the time Wiener himself, who a few years later would publish a widely noted book on cybernetics and religion,[33] was among Elias's colleagues. Where empirical or technical debate was not enough, the tirade invoked the values of scientific modesty and community by mocking opponents' prospective excesses. Parodic treatments of opponents and their values established a set of situated, modest, and well-defined values for Elias's nascent field.

After Elias's intervention, articles on linguistics, biology and artificial intelligence, and "other" fields gradually disappeared. More specialized research proliferated, as well as alternate publishing formats such as "correspondences": short articles that incisively critiqued and expanded upon recently published articles.[34] These repetitions and entrenchments were

31 Ibid.
32 Ibid.
33 Norbert Wiener, *God and Golem, Inc.: A Comment on Certain Points Where Cybernetics Impinges on Religion* (Cambridge: MIT Press, 1964).
34 See, for example, E. Riekeman, "Determination of Redundancies in a Set of Patterns (Corresp.)," *IRE Transactions on Information Theory* 3, no. 2 (June 1957): 167.

complemented by progress reports and tutorials that summarized the best research, divided the field into manageable subfields, and pointed out areas for future innovation.[35] Bit by bit these Shannon-style dissections and distinctions cut Wienerian speculation and synthesis into its smallest constituent parts. On the occasion of *Cybernetics*' second edition in 1961, a reviewer for *Transactions* slyly commented, "It is...not so much the great mathematician Wiener we meet in this book, as the man of universal knowledge for whom the unity of science is still a reality." The reviewer also predicted such men's imminent extinction: "Cybernetics covers so wide a field that few symposia nowadays try to cover the whole of it. Those that do have to divide into special sections very soon."[36]

If one of the major appeals of cybernetics and information theory was their promise as "technologies of liberalism" suited to liberating discourse across disciplines, regions, and cultures, Shannon and his peers had invoked another set of liberal values that could be traced to the foundations of Anglo-American science. Those on the side of Shannon and his proponents almost uniformly invoked scientific norms (modesty, plain speech, and expertise) with roots in seventeenth-century experimentalism. As John Stuart Mill put it almost two centuries later in the *System of Logic*, scientific terms should convey "a determinate and unmistakable meaning,"[37] and it was the task of scientists to develop the precise definitions that would allow them to compare results. In offering exaggerated portraits of their discursive rivals as loose thinkers plagued by vague analogies and responsive to no particular community of experts, these critics underscored their own moral virtues. Recalling Boyle's dispute with Hobbes—famously

35 See, for example, Peter Elias, "Progress in Information Theory in the USA, 1957-1960," *IRE Transactions on Information Theory* 7, no. 3 (July 1961): 128 –144.

36 F. Stumpers, "Review of 'Cybernetics, or Control and Communication in the Animal and the Machine' (Wiener, N.; 1961)," *Information Theory, IRE Transactions On* 8, no. 4 (1962): 332.

37 John Stuart Mill, *A System of Logic, Ratiocinative and Inductive: Being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation* (New York: Harper & Brothers, 1850) book four, chap. six.

recapitulated by Shapin and Schaffer in *Leviathan and the Air-Pump*[38]—Shannon and his allies offered an alternate style of reason which compensated for what it lacked in universality by furnishing a higher level of certainty, precision, and community. In classic experimentalist tradition, at its center was a group of like-minded and reasonable men who, if nothing else, could be reliably trusted as bearers of truth.

Linguistics' *Raison d'Etre* and Chomsky's *Etre de Raison*

It was not only engineers who expressed discontent with the cybernetic trading zone; researchers in human sciences also expressed discontent. However it was not some mythical humanist in the library or ivory tower, ruffled by the imposition of instruments and engineers, who launching the most attacks. Rather, it was researchers inscribed within the apparatus who used their proximity and intimacy with the rules of the trading zone to re-articulate and ultimately distinguish the specificity of their own fields. Typically these were mathematically inclined and technically informed humanists—a category that could include engineers—who deployed critical strategies in a manner reminiscent of the information theorists. For example, philosopher Hubert Dreyfus and computer scientist Joseph Weizenbaum—both professors at MIT—criticized the attempt to model natural language as a stochastic process.[39] Not content to restrict their criticism to matters of fact and terminology, they argued that their colleagues deployed a style of mathematical and instrumental reason that was epistemologically and

38 Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985).

39 Following the publication of a number of scientific articles along these lines in the 1960s, Joseph Weizenbaum summarized his critiques in *Computer Power and Human Reason: From Judgment to Calculation* (San Francisco: W. H. Freeman, 1976). Hubert L. Dreyfus developed his critique during the 1960s and 1970s and summarized his arguments in *What Computers Can't Do: The Limits of Artificial Intelligence* (New York: Harper & Row, 1979).

ethically misguided. Dreyfus's Heideggerrian critiques of artificial intelligence are well known, as are his claims that human reason is necessarily embodied and experiential. Less well-remembered are the proximate and practical origins of this critique. His initial target was the technocratic style of reasoning prevalent in American research funded by foundations and the military after World War II. As it happened, some officials in the United States military shared his skepticism regarding the proliferation of technocratic expertise, including one official who invited Dreyfus to prepare an official report on the shortcomings of artificial intelligence (AI) and related research programs. With funding from the RAND Corporation—one of the leading proponents of cybernetic-style analysis—Dreyfus authored "Alchemy and Artificial Intelligence."[40] Like Shannon, he inventoried what he saw as a number of technical and methodological errors on the part of AI-enthusiasts. But he went beyond this critique to suggest that AI researchers were modern-day alchemists who forewent cool scientific analysis and reasoned dialogues with critics in favor of pursuing fantastical and irrational endeavors.[41]

In the early 1960s Weizenbaum had built machines capable of generating passable simulations of natural language using stochastic processes like those studied by Jakobson and his colleagues. By the mid-1960s Weizenbaum was disillusioned by what he saw as the willingness of his colleagues and the public to draw sweeping conclusions about human understanding and reason from these simulations. He summarized his views in *Computer Power and Human Reason*, a broadside pitched at both scientific and general audiences.[42] He charged researchers in "human and social engineering" with "circumventing all human contexts, especially those that

40 Hubert Dreyfus, *Alchemy and Artificial Intelligence* (Rand Corporation, 1965), www.rand.org/pubs/papers/2006/P3244.pdf. For more on the Rand Corporation during this period, and especially its involvement with cybernetics, see Jennifer S. Light, *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America* (Baltimore: Johns Hopkins University Press, 2003).

41 Dreyfus, *Alchemy and Artificial Intelligence*, esp. 82–87.

42 Weizenbaum, *Computer Power and Human Reason: From Judgment to Calculation*.

give real meaning to human language,"[43] and alleged that such elisions lead inexorably to scientists' uncritical collaboration and collusion with the military-defense complex. Weizenbaum suggested that a return to "living truth" and authentic "human standards" was needed in society and in science.[44]

The most formidable critique came from Noam Chomsky, then a young and ambitious linguist at the Research Laboratory of Electronics. Chomsky and Weizenbaum were friends and the former shared with his colleague, Shannon, an especial interest in automata theory. In addition, Chomsky claimed that it was through Jakobson's friendship and encouragement that he pursued a career in linguistics.[45] Despite this, Chomsky resisted the scientific and intellectual coterie assembled around Jakobson and during the 1950s. Part of his resistance seems to have stemmed from a constitutional aversion to the synthesis of cybernetics and linguistics underway in Cambridge. He termed this synthesis "harmful," alleging that it led researchers to focus on "problems suggested by the available technology, though of little interest and importance in themselves."[46] In *Language and Mind* he illustrated this point with an anecdote:

> I recall being told by a distinguished anthropological linguist, in 1953, that he had no intention of working through a vast collection of materials that he had assembled because within a few years it would surely be possible to program a computer to construct a grammar from a large corpus of data by the use of techniques that were already fairly well formalized. At the time, this did not seem an unreasonable attitude, though the prospect was saddening for anyone who felt, or at least hoped, that the resources of human intelligence were somewhat deeper than these procedures and techniques might reveal.[47]

43 Ibid., 266.
44 Ibid., 261, 266.
45 Noam Chomsky, "[Untitled]," in *A Tribute to Roman Jakobson, 1896-1982* (Berlin: Mouton, 1983), 81–84.
46 Cited in Margaret A. Boden, *Mind as Machine: A History of Cognitive Science, Volumes 1-2* (Oxford: Oxford University Press, 2006), 673.
47 Noam Chomsky, *Language and Mind* (Cambridge: Cambridge University Press, 2006), 2.

Often cool and reserved in his writing, in the 1960s Chomsky would characterize the proponents of universalizing cybernetic and informatic theories with uncharacteristic disdain and moral opprobrium. About the study of linguistics at the RLE in the 1950s he wrote with sarcasm: "There were few so benighted as to question the possibility, in fact the immediacy, of a final solution to the problem of converting speech into writing by available engineering technique," noting that it was widely believed that information theory "would unify the social and behavioral sciences and permit the development of a solid and satisfactory mathematical theory of human behavior on a probabilistic basis."[48]

Chomsky is perhaps best known for his 1957 book *Syntactic Structures*,[49] in which he demonstrated that stochastic series—of the sort employed by Jakobson and his colleagues—could not account for decisive aspects of linguistic structure. At the time his findings were like a bombshell at the RLE: Even a skeptical theorist such as Claude Shannon privately nursed hopes that the stochastic methods of information theory would cast light on language, psychiatry, and the structure of the human mind. More speculative theorists, such as Warren Weaver, Norbert Wiener, and John McCarthy, as well as quite a few linguists and psychologists, took it for granted that cybernetics and information theory would sooner or later crack the codes of human language and cognition. Chomsky's approach did not simply reject that assumption: It used the results that could be generated from such an approach to generate patently absurd sentences. Using these negative examples, Chomsky posited that an innate "generative grammar" structured all human languages, as well as the acquisition and patterning of any particular language. Statistical analysis, behaviorist paradigms, and structural accounts of phonemic series could

48 Ibid., 3.
49 Noam Chomsky, *Syntactic Structures* (Paris: The Hague, 1957).

accumulate and analyze endless variants of sentences, but without a grammar key aspects of semantics and syntax would remain obscure, as would the ability of humans—even children—to generate new and entirely novel sentences on the fly. Chomsky identified the optimal basis for research and analysis not as acoustic machinery, computational devices, or elaborate spectrograms, but as native speakers' innate capacity for generating sentences. With only paper and pencil—in principle, even without that—any native speaker could "generate" a sentence and produce explicit, rule-bound theories for explaining the grammar that structured that sentence, made it correct, and enabled the systematic learning of the relevant language.

Through contrast and opposition to cybernetic reasoning, Chomsky had generated a breathtakingly precise and well-defined account of language and, ultimately, the human mind. His critique also applied and adapted the claims of structural linguistics, a task for which he found an ally in Morris Halle, Jakobson's coauthor and collaborator in the informatics studies cosponsored by the Rockefeller Foundation. Although once enthusiastic about his informatics research with Jakobson, Halle felt after a few years that there was little to show for the vast amounts of effort put into statistical studies of language.[50] In 1956, he, Chomsky, and their RLE colleague named Fred Lukoff coauthored a text entitled "On Accent and Juncture in English"[51] for a *Festschrift* dedicated to Jakobson. By reconsidering Jakobson's and Trubetzkoy's accounts of "distinctive features" from the perspective of generative grammar, this paper extended a key component of structural linguistics—the focus on differential distinctions in spoken sounds—even as it gutted the central conceptual and methodological principles that guided Prague-style research. Specifically, Chomsky and his co-authors maintained that phonemic analyses were only

50 Morris Halle, personal communication with the author.

51 Noam Chomsky, Morris Halle, and Fred Lukoff, "On Accent and Juncture in English," in *For Roman Jakobson: Essays on the Occasion of His Sixtieth Birthday*, ed. Morris Halle et al. (The Hague: Mouton, 1956), 65–80.

meaningful when subordinated to a hierarchical, grammatical system suitable to economical and rule-based description. This introduced new values of falsifiability and economy into structural analysis while arguing that reason and understanding—rather than distributed patterns and series of an elusive Saussurean *langue*—should guide description and interpretation. According to this new approach, both language and linguistic science needed to be reorganized around discrete, reasonable statements, wherein speakers and scientists alike operated as rational beings using language for the purpose of expression.

In a brilliant demonstration of how phonemic and grammatical analysis should be yoked together around the intention of speakers, the authors cited the phrase "light house keeper," arguing that it could be spoken in "three phonemically distinct ways" depending on whether the speaker wished to designate:

(a) a housekeeper who is light in weight
(b) a person who keeps a lighthouse
(c) a person who does light housekeeping[52]

The distinction between these three phrases resided in how the "stressed/nonstressed" distinctive feature was deployed. However the authors argued that merely recognizing and describing that feature demanded that the listener had competency in the language being spoken. A spectrograph was not enough. More importantly, explanation and analysis of that distinction demanded recourse to grammar as well as phonemic categories. Neither the classical Prague School approach nor information theory, with their emphasis on differential relations among series of sounds, was suited to this task. A generative grammar, by contrast, could formulate a distinct rule that took into account grammar and distinctive feature equally, while admitting experiment and falsifiability. The authors termed the result more "economical" and more general, on the grounds

52 Ibid., 66.

that it could simplify the rules for phonemic notation and also account for multiple levels within language: i.e., for the material facts of distinctive features as well as facts of grammar. This also led towards the ability to account for speakers' capacities to assign new stress patterns in predictable ways to new sentences.

The result was a transformation in phonemic analysis. Chomsky and Halle wrenched the analysis of distinctive features out of synchronic, diachronic, and poetic analysis, and effectively inscribed it within a history of reason and the human mind. Although patterns, rules, and change presupposed a language community, as in Saussurean *langue*, the central fact of the new analysis was a human mind. Phonemic analysis, in such a school of thought, would dispense with inventories of sound pattern in its myriad varieties and instead focus on a small subsection of distinctive features, such as stress, that cast light on grammar. Justifying their approach, the authors explained:

> We are not, in this work, concerned exclusively or even primarily with the facts of English as such. We are interested in these facts for the light they shed on linguistic theory (on what, in an earlier period, would have been called "universal grammar") and for what they suggest about the nature of mental processes in general. It seems to us [for example] that the gradations of stress [in contrast to other distinctive features] in English can be explained on the basis of very deep-seated and non-trivial assumptions about universal grammar and that this conclusion is highly suggestive for psychology....[53]

From the perspective of grammar, many rules about the patterns of distinctive features were arbitrary or idiosyncratic, while others—for example, the fact that a puff of air termed "aspiration" accompanies the pronunciation of the "t" in *tide* but not the "t" in *style*—conformed to rules that governed sound pattern throughout the language.[54] Still other rules of pronunciation

53 Ibid., viii.

54 I drew this example from James Alasdair McGilvray and B. Elan Dresher, eds., "Chomsky and Halle's Revolution in Phonology," in *The Cambridge Companion to Chomsky* (Cambridge: Cambridge University Press, 2005), 103. My own analysis has benefitted from Dresher's work, although our analyses may diverge.

could only be described in terms of semantics and syntax, as in the "light house keeper" example.

A superficial reading of the Chomsky-Halle intervention would suggest simply a more precise and accurate description of language, persuasive on account of an improved technique or method. But as the aforementioned references to economic and generalizable descriptions indicate, embedded within the intervention was a competing set of assumptions about reason. With compact elegance, Chomsky's claims that grammar trumped statistical series coincided with a claim about the nature of scientific inquiry itself as an activity of human reason. According to the authors, one advantage of presenting "a theory of a particular language in the precise form of a generative grammar...is that only such precise and explicit formulation can lead to the discovery of serious inadequacies and to an understanding of how they can be remedied."[55] This entailed correcting the inventorying procedures that guided the work of the neogrammarians, Saussure and Jakobson alike. As the authors explained:

> A system of transcription or terminology, a list of examples, or a rearrangement of the data in a corpus is not "refutable" by evidence...It is for just this reason that such exercises are of very limited interest for linguistics as a field of rational inquiry.[56]

Grammar, according to Chomsky and Halle, defined a problem both at the level of the sentence and in terms of linguistic as a rational science. As a criteria of analysis, it presupposed reason within the sentence, and also introduced constraints on what counted as reasonable and rational inquiry by the linguist studying that sentence.

The demand for clearly testable rules presumed that linguistic analysis must be inscribed within a community of like-minded practitioners with shared experimental standards. Similarly,

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55 Noam Chomsky and Morris Halle, *The Sound Pattern of English* (New York: Harper & Row, 1968), ix.
56 Ibid.

the insistence on a grammar that was both universal *and* peculiar to human beings drastically restricted the scope for linguistic inquiry. It created a new theory of language that ruled out the stochastic series of information theory as reliable models of natural language, and it also cast doubt upon the utility of the language of information theory for linguistic research. In imposing a definite structure that corresponded to syntax and semantics, it also ruled out appeals to a Saussurean *langue* constituted by series of oppositional differences with no positive terms. In their stead was a theory of human and scientific reason, wherein the individual mind's presentation of definite statements to others was the measure of language and linguistic science. Chomsky had given linguistics a new *raison d'être* by reconceiving language as the vehicle of an *être de raison*.

On the face of it, Dreyfus's invocation of the embodied lifeworld, Weizenbaum's celebration of a human and humane measure for technical accomplishment, and Chomsky's return to reason appeared to constitute very different strains of criticism. But at their core they resounded—albeit in distinct keys—with the same liberal scientific values upheld by their MIT colleagues Shannon and Elias. It was the task of a local community—bound by shared dialogue, united by similar standards of evaluation, and grounded in commitment to reasoned inquiry—to sustain the delicate work of constructing scientific facts. Abstract rationalization and speculation were rejected in favor of this local community of interlocutors and experimenters. Although often framed in the language of scientific method and rigor, this approach found its origins in an earlier set of scientific norms, especially those associated with seventeenth- to nineteenth-century experimental science and the Royal Society of London.[57] These norms themselves were founded upon and foundational to not only scientific practice but also concepts of liberal society and

57 Shapin and Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*.

governance elaborated most notably in Great Britain and the United States. Indeed, it was the close association between the concepts of liberal society and scientific reason that underlaid the Rockefeller Foundation's promotion of science as an agent for producing a rational global citizenry. The critiques of Shannon, Chomsky, Dreyfus and Weizenbaum severely qualified the ability of Jakobson and the Rockefeller Foundation to associate cybernetic research with the advance of liberal science and society.

The Fracturing of Reason

By the mid-sixties the cybernetic apparatus had fallen into disrepair. In the United States, scientists' enthusiasm over cybernetics' universal claims transformed into embarrassment over its proponents' unchecked hubris. The Rockefeller Foundation turned its efforts towards other initiatives. After the diatribes by Shannon and other engineers against the popularization of information theory, that field had narrowed its ranks to engineers focused on specialized mathematical analysis. Cybernetics and its founder, Wiener, fell into disrepute.[58] The Central Intelligence Agency tried to revive the field in the 1960s by channeling support through the Ford Foundation and the American Society for Cybernetics, but American cybernetics remained moribund.[59] Halle abandoned his efforts to apply information theory to natural language, and many years later Cherry admitted that the project had been a fool's errand.[60] Except for the publication of Cherry's *On Human Communication* (1957)[61], Jakobson's book series with the

58 See, for example, the already cited review Stumpers, "Review of 'Cybernetics, or Control and Communication in the Animal and the Machine' (Wiener, N.; 1961)."

59 Ronald R. Kline, "Cybernetics in Crisis: Reviving and Reinventing a Postwar Interdiscipline in the United States," *Isis*, forthcoming.

60 See Carol Wilder, "A Conversation with Colin Cherry," *Human Communication Research* 3, no. 4 (Summer 1977): 354–362. I have supplemented that source with information conveyed to me by Morris Halle via personal communications.

61 Colin Cherry, *On Human Communication: A Review, a Survey, and a Criticism* (Cambridge: MIT Press, 1957).

MIT Press never came to fruition. MIT administrators abandoned plans for the interdisciplinary Center for Communication Sciences around 1962.[62] The critiques of Chomsky, Dreyfus, and Weizenbaum, meanwhile, seemed to have fused a sense of ennui and moral disquiet with the desire for a cybernetically based science of man.

Rather than abandoning his commitment to a synthesis of cybernetics and linguistics, Jakobson doubled down. As informatic styles of analysis and instrumentation expanded into molecular biology, leading scientists such as François Jacob posited that life itself operated on the logic of informatic encoding, transmission, and decoding. Disregarding the critiques of his friends and colleagues at MIT, Jakobson pursued the new frontiers of disciplinary synthesis and parallelism suggested by an informatic approach to molecular biology.[63] For example, in a l967 lecture Jakobson said:

> Since our letters are mere substitutes for the phonemic pattern of language, and the Morse alphabet is but a secondary substitute for letters, the subunits of the genetic code should be compared directly with phonemes. Hence, we may state that among all the information-carrying systems, the genetic code and the verbal code are the only ones based upon the use of discrete components which, by themselves, are devoid of inherent meaning but serve to constitute the minimal senseful units.[64]

Jakobson's unabashed pursuit of informatic analysis down avenues rejected as unreasonable and irrational by mainstream American linguistics raises a critical question. By the standards of most American linguists, Chomsky had not only presented an alternate approach to linguistic analysis, but also demonstrated empirically and mathematically the errors of structural and cybernetic analysis. If one took Chomsky's critique as factual and technical, and accorded authority to the

62 One of the Jakobson's final correspondences regarding the center was in 1962. See Townes, letter to Jakobson, 7 Dec. 1962, box 3, folder 64. RJP.

63 Lily Kay, *Who Wrote the Book of Life?: A History of the Genetic Code* (Stanford: Stanford University Press, 2000), chap. 7.

64 Roman Jakobson, "Linguistics in Relation to Other Sciences," in *On Language*, ed. Linda R. Waugh and Monique Monville-Burston (Cambridge: Harvard University Press, 1990), 475.

expert decisions rendered by him and those of his scientific peers who had embraced the program of generative grammar and abandoned structural linguistics, then it would appear indeed that Jakobson had surrendered his commitment to understanding linguistics as a "rational" science.

But Jakobson's evolving approach was no simple error: It pursued a different set of scientific norms that held that analogies, the allusive, the poetic, and the connotative were foundational to science and to human reason.[65] Consider Chomsky's 1957 review of Jakobson and Halle's *Fundamentals of Language*. Commentaries on Chomsky's lengthy, detailed, and incisive criticism have largely focused on how the review anticipated his later work. Yet the first objection he made was, notably, not about rules, grammar, falsifiability, or economy. It was about something that links, orders, and conditions all of the above, and which was also of profound interest to Jakobson: style. According to Chomsky, the book was

> written in a rather picturesque and inexplicit style which, to me at least, presents a bar to comprehension. It is difficult to determine which statements are empirical hypotheses and which are true by definition, or just what conditions the authors require a phonemic transcription to meet.[66]

Although not characterized by any of the invidious, sardonic, or parodic rhetoric characteristic of a tirading zone, Chomsky's comment threw into relief the competing ethical values informing two styles of scientific reason. For Chomsky, economy, rules, and falsifiability corresponded to the values of the scientific community. The positing of grammar as the object of analysis facilitated particular definitions of scientific reason and inquiry *and* offered an image of language as the tool of a reasoning being. And while he used these principles to critique the application of

65 For more on cybernetics and analogy, see Peters, "From Cybernetics to Cyber Networks: Norbert Wiener, the Soviet Internet, and the Cold War Dawn of Information Universalism."

66 Noam Chomsky, "Review of Fundamentals of Language by Roman Jakobson and Morris Halle," *International Journal of American Linguistics* 23, no. 3 (July 1957): 234.

information theory or cybernetics to the analysis of language, his underlying model of reason also coincided with many of the assumptions held by would-be cyberneticians and information theorists. While Norbert Wiener, for example, never acknowledged the legitimacy of the critiques of information theorists or a linguist like Chomsky, his critiques of the use that anthropologists Margaret Mead and Gregory Bateson made of cybernetics coincided with Chomsky's objections: Scientific analysis, Wiener argued, must develop definite and falsifiable statements around precisely defined objects of investigation.[67]

Jakobsonian linguistics—shepherded forth on the eve of Russia's October revolution, brought to maturity in interwar Prague, and reimagined in the laboratories of postwar America—positioned itself as the site where the arts and sciences converged, and viewed logic and poetry as equal members in the science of language. In his early work in the Moscow Circle in the 1910s, Jakobson had already argued that the poetry of the Russian Futurists, through its use of patterning and imagery, provided insights into the fundamental laws of language.[68] His attempt during the 1930s to resolve the antinomy between synchrony and diachrony in Saussurean linguistics was founded in part on the presumption that language was, at its core, a unification (though not a dissolution) of differences.[69] His celebrated "Linguistics and Poetics" lecture, discussed in chapter three, assimilated elements of information theory for the purpose of integrating poetic analysis and the study of style into a rigorous, scientific approach to linguistic science. Throughout Jakobson's research, the use of evocative language in linguistic analysis

67 Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine* (New York: MIT Press, 1961), 24–25.

68 See for example his long essay "Modern Russian Poetry," written in 1919 in Moscow and published in 1921 in Prague as *Novejsaja russkaja poezija: nabrosok pervyj* (Tipografija Politika: Prague, 1921). See also discussion of this work in Victor Erlich, *Russian Formalism: History, Doctrine* (The Hague: Mouton, 1965).

69 See, for example, Roman Jakobson, "The Concept of Sound Law," in *Selected Writings I: Phonological Studies* (The Hague: Mouton, 1962), 2.

was not a defect in clarity but an evocation of the peculiar role of language in mediating a polyphony of converging cultural, disciplinary, and scientific concerns. As he put it in "Linguistics and Poetics," "poeticalness is not a supplementation of discourse with rhetorical adornment but a total re-evaluation of the discourse and of all its components whatsoever."[70] This approach recognized language as a site of grammatical articulation, but it refused to restrict linguistic analysis to that articulation alone.

The purview of such an analysis was scientific but it was not, ultimately, informatic or cybernetic in any exclusive sense. Jakobson's approach found resources within these fields—and the institutions of American science found a resource in Jakobson and his work—but he, too, could not hew closely to the increasingly oppositional and specialized zones being defined and disarticulated from cybernetics. His methods, oriented towards the styles, techniques, and procedures that constituted, transformed, and defined systems of signs, were as much semiotic as they were linguistic in nature. This perspective derived directly from Saussure, who, in his celebrated *Course on General Linguistics*, had asserted that linguistics itself was probably part of a larger science of semiotics:

> A language is a system of signs expressing ideas, and hence comparable to writing, the deaf-and-dumb alphabet, symbolic rites, forms of politeness, military signals, and so on. It is simply the most important of such systems.
>
> It is therefore possible to conceive of a science *which studies the role of signs as a part of social life.* It would form part of social psychology, and hence of general psychology. We shall call it *semiology*....It would investigate the nature of signs and the laws governing them. Since it does not yet exist, one cannot say for certain that it will exist. But it has a right to exist, a place ready for it in advance. Linguistics is only one branch of this general science.[71]

When Saussure inscribed linguistics within a general science of semiology that studies the laws

70 Roman Jakobson, "Closing Statements: Linguistics and Poetics," in *Style in Language* (Cambridge: MIT Press, 1960), 377.

71 Ferdinand de Saussure, *Course in General Linguistics*, ed. Charles Bally and Albert Sechehaye, trans. Roy Harris (Chicago: Open Court, 1986), 15–16.

governing diverse forms of communications, he invited new alliances with adjacent sciences. His conception of semiology spoke to a non-anthropocentric approach to language, an approach based on the dictates of "communication" rather than "man." It was the perspective on language that had enabled the alliance with cybernetics. Subsequently, as interest in structural linguistics and cybernetics waned in the United States, the semiotic approach yielded new methods abroad. As the anthropologist Claude Lévi-Strauss mounted the rungs of the French scientific hierarchy, and Jakobson and Lévi-Strauss's mutual friend Jacques Lacan made a name for himself within French psychoanalysis, they proselytized in the name of structural linguistics and communication science. Younger literary critics, such as Roland Barthes, scoured Jakobson's writings not only for insights into Saussure, but also for new scientific insights, forged in the laboratory, which would establish a semiotic science that comprehended fields such as psychology and mass communications. They courted Jakobson for friendship and letters of recommendation. In 1967, a group of graduate students at the *Ecole Normale Supérieure*, including Alain Badiou, solicited Jakobson's thoughts on "*la théorie des automates.*"[72] When Jakobson's old student from the Ecole Libre, Thomas Sebeok, launched the new journal *Semiotica* in 1969, its offices were in Bloomington, Indiana, and Paris, France, with the latter codirected by Julia Kristeva.[73] It is to the French course of structural theory—and the cybernetic apparatus—that we now turn.

The Technology of Psychoanalysis

As discussed in the last chapter, in France cybernetics was received with passion and intense criticism. Structuralists' alliance with cybernetic methodology excited harsh critiques

72 A. Badiou, J. A. Miller, J. C. Milner, and F. Fregnault to Jakobson. 27 December, 1967. Box 4, Folder 31. RJP.
73 Francois Dosse, *History of Structuralism: The Sign Sets 1967-Present*, trans. Deborah Glassman (Minneapolis: University of Minnesota Press, 1997), 129.

from Henri Lefebvre and other Marxist intellectuals, who likened Lévi-Strauss, Louis Althusser, and Michel Foucault to technocrats in the guise of philosophers.[74] The more incisive critiques, however, seemed to emerge from scholars who located their work within the operations of the cybernetic apparatus—among them, Lévi-Strauss's collaborator Jacques Lacan, the members of an institute for communications research established at the Ecole Pratique des Hautes Etudes, and a small group of philosophers at a new university located in the Paris suburbs and modeled on MIT, the University of Vincennes. These theorists, philosophers, and critics riffed on cybernetic rhetoric and exploited the fault lines of its structural analysis.

Among the earliest such critics was Jacques Lacan, who participated in the MIT-funded seminar on cybernetics considered in the previous chapter. For his 1954–1955 seminar, *The Ego in Freud's Theory and in the Technique of Psychoanalysis* (which could also be translated as *The Ego in Freud's Theory and the Technology of Psychoanalysis*), developed the year after his seminar on cybernetics with Lévi-Strauss. Lacan strategically adapted the premises of cybernetics, information theory, and game theory to put forth a novel approach to psychoanalysis that subordinated impersonal structures of symbolic association in favor of human subjectivity and interiority. For example, in a celebrated seminar Lacan reimagined Edgar Allen Poe's story "The Purloined Letter" as a game performed by a cybernetic automaton.[75] That automaton, which Lacan refrained from citing by name, was called *SEER*, short for **SE**quence **E**xtracting **R**obot. [Figure 1]. David Hagelbarger of Bell Labs developed the machine in collaboration with Shannon.[76] Lacan recounted how, rather than guessing whether human players would choose

74 See Henri Lefebvre, *Vers Le Cybernanthrope* (Paris: Denoël/Gonthier, 1971); and Dosse, *History of Structuralism*, 94.

75 My references are to the unabridged text from the original seminar. See Jacques Lacan, *The Ego in Freud's Theory and in the Technique of Psychoanalysis, 1954—1955*, trans. Sylvan Tomaselli (New York: W.W. Norton, 1988).

76 Although built and publicized in the early 1950s, the first comprehensive scientific treatment of the machine can

"even" or "odd," Hagelbarger's machine predicted if human players would choose "+" or "-." Due to humans' difficulty generating random numbers, the machine could make its predictions with impressive accuracy. By luring humans into a series of signs easily processed by machines, Hagelbarger and Shannon theatrically demonstrated how human "thought" is patterned and predictable. Later exhibited as an educational device, the SEER served as an object lesson in the distinctions between human and machine capacities.

Figure 1: Dr. David Hagelbarger of Bell Labs with the SEER
Image courtesy Dr. Hagelbarger

Lacan, by contrast, cited the machine and its results as evidence that human interactions are structured by an impersonal and nonsubjective symbolic order. In a detailed analysis that interwove a consideration of the machine with Poe's short story, he sought to show how human activity is structured by a symbolic order—represented in the story by a stolen letter that details a

be found in D. W Hagelbarger, "SEER, A SEquence Extraction Robot," *I.R.E. Trans. on Electronic Computers*, no. March (1956): 1–4; My own account of the machine is supplemented by personal communications with Hagelbarger. Annette Bitsch has also offered an account of this machine and Lacan's commentaries. See Annette Bitsch, "Kybernetik Des Unbewusstens," in *Cybernetics - Kybernetik 2: The Macy-Conferences 1946-1953*, ed. Claus Pias (Berlin: Diaphanes, 2004), 157–158.

woman's love affair. Through calculation, machinery, and mathematics, Lacan turned the story into a kind of combinatorial and topographic tale of how media—in this case, a missive gone astray—creates symbolic chains among those who have or would have the letter. The SEER, in Lacan's analysis, provided an instrumental verification: In eliciting "random" choices from its players, it compelled them to perform, unwittingly, patterns that became semipredictable through stochastic analysis. Ever the showman, he provided an in-class demonstration: a canny, low-tech demediation of SEER's high-tech remediation of the written word. Lacan handed two of his auditors pencil and paper. He exhorted them to quickly write out a series of "+" and "-" signs, which he would later submit to statistical analysis.[77] The students reluctantly agreed, but the mere structuring of their in-class activities by the operations and symbols of an absent, American computing machine had already proved that the cybernetic apparatus was operating at the heart of psychoanalysis.

Lurking within Lacan's appropriation of cybernetics was a devilish displacement and reinterpretation of its principles. Consider his commentary on the origins of information theory delivered in a seminar that same year:

> The Bell Telephone Company needed to economize, that is to say, to pass the greatest possible number of communications down one single wire. In a country as vast as the United States, it is very important to save on a few wires, and to get the inanities which generally travel by this kind of transmission apparatus to pass down the smallest possible number of wires. That is where the quantification of communication started....So a start was made, as you can see, by dealing with something very far removed from what we here call speech. It had nothing to do with knowing whether what people tell each other makes any sense. Besides, what is said on the telephone, you must know from experience, never does. But one communicates, one recognizes the modulation of a human voice, and as a result one has that appearance of understanding which comes with the fact that one recognizes words one already knows. It is a matter of knowing what are the most economical conditions which enable one to transmit the words people recognize. No one cares about the meaning. Doesn't this underline rather well the point which I am

77 Lacan, *The Ego in Freud's Theory and in the Technique of Psychoanalysis, 1954—1955*, 190.

> emphasizing, which one always forgets, namely that language, this language which is the instrument of speech, is something mat**e**rial?...Th**e** quantity of information then began to be codified. This doesn't mean that fundamental things happen between human beings. It concerns what goes down the wires, and what can be measured. Except, one then begins to wonder whether it does go, or whether it doesn't, when it deteriorates, when it is no longer communication....It is the first time that confusion as such—this tendency there is in communication to cease being a communication, that is to say, of no longer communicating anything at all—appears as a fundamental concept. That makes for one more symbol.[78]

At a time when his friends Lévi-Strauss and Jakobson rhapsodized about the transcendent revelations emanating from information theory, Lacan slyly mused about its industrial origins in a sector oriented towards the production and distribution of meaningless words. Intermingling insight with ironic style, Lacan's exposition tended to desacralize information theory even as he elicited from it new possibilities for a materialist definition of communications, while returning to and reaffirming his own core principles. Having offered his first systematic analysis of the role of "speech" in psychoanalysis earlier that year, he reminded auditors that information theory began far from "what we *here* call speech." More subtly, his insistence that the result of all this research was to create "one more symbol" suggested that information theory belonged to another concept introduced that year, namely the symbolic order. By suggesting that the science of signals was itself subject to symbolic relations, he undermined the privileged status Jakobson and Lévi-Strauss had assigned to it.

This intermingling of irony, qualification, and critique undercut attempts to situate cybernetics as a part of a neutral political or scientific apparatus. As Lacan put it in another lecture that year:

> The more language's role is neutralized as language becomes more like information, the more *redundancies* are attributed to it. This notion of redundancy originated in research that was all the more precise because a vested interest was involved, having been

78 Ibid., 82–83.

> prompted by the economies of long-distance communication and, in particular, by the possibility of transmitting several conversations on a single telephone line simultaneously. It was observed that a substantial portion of the phonetic medium is superfluous for the communication actually sought to be achieved. This is highly instructive to us, for what is redundant as far as information is concerned is precisely what plays the part of resonance in speech. For the function of language is not to inform but to evoke.[79]

Hence, even as Lacan elicited from cybernetics a validation that language was material, as well as a model for symbolic relations (as in his analysis of the purloined letter), he argued that specificity of psychoanalytic analysis—the Freudian preoccupation with errors, repetitions, gaps, and the elaboration of redundant relations among terms within a single statement—demanded a rejection of informational assumptions about language. This, in effect, overturned an entire assumption of cybernetics, namely that language could be modeled as a neutral, technical, or functionalist system. By interweaving commentary that linked but also distinguished between engineering, psychoanalysis, industry, and the assumptions of parallel disciplines, Lacan put forth a vision of science as both unified and heterogeneous. Like the discourse of the analysand, science elaborated symbolic relations divided against themselves (and their enunciators). In contrast to Jakobson and Lévi-Strauss, who universalized cybernetics, or American critics such as Shannon and Chomsky, who detached their fields from a broader conceptual milieu, Lacan erected a set of discontinuous but interwoven relations between the would-be sciences of communications.

79 Jacques Lacan, "The Function and Field of Speech and Language in Psychoanalysis," in *Ecrits: The First Complete Edition in English*, trans. Bruce Fink (New York: W.W. Norton & Co., 2006), 247.

Decoding Cybernetics

In the 1960s, French critics merged the cybernetic synthesis put forth by Jakobson and Lévi-Strauss and the ironic, circumlocutory commentaries of Lacan with the sharp Marxist critiques of Gurvitch and Lefebvre discussed in the previous chapter. The result was French semiotics, an experimental—in both the scientific and artistic sense of the word—mode of writing that theorized inscription while ironically and self-referentially thematizing the historical and political aspects of communications. The major center for these experiments was the *Centre d'Etudes des Communications de Masse* (CECMAS), founded in the Sixième Section at the Ecole Pratique des Hautes Etudes in 1960.[80] The center realized Lévi-Strauss's and the Rockefeller Foundation's hopes from the late 1940s and 1950s to establish a center of scientific, experimental, and empirical communications research. The center's directors considered Columbia's Bureau of Applied Social Research and the Institute for Communications Research at the University of Illinois to be among its peers.[81] Through coursework, conferences, and the center's in-house journal *Communications*, researchers imaginatively (and sometimes parodically) intermingled the aspirations of American empirical social science with French structuralism and Marxist critique. These divided alliances were manifest in the center's membership. Its founder Georges Friedmann was a regular contributor to the Marxist-leaning *Cahiers Internationaux de Sociologie*, and while faculty and lecturers may have shared his Marxist sympathies they were ultimately more closely associated with the structural and semiotic

80 For an overview of the center and its activities see "Editorial," *Communications* 1, no. 1 (1961): 1–2; Roland Barthes, "Le Centre D'études Des Communications De Masse : Le C.E.C.MAS," *Annales. Économies, Sociétés, Civilisations* 16, no. 5 (1961): 991–992; "Activités Du Centre d'Etudes Des Communications De Masse En 1966-1967," *Communications* 10, no. 1 (1967): 189–192; "Activités Du Centre d'Études Des Communications De Masse En 1967-1968," *Communications* 12, no. 1 (1968): 180–184; and "Activités Du Centre d'Études Des Communications De Masse En 1968-1969," *Communications* 14, no. 1 (1969): 211–215.

81 For the CECMAS directors' comments on parallel institutions with similar goals see "Vie Des Centres 1960-1961," *Communications* 1, no. 1 (1961): 226–230.

programs carried on in the name of Saussure, Jakobson, and Lévi-Strauss. Among the lecturers was Roland Barthes (then a director of studies at the Ecole Pratique), as well as a host of graduate students in the ’20s and ’30s, including literary critics Julia Kristeva, Gérard Genette, and Tzvetan Todorov; film theorist Christian Metz; and sociologist Jean Baudrillard. Umberto Eco and others from abroad occasionally taught at the center as well. Although divided by disciplinary training, national backgrounds, and political allegiance, together they developed a new critical approach that conjoined a rigorous commitment to scientific critique with a concern for the role of history and politics in covertly structuring science and culture. A sense of irony and literary showmanship also pervaded the center.

In its early days the center and its members showed an eccentric faithfulness to the cybernetic apparatus. Roland Barthes’s publications in the early and mid-1960s captured the ongoing synthesis and displacement of cybernetic, structuralist, and Marxist tendencies within semiotics. While often invoking the language and techniques of cybernetics, he consistently ironized and undermined its aspirations for neutrality or universality. And like Lacan, Barthes’s procedures were the inverse of those of his American peers: Rather than detaching the analysis of language from the analysis of information, he conceived of the communication sciences as interwoven but heterogeneous. As he put it in the introduction to *Elements of Semiology*, a primer prepared while he was working at CECMAS: “There is no doubt that the development of mass communications confers particular relevance today upon the vast field of signifying media, just when the success of disciplines such as linguistics, information theory, [and] formal logical and structural anthropology provide semantic analysis.”[82] In his view, the development of these

82 Roland Barthes, *Elements of Semiology* (New York: Hill and Wang, 1968), 9.

fields prompted a "demand for semiology"[83] as well as mechanisms for its procedures. However, Barthes, too, rejected the possibility of establishing a meta-discourse. As he deployed the tropes of cybernetics and information theory, he also submitted their procedures to ideological and historical critique. Consider his 1961 essay "*Le message photographique*," published in the inaugural issue of *Communications*, which reinterpreted Jakobson and Shannon's schematic account of communication to propose a method for analyzing photography. As he explained in the opening lines of his essay:

> The press photograph is a message. Considered overall this message is formed by a source of emission, a channel of transmission and a point of reception. The source of emission is the staff of the newspaper, the group of technicians certain of whom take the photo, some of whom choose, compose and treat it, while others, finally, give it a title, a caption and a commentary. The point of reception is the public which reads the paper. As for the channel of transmission, this is the newspaper itself.... [84]

But in stark contrast to the founders of French structuralism, Barthes twisted this analysis to propose a historical and ideological critique of language. In Barthes's hands the concept of "code," rather than stripping down communications to an ideal technoscientific essence that transcended individual utterances, instead suggested a dimension of concealment, conspiracy, and occlusion in language.

Barthes's arguments echoed, surprisingly, Warren Weaver's speculations in the late 1940s that the statistical regularity of Markov processes indicated the combination of predictability and relative freedom, or reason and liberty. As Barthes explained:

> Every [semiotic] code is at once arbitrary and rational; recourse to a code is thus always an opportunity for man to prove himself, to test himself through a reason and a liberty. In this sense, the analysis of codes perhaps allows an easier and surer historical definition of a society than the analysis of its signifieds.[85]

83 Ibid.
84 Roland Barthes, "The Photographic Message," in *Image, Music, Text*, trans. Stephen Heath (New York: Hill and Wang, 1977), 15.
85 Ibid., 31.

In Barthes's view, code was was defined the semiotic system—its scope, possibilities of articulation, constraints, and exclusions. The liberty of the individual speaker depended on confronting and deploying this prefabricated code. Taking a cue from Jakobson's arguments in the 1930s regarding the use of historical analysis to define the limits and possibilities of a language-system over time, Barthes developed a novel synthesis of semiotics and historically oriented materialism. The code itself became the site for marking out the historical and ideological determination of language in a given moment. Much as engineers could elicit a proximate definition of the limits and probabilities governing a given communication system, the semiotician could define the limits and probabilities—historical and political in origin—that governed a system of signs. Barthes offered a semiotic and scientific method for examining how history and ideology constituted a code, and that code in turn shaped the relative liberty of the readers, writers, and critics deploying that code.

This approach, which transvalued both science and critique through reference to technical media, also tended towards a radical critique of cybernetics and information theory. In equating codes with a historically and politically constituted order, cybernetics and information theory, in their emphasis upon producing more efficient, compact, and abbreviated codes, were reconstituted as components of a contingent, technocratic apparatus. But rather than overturning or rejecting cybernetic methods outright, semiotic analysis turned to the problem of decoding. On one hand, this meant an analysis and explanation of codes covertly governing communications, as in the press photograph. But it also meant a new effort to strip away the codes structuring everyday life, as well as a celebration of those aberrant and everyday methods of reading that revealed or rejected the hidden ideological content of communications. Again, it

was Barthes who was at the forefront of this new analysis. His celebrated book *S/Z*, the result of a seminar he taught at CECMAS from 1968 to 1969, upset the entire cybernetic system. Barthes argued that the essence of Balzac's novella *Sarrasine* lay not in its exquisite encoding, but rather its decoding. He defined the text as "readerly," to designate the multitude of conflicting codes that were operative within the text, constantly interfering with the possibility of eliciting a single code or meaning. He likened it to a "telephone network gone haywire" and claimed that it reversed the logic of formal sciences, such as cybernetics and structural linguistics:

> One might call idyllic the communication which unites two partners sheltered from any "noise" (in the cybernetic sense of the word), linked by a simple destination, a single thread. Narrative communication is not idyllic; its lines of destination are multiple, so that any message in it can be properly defined only if it is specified whence it comes and where it is going....Thus, in contrast to idyllic communication, to pure communication (which would be, for example, that of the formalized sciences), readerly writing stages a certain "noise," it is the writing of noise, of impure communication; but this noise is not confused, massive, unnameable; it is a clear noise made up of connections, not superpositions: it is of a distinct "cacography."[86]

While strategically retaining concepts of code, encoding, redundancy, and communication to define the readerly text, Barthes radically redefined it in opposition to efficient procedures of communication engineering. The flight from noise, which organized Wiener's and Shannon's endeavors, was here inverted: the readerly and narrative text staged a noise that was no longer confused or erroneous. Cybernetics was reduced to a science of properly and orderly encoding, to orthography, while semiotics—in its evolving alliance with Marxism—was a science of the improper and errant code: cacography.

A similar set of negotiated readings proliferated across the institute and among its associates over the next few years. Julia Kristeva cited Norbert Wiener's research on models as a resource for developing a "science of critique" that would be coextensive with a "critique of

86 Roland Barthes, *S/Z: An Essay*, trans. Richard Miller (New York: Farrar Straus & Giroux, 1974), 131–132.

science."[87] Metz theorized cinema as code, opening the door to a generation of ideological critiques of film. Baudrillard's book *The System of Objects*, based on a seminar he taught at CECMAS,[88] directed its readers' attention towards "a cybernetic imaginary mode whose central myth will no longer be that of the absolute interrelatedness of the world."[89] In his follow-up essay "Requiem for the Media," he directly attacked communication theory as a vehicle of contemporary oppression and accused Jakobson of its propagation:

> This theory is accepted practically everywhere, strengthened by received evidence and a (highly scientific) formalization by one discipline, the semio-linguistics of communication, supported on one side by structural linguistics, by information theory on the other, swallowed whole by the universities and by mass culture in general (the mass mediators are its connoisseurs). The entire conceptual infrastructure of this theory is ideologically connected with dominant practice, as was and still is that of classical political economy. It is *the* equivalent of this political economy in the field of communication.[90]

Baudrillard's analysis, which conflated structuralism, cybernetics, and the contemporary structures of political and economic oppression, resembled that of his former advisor, Henri Lefebvre. And although it was prepared as part of a brutal, post-'68 polemic against left-wing appropriations of communication theory, there was also something mundanely factual about its assertion that the rise of information theory in universities was "ideologically connected with dominant practice." While it is unlikely that Baudrillard had read the files of the Rockefeller Foundation or that he knew of the CIA's covert funding for Lévi-Strauss's cybernetics seminar held at UNESCO in the 1950s, the frameworks of cybernetics, information theory, and game theory, when transposed into the human sciences, remained rigidly oriented towards mapping out

87 Julia Kristeva, "Semiotics: A Critical Science and/or a Critique of Science," in *The Kristeva Reader*, trans. Toril Moi (New York: Columbia University Press, 1986), 74–89.
88 "Activités Du Centre d'Études Des Communications De Masse En 1968-1969," 211.
89 Jean Baudrillard, *The System of Objects* (London: Verso, 1996), 127.
90 Italicization in the original. Jean Baudrillard, *For a Critique of the Political Economy of the Sign*, trans. Charles Levin (St. Louis: Telos Press, 1981), 178.

the assumptions of industrial engineering. But what sharply distinguished Baudrillard's analysis from that of Lefebvre, or Shannon and Chomsky for that matter, was his insistence on semiotic insight: As he put it, "[Communication science] is *the* equivalent of this political economy in the field of communication." Rather than rejecting communication as such, Baudrillard ironically embraced it as the map of meaning that rendered the new economies of global communication intelligible. It was not a "false" model ill-suited for sociological or literary analysis; it was the perverted model that accurately construed the logic of new economies based on a system of simulation and electronic communications.[91]

Critics and Communities

Earlier in this chapter I suggested that Jakobson's cybernetic iteration of linguistics was not merely a mistake that failed to recognize the scientific findings of Chomsky and other critics of cybernetics. I argued that Jakobson instead pursued an alternate reason than Chomsky or other researchers at MIT, such as Shannon, Weizenbaum, or even Wiener. Uniting their approach was a characteristically Anglo-American conception of science, in which a specialized community, a plainspoken and univocal language were elements of a productive and virtuous scientific procedure. The turn towards semiotics in postwar France was one way of unpacking an alternate reason that not only rejected cybernetics, but also deployed it as part of a different kind of critical

91 This worked was continued and expanded at the newly formed department of philosophy at the University of Paris VIII (Vincennes),where Gilles Deleuze, Michel Serres, and Francois Lyotard, among others, selectively appropriated cybernetics to critique science. Uniting Deleuze's celebration of the schizophrenic who critiqued and multiplied the codes of capitalism, Serres's celebrations of noise [parasite] in the channels of communications, and Lyotard's diatribe against a postmodern society ruled by the laws of information theory and cybernetics found in the cybernetic apparatus resources for redefining and affirming alternate styles of reason. See, for example, Félix Guattari and Gilles Deleuze, *Anti-Oedipus: Capitalism and Schizophrenia*, trans. Robert Hurley (New York: Viking Press, 1977); Michel Serres, *The Parasite*, trans. Lawrence R. Schehr (Minneapolis: University of Minnesota Press, 2007); Jean-Francois Lyotard, *The Postmodern Condition: A Report on Knowledge*, trans. Geoffrey Bennington and Brian Massumi (Minneapolis: University of Minnesota Press, 1984).

technology. This rejection-cum-deployment was part of a broader argument based on paying attention to points of misunderstanding around common and shared meanings, which—following Taussig—I proposed might cast light on the global and political maps of meaning that often operate unnoticed in what Galison terms trading zones.

N. Katherine Hayles, the most astute contemporary analyst of cybernetics, has posed (and answered) a similar question. In *Chaos Bound*, her 1990 study of literature and science, she considered Roland Barthes's *S/Z* in light of Claude Shannon's theory of information. Observing Barthes's celebration of ambiguities, interferences, and the pleasure of textuality, she argues that he opposes the engineer's values of economy with the aesthete's preference for sensuality. As she puts it:

> Within his discipline, however, Barthes's attitudes are not deviant; they merely express mainstream beliefs in a risqué fashion. For the economy of explanation that scientists regard with respect has long been viewed with suspicion in literary circles. Some critical methodologies have attempted a scientific economy of explanation—archetypal criticism and structuralism, for example—but they are the exceptions rather than the rule. In general the literary community favors convoluted explanations that expand the few to the many rather than economical explanations that reduce the many to the few. The phenomenon can, I believe, be understood in terms of the economic infrastructure of the discipline.[92]

For Hayles, these two approaches can be reconciled with the competing professional structures and norms of two disciplines: Scientists prefer economy and simplicity in analysis, which serves their instrumental and rational control of the world. She cites information theory, with its contribution to more efficient and rational engineering, as an example. The world of the literary critic is different, she argues: There are "[t]oo many critics, too few texts,"[93] at least for the constrained "economic infrastructure of the discipline." She credits Barthes, poststructuralism,

92 N. Katherine Hayles, *Chaos Bound: Orderly Disorder in Contemporary Literature and Science* (Ithaca: Cornell University Press, 1990), 189.

93 Ibid.

and deconstruction with resolving the problem by showing that there is an infinity of readings, interpretations, and texts in every text. Multiple readings and multiple texts within the same text —as well as the celebration of noise and cacography—mean jobs for multitudes of critics.

In this particular analysis, Hayles, who is among the most original and penetrating critics of superficial oppositions between the natural and human sciences, falls back on the standard disciplinary and scientific logic of her own infrastructure, namely, the American university. Placing the sensual inclinations of the humanities in rigid opposition to the economical inclinations of the natural sciences, with their deep-grained suspicion of any analysis that does not appear restrained, impartial, dispassionate, and, above all else, reasonable, Hayles is echoing not only Chomsky, Shannon, and Weizenbaum—whose critiques of cybernetics pivoted around the need to situate scientific reason within proper, modest, and locally defined meanings and procedures—but also the earlier traditions of experimental science that structure the natural and human sciences in the United States today. There is a history and a reason to these traditions: Born in the seventeenth and eighteenth centuries, elaborated by English philosophers of mind, and implemented in the universities during the nineteenth and twentieth centuries, they constitute one of the most formidable apparatuses ever devised for establishing peaceful and reasonable solutions to divisive problems. Their strength is in their ability to submit the most complex and controversial of phenomena to an orderly procedure for analysis by an apparatus of experts whose mutual responsibility to one another and an impersonal set of standards secures the modesty and reliability of their findings. But, as discussed in chapters one and two and as referenced in the discussion of trading zones, the flip side of such benefits is the tendency to reduce political questions to impersonal technical norms.

The trouble—at least as far as Hayles's analysis is concerned—is that these norms are not those of Roland Barthes and his peers. For one thing, the cybernetic apparatus was transdisciplinary in scope. As indicated in chapter four, the norms of French science, though rigid and unforgiving on many points, are not defined and policed according to the narrow disciplinary terms that prevail in American science (or "literary circles" for that matter). This relative flexibility was especially apparent at CECMAS. As previously noted, French semiotics and the disarticulation of the cybernetic apparatus called into question the very principle of disciplinary and professional norms. In the 1950s, American critics astutely uncovered factual failures and inadequacies within the cybernetic venture, but their recourse to the autonomous and local traditions of their disciplines systematically obscured the transvaluations—of their own fields, and of the natural and human sciences more generally—carried out through cybernetics and technical media. In chapters one and two, I sought to trace these transvaluations back to the nineteenth century and the early decades of the twentieth century, when "technologies of liberalism" ordered and redistributed political questions as narrow, disciplinary problems of technique, method, and impartial analysis. However, chapters three and four demonstrate the ways in which World War II, the Cold War, and cybernetics marked an occasion for renewed and far-reaching experiments in such transvaluations. French critics, far from simply commenting on the failures of this cybernetics, used elements of it to adduce the institutional, economic, political, technical, and scientific regimes structuring critique, inquiry, and expression in their era.

The critical readings of French semiotics expressed another set of liberal norms, distinct from the Anglo-American tradition of experimental science but not necessarily alien to its aims.

As political philosopher Larry Siedentop observes, in the course of the eighteenth and nineteenth centuries English and French styles of liberal reason diverged. British philosophers of mind concerned themselves with questions about the accuracy and reliability of the individual's knowledge of the world, questions that tended to pivot around "an atomized and unhistorical individual."[94] French theorists, such as Condillac, Rousseau, and de Tocqueville, concentrated on "the conditions of social action....Instead of wrestling with the problem of verification of induction, they took a keen interest in the socializing process."[95] Particularly among the *Doctrinaires* such as Tocqueville, who struggled to explain the failures of the French revolution and the conservatism of the Restoration in the 1820s, the task of liberal thought was to explain how the reasoning and autonomy of individuals were constrained by language, institution, and tradition.[96] French liberal theorists posed a new set of questions, which would be extended and complicated by Saussure in the 1890s and Mauss in the 1920s.[97] Notably, they asked how freedom, reason, and even individuality—venerable liberal values worth protecting—are expressed according to a set of prefabricated differences or rules.

From this alternative liberalism came the "rejection" of cybernetics by Chomsky, Shannon, and their colleagues, who addressed the fact of the matter—a procrustean measure ill-suited to furnishing a universal model of analysis—while giving short shrift to the overarching institutions, structures, and language that make cybernetics or discourse a matter of pressing contemporary concern. (Chomsky's recourse to a universal grammar built around the individual

94 Larry Siedentrop, "Two Liberal Traditions," in *The Idea of Freedom: Essays in Honour of Isaiah Berlin*, ed. Alan Ryan (Oxford: Oxford University Press, 1979), 154.
95 Ibid., 155–156.
96 Ibid., 158–159.
97 See Hans Aarsleff, *From Locke to Saussure: Essays on the Study of Language and Intellectual History* (Minneapolis: University of Minnesota Press, 1982), 293–334 and 356–371; and Mary Douglas, "Preface," in *The Gift: The Form and Reason for Exchange in Archaic Societies* (New York: Routledge, 1990), ix–xxiii.

mind hardly resolves the problem.) Likewise, the appeal of structural linguistics, cybernetics, and information theory in France—despite and perhaps because of certain shortcomings—is also clear. The failures of structural linguistics in terms of falsifiability, for example, speak to only one scientific value. Among values it had was a style of reasoning that was—as mentioned above—allusive, synthetic, and given towards tracing out homologies and analogies across specialized domains, searching out the common thread of reason or intelligibility. Even as cybernetics and information theory smuggle historically contingent and politically questionable assumptions into analysis, they suggest methods for rising above the solipsism of the individual mind (or the specialized discipline) to consider formal rules of exchange, relay, and patterning.

As Siedentop himself cautions, one can go too far in these highly reductive, even crude oppositions. They are worth acknowledging, not to presuppose some abstract social force that is determining every instance of reason, but rather to consider the resources and procedures that inform a particular mode of reason and, quite often, become expressed and embodied in our habits, institutions, and instruments of analysis. We also acknowledge them to move beyond them. Indeed, the appeal of cybernetics was largely predicated on its promise to move beyond the constraints of familiar disciplines and traditions. As Mead explained in the quotation that opens this chapter, "We [the participants in the Macy Conferences on Cybernetics] thought we would go on to real interdisciplinary research, using this language as a medium. Instead, the whole thing fragmented."[98] Her regret over that fragmentation reverberates with the peculiar Anglo-American equation of difference with isolation. I have tried to show that the opposite is true: The disarticulation of the cybernetic apparatus was the occasion for a transversal reworking of both

98 Mead, "Cybernetics of Cybernetics," 2. One might argue that human scientists' predominant reliance on language alone as a "medium" (to the neglect of instruments and experiment, for example) nearly guaranteed this fracturing. For more on the hybridity inherent in language as a medium, see Samuel Weber, *Benjamin's -abilities* (Cambridge: Harvard University Press, 2008), chap. 4.

disciplinary and national traditions. Looking away from shared practice and shared understanding to focus on misunderstanding, critique, and the occasional tirade has allowed me to discover the neglected history of the exchange and intercourse that binds and regulates diverse communities. In tracing out those communities' distinct responses—and the surprising origins of the cybernetic apparatus and its critical disarticulation in competing traditions of liberal values—this chapter and this dissertation have also traced out a common world.

"French" Theory

Before long America's cybernetic gift to French semiotics began a slow migration home. Following a celebrated symposium on structuralism held at Johns Hopkins in 1966 that was co-organized by CECMAS and featured a number of its faculty members, structural and semiotic theories began to find their way into the American academy. Through texts such as Barthes's *S/Z* and Lyotard's *The Postmodern Condition* American scholars learned from their French colleagues to understand texts, cultures, and entire societies as vying systems of cybernetic code. What Peter Galison has termed "the ontology of the enemy"—namely, a cybernetic ontology based on World War II conflict—became the object of strange new conflicts dubbed "the culture wars" and "the science wars" in the scientific and popular press.[99] American admirers of the critical accounts of science in "French Theory" often overlooked the authors' ironic—sometimes even wistful or nostalgic—engagements with structuralist and Cold War fantasies of a communications science.[100] Meanwhile opponents ridiculed French poststructuralism as a dangerous parasite threatening the vitality of science.[101] In *Intellectual Impostures*, an infamous

99 Peter Galison, "The Ontology of the Enemy," *Critical Inquiry* 21 (1994): 228–268.

100 See François Cusset's argument that "French Theory" is largely an American invention in *French Theory: How Foucault, Derrida, Deleuze, & Co. Transformed the Intellectual Life of the United States*, trans. Jeff Fort (Minneapolis: University of Minnesota Press, 2008).

101 The classic text on critiques of French theories (and deconstruction specifically) is J. Hillis Miller, "The Critic as

screed against postmodernism, physicists Alan Sokal and Jean Bricmont condemned French theorists for their frivolous and politicized embrace of scientific terms and their application of them to nonscientific problems. Both authors were evidently ignorant of the ways science and politics were imposed on the human sciences in the postwar period.[102] In a response to Sokal and Bricmont published in the French newspaper *Le Monde*, Jacques Derrida commented:

> It would have been interesting to make a scrupulous study of the so-called scientific "metaphors"—their role, their status, their effects in the discourses that are under attack. Not only in the case of "the French."...That would have required that a certain number of difficult discourses be read seriously, in terms of the theoretical effects and strategies. That was not done....But what I do take more seriously is the wider context—the American context and the political context—that we can't begin to approach here [in *Le Monde*], given the limits of space. . . . This work has been going on for a long time and will continue elsewhere, differently, I hope, and with dignity.[103]

Derrida's elliptical and enigmatic commentary questioned the very possibility of direct communication, and seemed to suggest that medial scientific, and political structures conditioned their claims and constrained his response. Resigned to this deferral, he expressed a hope that the discussion would continue elsewhere, and differently.

A step in that direction might be to put aside conceptions of French theory as a foreign parasite and start thinking of it as a prodigal son returning from adventures abroad. Another might be to reflect on what kinds of historical and political structures return, unrecognized, in contemporary efforts to reform the discourse and methods of the human sciences with digital apparatuses.

Host," in *Deconstruction and Criticism* (New York: The Seabury Press, 1979), 217–254.

102 See Alan Sokal and Jean Bricmont, *Intellectual Impostures* (London: Profile, 1998).

103 Jacques Derrida, "Sokal and Bricmont Aren't Serious," in *Paper Machine*, trans. Rachel Bowlby (Stanford University Press, 2005), 70–72.

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