

Kai Teppo Eriksson
London School of Economics
PhD in Information Systems

Signs and Signals

**The Conception of Communication in
U.S. Telecommunications Rhetoric**

2 August, 2001

UMI Number: U154791

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



UMI U154791

Published by ProQuest LLC 2014. Copyright in the Dissertation held by the Author.
Microform Edition © ProQuest LLC.

All rights reserved. This work is protected against
unauthorized copying under Title 17, United States Code.



ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

THESES

Kai Toppo Erikson
London School of Economics
PhD in Information Systems

F
7907

Signs and Signals

The Conception of Communication in
U.S. Telecommunications Rhetoric



5 August 2001

819897

Abstract:

The thesis at hand will investigate communication and its changing conditions with respect to the thinking of the political community in the United States. The central aim is to deliberate upon the relationship between communication and specific telecommunication systems during the period ranging from the telegraph to computer networks. Together with related discourses and practices, systems of communication have formed an environment wherein “communication” as such has become thought about. That is, taken as both the object and the means of administrative practices, communication has come to be regarded *as* communication. It is in these practices that the inherent relationship between communication and control can be found, which makes them the main focus for an administrative history of communication and a history of the administration of communication. Thus, we will analyze the relationship between historical forms of communication and the ontology of communication to the extent that this relationship is built up through socially institutionalized communication systems and related discourses.

Table of Contents:

1. Introduction	4
2. On Thought About Communication	22
3. Lightning Lines	41
3.1 Coming Unity	42
3.2 The Nervous System	61
4. Systemic Orders	84
4.1 Communicative Machinery	87
4.2 Industrial Communication	112
5. Self-Regulating Assemblages	132
5.1 Automating Communication	136
5.2. The Rise of Information Systems	160
6. Conclusion: Communication and Its Modern Fate	190
Bibliography	223

1. Introduction

The thesis at hand will investigate communication and its changing conditions with respect to the thinking of the political community in the United States. The central aim is to deliberate upon the relationship between communication and specific telecommunication systems during the period ranging from the telegraph to computer networks. Together with related discourses and practices, systems of communication have formed an environment wherein “communication” as such has become thought about. That is, taken as both the object and the means of administrative practices, communication has come to be regarded *as* communication. It is in these practices that the inherent relationship between communication and control can be found, which makes them the main focus for an administrative history of communication and a history of the administration of communication. Thus, we will analyze the relationship between historical forms of communication and the ontology of communication to the extent that this relationship is built up through socially institutionalized communication systems and related discourses.

The analysis here is thus not centered exclusively around any communication system as such, as technology—although this aspect cannot be separated from the emergence of modern communication and social order, but, on the contrary, constitutes its precondition; rather, the emphasis is on the changes in and of communication during the period in question. The central purpose is to deliberate upon the relationship between communication and telecommunication, which has been approached as a question of a community and its fate. What we will undertake in the thesis, then, is to look at how conception of communication as yielded and organized by communication systems has been entwined with thought on the political. The systems and constellations of communication—alongside the communicative relationships opened up within these contexts—are included in the sphere of political thinking not only from the point of view of the communication industry but more importantly, from that of a body of thought that attempts to articulate the political as a question of communication. What has to be scrutinized is the way in which communication is organized in relation to the political, investigating the particular relationship each conception of communication creates to and within the political: how does communication constitute the political community in the era of telecommunications?

Modern Communication

The development of communication technology has undoubtedly been characterized as one of the grand narratives of our time. In this narrative, differences (fissures, alterations, displacements) cannot be taken fully into account because the main conceptual tools are based on types of totality. From Samuel Morse's "one neighborhood" to Marshall McLuhan's "global village," the theoretical discourse of communication has been bound by thinking motivated by the idea of a uniform, consistent whole. The old demarcation between science and nature, subject and object, drawn from the idealized model of the natural sciences, led social scientists also to analyze their objects as isolated and relatively coherent. The attempt to justify one's disciplinary approach in a way that would meet the criteria of scientificity, by defining its object as being real in some objective sense as well as being separate from the observer, had been established in the social sciences already by Émile Durkheim, and took firm root in its subsequent development in thought about "communication." This way of conceptualization has served some apparent aims. It has become much easier, for example, to speak about the "impacts" of certain forms of communication on different sectors of society. Similarly, processes such as design, implementation or management of given types of communication technology can be organized as a systematizable part of academic discourse. Communication can be seen as forming part of the historical-cultural environment, the human horizon, the being-there in the words of Heidegger, to which we belong originally and which we construct and reconstruct incessantly in the process that discloses what we are at any given moment of time. However, in its modern history, it has been conceived of in and as a distinct conceptual whole, the characteristics of which have become more mathematical the more telecommunication systems have developed.

It was only from intraurban telegraph systems onwards that communication assumed a truly positive character, developing into a productive force that represented the core of the modern society. It was this new positivity that made it an object of systematic thought: concurrently with the development of communication technology, a theoretical interest in its hidden mechanisms and its underlying laws arose, attempting to encapsulate them in a rational model in order not only to ensure the dependability of certain communication systems, but also, and most importantly, to understand communication in its essence.¹ Thus, as telecommunications became established and its cultural implications visible, communication was conceptualized increasingly as an object of action, not only as a means to that end. While it began to be thought of in itself, however, communication also lent itself to being captured in theoretical formulations which effaced the very historicity it was a manifestation of.

During the process of becoming established, conceptions and discourses of communication were articulated mutually with contemporary political thinking. If political sentiment found its expression in the discourses of communication, these discourses served as vehicles for thinking about and advancing some general political objectives, such as unification of the nation. In this way, they provided a conceptual environment for different projects of communication—timely interpretations concerning the political nature of communication. There was always an inherent tendency within those projects to formalize the models they constructed into a general mechanism of communication, thus depriving understanding of communication of its own historical time. This is what, from the perspective of the work at hand, is of importance: to think about how communication projects continued, broke off, reorganized, and reinterpreted not only the social production and sharing of conceptual identities but also the things shared, the shared tradition, and communality. If prevailing communication projects embodied communication predominantly as something expressible in quantitative terms, this is perhaps best understood as being a testimony to the relationship to perception of the social at that time. We have, however, to define our approach to this history more precisely.

Communicating instances originally presuppose communication: they do not take place in relation to others as if already perfect subjects of communication (as was thought in the era of the telegraph as well as, although in a different way, at the time the telephone became common and the conception of communication was rationalized), but this relationship—communication—is exactly what enables the subject positions and the production of meaning. In consequence, communication is the constitutive condition for both subjectivities and community, which is why they have to be understood on the basis of the ontological dimension of communication. In the process of the rationalization of communication, this dimension becomes unimportant: communicating subjects' relationships to communication is seen on the basis of a model wherein a subject assumes an originality which it expresses by means of communication. Subjects here are conceived as not having an inherent, only an external, relationship between each other, and communication is the rather superficial mediator between original intentions and the needs of interacting subjects. What has been lost in this conception is the fact that the subject of communication always already presupposes others as interlocutors: the other is not an external object of speech but more fundamentally constitutes the ontological condition of a speaking subject, of a social being who presupposes communication as his condition of existence. It is not possible to think of a subject separated from this communicative relationship. This is why thinking about communication should not take as its point of departure supposedly independent subjects and

the external communicative relationship postulated between them, but on the contrary the constitutive movement of communication, which here is analyzed through different nodes and constellations of communicability. This is not anything new as such, as it has been customary to treat communication in terms of general “trends” or “principles.” That however, is not our purpose here.

It is clear that communication has been articulated both as open, unpredictable, and untotalizable interpersonal relationships and as contained, determined, and hierarchical lines and structures. Similarly, it is possible to show the ways in which a given communication technology appears to support differentiating and specializing movements, on the one hand, and strongly centralizing ones, on the other. Yet the principal conceptual framework here is based neither on differentiation of the vertical and the horizontal relationships of communication, nor on centralization and decentralization. It is true that the horizon of centrally directed hierarchical systems has characterized the history of communication brought up and discussed here, but instead of taking this horizon as our starting point, what we will do is to make it our object of study and investigate its historical and conceptual conditions. At the same time, when rejecting the primacy of these dichotomies, we also abandon the theoretical conception underlying them. This conception was epitomized by Ferdinand Tönnies in his 1887 division between *Gemeinschaft* and *Gesellschaft*, or “community” and “association,” by means of which he distinguished two types of social grouping, a natural living society and a formal organization. It has been especially a twentieth century peculiarity of the social sciences to operate with strict dichotomies, a practice which has only recently been widely questioned.

Instead of remaining within this tradition, we maintain that communication is always mediated along lines that cannot be completely contained within some pure types and controlled in entirely rational manner, and that in contemporary societies these mediating instances have risen to a pivotal position. It is therefore of the highest importance to identify the forms in and through which organization of communication has been exercised successfully and which have spread across society and become generalized social techniques. Some of the most influential loci of the organization of communication have been those contexts in which it has been approached as an internal question within a given whole. Generally speaking, these are the contexts in which communication has been given a systemic character and in which the project to rationalize communicative relationships was inaugurated. Rationalization here is understood as the systematization and optimization of communication within an organizational framework.

As institutional practices always both presuppose and create knowledge, this relationship between systems and techniques of communication, on the one hand, and communication “as such,” on the other, insofar as it reveals the underlying conditions of communication, must be understood not only as political, but, and perhaps above all, as ontological. In these connections—in organizatory schemes, managerial ideas, and political innovations—in which communication has been posed as a question of internal communication, it has laid the foundation for thinking about the relationship in which communication and noise, and communication and multiplicity have been connected to each other within the framework of a controlled whole. Noise can be viewed here as the enemy of communication, whereas the multiplicity represents something that can swamp the voices and established order within a given system. This point is of utmost significance for an administrative history of and by communication for it is in this context that communication in general has become thought of as a distinct theoretical object with both an “inside” and an “outside”; that is, as an object that has its limits. Relating to this, there is a change in emphasis during this study. At the beginning, more weight has been placed on historical material, as distinct from theoretical material, because of the scarcity and state of uninstitutionalization of theoretical discourses on communication at the time. The differences in emphasis change proportionately as discourses become organized and theoretically articulated; that is also when the limits of communication become explicitly thematized.

These discourses and systems of communication are the principal arenas for its organization—implying its being thought of as a relationship between the organized and its outside—where communication *as such* becomes an object of societal thinking. This is of uppermost interest, for even though thought about the conditions of communication has found expression within the history of western philosophy, in the context at hand the question is posed in historical and contingent terms, which is exactly what has been ignored in the philosophical tradition. Thus expression of the question of communication as a practical problem always expresses the experience of the finiteness of communality in a way that does not relate, or has commonly been regarded as not relating, to the philosophical tradition. However, it does address essentially philosophical questions.

Now, if some forms of communication in certain historical conjunctions were generalized out of the particular contexts and discursive fields under examination, how is this process demonstrated here? It can be roughly shown by means of referring to two instances. In the first place, the generalization is seen as the spreading of some influential conceptions of communication across society, thus coming to constitute a common horizon for thinking about

and organizing communication. Secondly, a series of philosophical interpretations from Martin Heidegger to Giorgio Agamben has thematized language and communication becoming independent. In both cases, there is no general form or course of development to be discovered, but instead either a heterogeneous yet distinct communicative constellation or a loose theoretical tradition which serves as a frame of reference within which communication's generalization has been thematized. This is what we will discuss in detail at the Conclusion, as this interpretation is the foundation for the most cogent and powerful philosophical analysis of the fate of communication studied here. Heidegger figures in this study not only as part of the thematical subject matter, so to speak, but also as part of the theoretical background, along with Foucault and some other continental thinkers. There is no discrepancy here, however, because it is quite possible to accept some concepts without having to accept the whole philosophical system, whatever that might mean, from a given thinker.

What we have adopted from Heidegger is a method of analysis that enables us to identify a certain continuity, and not a mere succession of events, in the historical material and a certain thematical consistency between the writers analyzed. If there are some normative remnants in the analysis, that is because the line of development in and of communication can be exposed only in the context of some theoretical background through which it assumes its identity. Thus, the point of view, although incorporating inevitably some normative elements, is not evaluative per se but retains a critical stance as a technical tool for enabling us to discern some continuity in the line of development of communication being used both as an object and means of administration.

Communication systems, in discussion about their increasing influence in contemporary societies, have been addressed mainly in terms of the mass media. How then can the communication systems investigated here which transmit primarily interpersonal communication play a role in the articulation of communication as societal communication? The answer lies in the fact that the main line of demarcation here does not run through the axis of public/private, because even private communication is always socially mediated and structured. What is important instead is to analyze the forms and domains of the social organization of communication. It is here that interindividual communication technology, with the conceptual tools and the rhetoric relating to these technologies, provides the essential means of organization. Whereas the significance of the mass media is connected to wide dissemination of similar meaning-contents, intercommunication has to do with the functionality of social institutions. What is central is the way the social is institutionalized *in* intercommunication as structured interaction. Following Jacques Derrida, one can even risk

proposing that there is nothing outside these systems, from the point of view of the administrative history of and by communication, as it is within and through them alone that communication is thought of as communication.

Systems of communication consist of a set of technical inventions, industrial and commercial organizations, financial institutions, legal frameworks and political interests, with diverse methods, rules, and strategies, constantly varying their shape and structure. All this is linked to different degrees with the interests and rationalities that connect communication to the framework of governance. It is sufficient for my purposes to define the term governance according to Foucault as “the conduct of conduct,”² which refers to the activities, methods, and principles aimed to shaping the conduct of persons, groups or institutions. Rose and Miller have demonstrated that the problematics of governance can be articulated with respect to three dimensions: political rationalities, programs of government, and technologies of government. These refer, respectively, to the changing discursive fields conceptualizing the exercise of power, the theoretical formulation of specific tasks, and the complex of programs, techniques, and procedures through which authorities seek to embody governmental ambitions.³ The authors point out that the relationship between these dimensions is not one of derivation or determination but one of translation; that is, political rationalities can be articulated in various ways in a political program, which, for its part, can have multiple expressions in a domain of political technology. As for the thematics of the thesis, the amalgam of specific discourses, practices, and technologies of the time in question, it can be said, constitutes a space in which the particular programs and approaches gaining importance in interpreting and organizing “communication” intersect. It should be borne in mind, however, that the object of these programs in this study—communication—is also a kind of intersection space in its own right, for it offers a space in which the disparate movements of operative strategies and societal rationalities available come into contact.

The problematics of governance is inherently linked to not only political rationalities, programs, and technologies, but also the broader historical field of events that defines the particular meaning-contents of the said dimensions of governance. That is to say that to be able to trace the relationship between communication and telecommunication in the rationalities of governance, one must be sensitive to the nature of the specificity of the historical contexts within which communication has been institutionalized in the societal information economy. As Foucault would put it, one must look at the singularities in their historical assemblages. Thus, the constellations of communication, even though they can be linked in some cases to an influential program, theory, or the like, belong in a much deeper way to the social world they

come from. An idea can reflect the dreams and aims of diverse social forces and become embodied in a political program, and yet a similar thought can be considered as *de facto* basis for explicit objectives irrespective any particular person's or group's aspirations. Therefore, no attempt is necessarily made to trace political rationalities, translated into separate programs or objectives relevant to this study, to some particular origin. This is because, for the aforementioned reasons, the logic of a given program or political objective reflects, or is the expression of, multiple both discursive and nondiscursive (and if discursive, articulated and unarticulated) interests of the social dynamics, which do not have any clear or coherent origin; or if they have, it is already unoriginal.

These constellations should not be seen as a privileged source of a historical "truth" either, but rather as arenas in which both agreement and disagreement are articulated as concrete tactical positions—positions which are always predicated on some existing conception of communication regarding its alleged "nature." For this reason, those conceptions of communication constitute in this study more fundamental an object of analysis than any established institution, doctrine, or technology: they open up and delimit the field in regard to which diverse programs and systems of communication are proposed, assessed, and brought to fruition. In this way, conceptions of communication that enable the "being" of communication (which is nothing being-like or articulable) to be taken as an object of thought in a given historical situation emerge as primary with respect to any particular communication-related institution, whether it be linked with communication policy, legislation, or industry.

This brings us to our last point. As this study does not travel exclusively along the lines of national politics or established institutions, but seeks its way to communicative practices that cannot be contained within the abovementioned terms, it is clear that some points need to be made. It should be mentioned, for example, that for a long time the communication question was not central to national politics, and that other questions, particularly those concerning transportation, were considered more significant. However, as already said, in this study we have approached the history of communication not at the level of governmental policies or institutions but instead at that of conceptions of communication. Therefore, insofar as it seems that the role of communication has been exaggerated, it is because of the perspective chosen: it is not our purpose to write a general history of social development in which different things have a "correct" weight with regard to each other, assuming this were even feasible at all. This is not to say, however, that the study does not have a relationship to the general. Whereas communicating instances are integral parts of the whole to which they are related and thus

express its occurrence, conceptualization of communication, being often expressed in metaphors, can be said to be an attempt to describe the form or shape of this taking place.

Contextualizing the Thesis

A study, especially a doctoral thesis, is expected to place itself in some theoretical context, which implies the explication of its intellectual presuppositions. This is particularly important when the thesis is located in a specific discursive tradition. If there is no such a tradition, however, the matter becomes more problematic, which seems to be the case here. The subject matter of the thesis is the relationship between communication and telecommunication seen from the point of view of thought about the political, but this has not been systematically investigated in any established theoretical tradition. Most of the available research literature on telecommunication, excluding media studies, is concerned either with communications technology or communications policy, neither of which is our concern here. Communication research and media studies, for their part, have mainly occupied themselves in investigating different media effects with regard to mass communication, which is beyond our sphere of study. Moreover, in most of these discourses, the concept of “communication” has been taken rather narrowly. Whereas the Shannon-Weaver model of communication, for example, dominated the thinking of communication in more culturally oriented approaches until about the 1980s, it is our aim here to bring out the conditions of this and some previous hegemonous constellations. This is why the work at hand cannot be located as such in any discursive tradition proper, for there is no established tradition concerning telecommunication and the political. It is only possible to refer to some individual writers who have treated the thematic of the thesis but who, however, remain fairly alien to its ethos. Let me introduce briefly three interesting writers, by way of which we can approach the theoretical and methodological questions characterizing our study. The writers are James R. Beniger, Paul N. Edwards, and Régis Debray, respectively.

In his much discussed book *The Control Revolution*,⁴ James Beniger traces the technological and economic history of what came to be called an information society. Unlike many previous writers in the same field, he takes into account the lines of historical development in their specificity yet puts them into an interesting interpretative framework. Central to this framework is the concept of control, which Beniger understands largely in terms of technological practices and systems. They were responses to what he calls “the crisis of control,” manifesting themselves first in the form of formal bureaucracies, and secondly in that of “rationalization.”

Although he was insightful in many of his interpretations, there is also a crucial difficulty in his approach for our perspective. It lies in the fact that Beniger presupposes a consistent social system based on consensus, in this respect coming close to the American functionalist tradition. He tends to treat historical processes as if determined by the assumed needs and functions of the social system, which is essentially based on mutual agreement. This is why we cannot position our study in relation to Beniger, although he discusses many of the same themes. Let me now turn to a book that is closer to our objectives.

It has increasingly been acknowledged in recent years that computers and the information systems into which they have been incorporated do not constitute exclusively technological artifacts. With the rise of Foucauldian diagnostics of power, social histories “from below,” and the Italian micro-histories, which have all rejected the relevance of traditional accounts of great events and persons analyzed on one, usually political level, histories that have attempted to trace an inner, functional logic in a given phenomenon irrespective of its social context have become increasingly problematic. It is possible to discern a Nietzschean influence in many current reformulations of the tasks and aims of a historical study. Thus, it has become clear that the history of the computer (and that of communication in general) does not exhaust itself in a frequently reiterated succession of technical inventions and devices. The *sense* of a computer cannot be articulated fully on a technical level, as it forms only one constitutive part of its social configuration. In fact, the history of telecommunication comprises a whole variety of intersections; it offers a contact point for the disparate movements of operative strategies and available societal rationalities.

Paul Edwards has written a study, entitled *The Closed World*, on the history of the computer in accordance with these principles.⁵ His work stands in contrast to previous computer historiography, which has understood its object in terms of either computer engineering or business. The history of the computer generally has been conceived as the linear development of an information processing device, or a tool of computer or cognitive science, in which it is a conceptual model for the handling of information and symbols. In contrast to these approaches, Edwards sees the computer not as an information machine, nor as a cognitive model, but rather as a common denominator in constantly changing social constellations within academic research, engineering practice, industrial aims, and political interests, all of which have been linked with distinct discursive practices. His idea is first to analyze social and academic speech about the computer, and after this, to examine the construction of national computer systems for defense purposes in Cold War America, using the double image of the computer as both a tool and a metaphor. In his study, speech about the computer and the machines

themselves do not form two independent strands, but are instead inherently interconnected. In this way, he brings out the reciprocal relationships between distinct discourses, communities, practices, and technologies relating to speech and the construction of centralized command and control systems.

Although interesting, the study still maintains strong links to the arsenal of traditional historiographies, as it documents important persons, years, and even dates with uncompromising accuracy. Without being unanalytical, Edwards is more concerned with the coherent and continuous narrative which advances largely at the level of individual, interpersonal relationships than with the thematic possibilities provided by the richness of the theoretical material in question. This is why we have to turn to our third writer, as it is only through him that we can truly link our study to a theoretical discourse, if not with regard to the subject matter, then at least for its approach.

Régis Debray is a French philosopher and essayist who, after a period of intensive political involvement in the 1960s and 1970s, has devoted himself to develop what he has termed “mediology” (*médiologie*). The underlying purpose of his book *Transmitting Culture*⁶ is to continue legitimizing this research program. What the author does here, not unlike what he did in *Media Manifestos* (1996), is to endeavor to open up and explicate a distinct theoretical approach to communication and culture, especially from the point of view of the cultural transmission of symbolic systems, by means of diverse technical and institutional forms and routes. Mediology is thus interested in the continuously redefining and redefined boundaries and intersections of technological tools, systems, and strategies, on the one hand, and cultural practices and social institutions, on the other. At its core are the particular ways different conceptual assemblages and cultural systems have unfolded and found their historical ways of realization over generations in and by some very mundane yet indispensable material means traditionally overlooked by the research literature. It is this incessant interplay between the processes and vectors of symbolic transmission and the networks and bases of technological mediation that defines the field and scope of mediology. It thus comes near, if not being identical, to the study of the materiality of communication.

Although not completely new, this is all very refreshing, because despite the earlier works sharing similar orientations and conceptualizations, existing disciplines with cultural transmission as their research object tend to simplify the complexity of the process. From the viewpoint of symbolic systems, semiology seems a natural competitor to mediology. Yet Debray points out that whereas semiology focuses on the meanings and interrelationships of

signs, what is of importance in mediology is not the literal meaning-contents but the “frameworks that administer belief in that content.”⁷ Here, mediology studies not the meanings produced as such but rather the conditions and structures that allow those meanings to be formulated in the first place. In a similar vein, though from a different direction, sociology is close to mediology. However, with its emphasis on social institutions and structures, it tends to ignore the processes of technological transmission, argues Debray. What mediology is undertaking is a material study of the process of reorganization of cultural systems. This is not primarily a question to be approached through some supposed social constants, be they classes, structures, or institutions, but rather with a special sensitivity to the material forms and means of cultural self-articulation in time. In this sense, mediology is the study of the technical trajectories of cultural transmission.

As for the history of ideas, Debray holds that it tends to overlook technical systems of transmission, transportation, and communication in the same way as sociology, and to concentrate on the successive forms of historical processes where social agents, especially remarkable individuals, play an important part without noticing that technology is not only an instrumental object of action but also what engenders subject positions and social-historical states of affairs. Thus, while sociology and history tend to underrate the role of technology by focusing on social institutions and historical consecutiveness, respectively, and while semiology does the same by concentrating on meaning structures, it is the task of mediology to take cognizance of the productive nature of technology. By this gesture, Debray transgresses the old dichotomy, deeply integrated into the repertory of social sciences’ conceptual arsenal, between what is an action’s instrument and what is its goal. This dichotomy, of course, has its foundation in the differentiation between technology and the social, a differentiation which mediology refutes. It points out that drawing of a line between these elements is always an analytical operation performed afterwards. This is the essential point of departure of mediology that determines the whole program; but at the same time, it is also a juncture that connects the project to its historical predecessors.

Despite Debray's claims of novelty, most if not all of the main ideas in the research program advocated here have already been articulated elsewhere. It is Foucault, together with Deleuze and Nietzsche, to whom Debray owes perhaps his greatest intellectual debts. Foucault accepted and further elaborated the way in which Nietzsche moved analysis from the object proper, be it a value or a conception (what Debray called the literal meaning-content), to the conditions and circumstances where it is seen as true and meaningful. In this way it is indicated that the object of interpretation cannot be understood without taking into account the interaction of forces that

have produced it as an outcome. Therefore, what is to be done is to determine the way in which the setting has been formed in which certain values and conceptions have come to be seen as relevant objects of speech and how the values in question have formed in that setting. What is at issue here is nothing other than Debray's cultural transmission.

Now, the aim of research is to take up a chosen alignment of interlinked entities, both discursive and nondiscursive (Foucault), or human and nonhuman (Bruno Latour), and to analyze the formation process of a given power configuration in terms of movements, struggles, alliances and displacements. This type of approach traces and constructs the "effective history" of discursive and institutional practices, arrangements and formations of controversies, their transformations and dissolutions in a certain historical setting. Gilles Deleuze, working with Félix Guattari, conceived "becomings" as more important than history, and took up the task of mapping the philosophical conditions of the interplay of machines, assemblages, flows, and events which cannot be described in terms of power. For Deleuze, it was desire—an event at the micro-level—that conditions power, not the other way around. Whereas Foucault positioned strategy in place of social contradiction, Deleuze replaced strategy by lines of flight and the movements of deterritorialization—in other words, uncontrollable events in the disintegration of an order.

Notwithstanding some of their doctrinal differences, both Foucault and Deleuze shared similar kinds of perspectives, inspired in the main by the influence of Nietzsche, of the nature and aim of philosophical work. Central to that approach was to investigate the conditions and actualizations of both the interlinks and their dissolutions between macro-level structures and micro-level movements and flows within a certain context, whether in terms of history or of micro-movements. That was accomplished mainly by using the notion of an assemblage as an operational device, the aim of which, although inevitably a construction as with any interpretative tool, was "not a matter of bringing all sorts of things together under one concept but rather of relating each concept to variables that explain its mutations,"⁸ as Deleuze put it. Foucault called it "dispositif," whereas Deleuze preferred the term "agencement."⁹ Bruno Latour has recently coined the concept of "collective" in this specific connection.

Through the interpretative concept of *dispositif*, it becomes possible to transgress the rigid subject-object axis still extant in social scientific thinking. Now entities that were previously isolated or interrelated only at a very general level can be seen as constituting an interlinked set in a far more concrete and specific sense. In the case of information technology, the inventors, technologies, commercial and financial institutions, technical theories and discussions,

standards, political interests and legal frameworks can all be subjected to the same level of analysis. They do not belong to distinct realms but instead constitute a circle of mutual interaction, with an effective history of its own, in which it becomes clear that the interrelations between them are inherent, not external, and that their separation from each other is always an interpretative act, not a “natural” state of affairs. Thus, they are not seen, in this framework, as stagnant, stable, or unified components of an idealized model of stationary relationships, but rather as ingredients of an open formation constantly changing its internal distribution of power. This is why it becomes more appropriate to analyze this process in terms of flows, movements, alliances, and dissolutions, rather than essences or structures.

Without doubt, it is in this theoretical context that we must situate Debray’s demand to study the historical interrelationships between the technological and the social by taking into account the various agents, processes, materialities, and institutions needed in the production of a given cultural formation. Given the debt to the thinkers mentioned above, Debray’s mediology can hardly be called a novel approach. Moreover, though the program is presented interestingly in the book referred to, actual research, where it can be found, remains fragmentary and is used to exemplify the cases in point only. Yet when it comes to work undertaken within the departmental contexts of many of those disciplines that have taken culture and communication as their research objects, Debray’s criticism has its point. Communication and cultural transmission are to be treated not as phenomena that can be adequately dealt with by traditional research traditions, but as objects that, incessantly recreating the conditions of their own mediation, need the question of ontology of communication to be posed. Mediology is one name for this continuous questioning.

What is important in this type of approach, of which Debray’s contribution is an example, is the way it provides a framework for thinking about the linkages and fields of interaction between questions relating to communication systems and new practices developed, the administrative and scientific interests concerning those systems, the cultural sentiment and the discourses connected to telecommunication, and finally the concept of communication yielded. Instead of confronting a technological totality, we see a heterogeneous constellation of linkages and alliances between a number of distinct formations. Let me delve into the Foucauldian concept of *dispositif* a little deeper, as it is mainly this conceptual tool, in the genealogical analysis to which it belongs, that provides a methodological orientation for us here, too.

The Communicative *Dispositif*

Genealogy as a general Nietzschean research perspective characterizes the whole later Foucault, although a change of course seemed to occur from the *L'usage des plaisirs*¹⁰ on. Genealogy, as is known, is a philosophical-critical study in the form of historical research that is intensified by the concepts of event and struggle. It focuses on events which reorganize the network of relationships between “words” and “things” into confrontations, disputes, alliances or coalitions—that is, as changes in power relationships. Whereas for Nietzsche history was an endless confrontation and a mutual contest between energies, for Foucault it was also an incessant struggle between powers, which was not, however, characterized by destruction but by creation of something new. It is not reduced into any single paradigmatic opposition but is conceivable only as discontinuous and local changes in relationships of power. Genealogy as a kind of effective history does not regard historical conditions, permeated by the relationships of power/knowledge, as a foundation but rather as a “complex strategical situation in a particular society.”¹¹

Foucault's *dispositif* is the central operational tool for carrying out such an effective history. It is a conceptual construction that refers to an apparatus or assemblage. By means of it, Foucault could articulate the direction of action of a power that is seen no longer as being based on a sovereign: power does not manifest itself as an institution but rather as continuously functioning nets of relationships which form into chains with each other. In genealogical analysis, power is not concretized within the indefinite boundaries of a general concept but instead in local microrelationships that are defined and formed into an object of analysis by the assemblage. Therefore, the *dispositif* is not expressive of anything general but rather of the particular and singular. It gathers local and historical relationships under a given constellation, but it is not the “totality” of these relationships, let alone that of all social relationships. It is—insofar as it “is”—only in relation to the object of analysis which, in the context of the study at hand, is the history of telecommunication. This thematical core here defines an area of experience that manifests itself in and through the mutually constitutive interrelationships between theoretical discourses, social power relationships, and self-relationships of the self, as well as in the whole range of different practices, institutions, and systems involved. *Dispositif*, here, is to be understood as a constellation of relationships which, in a given historical period, organizes communication as both an object of speech and a field of experience.

Constellations of communication enable one to analyze the institutions, practices, and discourses inherently related to the constitution of the social phenomena in question not, as has

been usual in the academic division of labor, as independent and separate from each other, but, on the contrary, in terms of their historical interrelationships, as they shape each other and become, in the course of this process, redefined and reorganized. They do not belong to separate realms of institutional practice and scholarly discourse but presuppose each other in order to be conceivable. They form a mutual effective history which dissolves only to regroup again depending on the historical circumstances and thematic frameworks in question. In this way the constellation helps research practice to take into account that effects have an inherent, not an external relationship between each other, and that their separation is always an analytic operation, not a “natural“ state of affairs. At the same time it emphasizes that they should not be seen as coherent components of an idealized, static scheme of relationships but instead as ingredients of an open formation, the inner power distribution of which changes logically when seen in retrospect but always unforeseeably at the time of the change. For this reason the constellation enables articulation of thematic relationships, not in terms of essences or structures, but rather in terms of flows, movements, alliances, and detachments.

What is central concerning a constellation is that the specific relationships in and through which it is actualized do not constitute a “totality” independent of the analysis, on the one hand, or of the ingredients of these relationships, on the other. Although theoretical discourses and social practices have an inherent relationship with communication as both an object and a tool, it is only through a research program that this relationship is constituted as an object of thought. Furthermore, a constellation of communication is not a totality of all social relationships either. This is first because, as mentioned above, a constellation always thematizes a certain constellation of power relationships centered around some specific phenomenon or experience from which it receives its meaningfulness. Therefore, the constellation is to be understood only in relation to an experience thought of in this way. This is also why the conditions of communicative constellations are determined on the basis of different circumstances and of the regional and temporal relationships operative within them, although they may have convergent or analogical characteristics and connections. But the constellation is not the totality of power relationships even if it were applied only to relationships and fields of relationships actualized in this way because it is not independent of or preceding these relationships: it is nothing other than the occurrence of these relationships.

Although the areas of experience to be analyzed in genealogical research practice always take shape within some definable configuration of power relationships, which occur in both constant institutionalization and disintegration, talking about a general constellation with respect to these experiences is not nonsensical. It has a realness of its own as a unifying

principle that gathers together diverse communicative practices and institutions. Even so, a constellation cannot present itself as a united, harmonious, and as if already completed order, for these fragmentary and ever-changing chains of relationships and practices constitute precisely what it is. It is nothing other than the economy of the occurrence of the phenomenon under analysis, in this case, the administrative history of and by communication, and does not precede this occurrence in any way. Thus communication is inherently divided into an irreducible plurality of heterogeneous events. Of course, communicative relationships are not independent of the constellations of systems and conceptions to which they pertain and which they, as an experience, necessarily presuppose. If human language is thought as a general medium, history can be viewed as a diversification of different forms of communication. As every form produces its own relationship to the limits of communication, and as these relationships coexist together, partly overlapping but in any case always influencing each other, communication is a phenomenon that can be understood only with reference to this fragmentary concatenation of events. This is to say that although there is no constellation of communication as such, as an isolated phenomenon, that even though it gets its sense and significance exclusively by way of a plurality of communicative action, even this experience of the multiplicity of communication does not exist in itself “before” the constellations and systems that precisely produce it as an experience. On the contrary, communication “is” the social relationships that determine this constellation; it is the realization, expression, and mark of these relationships. Yet, as has become clear by now, the constellations of communication should not be taken as independent either, for they are determined, in turn, by the taking place of communication. Ultimately, the very movements and rhythms of communication are what provide a voice for the integrating and productive tactics of constellations of communication.

A communicative constellation, strictly speaking, is therefore not an area, principle, category, or a level of analysis. It is rather a texture of mutual relationships between institutions, practices, and sentiments, which are interwoven in a particular historical system and its discourses. For this reason this system is to be understood, like discourse in Foucault’s analysis, as a series of discontinuous segments, the tactical function of which is not coherent or stable: it is a point of intersection of social forces where it both unifies and disperses existing groupings, but is also produced itself out of the interaction of these same forces. But above all, a constellation of communication is the coming about, the continuous unveiling of society itself, because for instance the formation of discursive practices and power constellations related to the telegraph system is mediated and guided by the very assemblages that allow telegraphic communication. Thus attempts to replace communication with a new term in the hope of emphasizing its openness and eventual character must be welcomed, though propositions such as Nancy’s

“sharing,” often have other, equally unwanted connotations. Communication, in this conception, as in Foucault’s notion of sexuality, is neither a “primitive, natural, and living energy welling up from below,” nor a “higher order seeking to stand in its way.”¹² Not unlike Foucault’s sexuality, communication here is not a pure positivity, and not exclusively an effect of a law either. While it endlessly escapes the functionality imposed on it from outside, communicative constellations constantly introduce meaning structures and circumstances through which it is experienced and perceived. Similarly, whereas communication systems produce and institutionalize communication, the taking place of communication and the practices it gives rise to constantly reorganize the contexts of communication. This mutual relationship is the object that is posed as a problem in this study, as it is in this connection that “communality” becomes articulated and can be taken as a problem and an object of reflection in itself.

Systems of communication here are nonplaces that establish the site for communicative action. Communication takes place temporally and regionally in separate assemblages that—although overlapping and interrelated—are, however, distinguishable from each other. This is also why communication is always discontinuous and heterogeneous, and can be separated from social relationships only analytically, for it “is” this sociality, its realization: it is the realization of the social.

2. On Thought About Communication

Telecommunications bring two things together that were previously thought of independently: language and technology. If we combine them together, we have communication by technical means. The word “communication” is derived from the Latin word *communicatio*, which, in turn, has its root in *communis*, meaning “common to several, or to all.”¹³ Telecommunication systems, for their part, have been defined as “devices and techniques used for the transmission of information over long distances via wire, radio, or satellite,” in the New Encyclopaedia Britannica.¹⁴ Technical devices, in their ordinariness and mundanity, tend to reduce telecommunication to the sphere of human control and possession. Whereas language—although similarly to hand, like a manageable tool—remains fundamentally unachievable and uncontrollable. Thus, telecommunication opens up a horizon in which the interrelationships between language and technology appear on the one hand as ordinary and orderly, and on the other hand as strange and fundamentally uncontainable. These two dimensions are not exclusive but, on the contrary, presuppose each other.

“Communication” is surely not to be reduced to the (technical) transmission of singular linguistic meanings as has been the case, as a rule, over past decades. Rather it “is” the daily realization of “the social,”¹⁵ in at least two senses: it is its happening, the voice and trace of it, and at the same time its mechanism, too, the vehicle for what is to be articulated. Although they are realized in communication, are social relationships precisely what communication “is” all about? They presuppose it as their precondition, but are also at the same time communicative events themselves, events *in* communication, in the field determined and delimited by communication. Therefore, communication is also, and perhaps most fundamentally, the constitutive condition of this sociality and its expression, for without it the social would not be a possible object of thought and action. This constitutive dimension remains at root always inarticulable: it is what enables articulation but is not articulable in itself. Hence, it can be said to be transcendental with respect to the day-by-day realization of communication, as it constitutes its precondition. Yet this transcendental dimension does not form any infinite, unchanging structure external to the very historicity and finiteness of communication, and

cannot be thought as being “before” its occurrence. On the contrary, it is fundamentally historical, marked and implemented by the daily rhythm of communication.

Is it possible to consider “communication” as an attribute of anything actual? This question becomes relevant as we understand that we cannot approach the phenomenon of communication in itself by interpreting communicative situations and processes. The system of communication, or what allows communicative events to take place in an organized manner, cannot itself take part in communication and enter the communicative world. Similarly to Heidegger, when he was deliberating upon the concept of “worldhood” in his book *Being and Time*,¹⁶ we can notice a certain undecidability at play here. On the one hand, this kind of communicative event (discourse, discussion, speech act, message transmission etc.) is based and built on the item of its structure that is communication itself. As “worldhood” in the Heideggerian sense, “communication,” is for us an ontological term, referring to the constitutive movement of communication. Yet on the other hand, we know “communication” only in terms of the actual events in and through which it manifests itself. Hence, there is no way to investigate it other than by actual communication events and systems. Communication “is” the expression of difference and the production of identity, but this expression and this production neither become articulated nor assume any detectable identity. Although inarticulable, it always leaves a trace—a trace that tends to vanish and be forgotten in communication.¹⁷ Communication, insofar as it is understood precisely as the occurrence of a difference, cannot be defined in any specific sense: it manifests itself only as differences, not as differences of differences, which constitute its conditions. It is in this sense that communication is fundamentally incommunicable.

It is worth considering how the conditions of communication relate to the historical conditions of the knowledge/power relationships Foucault studied in his genealogical works. It was Foucault, after all, who replaced the concept of *episteme* (which had a touch of built-in structuralism) by that of *dispositif*, determined entirely in a finite, discontinuous social realm, thus allowing the conditions of a given institution to be thought as historical and within the historical. Like the conceptual operations of *dispositif*, thought about the conditions of communication refers to a certain extent to a “wholeness” (insofar as this “wholeness” is perceived as always implying not a totality but a radical incoherence and discontinuity) of the occurrence and formation of a certain type of social experience. The former is conceivable—although as inconsistent and fragmentary—in terms of some particular experience (whether that of madness, criminality, or sexuality, for instance) that enables its identity as an object of analysis. The conditions of communication, however, are not

expressible as such, for they do not constitute any comparable experience—not even an incoherent or temporary one—but are instead the precondition of any social experience. This is because the idea of communication’s constitutiveness, its being the condition of the social, of what is shared and the fact of this sharing as well, must be conceived in its whole fundamentality and irreducibility.

However, it is true that both are determined within the social. Although the conditions of communication have a transcendental status with regard to the coming about of communication, this status is constituted entirely within the ever-reshaping domain of sharing, in its unconstrained historicity. This means that the conditions of communication do not retain any ahistorical structure or unchanging nature, which would constitute the ultimate law for the production of any meaningful communication—a law that was thought largely to exist without a history of its own.¹⁸ On the contrary, it is precisely the occurrence of communication which yields, renews, and reorganizes its own conditions in the course of its realization, in the daily communication. In this sense, the positivity of communication, communication *as* communication, does not depend on individual decisions involved in communicating instances, but rather on the constitutive movement of its *going on*, independent of any particular subject positions. It is rather the fact of its occurrence which allows us to form relationships, identities, and subjectivities during this occurrence. It is by and during this forming of relationships within communication that the historicity of the human being and the community it is a member of is articulated, not in any definite terms but always on an experimental and contentious basis. It thus also forms the conditions of communication, but there is nothing transhistorical in this as there is no other law than the thoroughly historical law of the communication occurring that constitutes the conditions of the articulable and objectifiable, in other words, human institutions and communities.

A clarifying note should be made concerning the *dispositif* or constellation of communication. When we are discussing a communicative constellation or its displacement, we are always referring to the administration of and by communication: displacements in or between communicative constellations are always displacements within this history of communicative administration and administration of communication. Although these constellations do not, therefore, relate to communication “as such” but only to one of its historical lines of development, it is evident that they cannot present themselves as consistent or dominant totalities even within this one line of development. Communication is a multiplicity of heterogeneous series and fields, and this multiplicity is irreducible into any single identity in principle. In spite of this, the communicative constellations and their displacements traced here

are significant—in all their impurity and porousness—since they have without doubt shaped the thinking of communication in a way that surpasses the scope of their specific contexts of origin. Let me venture a generalization. Although new starting points and perspectives for thought about communication have increasingly arisen during modernity, many of them share the same conception of communication. Although it has died out in the form being discussed, this tradition has been one of the most effective in constituting thought about communication in the modern age.

Our main object of interest here is thus not communication or its conditions as such but rather the relationships between communication and specific telecommunication systems and discourses that has been constructed through certain nodes or points of intersection. It is in this connection that “communication” has become thought of as such, which makes these nodes the main focus for an administrative history of communication and the history of the administration of communication. This is why we have to turn to systems of communication as the main loci where communication has been regarded as both a means and an object of action.

Communication Systems

Communication is neither homogeneous or uniform, and it does not determine a subject that can be understood as unitary or composed of similar units. It always takes place in some locatable situation which is made up of a given assemblage of social forces, and is thus never separate from the power effects actualized by way of this set of relationships and groupings. A central part of the constitution of communication, so to speak, in modern societies consists of different communication systems—the systems which produce and transmit communication within an institutional framework. They engender communication by establishing a network of principles, techniques, institutions, standards, and codes, which together determine not only the practical conditions of communication, but also to a great extent its conceptual form. Of course, these systems do not form a constant in the changing and reorganizing economy of power relationships either. Like singular communicative events, the loci of which they predominantly constitute, they take shape within the prevailing groupings, strategies, and objectives, the movement of which they follow. Moreover, they are not homogeneous entities. By defining them in terms of diverse techniques and practices, one could still stick to some kind of uniting *logos* which, seen from a certain conceptual viewpoint or operational function, would bind these dispersed elements together. However, a given communication system is not reduced to any whole but is connected unrestrictedly to two separate dimensions. It is coupled firstly with

other systems with similar form, and secondly, with expressions dealing with their “material,” namely, communication.

Yet it is precisely through systems of communication that we can approach communication as communication: it is in intercommunication systems that “communication,” properly speaking, has been made both an object and a means of administration. Once telecommunication was established, “communication” was set up as a new aspect of administrative practices. It was linked not only to interorganizational schemes but increasingly also to plans on a national scale, based on its integrating functions. What is more, communication by its systemic nature became a presupposition for thinking about the political community. However, in order to be practicable, communication had to be formalized in a consistent theoretical framework, which made it an object of ever intensifying investigation. As in the previous case, this formalization was not restricted to a few specific telecommunication systems alone but characterized the general attitude towards communication during the modern period with the institutionalization of communication research. In this sense, systems of communication and related discourses and metaphors have invariably engendered frameworks within which communication has been systematically thought about in itself.

What is of importance is this institutionalization of communication through diverse technical and cultural systems, which constitute the environment for its becoming an object of thinking. Those systems organize communication, which, then, “reflect” or “reveal” the historicity of the prevailing social dynamics: communication systems and discourses acquire their conditions of possibility always in a particular historical situation and through the relationships and circumstances prevalent in it. In addition, if we believe that communication constitutes the community, as Jean-Luc Nancy has stated,¹⁹ then these communication systems have a necessary and intrinsic relationship to the processes that make up society. Yet there is nothing original about them: they must be seen as being produced by the same constellation of relationships in which their incessant mutual functioning becomes possible.

In the light of Nancy’s meditations, it can be thought that communication “is” the endless dissolving, reorganizing, and intertwining of identities which are exposed, over the course of time, as not having any lasting authenticity. They thus do not make it possible to identify any collective project which could provide a foundation for society. Yet there are also institutions and discourses of a more influential and long-lasting nature, which form contexts for new meanings and interpretations. By drawing one’s attention to systems and theories in which “communication” is regarded as a problem of intercommunication, it becomes possible to

discern a line of development of and within communication, a line that gave rise to communication as communication. It is obvious that internal communication systems do not occur in a cultural vacuum, but on the contrary are themselves part of the prevailing political culture from which alone they obtain their social significance. While communication systems take their positions within and through the constellation of relationships they belong to, they also lead to redefinition of the latter by changing the conditions through which the social is conceptualized.

Communication does not appear here only as an object of representation but also as a locus for social orders to take shape, as a place in which those orders can be articulated, as well as an agent of their realization and as a factor that maintains and embodies their formation. What is of interest here, is the way communication systems bring about this happening of communication, its institutionalizing and, on the other hand, its disintegration and the emergence of new forms of communication and their adjustment to the prevailing constellation. Those systems constitute inherently the conditions for communication taking place, though clearly this taking place is never reduced to the structural conditions alone. Communication is not, of course, totally assimilated into the techniques and systems which shape its forms of realization but constantly escapes their functionality: new modes of communication ensue from the coincidence of heterogeneous forces in the communicative event. It spawns new, unprecedented practices, develops ramifications in fields and directions calling for institutionalization, and endlessly yields interaction that is beyond the reach of governance. Consequently, communication systems constantly take new forms to meet emerging practices as communicative events constantly reconstitute the institutional conditions of these systems.

In this sense, communication always takes its place in some system of communication, which organizes and mediates it as an internal communication, although the perpetual realization of intercommunication generates new arrangements and forms of communication. These forms are natural candidates for the objects of “pure sociology,” proposed by Georg Simmel, namely, the “societal forms themselves.” He distinguished the “pure” element of sociation from its heterogeneous and variable embodiments.²⁰ What Simmel had in mind were objective forms with positive contents rather than different communicative forms, although he ultimately failed to formulate a satisfactory theory of this kind of interaction. That there seemed to be no *model* for a form that comes into existence through communication has been regarded since Simmel as simply a challenge. For instance, communication theoretician Hugh Duncan tried to draw up a model in 1962 that would explain a reciprocal relationship in which the forms of sociation are determined through communication which, in turn, is constituted by these same

forms.²¹ It seems that the type of approach endorsed by Duncan and many others, which seeks to construct a positive model for communication, fails to take into account that lack of such a model is perhaps not due to a failing of theory, a problem which could be redressed by more resolute investigation, but instead a permanent state of affairs which any analysis of communication has to take into account. Now, by examining communication systems as points of intersection of diverse technical, political, theoretical, and juridical practices, we have the possibility of thinking about communication in a Simmelian spirit as something pivotal to sociology, but without Simmel's (and Duncan's) positivistic frame of analysis. This is because the systems in question do not passively reflect the functionality of social practices, but rather create fields of knowledge and practice in which this functionality is exposed to systematic thinking and reorganized along the lines forged in this thinking.

This is where the ambivalence of communication can clearly be seen. On one hand, the general category of communication as constituting the social is not formally equal to other ontological categories: it has a special relationship to ourselves. The category of communication is principal with respect to other ontological ones, for it constitutes the possibility of existence for those categories, which, as possible objects of thought, are revealed to us only *in* communication. Yet, on the other hand, communication is not independent of culturally institutionalized practices and systems. It is, in fact, always defined by the specific forms of regional and historical practices, and thus deprived of any permanent identity or "logic." The meaning of the concept of communication varies according to different qualifiers (geographical, temporal, strategic, theoretical, technical, etc.). However, these are far from neutral, immutable coordinates, but instead facts that become intelligible and relevant only in communication and for this very reason cannot be analyzed independently from the development of communication itself.

That communication lacks a lasting identity becomes clear from the diverse communication systems studied below: one can see that telegraphic communication has a different ontological constitution from that of telephonic communication—which is not so much a comment on their mutual technological differences as more importantly on the distinct realms of action they make possible. Hence, "communication" does not have conditions of possibility that would be valid in all communicational activity. Yet on the other hand, in order to talk about the history of "communication" in the first place, some continuity has to be discernible, some sort of succession, not necessarily a coherent line of development but rather a set of practices and conceptions sharing the same *ethos*. It should be emphasized that this history should not be conceived of as narrative about "communication," implying that what is studied could be

reduced to an object like any other. Keeping in mind that what is at issue is simultaneously the ontology of communication that cannot be analyzed on the “ontic” level, as Heidegger would say, and its historical forms, it is in the systems of communication that both these dimensions find an expression that is both theoretically interesting and historically representative.

Thus, although it is always already impure and instrumental in view of the ends it is connected with and whose functions it performs, communication is never purely external in the relationships it expresses. This is because, although it is an instrument with certain practical ends, it constitutes the communicative context in which those ends are conceptualized and become intelligible objects of thought. In this way, “communication” is essentially the constellation of a given social situation and related power relationships and discursive practices. Without an objective frame of reference, it is not sensible to assess its purity or quality; clearly, in any case it immediately exposes the experience of a given historical constellation, of the particular state in which local relationships are given their place and meaning. Communication, thus, does reveal anything but itself, its own course of happening.

“Communication” always takes place through certain practices and systems only in and through which it “is.” Thus, it functions here rather as an effect of a law than as an independent entity. Yet, unlike in many comparable interpretations that emphasize its position with regard to the singularities relating to it, law is understood in this study not in terms of a totality but rather as an essentially heterogeneous assemblage, in which relationships of power, bodies of knowledge, cultural discourses, and material contexts are under a continuous process of reorganization in which they constantly produce and are produced within a field of effective relationships. “Communication” can be seen as an effect of this network of relationships, the dynamics of which it expresses, but at the same time also the mechanism through which the network in question functions, by means of which it gets restructured, and which, thus, is not only the voice but also the mechanism of this process.

If my sketch is plausible, we have next to investigate the relationships between distinct communication systems and the ontology of communication. Here, these systems are conceived of as forming separate, though interrelated domains of interaction that are structured around arrangements based on specific communication technologies and, on the other hand, discourses and practices pertaining to those. These systems must not be viewed as conditions of communication as such, for they only open up certain kinds of relationships that allow communication to become actualized. Yet, talking about communication in general, as we have pointed out, is problematic, as it cannot be thought of in terms of a whole. Instead, these

systems can be regarded as necessary for the functioning of a modern society in two senses: both as an essential technological infrastructure and as a conceptual precondition for it. Communication, as has been said, is not an unchanging constant but always dependent on the social relationships which it expresses and carries out. Thus, the daily evolution of modern societies cannot be separated from the particular communication systems which have operated as integral parts of the relationships determining the social. Yet it is not exhausted in the functioning of these systems either. In this sense these systems constitute the ontological condition of technologically institutionalized communication—not as a foundation for it but rather as a nonplace of the historical constellation of societal relationships, as the site and tool of their creation—from circa the first half of the nineteenth century on. They make up the intermediary between human community and language, a construct that brings these together as an experience of the present time.

In modern societies from the middle of the nineteenth century onwards, the need to have organized communication networks has increasingly meant the strengthening of the position of telecommunication systems. They occupy a pivotal position as the precondition for thinking about these societies. In fact, it is only in recent decades that they have emerged as *the* mechanisms for manifesting what is common: interlinked with all the other technological and cultural institutions that together make up society, they reveal the modern experience of being in common. Whilst setting the frameworks for communication, they also execute it, and in the process of this communication its very point of departure, the context of its birth, is revised and transformed. It is this relationship that determines the constitutive status of communication within the actual operation of communicative practices in their social functions.

Conceptions of Communication

It is possible to trace the birth and consolidation of certain conceptions of communication in relation to new communication systems. These systems inescapably give rise to conceptualizations, in each historical period, which seek to consider and position communication as a conceivable entity and a rational object of thought, and thus try to capture its always elusive “essence” or being. These projects, of course, are illegitimate: if communication can be thought of as having a character of its own, it resides precisely in its nature as denying or repelling any single essence. In any case, these conceptualizations express the necessity to take communication in itself as an object of thought, although these projects understandably cannot ever be successful in their goal of presenting what is ultimately

unpresentable. Because they relate to modern communication systems, and because these systems were considered as representing the advanced state of contemporary society, the concepts of communication were also inevitably linked to attempts to describe and account for the specific character of the experience of modern society; they were endeavors to think about its “logic” within a general framework. This is why these concepts must be seen above all as testimonies to social self-conception, for they encapsulate conceptions concerning what is most characteristic and illustrative of the particular social constellation they belong to.

Those conceptualizations define communication in a way that always retains an intrinsic relationship to thought about the nature of community. This is because, whilst they determined the new positions assumed by communication, these conceptions came *de facto* to define a certain understanding of the realization of communality, for communication is this very taking place of communality. In this sense, by trying to encapsulate the “essence” of communication and systematize its logical structure, those formulations always reflect prevailing historical conditions: through them communication could be comprehended as an experience of the present. Consequently, one can view them, to a certain extent, as expressions of their own kind of the same amazement that can be found in more theoretical form in Martin Heidegger, Ludwig Wittgenstein, and recently in Giorgio Agamben, that there *is* language. It is not a matter among others but the condition of possibility of all thinkable matters—and thus indescribable.²² Communication is possible because of language but should not be likened to language as such, as the former primarily expresses the facticity (*factizität*) of the social. It is situated in the historicity of human communities and follows their “logic” alone—logic, which cannot present itself, not even regionally, in the form of common rules but is divided within the fragmentary movement of heterogeneous forces into discontinuous series and repetitions. This is to say that what is most fundamental in communication is not to be found in any distinctive meaning-content, but rather in the fact that it is always the condition and expression of the experience of the social. And it is exactly in this respect that it corresponds to the experience before the “wholeness” of language, because it is at the same time the condition of the “we” and our society.

In this sense, the diverse conceptions of communication analyzed in what follows—which could provisionally be referred to as organic, mechanical, and self-regulating—should be seen as attempts to encapsulate and preserve something that is inherently inarticulable: the fact of communication, its happening. Although it is true that specific viewpoints are always articulated by particular individuals, conceptions of communication should not be seen as being dependent on a single individual: what is central is that certain sentiments concerning communication

gained ground across diverse discourses and became a common horizon that shows communication in a new light. In fact, they are best seen as having been efforts to conceive the condition of possibility of communication. However, rather than being purely theoretical, these undertakings must be perceived as corresponding to particular historical experiences. As endeavors to capture in the most trenchant way what communication “is,” and to encapsulate the nature of communication that corresponds to the experience of its historicity, those conceptions certainly did not stay merely within the discursive domain. Although the “logic” of communication is not consistent, and in fact not even representable in itself, it is clear that human life requires representations of this “nature” of communication for its everyday needs. What those representations really did, whilst trying to give expression to something that is not expressible, was to disclose the community’s historical experience of its present time. It is in this sense that these conceptions can be thought of in connection with Durkheim’s totems, as they are marks (voices and writings) of community’s experience of itself.

Seen from this perspective, in the act of reflecting general collective sentiments and self-conceptions, systems of communication together with related discourses defined a place in which not only was communication manifested as communication, but also communality in itself was revealed. For instance, thought about the telegraph using the analogy of the nervous system introduced the idea of a system to communication. What it actually conceptualized was the experience of the present and the “logic” of the social. The specific historical character of this experience in any given period finds its expression precisely in and through discourses relating to these communication systems. Far from being the only or privileged loci for this experience, they nevertheless provide a consistent framework for its reflection. Conceptions of communication cannot be other than the effects of collective self-understanding—expressions of those discursive relationships in which social practice finds its interpretation—for no cultural identity can transcend in any definitive way the horizon of its birth, as it is this very horizon that makes it possible as an identity in the first place. It is exactly this issue that is at stake when it comes to the question of the impossibility of transcending the tradition of metaphysics, as every critical gesture inevitably gets articulated through and with regard to this same tradition.

Yet, evidently interpretations concerning the nature of communication contribute to the self-constitution of communicative processes. Now, given that the constitutive horizon of communication cannot be “external” to its actual happening as it is always already part of its daily realization, clearly the juxtaposition between “discursive” conditions and “real” ones cannot be regarded as being valid. The conditions of communication can only be discursive,

and insofar as interpretations of communication are constitutive to our collective landscape, they must also be an integral part of the historical conditions of communication. What is more important, however, is that alongside the occurrence of communication the conditions of interpretation are immediately conducive to collective self-conception, for insofar as communication manifests the social, the conditions of its conceptualizing are simultaneously those that allow for thought about the social. For is it not true, for instance, that contemporary society is increasingly spoken about in terms of a *network*, whereas the metaphor of a *nervous system* was absolutely essential when addressing modern society in terms of communication until about the 1970s? Our concern here is to ask how the diverse discourses, practices, and theories in conjunction with the telecommunication systems both organize and implement the experience of “communication” in the modern time.

It is not our purpose, however, to show that telecommunication systems and discourses would have produced the only or the most influential model of social dynamics. What we attempt to do is to point out that discourses relating to telecommunication systems do incorporate elements that make it possible for us to analyze the historical relationship between communication and telecommunication. This possibility is related to the models of communicativity that can be found in these discourses—models (theories, conceptualizations) that constitute one of the most interesting attempts to think of and formalize social dynamics in terms of communication that respond to experience of the present.

As conceptions of communication do not establish any coherent line of development but are instead an intrinsically heterogeneous constellation, one should not seek a unifying principle or a hidden logic underlying them. Yet in any given period in the history of the administration of and by communication, there is a discernible constellation of diverse discourses and technologies that in the final analysis sets the limit of communication. “Communication” always takes shape in the mutual effective relationship between the forms and directions of contemporary discourses and existing communication systems. It is always an effect of a given historical constellation, for it is this constellation which determines the functions of communication as well as opening up the areas of articulability. For this reason, as communication systems multiply and related discourses became fragmented, the conceptions of communication inevitably lose their specificity.

Communication is to be conceived as the effect of collective traditions and institutions, or, if you will, in the Foucauldian parlance, of the formations of knowledge and relationships of power, and not as an independent positivity. It is thus not a pure, privileged, and primary

instance that would stand in contrast to something derived, artificial, and only apparent. Being always already nonoriginal and impure, it is determined and given its content in relation to a social set-up alone, only within which it becomes conceivable. Yet, this relationship is not unilateral because communication is the very condition of the self-determination and incessant reorganization of the constellation within which it is practised. This is the reason why communication can never be external with respect to society, which on the contrary it constitutes, and, on the other hand, is why communication cannot be thought of independently of social relationships, which determine its meaning.

Against the backdrop of what is said, it is easy to understand that communication is not singular but always plural. This is because it consists of numerous heterogeneous and irreducible events which do not make up a single, unitary system although they still belong to a whole that is the economy of its happening. Communication involves heterogeneity in at least three ways: first, in its capacity as a conveyor of meanings as it does not manifest itself at the same level as the signs transmitted; secondly, in the communicative event itself, for it is not reducible to a common structure; and finally, in its effect, since that is not necessarily what was intended by the initial act of communication.²³ As it materializes in a multiplicity of connections, in which it performs diverse functions and pursues different purposes, communication—contrary to the connotations of the term, which make us think of a totality of some sort—does not form a complete whole or a single homogeneous realm either. This is why the “nature” of communication has to be thought of in the plural and always in connection with existing relationships and practices. Thus, without any permanent identity in the process in which it ceaselessly constitutes as well as is constituted, communication, in this study, is seen as fundamentally nonoriginal. This is to say that there is no deep, hidden foundation that would function as a final matrix for accounting for and determining the underlying truth of communication or community. Communication cannot claim to possess that kind of privileged instance as the ultimate point of reference, for it is nothing other than the trace and indication of these fleeting relationships and practices that constitute what society is, being constantly redefined along with the simultaneously institutionalizing and dissolving social constellations stemming from these practices. It is not something deep, layered and complex, something whose essential nature one could reveal through a thorough interpretation, but rather something the surface of which, the day-by-day realization of communication, is itself the infinite “unfolding” of communication.

It is possible to go even further by saying that, to the extent communication is an integral part of the social, there is no communication in itself whose character is established once and for all

and which is independent of the relationships occurring in community. On the contrary, as has been emphasized, it is the very manifestation of these relationships that constitute what society is. So, instead of communication in general, we should speak of the relationships of the social, of the institutionalizing and reform of collective practices and the birth of new fields and orders of communication alongside disappearing, defunct ones. Similarly, the “nature” of communication is related to the context of its use, in which it is under constant rearticulation and disarticulation. The appropriate unit or type of communication must be determined through discretion, which, ultimately, relates to the social functions implemented by and through communication.

Because communication is understood here as possible only within a particular system, a point that entails a rejection of the notion of an authentic and original instance, the idea of its being corrupted or objectified in some way or other (customarily considered to be due to increasing system rationality in, for instance, circles influenced by the ideas of the original Frankfurt School) is not feasible either. This is the threat, however, that lurks at the core of Agamben’s thinking, and which is similar to the later Habermas’s conceptualizations. The threat consists of the belief that Being is institutionalized into a certain way of being and has thus lost its connection to existence. It is viewed as having been structured into a property or character, which, through becoming independent and isolated, encloses the realm of possibilities within the prevailing order. Accordingly, language is seen as having broken loose and separated itself from historical existence and become autonomous and primary with regard to human activity. It is said to be in this process that language is estranged from its own being. What for Agamben is under threat is the pure singularity, or “whatever” (based on the Latin term *quodlibet ens*), which does not have any determining identity but can be—yes—whatever.²⁴ As human existence is, at root, communication of these pure singularities, the autonomization of language necessarily implies undermining the very basis of human community; namely, of its openness and its rejection of any collective identity. What then, can be said of this characterization? Without going into the richness of thematizations related to this basically Heideggerian line of thinking, and limiting our consideration to a single, though essential, aspect of the problematics presented, it can be argued that it is precisely the identities which constitute the togetherness of existence, not the communication of pure singularities, as these are always external to each other. The identities are not what they are presented as being, and can claim to be neither coherent (in themselves) nor permanent (over time). Nevertheless, identities are what we constantly produce and through which we conduct our existence: the endless construction and demolishing of identities is what the human horizon is about. In this sense the Nietzschean vision of an unending struggle, which is not marked by complete

destruction but by creation of what is new, is closer to the perspective of this work. For an identity—as an object of contention—is seen here as always being only an indication of unequally visible social forces, though without becoming reduced to those.

Moreover, this kind of *quodlibet ens* or “whatever singularity,” which rejects every identity, is considered to be an authentic force, in relation to which production and generalization of identities in contrast represent repression. Yet, if we take seriously the idea that there cannot be any pure, original singularities, but that they are always determined by the constellation of powers they belong to—an idea powerfully formulated, for instance, by Foucault in his critique of the repression hypothesis in his *Volenté de savoir*,²⁵ this notion becomes problematic. According to this view, the singularities, far from being authentic, are always the effects of the related assemblages of power, which establish the area and open up the relationships through which alone the singularities can be thought as singularities. Furthermore, it can be noted also that representation of language as a pure or original entity which has become estranged from its own being is problematic. As language is always already segmented in terms of geographical, cultural, and functional modalities, and is for this reason to be conceived as a discontinuous and restless network of heterogeneous operations and structures not reducible to any single model, it must be thought about through the idea of original impurity. Language is not a coherent dimension or pure category, the movement of which would lead to its becoming independent from communication, leading to an autonomous, “technicized” entity, for it is always determined and modified on the basis of local and functional conditions. In this respect our present time does not represent any great historical turning point. Insofar as it has to a certain extent become technical, which it certainly has, the present time with its functional requirements has imposed more technicized models and schemes of operation, of which language is an indication and expression.

Yet, it would be implausible to view the process as a homogeneous and linear one—even given that language does form a constitutive horizon, and is not thus *only* an effect or reflection of the social—for it does not have a conceptualizable identity and cannot therefore be thought as a single “whole.” Language is the ultimate nonplace for *quodlibet ens* for it is exactly what can be whatever: there is no stable, positive collective content for it *before* its happening. In this way, its own nature seems to be revealed only as eternal deferral. Furthermore, while it is constantly determined and thus also produced through certain historical conditions, language at the same time escapes the functionality yielded by exteriority and develops practices and audiences of its own. This is why language must be analyzed in the light of its historical movement, not as an autonomous instance that has the same immutable temporal and physical

coordinates over time and place—a condition one has to presuppose if language is to be thought as having a single essence. It is language that enables mutual coordinates to be plotted and negotiated, not the other way round.

Repetitive and Controlled Practices

Communication is the production of difference, but above all it is the practice which gets its driving force from the repetition of difference: what is central is not the differences as such but rather the movement of repetition through which prevailing forms are exposed to variations, thus bringing new and complex structures into being over time. It is in this respect that musician Charles Reich was right when proposing that by “changing harmonic rhythm against constant melodic pattern” it was possible to “vary that which is in fact unchanging.”²⁶ What is significant here is not so much the effect of what is new but what is repeated, as controlled repeatability is one of the central principles that mark the industrial era. It is the weight of persistent repetition which, by way of gradual mutations and divergences, gives rise to something new without changing itself functionally. This implies that, in interpretations of the history of communication, perhaps too much attention has been devoted to the point that it appears only in the course of its own being-expressed, and thus the movement of repetition of the same, central to which is not production of a meaning but execution of an event is neglected. Although these repetitive events are clearly always given their meaningfulness in some determining context, it must be noted, that this constant repetition also transforms and reconstitutes the conditions of its own meaningfulness in its historical movement.

A communication system produces communicative events, which, in turn, constantly engender the community of communication: it is not only a question of producing communication but of producing *by* communication. Unlike in the case of the mass media, where interpretations presented constitute a kind of fictional discursive space, intercommunication is related largely to routines, to the accomplishment of daily tasks determined by the requirements of organizational objectives. In those routines, insofar as they serve some preset ends, the content of communication is usually formally subordinate to its functionality, and consequently the execution of an action is more significant than the individual meaning-contents transmitted. These routines reorganize social existence through constituting collective practices and exposing the occurrence of the social to these practices, rather than by interpretative representations in the first place. While necessary to the continuance of a given organization, these routines process the tasks involved performatively rather than discursively, revealing the

incessant change and physical restructuring that an organization consists of on a day-by-day basis. Although routines are actualized only in specific contexts, determined by discursive practices, their daily movements nevertheless have their own dynamics independent of these discursive positions. Thus, by focusing on these communicative routines and on their conditions, we are able to approach the constitutive horizon of communication in a way that does not presuppose any given transcendental principle external to the historicity of communication.

What is the nature of the relationship between institutions that distribute information and interpersonal communication systems? As these institutions form an integral part of our cultural history, should we not turn our attention to centralization of interpretative material instead of looking at often mundane, repetitive communicational practices in organizational contexts? Would not one be inclined to think that the media, as the central agencies that disseminate information, have a privileged relationship with the institutions in question? In the research literature, much emphasis has been put on the political significance of the media, ultimately at the expense of internal communication systems. The latter are of particular significance, however, for through them communication takes place in direct connection to social functions without any generalizable interest in the content of communication. Of course, there is no communication independent of political interests as such for it can only come about in the political realm. But in internal communication, unlike in the media in which the level of interpretation is dominant, communication as such, that is, the occurrence of communication as a structured process inbuilt into the performance of the system itself, has come to constitute the central focus.

Secondly, intercommunication systems are constitutive to the daily functioning of a highly developed society. They form the basic structure of the transmission of communication and information and are thus a necessary condition of the day-by-day maintenance of modern societal institutions. These systems cannot, however, be categorically separated from the broadcasting systems, for the former largely enable the latter to function in a cost-effective way, as they require interpersonal communication systems to connect different broadcasting stations together to extend their area of coverage. Similarly, the functioning of the press is dependent on these systems. In this way, the features of these systems are incorporated in broadcasting, and their separation is only an analytic operation, not a “natural” state of affairs.

Although always based on a rational whole, organizational communication routines do not give rise to any unchanging order but only to series, repetitions, and subtle formal variations which

serve as the basis of new repetitive programs. While becoming cumulative or concentrated, communicative routines are formed into hierarchical chains in accordance with the functionality they realize, yet they retain the singular, detached, and operational character peculiar to themselves. In this way, the being-articulated of society can be viewed not only as a process taking place through thematical interpretations—a process in which institutionalizing conceptual orders are exposed to the law of dispersion and reorganization—but also, and perhaps more importantly, as the discontinuous and unyielding thread of the daily exercise of socially necessary routines, as the flow of the regular and industrious execution of practical, mundane functions. To the extent that this flow opens up new channels in its course, repetition is the innate principle of the “inoperative community,”²⁷ manifesting itself in the rhythm of ever proliferating and gradually varying routines organized within an institutional framework.

In the context of this investigation, communication is not only the existential condition of possibility of singularities but also a positive vehicle for expressing and performing social relationships. This aspect is explicitly what allows for its analysis from the point of view of its use, of the production of meanings, and, hence, allows the positivity of discursive practices to be taken into account. But in addition to in the discourses proper, this “positivity” manifests itself also in the communication routines and in the social functions that organize them through diverse communication systems. For this reason communication is not viewed here as anything original but rather as always already mediated and impure. Thus, two central features of the examination of communication embraced here are as follows: First, “communication” is not thought about in itself, but always as something already interpreted and organized, the main instances of this in modern societies being the different communication systems studied below. What is at issue here is the position and conditions of the systems that produce, organize, and ultimately enable communication as communication. Secondly, communication (especially telecommunication, which is our subject matter) is not considered only as the condition of possibility of community and of discursive structures and practices of meaning, but also, and perhaps above all, as communicative routines—as operational communicative events. Both communication systems and routines have a positivity irreducible to individual activities.

What characterizes community—its instability, openness, and immunity to any founding collective identity—disappears in a perspective limited to a single expression or *parole*, which is always remained within its own interiority. Although communication presupposes the other, a single parole is of necessity already accomplished, at least in as far as it has been provided for communication. As communication in itself is something incessant, no individual communicative event can capture this persistent, continuously varying community that

communication “is.” This is also the reason why it is not something one can easily refer to in numerical terms: although communication takes place through distinct units, the units cannot be enumerated. Communication is not the wholeness of all individual communicative acts; it cannot be divided into parts, which would then constitute what it is, for in that case the whole would be only one term in a series, namely the end product of a series in which all the attributes are moments in an infinite progression. If attributes were added to one another in a progressive series, they could inevitably be reduced to each other and thus lose their distinctiveness.²⁸ This implies that communication is producible indefinitely and it does not have a final point that gathers together the wholeness of it. On the other hand, the attributes are not comparable with one another, for they are heterogeneous and variable, and do not constitute a uniform series.²⁹ As there is no communication independent of the relationships that permeate society, every communicative event is to be seen through the practices, strategies, institutions, and discourses which at each point in time constitute the relevant constellation of communication. The development of community by way of communication is given its continuance in the process in which any utterance, though distinct, cannot be understood as independent or uniform but must be thought of in relation to an unstable and continually reproduced field of heterogeneous discursive practices. This is also why in this study, unlike in the overwhelming mass of the literature, there are no references to relationships between quantitative units.

To emphasize the alleged repetitive nature of intercommunication in collective production of more or less shared meanings can cause some misunderstandings. It is not my intention to imply that the diverse interpretative discursive practices that can be seen, for instance, in the media and other information collection and delivery agencies, do not constitute a *de facto* precondition for our world-relation and perceptions. However, these practices, in turn, implicitly presuppose the *possibility* of free, unrestricted intercommunication. Therefore, to the extent that it enables interest articulations and interpretative representations to take place in the political realm, the possibility of intercommunication is a condition of the political and is never determinable or articulable in itself. It is thus “precedes” all utterances of meaning for it constitutes the condition of the possibility of meanings without being itself meaningful in any definite sense.

Let us now, having clarified our theoretical point of departure, turn to the main body of the thesis. In what follows, we will discuss the ontology of communication in relation to the telegraph, the telephone, and computer networks, respectively. Let us start with the telegraph system.

3. Lightning Lines

The communicative sphere in the last half of the nineteenth century was structured as a result of the conjunction of two separate fields of forces. They were characterized by a concern for political unity, for securing the formal preconditions of a political system, on one hand, and the advent of telecommunication in the form of telegraph technology, on the other hand. Once interweaved, they formed a new communicative order in the place of a system of local and regional networks that lost its effectiveness by the late nineteenth century.

When the telegraph system came to characterize the self-conception of a whole era, modernity differentiated itself from its historical past and presented itself, especially in its American form, as new and ahistorical. In the eyes of the moderns, the telegraph encapsulated something that had never found historical expression. If this experience of a new era could be crystallized, it would be the conception of the technical basis of the political. In other words, what is at issue is the fact that communication as technique (telecommunication) seemed to enable communication as community. What was conceived as a community was not only the nation as a political community but also, potentially, the whole world as a community of independent nations. Here, telecommunication was held to present community as a community, not to structure it from outside, as it were. Telecommunication, thus, secured and let community be what it was, that is, a community.

The development of telecommunication has always been essentially connected with the existence and history of a community. It has, in the first place, invariably been regarded in America as to have determined the national basis for the political.³⁰ On the other hand, by engendering more or less common national publicity, telecommunication systems—with the telegraph leading the way—also created the network of conditions and possibilities necessary for business organization—the principal user and developer of this mode of communication. This is why the history of communal communicativity is closely tied to development of the communicative and organizational conditions of commercial activity. They constituted an environment for thought about communication, but to an ever greater extent

communication—in the form of improving communication systems—formed the environment for social order.

Let me begin by examining the way the development of transportation and communications systems has been involved in forming a national community. This is followed, in the second section, by an examination of the telegraph's role in the creation of centralized communication structures.

3.1. Coming Unity

The introduction of the commercial telegraph system can be seen as having been a process without a present tense. This is true in two senses. First, the telegraph inaugurated a new era of electric communications that, with the improving transportation systems, destroyed the traditional order of life and gradually made it necessary to erect institutional frameworks for its social control. The telegraph was thought about through existing social institutions and practices which provided insufficient yet indispensable cultural contexts for it. Secondly, and more generally, any event, it can be said, has no present. Rather an event retreats and advances in two directions at once, namely, to the past and the future. Both of these form complete and distinct realms in themselves, each excluding the other and dividing any singular event into the past and the future. An event is always determined by these two realms; it is a borderline case within the scope of a given temporal direction which it reflects and expresses. This is because a pure event is at the same time something which has just happened and something about to happen, never something which is happening: the event cannot produce its own frame of reference.

The event of the advent of the telegraph can be understood through this interpretation. Its development has been linked with either the past or the future. In the former case, the existing arrangement for information distribution—the postal system—served as the closest conceptual framework for thinking about the telegraph, whereas in the latter case the idea of the possibility of a universal language for connecting all peoples formed a horizon for this. On one hand, the telegraph was conceived in accordance with general aims which the postal system served, especially with that of integrating the nation by disseminating public information. On the other hand, when its unifying potential was understood, the telegraph soon captured public imagination as the bond enabling future peace and harmony among nations. Thus, it can be seen that these were not two separate phases of the development of the telegraph, but instead

closely interrelated ones, centering around the telegraph's unifying capabilities. In both cases there was the same underlying logic which reflected the contemporary conception of the nature of this first form of telecommunication: it was conceived of as a fundamentally neutral instrument of communication. That conception made it possible to formulate communication projects for national unification and to universalize the hopes and plans invested in those. Let me now elaborate on these themes a little further.

The Postal System

Socially institutionalized communication in nineteenth century America was realized mainly in terms of face-to-face relationships within local contexts. The nation was a loose association of poorly connected settlements, "island communities," to use Robert Wiebe's well-known expression. In this dispersed societal structure, based on the principle of local autonomy, weak communications rendered interregional interaction difficult, thus impeding public participation in politics and enactment of public policy.³¹ The problem of communication was one of the most important ones national government had to solve, being as much a technical as a political question. There was a general concern regarding the limits to extension of the Union as an integrated political unit in a period of rapid westward movement coupled with fragmentary and unpredictable communication and transportation systems. T. Ewing, Secretary of the Interior, urged "some means of communication across the continent, through our own territory, from the Atlantic to the Pacific" in 1849, thus expressing the need to link the two coasts.³² In the following year President Millard Fillmore brought up the same question—as Zachary Taylor had done earlier in his annual message as President.³³ It was crucial to link settlements by reliable and effective means to the main body of the Union in order to maintain political order and coordinate the scattered system of regions into the framework of one political system.

Many plans and proposals for large-scale projects were presented, including roads, canals, and waterways, aimed at opening "speedy and easy communication" throughout the territories of the Union and thus improving intranational public communications.³⁴ These routes were important not only for the military, but also to "facilitate the administration of Government: and more especially, in a country like ours, to make known, by a rapid circulation, the political disquisitions relative to public measures," as the matter was put in "the Report upon a National Road, Washington to New Orleans."³⁵ The postal system was the foremost national institution developed in accordance with these objectives, attaining such a coverage and

regularity of service that it came to constitute the basis of the American communications system until the introduction of the telegraph in 1840s.

The American postal system emerged as a focal governmental organization that linked the demands of communications and governance. It bound together scattered localities and facilitated their governance, becoming the central administrative apparatus of the nation by the early nineteenth century.³⁶ There were at least two reasons to further effective and reliable dissemination of political information. First, according to a republican doctrine that was an essential part of the theory of government from Thomas Jefferson's sponsorship of a "Bill for the More General Diffusion of Knowledge" onward, an informed and vigilant public constituted the foundation of a liberal governance, forming an ultimate defense against a strong government. Participation of a politically aware citizenry in the affairs of national politics became an essential republican principle.³⁷ Secondly, a need to Americanize the growing number of immigrants forced the administration to seek means of developing a comprehensive system for information distribution.³⁸ The policy of informing the public was conducive to growing a comprehensive communication and transportation network, which became the technical basis for an evolving institutionalization of the structure of information distribution.

The postal system was a tool under the government's control for binding localities together, for decreasing the isolation of settlements, and for tightening the mutual interdependence of the regions, thereby enabling the feeling of a common national space in both political (a truly federal unit) and economic (a national market) terms. In fact, it seemed possible, as a commentator put it in 1829, that unlike any other mechanism of intercourse, the postal system could transform the whole country from a confederation of separate states into "one great neighborhood,"³⁹ thus anticipating Samuel F. B. Morse's similar description of the power of the telegraph. As Richard John pointed out, long before the telegraph was credited with having "annihilated" space and time, the postal system had been described in exactly the same terms.⁴⁰

The concept of unification—an idea that did not always get explicitly formulated but became rather a *de facto* basis for thinking about communication—implied two interlinked political tasks. Firstly, it introduced the requirement to create physical communication and transportation connections. This was the dimension of roads, embankments, locks, intersections, and tracks constituting a network of trails over the surface of a wide terrain. Secondly, there was a need to construct a comprehensive and effective distribution system for public information. This latter task naturally relied on the existence of an adequate physical

infrastructure, but it had a distinct dynamics of its own. More important than to coordinate the evolving set of tracks was to create an arrangement for securing unrestricted circulation of different types of information over distance.

On the other hand, if both of these tasks were necessary for unification, the objective in itself can be seen as having two distinct yet related parts, namely political stabilization and cultural homogenization. Political stabilization accounted for governmental attempts to mould the country into a coherent political unit with its central political institutions and legislative frameworks covering the whole country in an equal fashion. The need for cultural homogenization, for its part, showed itself in the emphasis on the common national ground of the American people, irrespective of differences in ethnic background, geographic location, or individual interests. However, connections between arrangements to develop a comprehensive informational environment and the construction of physical infrastructure networks should not be seen as separate from the prevalent economic activity surrounding them, which, in turn, was an essential prerequisite for formation of the national market.

Both processes were, however, centered around the same goal; namely, rendering the nation more like one political and economic unit. And the postal system provided the vehicle to bring these objectives together in a way that allowed not only governance of the population but counter-governance of the government by the people as well, thus “drawing still closer the bond of union,” as a congressional committee put it in 1830.⁴¹ As telegraphic communication was introduced in the U.S., it was incorporated into this general political constellation. The urge for yet speedier communication had induced Postmaster General John McLean to consider the introduction of a telegraph system for postal use already in 1828. At that time the term “telegraph” referred to the system, invented by a French engineer called Claude Chappe, of transmitting visible signals between towers located about ten miles from each other in a chain. However, Congress never authorized the construction of this kind of optical telegraph, although pressure to restrain growing market speculation by some effective means of communication—faster than any private express service in delivering market information—was imperative. It seemed that the electric telegraph, the “last and most wondrous birth of this wonder-teeming age,”⁴² would suit this purpose perfectly.

Wiring the Nation

Regarding the complex processes of territorial expansion and population increase with their unanticipated concomitants in the society of mid-nineteenth century America, the continental extension of communication and transportation systems became crucial in maintaining political consistency: the telegraph and the railway became pivotal technologies of social control. They facilitated communication to remote forts and settlements, thereby increasing capabilities to improve military defense and coordinate social processes. The growing network of connections was thus conducive to increasing safety, predictability and homogeneity.

Two events in the early history of telegraphy marked the phase when this technology started to play an important part in creating and maintaining areas of stability. First, telegraph lines, or "lightning lines" as they came to be known, started to spread vigorously under private control in the latter part of the first half of the nineteenth century. Secondly, connection of the telegraph to the railways was operationally a mutual triumph with profound repercussions for the whole of national industry and commerce. The telegraph provided the railways with a control mechanism required for effective operation of its intricate network, so that management could be kept informed of the location and movements of trains in its system. The railways, for their part, could provide the telegraph company with an exclusive right of way, free office space in the stations, and a commitment to keep rival telegraph companies away.⁴³ The telegraph equipped the railroad company with an economical means of controlling traffic, thereby rendering management "prompt, consolidated and simple." To the telegraph company it was "protection, economy, permanence and strength."⁴⁴ After the alliance between the telegraph and the railroad had been established, they developed largely hand in hand, forming a comprehensive network for transportation and communication. Together they provided the speed, regularity and reliability required to generate commercial relationships which, it was hoped, would lead to national cohesion.

Speed came to be established as a new factor that would rearrange the conditions of communication. The telegraph was fast: "thirty characters can be transmitted in a minute by a single instrument; and as these characters are conventional signs, they may mean either *numbers, letters, words, or sentences.*"⁴⁵ Now for the first time communication could potentially become a continuous flow supplanting the preceding forms of intermittent waves of information supply. It was the telegraph that made communication a continual process, thus freeing it from the rhythmical motion of the postal service and from physical transportation in general. The advent of the telegraph did not, of course, take the place of the postal system as a

mechanism for general information delivery, but what it did do was establish a brand new conception of communication, differentiating intermittent torrents from a continuous flow, and transportation from communication. This was the moment that marked the beginning of the course of action in which information came to be utilized as a means for controlling other technological processes, especially transportation systems.

The telegraph expanded the boundaries of a region within which the regular exchange of information could be routinely maintained by liberating information transfer from transportation.⁴⁶ This required immense investments in the construction of a comprehensive system of communication lines. Making the West Coast reachable from the East by telegraphic means was a major development in the creation and extension of areas of stability.⁴⁷ The first words of the President of the United States through the new line, which was completed on 26 October 1861, eight years prior to the transcontinental railway, besides showing great relief, was indicative of the belief in the harmonizing effects of this new connection to “the stability and union of the Republic --.”⁴⁸

Now, it was evident that the telegraph, coupled with the railroad, played an essential part in plans for national unification and homogenization,⁴⁹ an idea which had strengthened by the time of the threat of, and continued to grow stronger especially after, the Civil War. Therefore a legislative framework was needed to create a predictable environment for favorable extension and consolidation of the nascent communications network. This was meant to ensure, first, protection of the telegraph lines (*any injury to, or unauthorized interference with, the telegraph lines will be prosecuted*); secondly, secrecy of dispatches (*penal laws had been adopted to secure the secrecy of messages transmitted over telegraph lines*); thirdly, indiscriminate transmission of dispatches (*any dispatch, with the money for its transmission, offered at a station, cannot be refused by the telegraph company, except in cases where the transmission would be in violation of the patent rights of another company*); and finally, right of way for the telegraph consisting of the right to build lines over public land and roads (*any telegraph company shall have the right to construct, maintain and operate lines of telegraph through and over any portion of the public domain of the United States*). The act which Congress passed in 1866 granted telegraph companies the right to build lines “over and along any of the military or post roads of the United States”⁵⁰ served as a basis for organizing not only a rudimentary form of regulation but also a way of supporting companies in their effort to spread telegraph lines across the country.

As establishment of economic links between different regions was considered the primary way of consolidating the nation, the government's endeavors were directed at encouraging an extension of the telegraph lines in addition to furthering a development of the railroad system. For as the then Secretary of State, William Seward stated: "Other conditions being equal, the country that has the largest extension and the most thorough radiation of the telegraph wire enjoys the most active and profitable system of domestic commerce."⁵¹ In effect, the telegraph appeared a central mechanism for fostering truly national markets.⁵² Another reason for interest in the telegraph was a need to inform the public—a goal successfully advanced by the postal system. Increasing social circulation of information by means of the telegraph was an attempt to diminish differences in availability of information between regions and localities. Once the telegraph assumed the character of a network, it became an excellent means for this particular purpose. Thus, systems were established by which news and governmental information could be sent simultaneously from a central station to a number of points, enabling reception of congressional reports, for example, at the same time in Baltimore, Philadelphia, and New York.⁵³ In this respect, the Wire Service that later became a part of the New York Associated Press grew into a central institution, transmitting uniform news to numerous newspapers over the country by utilizing precisely the network nature of telegraph lines.

Improved communication and transportation capabilities coupled with expanding political reporting by wire service were seen as advancing the forming of public opinion, which, in turn, was as a quintessential element in a process of political integration. The rising public availability of information gave rise to an idea of political transparency. As James A. Garfield, then a member of Congress put it, "distance, estrangement, isolation, have been overcome by the recent amazing growth in the means of intercommunication. -- Public affairs are now more public, and private less private, than in former ages."⁵⁴ If the telegraph had brought, in a certain crucial respect, transparency to the economic realm, it was hoped the same could take place in political domain as well. Although it constituted only the latest improvement in already relatively rapid and reliable communications and transportation systems,⁵⁵ the telegraph was soon established as a basis for modern systems of information distribution allowing individual views and interests to get in touch with one another. By itself becoming part of an experience of the social, it redefined the conditions for a feeling of nationality, as, for example, the telegraph historian Robert Thompson observed.⁵⁶ The telegraph thus constituted a means for national ends, but in addition to this and more importantly, a means for constitution of the political as a national experience.

A sense of unity, enabled by the improving means of communication, was a popular theme in nineteenth century literature, as shown, for example, in a passage by Joseph Bradley in 1849:

“What constitutes the indissoluble bond which unites and keeps us together as one nation, as one people? What, but the mutuality of interests produced by the great variety of our industrial productions, and the consequent exchanges which the mutual supply of wants requires? It is this which lays down upon the map of our country the complicated network of our canals, our railroads, and our telegraphs. It is this which interlocks and weaves together all our public lines of communication and transportation; which carries life into all the breathing engines of social prosperity that labor around us, on the sea and on the land, by day and by night, unceasingly.”⁵⁷

It is true that the telegraph and railroad made elements, sections and regions more interdependent in the late nineteenth century America. An assemblage of practices, institutions and technologies centering around the telegraph laid the foundations of a systematic and effective mechanism for channeling a continuous flow of information across the nation. It should still be kept in mind that the process of harmonizing the country was not a matter exclusively of the scope of information routes, of the nature of the material moving over and within these networks, or of the speed of individual pieces of information traversing a given delivery system. Instead and above all, it had to do with growing awareness of a common, although not always necessarily very tangible, political space. Accelerated pace and enlarged scope of distribution of information undoubtedly strengthened the sense of one nationhood, and of “one people.”⁵⁸ With development of communication networks, the Union would become, it was believed, “more and more one people, thinking more alike, acting more alike and having one impulse.”⁵⁹ However, this did not only enable the feeling of a shared political system—it constituted also the place where the political was presented as an issue. Forming the conditions for social communication, communication systems structured, to a certain extent, a space in which society could reflect itself, so to speak. It formed a space where this reflection could take place, allowing members of society to define an experience of the present.

Commitment to a social unity, to a truly cultural integration in which divergences and disparities can always be reconciled because of common national ground, was thus fostered and sustained by the ever-extending and deepening infrastructure of centers and links that together formed a mechanism for a comprehensive public to emerge. Thus, we can conclude, as Thompson has done, that “a stronger and more unified nation -- emerged with the development of the telegraph and the railroad.”⁶⁰ Notwithstanding improvements in

transportation or communications, however, or perhaps precisely because of those, population was growing more diverse than ever before.⁶¹ Stable structures of meaning emphasizing unity that were linked to agricultural America were becoming transformed into something different through closure of the frontier, the rise of class divisions, rapid urbanization, and a massive influx of immigrants. Extension of markets and enhanced distribution of newspapers increased the possibility for unconnected local conflicts to become articulated as confrontations between political groups on a national level. As conditions of social information economy transformed from an arrangement based on local and regional news distribution to a national information market, patterns that had previously maintained social cohesion became a basis for social diversity.⁶² So, although the telegraph and the press did unify the country by taking up nationwide issues, they also rendered differences of opinion more clearly visible.

The telegraph constituted not only a tool for creating and fortifying connections, but far more importantly, also a system within which these connections could be thought about in and as a consistent whole. This horizon of multiplying and network forming links formed the prerequisites that to some extent allowed contemporaries to think in terms of cohesion and unity while at the same time it increased the overall complexity and uncontrollability of social processes. Whereas telegraphic communication indeed improved the means of administering a vast territory with its growing population as a federal unit,⁶³ it also, and perhaps more importantly, laid the basis for a quickening pace of physical and informational entities to traverse the country. It thereby contributed to unleashing of multitude of movements with nationwide effects. By letting these unprecedented forces loose the telegraph actually contributed to undermining the plausibility of thinking about a unified social being. Naturally, however, this did not prevent new political projects based on the very idea of unity to emerge, as the need to conceptualize social processes under a coherent framework only grew bigger.

Universal Language

Thinking about communication in the age of the telegraph has no doubt been preoccupied with the idea of unity. To be more precise, it is the idea of a conceptual whole that has constituted a way of thinking about communication, insofar as communication is manifested in and through the telegraph system. It has been conceived of as being a means for engendering a political whole, the functioning of which it would then constantly maintain. Yet on the other hand, the conceptual wholes in which this could take place emerged from telegraphy itself, as systems and discourses relating to telegraphy provided, with other fields of practices, forms for

conceptualizing the social in a rapidly changing age. Moreover, this was not restricted only to the Union, for the lines along with the telegraph developed and the logic it followed seemed to point the way for conceiving international relationships as well.

As extension of telegraph systems continued unabated, it became natural to think that if the telegraph could unify the country, why would it not do the same to the rest of the world? The theme of unification linked to the spreading of the telegraph was thus taken to its logical conclusion: it was seen as being a potentially unifying force among different nations and cultures, a universal language, so to speak, thus evoking Enlightenment's dream of a continuous extension of the *ratio* that would shed the light of reason on dark corners and recesses previously only indistinctly visible, and in this way render universal space transparent once and for all.

Thus, the telegraph's spreading out toward foreign countries marked the beginning of universalization of hopes invested in its unifying potential. The Atlantic cable project was the foremost intercontinental enterprise at the time, development of which was closely followed and reported on on both shores of the ocean. After the line's completion in 1866, which knocked out a project to construct an alternative overland telegraph line to Europe through Siberia, Seward saw it "tributary to an expansion of our national commerce, and ultimately of our political institutions."⁶⁴ Toward the end of the decade, commercial and political links to foreign countries became more important, which was reflected in the need to create corresponding telegraph connections. This physical outward expansion of the telegraph lines caused great enthusiasm and optimism among the contemporaries.

A contemporary commentator in London extolled the electric telegraph, in 1866, for "it has gathered the civilized world together into instant and direct intercourse; a network of sympathetic intelligence encircles the earth, and we feel as though it had always so existed --. *Since the introduction of printing, there has not arisen an agency so beneficial and ubiquitous.*"⁶⁵ People in the nineteenth century, especially in pre-Civil War America, believed that telegraphy and the railways, as both were seen as pure scientific miracles of the time, would not only bring political unification to America, but in parallel with that, also improve "the political atmosphere of the nations thus brought into closer moral contact with each other,"⁶⁶ in this way eventually ending all hostilities. Capturing the sentiment of the age, James Reid, a telegraph pioneer who had served as a superintendent of several telegraph companies, held that the telegraph "gave to races of men in various far-separated climes a sense of unity. In a very remarkable degree, not necessarily definable, the telegraph in this mission of union,

confederated human sympathies and elevated the conception of human brotherhood. By it the peoples of the world were made to stand closer together.”⁶⁷

Also Morse himself believed firmly in the emancipating capacity of the telegraph. “The effects of the Telegraph on the interests of the world,” he pronounced in 1855, “have, as yet, scarcely begun to be apprehended --. I trust that one of its effects will be to bind man to his fellowman in such bonds of amity as to put an end to war. I think I can predict this effect as in a not distant future.”⁶⁸ This was because of the telegraph’s capability to make “*one neighborhood* of the whole country.”⁶⁹ In this way, the formulation originally used to describe the effects of the postal system was rephrased and recontextualized in relation to the telegraph, where it found a new home for a long time. At issue here, as well as in the postal system, was how as vast a nation as America could hold together and function efficiently, avoiding disintegration and chaos. This horizontal perspective framed speech about the telegraph and linked it with the question of maintaining democracy’s ability to function. Morse’s statement was clearly motivated by this issue of a working order of democracy in a continental-sized nation, but was used to nourish visions of international harmony too.

The optimism these enunciations reflected gave expression to general hopes and beliefs of contemporary commentators on the power of the new instrument in advancing peace among men. “The best interests of the world,” declared George Wilson, a professor of technology at the University of Edinburgh, “are bound up in [the telegraph’s] progress, and its mission is emphatically one of peace. It does not merely speak swiftly but softly, and it offers men a common speech in which all mankind can converse together.”⁷⁰ The underlying idea of a universal language provided by the telegraph, which would serve as a basis on which different nations could establish a union of peace, was quite unlike that which its position as an essential mechanism of a rapidly bureaucratizing and technologizing world would warrant thinking only a few decades later. The question as to whether the telegraph indeed constituted a language that was universal was not seen as problematic at the time. This was because telecommunications did not appear so much a public utility as a political tool in rivalry between great powers until the end of the nineteenth century.⁷¹ The idea that the language of the telegraph was spoken in a particularly “soft” way became increasingly questionable as the telegraph’s position as a strategic instrument in political and military matters became clear.

Hopes that accompanied many of the declarations in which the electric telegraph was regarded as “facilitating Human Intercourse and producing Harmony among Men and Nations”⁷² ignored the fact that the telegraph was a remarkable social force in its own right. It was not

only a complicated technological device that enabled diverse tasks to be performed much faster and over a much longer distance than before: the telegraph also unleashed a movement that changed—with other social processes—the prevailing social dynamics in American society. Like every form of subsequent new communications technology, it changed and restructured prevailing fields of societal relationships. It engendered a renewed form of interaction, a novel matrix for rearranged power relationships. Moreover, it created a new system of knowledge, a whole set of positions that enabled one to incorporate a new field of objects and processes to an existing body of common culture. Finally, it established a novel network for the distribution of information. The question that has to be raised now is how the electric telegraph came to be understood as a purely enabling system, with certain inborn emancipating tendencies, that appeared as an asset rather than a threat.

The answer lies in a conception of the telegraph as fundamentally neutral in its innermost nature. It was seen as a simple adjunct to existing social practices by improving the way they were carried out, and this was true not only with regard to some individual tasks but also to the functioning of the whole social communication economy as well. This neutrality constituted a precondition for emancipating tendencies: it was the mental terrain that made possible evolution of hopes of a universal spirit of togetherness. When considering contemporary conceptions of the nature of this new form of telecommunication, one can discern at least two distinct yet related features characterizing it:

1. The telegraph constituted a thoroughly instrumental medium for communication, it was thought. Irrespective of its mysterious double nature, which combined the pure miracle of electricity with strange mechanical logic, it was eagerly adopted as a facilitating adjunct to social practices soon after its practicability had been demonstrated. It was an instrumental tool for performing more effectively certain functions that existed prior to its introduction, not a social force in its own right that would engender radically new practices or organizational structures, let alone new ways of being. Contemporaries distinguished between individuals and formal social institutions. In this respect, the telegraph was analogous to central government: it was seen as only an appendage to the actual functioning of society. It was a technology that people could use according to their individual purposes, whilst its productivity was not yet recognized. The telegraph constituted first and foremost a medium of communication, not a social institution.

Later it turned out that institutionalization of the telegraph resulted in unprecedented accumulation of business power. Growing financial concentration deviated from and

simultaneously infringed upon what seemed to be the natural state of affairs, but before this became clear, the operational mechanism of the telegraph was not seen as a productive social force. This was because the telegraph, once combined with the natural dynamics of society, was seen only as improving the effectiveness of society's inborn characteristics. Its exploitation did not aim to change but rather to support prevailing practices, it was thought, without adding any extra features or taking away existing ones. However, if nonetheless it altered something, that was only for society's own good since everything it created was regarded as having already preexisted within it in an inchoate form. Thus, it brought out the inner potentialities of American society, eventually rendering its rhythm of life much quicker than it used to be while still maintaining its basic nature and order intact.

The telegraph was conceived, in sum, as an immensely effective adjunct to governance and communication, not a social power of its own right that would bring about a redistribution of the prevailing power system. Although positioned within the normal and natural, it was not considered an inherent or genuine element of society. This is exactly why it was neither inside nor outside of the social order: rather, the telegraph's essence was neutral, which precluded its location in positive terms into either category. It was only through this state of affairs, by being a tool without any positive social nature of its own, that it enabled the enlightened dream of a universal and transparent space, potentially common to all people.

2. Every communication technology creates its own area of communicability in the sense that it sets up the particular conditions, definitions, and ways of communication within its domain, operating by coding and territorialization.⁷³ In telegraphy an assemblage of these structural determinations, the Morse code being its coding system and the way of its territorialization being the institution of the telegraph office, was not seen as having any essential influence on the substance of the message itself. In this case, contemporaries distinguished between content and its form of expression, leaving to be discovered the insight that content, like expression, has a form of its own. This allowed them to see the telegraph as an effective way of transmitting preexisting messages without the messages being changed by their transmission. The telegraph was established as a medium for transmitting independent content: what the telegraph transmitted was seen as existing irrespective of its existence.

This was reflected in a tendency to conceive technical improvement in communications not in terms of a new enabling productive principle but instead of face-to-face communication, for it constituted a basic level of the contemporary social communication economy: "The railroad, the telegraph, and the press have virtually brought our citizens -- face to face --." ⁷⁴ The

telegraph, as any other communications medium, was seen primarily as allowing communication to take place over distances chiefly in the same terms as those in which it occurred in local, everyday circumstances. Although messages that were sent over the telegraph could not be formulated in as verbose a manner as in interpersonal discussion, and although they had to be transmitted through unfamiliar officials working in the telegraph office, the directness of the messages sent was regarded as remaining unaffected. As the telegraph was almost exclusively a one-way medium, lacking the interactivity present in conversation, the idea that it brought citizens face to face with one another must not be interpreted in terms of conversational criteria, but in some more general context. That context seemed to be the public. The telegraph possessed the capacity to bring individual opinions together in the sense that it enabled modern publicity. This publicity defined a space within which it was possible for conceptions to be viewed alongside one another, the press being the reflecting surface, and the telegraph and other means of communication the vehicle of the publicity thus defined.

What kind of system did the telegraph institutionalize in the communication economy of nineteenth century society? It created a system that differentiated flows of information according to their factual value, thereby dividing messages into different classes and types that had previously seemed to constitute a rather uniform group: "The first result of the discovery [of electricity] has been a vast diffusion of what is called 'news,' the recording of every event - everywhere without perceptible interval of time."⁷⁵ Telegraphic communication was fundamentally about transmitting messages with a particular pecuniary or news value. Information in its sphere moved rapidly, whereas other contemporary literary or journalistic materials continued to circulate relatively unhurriedly. More importantly, now these rapidly transmitted telegrams became the norm: they defined the type of information that was considered to be of particular social importance. This was one unanticipated concomitant of the great communication projects aimed at bringing unity to the Union.

In conclusion, the universal hopes invested in the telegraph can be traced back to the project of national unification. As the postal system provided a model through which it could be seen as part of the contemporary communication infrastructure, the telegraph soon became a focal point for a broader and more utopian social order, because universalization of its potential as a link between individuals, regions, and nations made it a general political technique for community-building. Let us now, lastly, turn to the question of what was the cultural self-conception of nineteenth century America like, a self-conception which allowed telegraph be seen not only as an instrumental and neutral communication technology, but above all, as a more or less coherent whole.

Contractual Relations

After a period of suspicion about its supposed advantages, it gradually became clear that the telegraph would constitute a key asset in the modernization of society. The telegraph could transmit messages within a single day over a distance that by mail would have taken possibly weeks and thus became an unbeatable communications device whenever speed was required. As people became convinced of the practicability of the telegraph and as it started to spread across the country, usually following post roads and later railroads, isolated communities became knitted together in ever tighter bonds: now news of changes in amounts of cotton production in the South was transmitted almost instantly to every major financial center, from which the implications reverberated over the whole nation. It was these circumstances that politized the communicative sphere of the telegraph.

The nation confronted the question of the telegraph in an era when separation of the spheres of government and individuals, including their mutual associations, defined the political horizon. A strong distinction between state and society was made in the tradition of the classical liberalism of nineteenth century America. The scope of the state was kept limited by a doctrine of negative state, the central idea of which was that the state was not allowed to interfere with the private sphere. This, for its part, was composed of autonomous individuals who were seen as possessing inalienable and absolute natural rights that no government could change. It was held by Jefferson and other political leaders of that period that the purpose of government was precisely to protect these rights, and the theory of natural rights in this way became a foundation for the concept of limited government.⁷⁶ The idea of limited government became dominant in the era after the Civil War when the political economy was understood largely in terms of laissez-faire liberalism. The popularity of that concept among academic and popular theorists stemmed mainly from a belief that the social order was governed by an immutable and universal law of nature, that competition was a fundamental characteristic of that law, and, finally, that government was an inefficient agency compared to natural competition.⁷⁷

Social progress, it was held, was dependent neither on political institutions or practices, nor on local, traditional customs or conceptions. All that was fundamental in society, all that characterized it as a republican community, was seen as based on the authority of free individuals: the political in classical liberalism was encapsulated in this principle of popular sovereignty. The interests of society in general were seen as being best advanced by the discretion of enlightened private individuals who, by pursuing civic virtue, operated simultaneously on behalf of the whole community. The political was no more than the sum of

the individual interests involved. The whole, they believed, was given content and meaning only by its integral parts, and, therefore, it could never be greater than these parts. This was the case because what was “true of every member of the society individually,” according to Jefferson, was “true of them all collectively, since the rights of the whole can be no more than the sum of the rights of individuals.”⁷⁸ The political, thus, was essentially a heterogeneous entity in the guise of a common and unambiguous one.

Free contracts were a central organizing principle of civil society. Liberalism interpreted relationships within the private sphere as contracts through which individuals sought to achieve personal security and economic gain. Therefore the conception of politics in negative terms, as bearing responsibility for securing civil society’s inviolability, must be translated as meaning above all protection of a realm of interindividual contracts. Within this tradition of thinking the contractual relationship was viewed as “rational,” as opposed to other, “emotional” relationships such as those relating to family or friendship. The view included a belief in historical progress from an “irrational” society based on custom and sentimental bonds to a rational one in which society would be organized in accordance with a model of formal, objective contracts.⁷⁹ This conception is epitomized in William Graham Sumner’s writing dating back to 1883, according to which in the middle Ages “society was dependent -- on status, and the tie, or bond, was sentimental. In our modern state -- the social structure is based on contract --. Contract, however, is rational -- realistic, cold and matter-of-fact.”⁸⁰ As civil society was seen as an original source of human progress, and as the contract mechanism provided a principle of mediation between autonomous individuals—a basic unit of civil society—contracts gained the status of a paradigmatic societal mechanism.

The doctrine of liberty of contract forged a link that connected the individual liberty of classical liberalism to the market, for it not only placed individuals with their private associations in the economic domain, but, most importantly, became the organizing principle of social relationships, if these were understood as market relationships, as liberals generally understood them during the first three quarters of the nineteenth century. This link between a political concept of self-government and an economic model of contract was widely thought to have a scientific grounding as it seemed to demonstrate a natural affinity between legal and economic ideas of liberty.⁸¹ The market mechanism, in turn, was conceived of as forging a tie between private liberty and the general good, as the combined effect of free individual economic decisions was held to advance the common interest.⁸² Thus, the liberty of contract constituted a system for mediating on relationships between the right to individual liberty, markets, and the idea of a common good, as all were understood within classical liberalism.

The market economy in nineteenth century America was governed by an ethos of freedom of contract: it was “the golden age of the law of contract.”⁸³

Jefferson and his followers believed in an inherently self-regulating market, consisting of equal sized economic units none of which was bigger or more powerful than the other. Free competition between different interests standing on an equal footing would ensure the ultimate balance and fairness of the market in a predominantly agrarian society. In addition to group competition, wide diffusion of property and a vast open frontier were seen as factors that secured the harmonious working of the market, which is why administration should assume a highly restricted role in economic affairs and particularly should not advance the interests of any single social group in relation to others. Thus, the common-law regime of contract and property, under which social relationships were constructed, was seen as ensuring a fair, self-regulating market environment as long as its “natural” order was not artificially interfered with.⁸⁴

It must be borne in mind that the contract institution operated simultaneously on two different registers, for it constituted both a paradigmatic model for social relationships and a legislative regulation mechanism. Similarly and concurrently, also the telegraph system operated on two separate levels in that it not only provided a particular service to be exploited but also constituted a whole framework within which it was possible to view the complex system of communicative relationships as a consistent whole.

Within the liberalist tradition of thought the telegraph could be conceived as having an inherent relationship to the contract principle. The telegraph was conducive to expansion of the market, and thus to social application of the contract principle in both of its cultural and legal dimensions. It rapidly became the foremost medium for performing commercial transactions whenever speed was a premium value—thus establishing itself as a *de facto* standard in a realm based on the contract mechanism.⁸⁵ It therefore became a conceptual model of an economic relationship based on modern market conditions in the minds of contemporary Americans. Seen in this light, the telegraph, being essentially a system for intercommunication over distances, was congruent with the prevailing political self-conception and the structure of society, which was composed of independent individuals. The telegraph provided an effective and still neutral, it was thought, inter-individual connection mechanism. While the principal social relationship was viewed within political liberalism as being an economic one, the liberty of contract institutionalized a constitutive political mechanism that arranged these relationships into a whole. The telegraph was adapted to this mechanism as it provided an effective means

for executing economic transactions rapidly and over ever longer distances in a domain controlled by free contracts, rapidly becoming the principal medium for fast communication needs in financial and commercial sectors. For the telegraph, the world appeared to be composed of distinct geographical locations, with the task of the telegraph being to forge the required links between them. So the telegraph's mission was congruent with that of the contract principle: to forge detectable connections within society.

Moreover, the telegraph was conducive to transformation of contract law into an objective legal structure aimed at the regulation of vast, impersonal contractual relationships in a modern society. With the railroad, it enabled expansion of the market, thereby gradually leveling out fluctuations in supply and prices in different locations. As long-distance trade evolved, the amount of impersonal economic relationships formed within civil society increased rapidly: the emergence of a national market produced a growing number of transient and anonymous connections between strangers.⁸⁶ Thus it became important to create a system to ensure their predictability and reliability, which led to a transformation of contract law from an ethical system to a formal, impersonal jurisprudence. Modern contract law was devised and adapted to the particular needs of an industrialized society oriented towards a national market.⁸⁷ It was thereby separated from its common-law origin and reconstructed as a modern rationalization of the political doctrine of contractual relationships for the practical needs of an emerging social order. This was linked to changes in cultural structures of meaning and the posing of new political questions, as the telegraph helped to centralize economic power in a way that finally made government interference necessary to the operational dynamics of the civil sphere.

Thirdly, the common-law origin of contract law provided a basic legal structure through which the telegraph system itself was regarded as part of the civil sphere, as were any private businesses, although it was practically left free from the common-law obligations applied to common carriers. In the legal framework that gradually evolved to regulate the telegraph industry, the telegraph finally became likened to common carriers and incurred the same responsibilities relating to economic damage caused to customers. Through introduction of a law specific to the telegraph, this technology was for the first time given a juridical identity of its own, and liability for the transmission of telegrams was thus tied to modern jurisprudence in accordance with a general attempt to create a predictable business environment.

Unlike counterparts in Europe, the government of the United States distanced itself from the proprietary ties of this form of communications and let it find its place within the private sphere like any other business. The purpose of politics was not to govern private interests but those

interests constituted the possibility of politics. The telegraph's influence on changing the distribution of power in society was growing but that did not pose a political threat because the mechanism of free contract already existed to govern economic relationships between individual interests, while the principle of governmental noninterference was preserved. This was where the central significance of the telegraph for society lay: it was viewed above all as fostering competition by providing a means for increasing economic connections and facilitating market transactions. It is not far-fetched, from this perspective, to see the telegraph, with the contract, as a political system for organizing social relationships between independent individuals within a national framework. Because the telegraph would create a multitude of economic connections over a vast territory without any government intervention—an idea that fits inherently into the liberal political tradition.⁸⁸

Yet it was recognized in social and political discourses that growing monopolies steadily undermined the assumed natural operation of the economy. Consolidation of business power in the form of trusts and monopolies was seen as diminishing individual freedom of contract and stifling natural competition. What propelled this process of consolidation was that underlying structural conditions for competition had changed with the growing national market so that competition favored bigger corporations that were able to exploit a scale effect. Or, to put it in another way, a company's growth tendency was a reflection of changes that had occurred in the market mechanism. Although it could be seen as having advanced the common good in pre-war society, competition after the war had plunged industry into serious disorder, which it then had to attempt to manage within itself by seeking more cooperative strategies and mutual interests. This led finally to industrial consolidation.

As belief in a harmonious market was gradually undermined by the accumulation of capital, it became necessary to rethink the structure of the political economy. As emphasis on coordination replaced competition, as was the case in the telegraph industry in the 1860s, and as the complexity and power of industrial systems grew, so the public began actively to demand more control over these powers. The society previously understood as being composed of equal sized economic units on an equal bargaining level had clearly been replaced by an aggregation of extremely disproportionate economic relationships between different business organizations, as well as between employers and employees. Another phenomenon that encouraged regulation was the fact that alongside urbanization slum areas within cities that were densely packed and vulnerable to epidemics began to evolve. Growing pauperism in urban centers on the European model posed an unprecedented problem for American society, one that required a rethinking of the relevance of the concept of minimal government and the

policy of nonintervention.⁸⁹ Moreover, accentuation of class divisions, growing quantities of immigrants, and the fact that free land available for citizens had run out created more pressure for government intervention. Thus it became obvious that social reform involving expansion of the administrative functions of the state was getting unavoidable. Adequate regulation of the telegraph industry was not established on a national basis until 1910, when Congress amended the Interstate Commerce Act of 1887 and declared telegraph companies to be common carriers.

Thus, at the time, many social issues came to be articulated within a dichotomous model in which economic laissez-faire, the tradition of individual freedom and self-determination, and local autonomy were juxtaposed with a need to establish a decent national regulative policy and with pressures to support a more active state in relation not only to the economy but to the whole of society. A growing tension emerged between fear of accumulating corporate power and fear of government power strong enough to cope with the new economy.⁹⁰ By the end of the nineteenth century, the concept of the positive state had replaced the minimal, noninterventionist understanding of the functions of the state. It also constituted a new view of society. Whereas previously the political amounted only to the sum of individual interests expressed in society, now it achieved a positive content of its own. Society was seen as consisting not of individuals, but of groups. It was not an aggregation of autonomous individuals, but a positive whole that had an inner dynamic and inherent laws of its own. This was a moment when society achieved a distinct natural history of its own separated from the supposed laws of nature. Society not only assumed a more evident character as a political unit; it also became a subject for intensive investigation by the growing social sciences.

3.2. The Nervous System

The telegraph sustained the political self-conception of post-Civil War America which was mainly conceived through laissez-faire liberalism. This is because it created and strengthened private connections within society without governmental interference, thus sharing the same goal as the contract principle—the organizing principle of an economic system based on private transactions. What is more, the telegraph assumed a prominent role in cultural imagination and served as a model for thinking about contemporary social processes. Its logical structure had already been fully articulated by William F. Channing, a remarkable American inventor in telegraphy, in the middle of the nineteenth century. His description of the nature of the telegraph, using a rhetoric of organic analogies, was linked with the Spencerian

theory of social evolution analysis which came to be regarded as a cogent interpretation of communication in the age of the telegraph. Being in line with Channing's style of formulation, Spencer's vocabulary seemed to provide pertinent conceptual tools for the contemporary conception of telecommunication which was deemed to support splendidly his notion of a biological analogy between an animal and society.

Although a relationship to telegraphic communication in late nineteenth century America may have been formed on a practical level, the way it was seen was influenced largely by Spencerian analogies. Use of the telegraph in national administration and of society at large was not immune to contemporary intellectual discourse. On the contrary, the role and significance of telegraphic communication was mainly understood in terms of Channingian/Spencerian vocabulary. Discourses on telecommunication and the construction of telecommunication systems should thus not be seen as two separate activities but instead as mutually articulated ones. Spencerian vocabulary relating to the telegraph was corroborated by the central social role that technology achieved in coordination functions, whilst its practical use was influenced by a climate permeated by the vocabulary. Let me first elucidate some central points in emerging social scientific theories relevant to understanding contemporary experience of the telegraph.

Social Organism

Life in early nineteenth century America, based on isolated localities with customary rules, could still have been characterized in terms of autonomy, self-rule, and independence. However, development of a national market, and fast acceleration of processes usually characterized in terms of "urbanization," "industrialization," and "modernization," transformed conditions of traditional comprehension of social reality so that the consequences of human action became intricate, unpredictable, and untraceable to any single source. The causes and impacts of individual actions formed links and chains with distant social processes, became anonymous, and could no longer be handled through traditional conceptual means within a single locality. During this process, social conditions became impossible to describe through the traditional liberal principles emphasizing individual and local autonomy. What was needed instead was a new conception of society that would take into account the increasing interdependency of American society. This changed state of affairs can also be said to have been the reason for the birth of professional social sciences, and along with them, the whole concept of the social.⁹¹

Clearly, the rise of professional social sciences was possible because of a displacement in traditional cultural structures of meaning—a process dependent on the ever-thickening networks of connections across the country. Social sciences in America began their institutionalization at the same time as the influence of the Darwinian theory of evolution reached them in the 1870s. Herbert Spencer was the most important figure in acceptance of social Darwinism in the New World, where he became very popular after the Civil War. Spencer's works supported a strict interpretation of the politics of *laissez-faire*. While cautious about analogies between a "body politic" and a "living body," he likened society to an individual organism from a functional point of view because "structures and functions in the human body furnish familiar illustrations of structures and functions in general."⁹² As social processes were thus incorporated within an unchanging structure, it became pointless to attempt to modify them in any substantial way. This idea proved useful not only for social scientists but also for conservative politicians, who believed the organic structure could restore social order from the disorganization brought about by the liberal political tradition. Within social sciences, historical development became increasingly viewed as following a distinct inner logic that had a precharted course, isolated from historical change.⁹³ Societal development was conceived in this theory as a progression through a number of stages within a stationary, ahistorical frame of reference, thus becoming at root a timeless event.

Spencer expressed his conviction that history was a process in which government control would gradually decline. The distinction he made in his later works between military and industrial types of society was in accordance with this theme. Whereas military society was characterized by status and self-preservation, industrial society's primary quality was contract. An individual's life, liberty, and property were no longer subordinated to the state but instead defended by it. As there was no interference by the state in a regime governed by free contractual relationships, survival of the fittest was seen to be ensured.⁹⁴ Spencer's huge influence in America helped to establish *laissez-faire* liberalism as a central view in the political economy after the Civil War. Needless to say, in this historical period there were also challenging interpretations and countercurrents, but it would still be fair to characterize the *laissez-faire* interpretation of the liberal political tradition as the major component in the conceptual construction of social reality in late nineteenth century America.

William Graham Sumner, reputed to be the first American sociologist, mediated Spencerian thinking to a broader intellectual audience and expressed the *laissez-faire* idea in its most cogent form. He viewed the law of survival of the fittest as constituting a determining context for the development of human societies. It became possible to see the existence of a given

social institution or practice as an indication of a successful adaptation to underlying laws of nature, for otherwise it would not have survived. Social Darwinism was in this sense essentially a doctrine that made the prevailing order, viewed as based on an unchangeable course of the universe, legitimate. One could not change these superior, inherent, and inevitable laws of nature which constituted a predetermined structure for human life.⁹⁵ Rights therefore had no natural status as nature did not recognize any privileges: “there can be no rights against Nature.” Rights were seen by Sumner only as an outcome of evolving, unplanned “folkways” that gradually achieved a normative authority embodied in social tradition.

Sumner made a clear distinction between social and political phenomena. Whereas the social was determined by natural, unchanging laws, the political was seen as being only an artificial product of human action which should not be allowed to intrude on the former. He resisted all interference with social development, because redistribution of wealth or regulation of private businesses would only have harmful and unanticipated consequences. The process of evolution was not only natural but, above all, an ineluctable one. The progress of human society depended on a selection process based on unrestricted competition. Moreover, because social phenomena were so complex and human’s comprehension of them so limited, formulation of unambiguous rules for social reform was ruled out as a matter of principle. It was not possible to change an intricate industrial organization to suit needs evolving at any given time; the best rationale was instead to engineer a more effective adjustment to existing conditions. However, Sumner did not abandon the possibility of sociology, “the science of life in society.”⁹⁶ Sociology could disclose objective laws underlying the surface events of history; the essence of these, however, could not be changed by human policy.

One of the overriding Spencerian themes that reverberated widely in the writings of contemporary social theorists was a conception of society as an organism. Spencer formulated the idea of society as a constantly developing and growing, living organism, uncontrollable by human-made laws. The best analogy for understanding the nature of this being was an animal: “A society as a whole -- represents phenomena of growth, structure and function, analogous to those of growth, structure and function in an animal; and these last are needful keys to the first.”⁹⁷ By this straightforward biological analogy, Spencer forged a strong correspondence between the structure and function of an animal body and those of a society. Whereas social structure thus became conceived in terms of animal anatomy, social action was understood in terms of animal physiology. This is why it was only natural for Spencer to compare railway and highway systems with an animal’s vascular systems, or the telegraph lines with its nerve fibers.⁹⁸ In so doing, he was utilizing the age-old reservoir of biological metaphors that

Descartes too had found useful when comparing nerves with water-pipes, muscles with hydraulic engines, and the respiratory system with a clock.⁹⁹ It was the same reservoir that Albert Schäffle, for instance, had worked on in many of his books in the late nineteenth century. Especially in Schäffle's *Bau und Leben des socialen körpers*, newspapers and other media that transmitted symbolic meanings were depicted as composing a continually growing and diversifying nervous system which would ultimately link every individual.¹⁰⁰ An underlying motive for the use of these analogies by Spencer was to exemplify a conception of society's functional integration, a seamless cooperation by differentiated institutions and operations in highly evolved modern societies, or "superorganisms," as he put it.

The conception of a society as an organism laid the foundations for theoretical understanding of the human condition. It enabled one to see the whole society with its functionally specialized institutions and practices, which superficially seemed to be a disordered complex of incompatible and disjointed parts, as an operationally integrated and coherent entity. From underneath the diverse parts and units of society emerged a clear order that rendered the complex and scattered structure an organic being. However the structure itself still lacked spirit and liveliness and had to have life breathed into it. Transportation networks made the functioning of a societal organism possible, for traffic over rails and roads performed the same kind of task as circulation of blood in an animal body. On the other hand, telegraph lines enabled a conscious coordination of society in a similar way that the nervous system transmitted the impulses of the higher nerve centers of an animal to its organs. In this way, the telegraph provided a supposed central agency with a means to direct the functioning of society, and, at the same time, made visible a principle of conscious command.

Biological analogies were frequently used by well-known public figures to describe the postal system for several decades prior to commercialization of the electric telegraph. In a major speech, for example, South Carolina statesman John C. Calhoun termed the postal system the nervous system of the "body politic" in 1817. When an organic analogy was used by Samuel Morse in 1838, as he sought Congressional funding for the experimental Washington-Baltimore line,¹⁰¹ he was drawing on these postal analogies.¹⁰² It was William F. Channing, however, who used this analogy in a more systematic way with respect to the telegraph, stating that the electric telegraph "is to constitute the nervous system of organized societies."¹⁰³ According to *The Telegrapher's* account, the mechanism of the human system suggested to Channing the separate "signal" and "alarm" circuits that characterized his plan. This made "the analogy with the functions of the motor and sensitive nerves of the animal organization -- complete. The central office is the *brain*, the wires the *nervous system*."¹⁰⁴ This comparison

was elaborated in a more explicit form in a paper he delivered in the Smithsonian Institution in 1855. "The electric telegraph," Channing remarked, "is -- the nervous system of this nation and of modern society by no figure of speech, by no distant analogy. Its wires spread like nerves over the surface of the land, interlinking distant parts, and making possible a perpetually higher co-operation among men, a higher social form than have hitherto existed. By means of its life-like functions the social body becomes a living whole, and each of its new applications marks a step in the organization of human life."¹⁰⁵ Here the pre-Spencerian biological analogy did not serve as a retrospective rationalization of the telegraph system but instead as a conceptual prototype for its technical structure. It did not *explain*, but actually *directed* thinking about and the construction of the electro-magnetic telegraph and of the sphere of communication it enabled.

The anatomical comparison largely laid a foundation for contemporary interpretations of human-made technical systems, as it seemed to provide a good way to conceptualize their social role. This is also why it made sense to attempt to extract the inner laws of nature and translate them into some practical, applicable rules, for this was seen as the only way any human innovation would work. An invention that conflicted with these laws would have no chance to survive. This is exactly where the ingenuity of Channing's recipe lay: in order to be able to simulate nature's logic of operation, one has first to systematize its central principles. This is also the reason he thought himself entitled to deny that his interpretation was a pure analogy. Instead, through it, so he seemed to think, nature revealed its innermost essence.

Although it appeared the right tool to decipher nature and the mechanisms of some major technological systems, the analogy remained somewhat isolated until it was subsequently incorporated into a more general theory in Spencer's interpretation. The way Channing used it in relation to his telegraph was broadened and connected to a coherent theory of social development. With the spread and popularization of the Spencerian theory in the United States, the biological analogy was entrenched as a general truism in public awareness.

The conception of technological networks—meandering railroad tracks or stretching telegraph lines—as the vascular or nervous systems of modern American society presented a startling vision to contemporaries. The analogy was in wide use among contemporary popularizers of science and other semi-academics, in addition to scholars within the institutionalizing social sciences, who were interested in current technological developments. So it was not meant as an overstatement when C.R. Henderson, an associate Professor of sociology at the University of Chicago, claimed in accordance with contemporary understanding in 1897 that "telegraphs and

telephones -- are -- the nerve system of the social body, the material means of welding this nation and all nations into one spiritual community.”¹⁰⁶ The telegraph helped society as a whole to better fulfill its true nature by equipping it with an effective control mechanism. It let society, it seemed, control its own being.

The transformation of American society from a “segmented” society with isolated and self-sufficient communities to an “organic” society, in which the regions and localities were tied together by a process of growing interdependence, constituted a precondition for a change in the conception of telecommunication from a purely neutral form of technology to the nervous system of society.¹⁰⁷ This marked a new stage of cultural sentiment through which communication in the age of the telegraph assumed a clear, distinctive, and positive character. This is not to say, however, that a total break in conception of communication occurred either. As the effects of social transformation became visible, the telegraph inevitably got a more positive identity, but at the same time it largely retained its instrumental nature in the sense that it was held to be directable by the decisions of men: although becoming more clearly a social power in its own right, telecommunication was seen as remaining under the control of the people whose practical affairs it helped. The changes the telegraph contributed should still not be underestimated. It had entwined with the historical fate of the nation by being conducive to processes which changed conditions for thinking about not only different technological systems, such as itself, but also the whole cultural construction. In so doing it transformed the same historical self-conception within which it had been developed and considered.

In new social circumstances in which anonymous chains of actions penetrated distant regions, the telegraph came to be regarded, alongside the railroads, as the most visible representative of this novel logic of operation. The telegraph’s interlinking power formed a sensible model for thinking about increasing interdependence and interpenetration of distant regions and actions. Not only was it conducive to facilitation of nationwide circulation of actions and implications, but it came to constitute a conceptual frame of reference on the basis of which this phenomenon could be conceived. Thus, the telegraph had two simultaneous effects; it was at the same time a historical force for societal transformation and a model or metaphor for conceptualizing the new societal logic. The nervous system as an analogy for the telegraph provided an excellent rationalization for the latter purpose. In particular, it seemed suited to describing firstly the telegraph’s use and position in tasks of the national and municipal administration, and secondly the thickening networks of urban communication, which represented points of concentration of social power.

The analogy of a nervous system was not only an attempt to describe the prevailing organization and function of the social in terms of communication, but also, and above all, an attempt to think about the conditions of communication, and thus, also the “whole” of communication as it corresponded to contemporary experience. By means of the analogy, it came possible to conceive of the “essence” of communication, which presupposed thinking about the conditions for its possibility. Through the idea of a nervous system, experience of the social appeared historical insofar as the nervous system is always situated in a particular organism which *is* only in a historical time. Whether this aspect was explicitly discussed or not—and, generally speaking, it was not—it still retained in itself the possibility of perceiving the community as a fundamentally historical experience. In sum, then, the biological analogy constituted a relationship through and in which thinking about communication was given a definite shape and form. These sorts of forms, after their formative period, directed and structured thinking by providing unifying frames of reference. With respect to thinking about communication, the idea of nervous system proved a lasting conceptual whole that not only constituted a structure for communication, but more importantly, also formed the framework within which communication could be viewed as an object for thought in itself.

The Telegraphization of Society

Although it was potentially a general communication system, the telegraph, largely due to its expensive use, was largely related to governance and coordination. The logic or nature of the diverse functions it added to different operational domains varied remarkably. Despite these disparities, an underlying conceptual image of the telegraph as the nervous system of the society constituted a unifying conception for telegraphic communication. National and city governments together with the metropolitan press and news agencies can be regarded as realizations of the idea of the nervous systems of a nation, in that they were the primary intersection points of inflows and outflows of telegraphically transmitted information. As municipal telegraph systems had established a practical basis for the concept of a center, this idea (a dominating center and local offices arranged in a hierarchical manner with constant information traffic between these locations) provided the framework for both thinking about and the practical organization of communication on an increasingly regular basis. This is why we have to study local systems more closely, because they, especially the police and fire emergency systems, came to be referenced in thinking about more general societal processes too.

The telegraph issue needed to be addressed not just as a general concern as to its position in the liberal political discourse. More practical and specific questions also arose as to its role in administration within an organizational framework. The question of possible uses of the telegraph for government purposes, however, was not a particularly urgent one. Although administration was weak and lacked appropriate means for enforcing legislation, the telegraph did not immediately appear as a mechanism to meet these needs. This was partly because of a common fear of strong central government and partly because the telegraph was first seen rather as a kind of scientific tool with no inherent practicability for serious applications. Efforts to connect this system to government objectives increased steadily, as its role in a national communication infrastructure gradually became clear. Eventually, the diverse administrative tasks of the government came to be closely connected to the telegraph.

The telegraph was connected mainly to functions that served a number of communicational and scientific purposes within administrative institutions. It was placed in the service of politicians for example for keeping in touch with their constituents; of diplomats for correcting misapprehensions; of scientific and technical government agencies, such as the United States Coast Survey "in charting weather reports and spreading warnings of approaching storms, calculating longitude, establishing correct time at various points throughout the country, and in registering astronomical observations."¹⁰⁸ In this way, scientific practices, as well as political ones, helped to reduce uncertainties and increase predictability.¹⁰⁹ The telegraph became an important part of gradual standardization of different spheres of life, coalescing with other technical developments to make the social more predictable, stable, and governable.

The telegraph became a common instrument in administrative departments in federal and state governments, being used for ordinary departmental business that required dispatch. By 1860, the General Land Office was sending telegrams routinely to correspondents five days late in responding.¹¹⁰ After the telegraph had been established in government use for good, arrangements for a comprehensive telegraph system for government service in Washington were being advanced,¹¹¹ making its position as a political nervous center of the national body even more visible and unambiguous. One of the central advantages of the telegraph in governance was in enhancing the ability to coordinate diverse operations and geographically scattered units under centralized management and in controlling the whole intricate system more effectively. It accelerated communications between central government and its representatives across the country, and between headquarters and smaller units within a region, thus strengthening the importance of a central executive agency. As Leonard White pointed out, relationships between headquarters and the field no longer depended wholly upon a

lengthy correspondence consuming weeks or months, since now field information, thanks to the telegraph, could be transmitted straight away to Washington and responses dispatched on the same day.¹¹² So close did the connection between the telegraph and central administration become that, according to the Circuit Court in the Pensacola case in 1875, “the functions of the Government either in war or in peace could not now be carried on without [the telegraph’s] use.”¹¹³

The new dimension of rapidity that the telegraph introduced not only strengthened but also reorganized administrative machinery. Institutionalization of the telegraph in governmental organizations was part of a professionalization of administration which involved the concept of administration as properly businesslike rather than political in nature.¹¹⁴ This was connected to a historical accumulation of public power in governmental bureaucracies which were separated from party politics and the market economy. Now government was equipped with better means for monitoring the varying dynamics of the social, although control on the whole, as well as improvement of the government’s administrative effectiveness, remained minimal by modern standards. This was because the political climate did not allow government to take full advantage of available technology and strengthen its control capabilities. Any attempt to increase the power of central government was confronted by a resistance stemming from the political tradition that relied on the principle of self-governance.

Municipal authorities became central stages for realization of comprehensive telegraphic systems. This, in fact, was the field of administration in which the concept of the nervous system proved most apt, providing a model to be seriously considered also in national administration: management of space and movement in a city came to be taken as a model for governance of the country in political discourses. One question that required urgent attention was control of space in rapidly growing urban areas, as many American cities were beset by problems caused by a fast increasing and densely packed population. Such cities became explosion points for urban riots, fires and epidemics around the middle of the nineteenth century. Implementation of municipal telegraph systems, introduced as technical adjuncts to city governments in a battle against urban disorder, was part of a professionalization of fire departments and police organizations. Partly thanks to the telegraph, both groups were reorganized into more unified and efficient bureaucratic organizations. The telegraph made coordination of units more effective and faster, permitting continuous control of city space to become gradually institutionalized in administrative machinery. In this way, the telegraph equipped government with a means that enabled development of an organized practice to penetrate society on a more detailed level than had been possible before.

William Channing seems to have been the first to systematize a model of an efficient municipal telegraph system. He did that in 1845 in an article in the *Boston Daily Advertiser* in which he described the general principles of his system for applying the electro-magnetic telegraph to fire alerts, a system which subsequently became the basis for the American fire alarm and police telegraph systems.¹¹⁵ In 1851, he submitted a detailed plan with Moses G. Farmer for a Telegraphic Fire-Alarm to the city government of Boston; the plan was adopted and put into operation in 1852.¹¹⁶ Under the scheme, Boston was first subdivided into fire districts, and then a central station at city hall was connected to nineteen belfries and thirty-nine alarm boxes throughout the city. Turning a crank inside the box transmitted a signal to the central station identifying the box and the fire district in question. On this basis, the central office operator could signal identification of the district to the bells as well as that of the originating box to all alarm boxes so that by listening the nearest box the firemen could locate the fire.¹¹⁷ New York got its fire-alarm telegraph system in the same year, and Philadelphia and other large cities followed suit soon after.

For Channing, the conception of telegraphic communication had to be rethought since existing systems could not serve as models for a city telegraph. Tasks and aims related to the former could not possibly form any substantive part of the latter, which had a distinct logic of its own. Hence, he planned his telegraph system with a concentration of points close to each other rather than a dispersed distribution of distant points, thus replacing a network based on a number of centers by one that had only one. Instead of the "linear" connections in a long-distance telegraph, municipal systems would operate in loops, circles, and intersections: unlike long-distance links, municipal links did not embody a single direction or relationship. Whereas long-distance telegraphy was based on straight lines generating reciprocal relationships across wide areas, an intraurban system operated on the basis of contacts between different hierarchical strata within a multiplicity of possible points of interaction. The space for intraurban systems no longer consisted of a heterogeneous diversity, but rather of a hierarchical density. Contrary to Channing's conception, however, the difference between the structure of the two systems was perhaps not so absolute after all. This is because the city telegraph only concentrated all the connections and relationships of a long-distance system into a single, geographically and politically limited unit. With the help of a system of preselected codes, urban telegraph could squeeze all transmissions into a multilevel complex. Thus, what was initially formed through straight lines was now organized in folds and circles; namely, on a principle of concentricity.

The more the circles and loops were concentrated on and limited to a single system, the more the idea of a strong center became reinforced. Whereas “the common telegraph connects two independent centres of life and activity,” Channing stated, “the municipal telegraph connects a multitude of subordinate points with one centre, and makes the position of those points dependent upon the centre and the needs of the system.”¹¹⁸ Diverging from the contemporary cultural climate and political tradition, he thus articulated a powerful center-based view. The multiple points of connection served as information sources through which information from any part of a city could be sent to a center in which it was analyzed and from which an alarm would then go out. A center had to be presupposed, since the area to be governed constituted a system, and every social system required a central organ. Moreover, as the telegraph system corresponded naturally to the nervous system, it had to constitute a control mechanism for the social body. The underlying biological analogy directed thinking about the system, for just as coordination of a living body depended on the activity of the brain, coordination of a city system was thought to require a commanding center. Through this center, the whole could not only function consistently but also become aware of itself.

“[The municipal telegraph’s] function is not to connect distant towns or independent centres of life and activity with each other, but it is to organize a single city or town so as to bring every subordinate part into relation with its centre of government and direction. Its purpose is to multiply points of communication, to cover the surface of the municipal body as thickly, if you please, with telegraphic signaling points as the surface of the human body is covered with nervous extremities or papillæ, the whole being intelligently connected into a system by which the municipal body shall understand itself in every part, and shall have a common life and vital functions for its own essential purposes.”¹¹⁹

In this quotation, the idea of a self-conscious system was given an explicit articulation. The whole is first divided up by the telegraph into different segments, after which every single part of the system is locatable. When all the distinct sections have possibly been subdivided further into different districts, all connected to local centers, the segments can finally be linked to the main center of the system. In this scheme, the center would be capable of covering every part of the whole, according to hierarchically arranged relationships. Moreover, these governed parts, being simultaneously in touch with the center, enabled the whole to be aware of its own being. In this way, the idea of a self-governing whole was expressed in terms of communication. The center can be aware of events going on in different parts of the system, whilst individual points of contact distributed throughout the whole provide the means for the whole to attain a certain level of formal self-reflexivity. This is why Richard Vaux, a Mayor of

Philadelphia, could say that “the telegraph is not only the voice, but the eyes of the executive department.”¹²⁰ All component parts could thus be geared to the interests of a commanding center, which, for its part, could be aware of the whole because of the density of connections between it and the various parts of the social body.

Police telegraph systems constituted the second application of municipal telegraphy in which the telegraph was used in controlling social disorders such as urban riots and crime. It provided better coordination within the police force by linking police stations to central headquarters. The New York City police department installed a telegraph system between headquarters and ward offices in 1853.¹²¹ In Boston, a police telegraph system was designed using Channing’s fire-alarm system as a model. The police telegraph soon became an indispensable instrument in police organization. By creating direct connections between police districts and headquarters, it lessened a need for frequent meetings between captains of districts and the police commissioner. It enabled coordination of action between separate stations and was adopted subsequently for connecting patrolling policemen to their stations by using call boxes that were connected either to the precinct house or to headquarters. By 1864, New York City was divided up into 58 signal stations: “From the central office -- wires are extended to every part of the city, connecting with the signal boxes and alarm bells, and returning again to the central office. -- Each signal box is furnished with a telegraph key for police purposes, and, by a simple set of signals, any policeman can communicate with the central office from any part of the city.”¹²² Channing’s idea of organizing the system according to “signal” and “alarm” circuits was the underlying model here too, although in contrast to the original fire-alarm system the signal boxes contained a dial enabling policemen to pass a specific request to headquarters.

The police telegraph allowed centralized control of city space and of police forces, constituting thus, with fire-alarm systems, a central organ of the social body in the minds of the contemporaries. *The Scientific American* resorted again to the old analogy when describing the combined telegraph and telephone system in 1881: “When the entire area of the city shall have been covered by the system the analogy between the civic organization and the nervous organization of an individual animal will be curiously complete. The civic organization will become sensitive, so to speak, at every point, and the transmission of intelligence therefrom to the brain and subordinate nervous ganglia—that is, the central and district police stations—will be practically instantaneous.”¹²³ Principles of transparency from the center and of hierarchical relationships in relation to information transmission came to be understood not only as

characterizing technical features of new systems but, above all, the structure of the police organization itself.

According to *The Telegrapher*, “through [the police telegraph] the Superintendent transmits all his orders to subordinates, and he can, if he chooses, sit quietly in his arm-chair in the Mulberry street police palace and direct the whole immense machinery under his charge.” The Superintendent, however, was not the only user of the system: “The Police Commissioners and their chief clerks also use the police telegraph in the transmission of orders, and the transaction of nearly all other official business.”¹²⁴ With this system, the police could improve control of city space qualitatively, as telegraph wires twisted a network around a city, allowing subtler and more exhaustive control over its interstices. Like the fire-alarm system, the police telegraph divided a city up into sections, created relationships between stationary points of contact and station within a section, and finally connected all sections into a unified structure. “Now, the entire police force has but one soul,” declared Judge Conrad, Ex-Mayor of Philadelphia, in 1856, “and that soul is the Telegraph.”¹²⁵

The New York police telegraph system was used for sending “all notifications to the coroners” and those “in regard to offal, dead animals, nuisances, etc.,” for “restoring lost children, recovering lost or strayed horses, arresting deserters from vessels, protecting shopkeepers and others against newly-issued counterfeits and other descriptions of bad money,” and for “the suppression of riots, the dispersion of mobs and the allaying of popular disturbances of all kinds.”¹²⁶ Thus, the Superintendent of the police telegraph could announce in 1869 that with the aid of the telegraph, “128 lost children have been restored to their parents; 170 lost, strayed, or stolen animals have been returned to their owners; 58 vehicles have been similarly disposed of; 542 dead animals have been reported to the sanitary police, and 15 alarms of fire have been sent over the wires.”¹²⁷ This communication system was an essential component of a technical basis for coordination not only of the police force but of governmental institutions responsible for the internal safety of society, of control over and on behalf of the subject population. Police telegraph systems were adopted at a somewhat slower pace than the fire-alarm telegraph, and the number of systems started to accelerate only after 1882.¹²⁸ Although the telephone rapidly replaced the telegraph as a central police communication medium, the police telegraph constituted an effective aid to the police, being, according to a contemporary commentator, “equal to a model guard of two hundred and fifty men.”¹²⁹

As mentioned, creation of an improved technical basis for coordination and control was part of professionalization of the police and other administrative institutions, which, in turn, was linked to a process in which local governance practices came to be supplanted by national bureaucratic control of formal state organizations. The construction of a new police organization was a reflection of this. Intermittent and reactive control, concentrated mainly on individual incidents or areas, was replaced gradually by preventive, detailed, and regular supervision of society. This was connected to the application of scientific techniques to the practice of governance, to establishment of separate functionally specialized public institutions and to general improvement in government data-gathering, storage, and retrieval. The Bureau of Statistics, for instance, was organized as a branch of the Treasury Department in 1866.¹³⁰ Government started systematically to gather information on its subject population and of societal processes after the Civil War.

These practices developed hand in hand with the increasing use of statistics among social scientists. The conception of statistical work changed in the Gilded Age from a descriptive statistics of social groups and a rudimentary science of natural laws to a scientific method proper for analyzing diverse social phenomena following the German model. In this way, the notion of social processes following unchangeable laws of nature was gradually replaced by an idea that those processes had an inherent dynamic of their own, brought about by collective human activity. A positivist conception of natural law was still widely maintained in social sciences, though.¹³¹ However, it now became possible to articulate societal development in its own terms—separated from any metaphysical laws of nature—composed of complex set of human actions. Thus, society achieved a history of its own, gradually undermining the traditional ahistorical framework through which its development has previously been conceptualized.

Changing Lines of Communication

Whereas introduction of the telegraph can be said to have had profound effects on national and municipal administration, the effects on communicativity in the national communication economy were absolutely sweeping. As in the former case, the biological analogy provided a cogent framework for thinking about power centers in the changed communicative constellation—the metropolitan press accompanied by an emerging nationwide system of news wire services. In fact, this analogy was embodied in the very model articulated by Channing,

generalized from local into national systems while retaining the same form of a nervous system.

The telegraph created a basis for the great metropolises to consolidate their roles as major communication centers on national level and thus to undermine the decentralized information distribution that government had supported. This process formed a setting within which an emerging centralized news transmission system was established as the nerve center for social circulation of information. Conditions that paved the way for generalization of Channing's scheme can be divided into at least two dimensions related to the development of metropolises as concentration points for flows of communication. First, the forming of big corporations with their headquarters, responsible for nationwide operations, positioned in major urban centers; and secondly, the development of numerous intraurban telegraph-based communication and information services to help commercial, financial, and domestic sectors.

First, the telegraph can be said to have promoted large organizations while at the same time perfecting the functioning of markets, as these two developments were mutually complementary processes. As the telegraph favored users who needed rapid long-distance communication, companies were prompted to exploit it to its full advantage by expanding their scope of activity and operating on a national basis. During the late nineteenth century, large business organizations came to dominate the economy as a result of the establishment of telegraph systems.¹³² Eventually the telegraph came to support a concentration of economic power, contrasting with its previous role as an agent in helping the progress of an ideal fostered by the Jacksonians, in which small enterprises competed against each other within formally equal conditions.

The second dimension in a process that made metropolises the undisputed hubs of communication networks implied the rise of intraurban telegraph systems, which became a principal area for the development of telegraphy after the Civil War. After a variety of systems based on pre-assigned functions and automatic signaling mechanisms had been developed, specialized uses of the telegraph multiplied and became broader in scope. Urban metropolises became concentration points for a number of different telegraph-based information services that enhanced and speeded their internal communication. They constituted rapidly growing arenas on the basis of which ever-denser communication networks were interrelated with evolving social power formations which extended their influence all over the country. The remarks made about these two dimensions are naturally not intended to propose that construction of a prominent news system was a consequence of the abovementioned

developments or that it somehow applied only to the urban sphere in which communication flows were increasingly organized. All we are claiming is that these processes helped to transform the communicative constellation by strengthening metropolises as the communication hubs of the nation.

Now, the metropolitan press and news agencies grew, alongside national governmental bureaucracies, as principal information intersections, the true nerve centers of the transforming societal constellation. They laid a foundation on which a new national communication economy would have to be arranged. A strong linkage between the newspaper press and development of the telegraph increasingly rearranged the whole existing system for collecting, processing, and distributing news, which was based on editorial exchange of news. Now the telegraph became a necessity for individual newspapers, with an increasing volume of information that had, prior to the telegraph, been available only intermittently, now being systematically transmitted to newspapers.¹³³

The telegraph system, providing rapid one-way communication over distance, favored centralized news gathering agencies. The New York Associated Press was exactly this kind of center: it received pieces of news from all over the country, which, after a process of selection and editing, were sent back in standard form to local newspapers. Thus, it was based on a similar scheme to that originally formulated by William Channing for a fire-alarm telegraph, in which information came in from numerous points in a system and was gathered in its center, where it was analyzed and finally sent back to the public in a prearranged fashion. In the Associated Press system the content of information transmitted, namely diverse instructions and reports, was only replaced by individual pieces of news reports. Furthermore, whereas in the fire-alarm telegraph a single, hierarchically organized system was the basis for operations, the newsbrokerage system extended its lines across the nation and incorporated a large number of local centers and regions. In this way, the principle that Channing had successfully applied to cities by translating and folding the linear lines of long-distance systems into circular and hierarchical ones was reversed and stretched again to cover the entire area of the social body.

Thus, the newsbrokerage system was structured according to a more complex constellation. It was based on interlinking a number of distinct, interactive points or poles, thereby creating a network for constant circulation of information. It operated on Channing's principle, but expanded it again to a multipole organization. Although the poles in the system were genuinely interactive, only one center dominated the configuration and determined the principles on which it worked. This centralized system of newsbrokerage displayed a twofold structure. The first

part was based on an arrangement in which a large number of individual sources fed information into a single center. The second one turned this structure around as it embodied the unprecedented principle of the mass media: the narrowing of the range of news sources, and the corresponding widening of the range of passive reception.¹³⁴ So while the first, inflowing movement provided new, heterogeneous, and potentially incommensurable information for the system, the second, outflowing movement provided edited, congruent, and essentially identical information. This duality indicated also that the numerous points of contact which were essential to the system's functioning assumed different roles in each case. In the first place, the points served as sources of new information to be edited at the center. In order for the center, and the whole mechanism, to be capable of constant service, it needed active contribution from its local agents in the form of continuous information feed. In the second place, the peripheral circumference of distant points were terminuses for final news sent from the center. In this case, the localities were transformed from active sources to mere passive recipients of information. Whereas at first the working of the whole depended on multiple information sources, emphasis then moved on to the center, while feedback did not gain any substantial significance in the process.

As in fire-alarm systems which concentrated control of an urban area at a single point, the Associated Press system centralized newsgathering and delivery into a single structure. As speed improved and technology developed, however, it became possible to let a particular piece of news be posted directly to the whole network from a remote location, thus increasing the system's flexibility with important messages. Hence, the headquarters' role changed from that of a collection and delivery center to that of a supervisor or regulator of the system, retaining control over policy but dispensing with the practice of centrally editing the incoming flow of raw news.¹³⁵ The newsbroker service nevertheless remained a centrally organized and professionally controlled business which reached an ever-increasing reading audience over ever lengthening distances. As, in any case major metropolises dominated the news scene as both the main sources and increasingly the recipients of wired information, the center assumed an unquestionable position of command with respect to the rest of the system.

Alongside the Associated Press communication system which was founded on centralized news collection and delivery, a different pattern of information circulation evolved. What was at issue here was a constant increase in the horizontal flow of communication. It did not necessarily result from a center-based system of organized relationships, but rather had to do with the emergence of a multitude of sprawling, discontinuous, and competitive sets of literary presentations. This heterogeneous movement traversed the social landscape, carried by

different interests and groups that overlapped or even opposed one another. Unlike the newsbrokerage system, this movement did not deliver the same but instead disparate. The basis for its operation was not found any longer in hierarchical relationships between a processing core and a number of different points of contact in the periphery, but from a free, unorganized distribution of certain groupings of information, propelled by commercial or factional interests, along a horizontal plane. It enabled dispersed localities to receive various kinds of relevant information not only from the commercial centers of the east but also from other smaller regions with information considered valuable. At the same time, information tended to be grouped into topical classes, around which like-minded persons and interest groups could gather.¹³⁶ Thus, whereas previously public information had been scarce and limited mainly to learned and wealthy circles, now it was abundant, and its circulation became based on popular demand and taste. Moreover, information that used to be governed by communal order and local tradition came to be provided on a competitive basis.

The systems of news wire services and segmented information generation and delivery practices established a grid across America. Their underlying principle consisted of two things. On the one hand, local centers were increasingly incorporated into the system as interactive points of contact, as both senders and receivers of information. On the other, horizontal information flows which connected diverse centers were speed up, covering vast areas that had previously been dependent on a main metropolis for their news supply. Whereas a news service system unified a given area by transmitting the same kind of information, in horizontal flows information content was divided and grouped according to special interests. To multiply active points and to intensify circulation between these and the center constituted a general formula. A joint effect was a sense of a common event taking place, a shared national experience based on uniform news reports.

Given this, what can be said about a change which occurred in the communicative constellation? The constellation between regional powers lost its stability as communication and transportation systems coupled those powers with a close interrelationship. Hence, the meaning structure that was based on a predictable network of forces had to be recast for a new environment in which previous relationships had lost their validity. What was at play here was not only an expansion of private economic power but also a transformation of the underlying conditions of social life. As has been shown, in the course of this process the idea of a centralized hierarchy was strengthened. Having unleashed (together with improvements in transportation) accumulation processes for capital and power, and enabled construction of centralized systems of coordination and communication, the telegraph system formed an

illustrative conceptual model for thinking about contemporary events that characterized the rapid transformation of society. Thus introduction of the concept of a center in American political culture was linked with this twofold operation of the telegraph as a technology and a conceptual model. Of course, however, the rise of the telegraph institution represented only one albeit significant historical process related to the idea of a center becoming formulated. Like any tool, the telegraph was a metaphor of itself, symbolizing the activities it enabled.¹³⁷ However, its character as a model was not limited to the way it was used but was instead more profoundly entwined with cultural self-conception articulated in an explicit form in the Spencerian theory of society. While supporting free individual activity and minimal government, it also came to conceptualize the role of a central organ of the social body. It was introduction of the telegraph as the nervous system of a modern society that embodied and made visible this principle of center; and this, for its part, paved the way for more centric arrangements and expressions in political thought. In this way, although not the only cultural model for it, the telegraph enabled conceptualization of a more justified view of a center and thus of a hierarchical, centralized system.

Certainly, this ran counter to the tradition of American political thought. Yet it instilled a vision of the functional advantages of a hierarchically organized whole in thinking about the social as such. It provided a model to cope with interlinking clusters of problems like those that ensued from growing immigration and the worsening condition of cities. This was because of a conception that what a municipal telegraph system did to a city, a social system organized on similar principles could do to the whole country; namely, divide it up into distinct units and classes, set up boundaries between different areas and districts, form horizontal and vertical relationships between them and the center, and finally render this hierarchical network governable, at least in its essential aspects, from a single location. On the other hand, like the news wire service, it could organize channels, hubs and intersections for communication flows, establish institutions for systematic gathering, restoring and retrieving differentiated types information, and finally connect all the flows into a dominating center. In this way the telegraph would provide a model for the whole to become truly aware of its own being.

This way of thinking characterized more the aims enacted in Europe, especially those of Prussia and France, than those of America. For the latter, acentric systems rather than centralized ones constituted a foundation for social structure. One should not, however, presuppose too sharp a conceptual distinction between these organizations, as Tönnies did in his division between *Gemeinschaft* and *Gesellschaft*, for they had an inherent relationship to each other. Acentric systems were not independent on centralized ones, which, as for them,

could not contain the movements of disintegration within them. Thus, for example, the news wire service enabled and was conducive to the processes that produced a number of heterogeneous information systems. For their part, these systems inevitably influenced the way the news wire service worked by, at the very least, constituting a thick texture of institutions and practices that served not only as a background, but often also as a source of counter-truths for national news.

If society did not, after all, turn into an immense telegraph system, the idea of this system doubtless forged a new relationship to thinking about the political. Combined together in a symbiotic relationship, models provided by some networked systems, worsening social problems, and theoretical discourses of the Spencerian variety seemed to justify demand for a stronger centralized political government. Ever more complex chains of problems and the accelerated pace caused by technological development lead contemporary political thought to consider similar kinds of arrangements to those that had successfully been applied in private businesses to maximize the scale effect in nationwide operations; namely, management of a variety of processes within a single coordinative center. This fact, related not only to organizational design but also to methods of effective treatment of problems, prepared a terrain for technocratic thinking to take root later in the following century. It articulated a model on the basis of which political questions could be handled successfully, it seemed, as technical problems. The apparent efficiency of organizational arrangements prepared the ground for an emerging approach that sought to formulate a technical model for management of political processes. It received its first theoretical embodiments in Taylorism and the technocracy movement, the influences of which, notwithstanding their limited periods of active practice, were not transient but left a lasting trace in common ways of conceptualizing political questions as well as in the administrative history of and by communication. It is here that the role played by the telegraph is absolutely unparalleled, as the model it lent to the service of powers championing a centralized decision-making structure was also conducive to technocratic phrasing of non-technical problems together with results produced by institutional reorganizations.

Of highest interest for us are not the possible effects of the telegraph on specific schemes for thinking about the political, although this is certainly not unimportant. Rather, our interest lies in communication's position as a precondition of the political and in the telegraph's central role in the new communicative sphere. No doubt without the telegraph, communication would neither have become politicized nor conceptualized to the extent it was at the time. It was the telegraph that produced an unprecedented positivity in communication; and an awareness of the

historical and positive role of communication was only intensified during the era of the telephone. At this time, people started to pay attention to a reciprocal relationship between cultural circumstances and communication practices that had an effect on each other, and thus to the productive influence of communication systems to society.

What is significant in the history of communication from our perspective is that “communication,” in the age of the telegraph, depended on a conceptual whole. Thinking about communication was inherently connected to the idea of a prior whole that enabled communication as a social experience. This was realized in two related aspects. As a result of the telegraph and a subsequent new identity for communication, attention was focused on mechanisms, movements and flows of communication. As thinking about communication was motivated more by practical than theoretical interest, not least because of the uninstitutionalized state of telecommunication discourses proper, instances that produced and directed these flows became the framework for “communication.” On the other hand, the idea of unity that marked political discourse provided an environment in which communication was not only politicized but also conceptualized in terms of its own positivity, that is, as communication. As in the case of communication systems and institutions, the theme of national unification served as a conceptual whole within which all the disparate communicative events and processes could be conceived of as being subservient to a single objective or purpose, a principle that would give communication a consistent structure.

This whole that seemed to both enable and set the limits for thinking about communication had a name. It was the nervous system, which constituted largely the conceptual framework for “communication.” Thus, insofar as communication was viewed as a socially effective object in itself, it is possible to argue that this took place in terms of the biological analogy, which conceptualized communication as a social mechanism. The analogy of the nervous system, together with telegraph systems and discourses, laid a foundation for the idea that communication could be subordinated to a single law or principle. In the course of this idea’s development, communication became regarded through the themes of ordering and planning as an object to be organized according to consistent functional principles.

This analogy politicized a common characteristic of all communication systems, that communication was something that could be sold: communication, and especially a communicative event, was made a saleable commodity. All systems of communication yield and organize communication, but not until the commercial telegraph became common it was included in capitalist production. Before this, communication had mainly been a resource

outside market relationships, but the telegraph made it an article of trade on which the telegraph based its industrial organization. For the first time communication as an event became something saleable: it was incorporated into the market economy and became an industry of its own. The biological analogy turned this fact into the basis for political system, and provided a model and legitimation for political attempts to seize “communication.” Under the sphere of influence of this powerful image of communication as the vital system of modern society, communication was not only rendered a “whole,” it was also made a rational whole since the lines and routes of communication were seen as constituting ultimately an orderly system serving specific social functions. The biological analogy sought to rationalize networks of exchange and organize the tracks and connections of information flows under the same conceptual whole. This is a theme, however, that found its greatest expression during the telephone’s heyday.

4. Systemic Orders

The communicative assemblage underwent a change at the beginning of the twentieth century. This was mainly because of the coincidence and interweaving of two distinct fields of power. The emergence of a new constellation was occasioned, first, by rational planning becoming established, which, in turn, was an outcome of efficiency doctrines and scientific method coming together, and secondly, through the organizational technique of carrying out the diverse functions by means of a hierarchical system. The new technology of telephonic communication constituted the chief framework for these processes.

The position of the telephone is central in the modern history of communication. Being the first real interpersonal communication system, it assumed at the beginning similar functions to the telegraph, but soon turned, after the creation of telephone networks predicated on the exchange principle, into a general conversational medium.¹³⁸ As it did not require expertise to operate, as was the case with the telegraph, the telephone made possible instant interpersonal communication, and not, as the telegraph did, only interregional communication. This personal accessibility brought about the immense constitutive effect the telephone had on the functioning of the social, and provided the prerequisites for it to be considered not only as an instrument enabling new forms of organization to be founded, but as a central institution by way of which the social organism could organize its inherent being according to a conscious rationale. This is why the telephone system, “a great communication machine,”¹³⁹ was not just an institution among others. Its significance resided in the fact that it allowed social institutions to adapt themselves to the changed circumstances of modern society in a desired way: by rationalizing operations and increasing their efficiency. On the other hand, it was to a great extent the very improvement in communication that set in motion the dissolution of the previous social order, a process we understand as modernization. Thus the telephone system cannot be considered as only having made a “contribution – [to] the functioning of [social] institutions,”¹⁴⁰ as many commentators tend to think in line with functional theories, because this system was a precondition for existence of these institutions in their modern state. But even this is not all. The telephone system can be said not only to have constituted a precondition for collective institutions and their possible interrelationships that together made

the society what it is, but more accurately, to be the expression and mark of the temporal unfolding of the social insofar as the latter is based on communicative relations. This is why communication systems do not contribute to, reflect, or follow the social as if being “external” to it; rather, they “are” the very loci of the social, and thus expressions of the unfolding of what the social “is” — an unfolding that consists precisely of this process of expression.

The telephone, after its use was socially established, created conditions for interpersonal communication that transgressed and restructured communicative practices being formed in large organizations. Unlike the telegraph, in which the ticker, on the one hand, and the news service, on the other, had created a medium to be used for broadcast purposes too, the telephone was mainly an interpersonal medium. While allowing people to communicate with each other without going “through channels,”¹⁴¹ the social impact of the telephone system has at the same time been conducive to the formation of extensive hierarchical systems. Although there is much truth in the argument that the telephone was not important to establishment of internal lines of communication as a managerial tool, being mainly a mechanism to extend informal communication,¹⁴² it formed at any rate a conceptual model for this purpose. The telephone constituted largely the horizon within which thinking about communication was tied to the idea of a system in the early twentieth century, especially in organizational contexts. Although (horizontal) communication never ceased to unfold, systemic, hierarchical communication rose from the sea of horizontal communication and was regarded as paving the way for the future of communication. It created not only areas of organization, but also an image of the community itself by providing an idea of how it functioned as a whole.

Thus, though it had a remarkable role as a precondition of horizontal communication, the telephone played perhaps an even more important role as a foundation of hierarchical power structures. As the telephone’s position as a condition of centrally planned systems became clearer, so the promotion of horizontal relations and the distribution of information, as outlined by progressives, were replaced by the demand to found a law. This law, to determine and regulate relations and practices within the purview of a given system, was already a prominent part of the formation of the new socio-economic order in terms of systematically applied methods, hierarchically arranged organizations and routinized practices. However, it was not until the telephone was established as the main form of electric communication that the law turned into being an undeniable basis of the social order. Thus, law, as opposed to education and the distribution of information, became irrevocably the basis for politics and social practices.¹⁴³ Moreover, it was during this process that communication posed law as the method of politics. While law is understood here as a set of predetermined rules and methods,

communication as a precondition of centrally planned bureaucracies can be similarly conceived of as a relation in which function and parties are predetermined with respect to the system through which the relation is realized. Communication here is above all internal to the system that establishes it as communication. In other words, it receives its meaning from the functions of the system, and whose status and purpose have thus been formally pre-given, which is not the case with horizontal relations.

In what follows, I will analyze the dimension wherein communication was connected to law, understood as above as a formal mechanism to control interrelations within a given system, instead of to free horizontal relations in two interlinked senses. First, communication was the precondition of law: it made possible the formulation and enforcement of a rule. Hence, it was an integral part of the formation of social power systems. But the development processes of these systems are not something that can be disentangled from the historical unfolding of communication itself, as if external to it. On the contrary, communication is nothing other than the historical process through which a community constantly reorganizes itself as a community. Therefore it is to be understood not only as providing the possibility for social relations, but also as the daily occurrence of these relations insofar as its historical role is determined in and through these very relations. This is because the conditions of the social are not formed in any domain or dimension independent from the daily course of the social, but expressly through the occurrence of restless, undetermined, and undecidable processes which constitute the social.

Thus, secondly, communication can be seen as having been articulated through law during the period in question by taking the form of law—universal and indisputable logical structure. Though in this respect it was analogous to natural law rather than to the legal norm, communication nevertheless lent itself as a seemingly neutral, accurately definable mechanism to the service of powers seeking rational governance and determined social relations. Here the application of scientific research to social questions cannot be separated from rational reform and subsequent projects, from the New Deal to Johnson's Great Society and beyond, for social rationalization. Communication took a form in which it corresponded to its own age and in which it became both an object of scientific concern and a useful tool in the prevailing institutional practices grouped on and around the foundation of the aim of rational order. Of course, communication as a law and a precondition of law is only possible in the same social practices and the field formed by these practices wherein the social, too, becomes thought of especially as social. Thus, the role of communication in the modern world¹⁴⁴—in its position as both law and a condition of law—is indistinguishable from the history of modernity. This

does not mean, however, that its constitutive dimension as the condition “before” any particular communicative relation could not be considered separately from its historical manifestations, although in a given historical situation these are always, as has been proposed, one and the same thing.

In this chapter we will deal with the industrialization of communication in relation to both the systems of and discourses on the telephone. Along with the development of telephony, the central theoretical cornerstones of this process included the rise of “scientific method,” the Progressive movement, the work of Lester Ward, efficiency engineering, Taylor’s scientific management which systematized efficiency doctrines, and the technocracy movement. Let us now turn to the theoretical tradition that formed the conceptual terrain for thinking about communication, after which we will discuss, in the next section, the forms and modes of communication as realized in certain individual systems.

4.1. Communicative Machinery

Insofar as the telephone as the main form of electric communication created a model for systematic application of scientific research to the production of consumer goods at the end of 19th century—alongside the electrical and chemical industries—it is possible to see “the speaking machine,” as it was often called in the contemporary press,¹⁴⁵ as having formed a speaking machine of the whole society. This is because it set the pattern not only for communication, but also for industrial system as a whole.¹⁴⁶ The telephone largely constituted the intersection of powers in and through which both modern communication and industrial order—which are not to be treated as separate from each other—assumed their shapes. The social history of the telephone, and of telecommunication in general, can naturally be construed from diverse starting points, not necessarily compatible with each other. It is my intention here to bring out the path of development through which modern metaphysical (in the sense given to the term by Nietzsche and Heidegger) ways of thinking have been inculcated into the manner communication has been taken as both an object and a means of administration during the telephone’s heyday. In the course of this development the uncommunicative conditions of communication, that is, the ontological dimension which makes possible communication as communication, has been understood in terms of a whole characterized by growing systemicity. In this heterogeneous but unidirectional project, wherein communication was given ever more precisely formulated meanings, the connection through which thinking about communication does not deal with its determinable characteristics but rather with what in

communication “precedes” all particular communicative meanings and its articulable properties begin to be perceived within an ever more technical context. This is why the line of development, brought up here, from Lester Ward through Frederick Taylor to the technocracy movement and further to cybernetics, is important. For it was the working of these discursive frameworks which paved the way for considering communication primarily as a question of technique. It is in and through these forms that the fundamental historicity and finiteness of communication found its modern industrial appearance.

Communication as a general social dimension, during this period, was reduced by way of these instrumental settings mainly into two distinct, although related, categories. First, at its most visible and impressive in the form of and as the effects of great industrial systems, communication was conceived of first and foremost as part of the growing national economy. Thus, it was considered an industry, that is, it was of interest only insofar as it was seen in the light of the functioning of an industrial unit. It was in this period when communication, representing the modern technological society, was linked irrevocably with the organizational form and functioning of an industrial field—a link that is still highly effective. Secondly, given the efficiency of communication as an industry, there emerged an interest in systematizing the whole communication process and unveiling its mechanism, its very “logic” within this industrial context. The systematization of communication emanated, of course, from the same movement in which industrial processes became rationalized according to a general scheme for making them function more efficiently, and was thus intertwined with the institutionalization of scientific research. While actual telecommunication technologies and the systems they enabled did largely constitute the environment wherein communication originally was brought out as a social question, thinking about communication was articulated more in technical terms, the more these technologies were incorporated into a sphere of institutionalized scientific research. The concept of communication, although the motivation for its systematic explanation stemmed from a particular historical stage wherein its instrumental positivity was brought out by and through the effects of industrial consolidation, was materialized within frameworks that presented themselves as objective, and dispensed with all its “subjective” and thus irrational empirical connections in order to capture its innermost “essence.” It is in this context that the “scientific” conception of communication was first worked out, preparing the ground for subsequent generalized models of communication systems deeply rooted in academic treatises. Therefore it is this latter lineage that we must follow in order to trace the formations laid down for and in the course of communication, and to investigate the role communication has been given in modern American society, that is, in what during the nineteenth century was separated from the preceding social order.

Communication and the Challenges of Industrialization

By the time the telephone system was established culturally it had become clear that the influence of the new communications and transportation technology, coupled with machine industry, on the transformation of the social conditions of American society was fundamental. Communication in its modern forms was not only conducive to the dissolution of the shared structure of meaning and the undermining of the normative order of agricultural America: it was one of the most important causes of this process.¹⁴⁷ The rearticulation of social conditions to this extent clearly would not have been possible without the improvement of communication systems and the establishment of their social status. Charles Horton Cooley, for example, writing in the early nineteenth century, depicted the social transformation brought about by the railways, the telegraph, newspapers, and the telephone as revolutionary in every aspect of life.¹⁴⁸ Therefore the configuration of means of communication cannot be thought of as separable, nor even as distinguishable, from society. Communication as the basis of society naturally always builds this connection, but especially in developed industrial societies social events are organized expressly as communicative events, as events in a communication environment in and through which social relations are established as social and the common experience of what is going on comes in the sphere of shared meanings. Modern communication systems were not only vehicles of change, because by constituting the field wherein this change could be taken as an object of speech they formed the preconditions of the thinking of the social reorganization itself. This idea was articulated in contemporary writing mostly as a notion of communication as the factual site of the political. It was also the conclusion to which the progressive historians Charles and William Beard, for instance, came in 1930, for according to them the improved means and forms of communication had created an “intellectual climate in which governments make and execute policies.”¹⁴⁹ Though communication technology was still seen strictly as a means to distribute information, the new systems nevertheless were conceived as having become established not only as the essential environment for political action, but also as its necessary precondition.

The telephone system, regarded as an organism, constituted a whole new mode of publicity. Arnold Bennett, writing in *Harper's Monthly*, understood that the telephone network, in connecting innumerable private households and businesses together, engendered a new field of communicability. “Just as I think of the big cities as agglomerations pierced everywhere by elevator-shafts full of movement,” he said, “so I think of them as being threaded under pavements and over roofs and between floors and ceilings and between walls, by millions upon millions of live filaments that unite all the privacies of the organism—and destroy them in

order to make one immense publicity.”¹⁵⁰ As it was hoped the telegraph would bring communicating parties together, so the telephone seemed to be capable of bringing this process to a conclusion and establishing a unifying publicity by means of speech. Thus, a contemporary commentator characterized the telephone as a social force as follows:

“Behold a highly developed and well organized system of communication touching human activity at every point—an essential factor in the social and industrial life of the nation—cities, towns, villages and hamlets, though widely separated, farms, factories and firesides everywhere intimately bound together by countless avenues of speech. -- The incessant exchange of information and ideas which this system makes possible, puts individuals and localities on common ground—sweeps away sectional prejudices—advances civilization. -- While the telephone, together with other methods of communication—the railway, the mail and the telegraph—have been the means by which the occupation and civilization of this great country have been accomplished, the telephone has provided a facility peculiar to itself, in that, over areas of great and small, it has made it possible, by spoken word, to bring together—mind to mind—the vast majority of the American people.”¹⁵¹

The belief in a coherent political unit, to be fulfilled with the aid of growing communication, struck the social imagination. If the telegraph did not actually succeed in establishing a harmonious community, the far more efficient telephone, which inherited the hopes invested in the earlier communication system, seemed to be able to fulfill expectations. The telephone was no doubt regarded as an important means of engendering and organizing the social into a unified system. This view was reflected, for instance, in the address by N.C. Kingsbury before the Central States Conference on Rail and Water Transportation. “In the history of the telephone,” he stated, “there have -- been no greater achievements than the development of transcontinental telephony and of wireless telephony. -- This is a final blow to sectionalism. The East is no longer separated from the West, nor the North from the South. -- Co-operation is rendered easy, natural, necessary, permanent.”¹⁵² It seemed apparent that communication resided in the core of the modernization process that permeated the whole society, and, in the final analysis, it was nothing other than the expression of the unfolding of society itself. Of course, it must be noticed that communication was not—with some notable exceptions¹⁵³—articulated as an ontological question but was stuck in the instrumental register: communication was something by which one could create “intellectual climates” rather than being related to the emergent way of being that made this creation possible in the first place.

The revival of communication in a new technical mode appeared as a two-pronged question. On the one hand proliferation of connections speeded up the general economy and increased the complexity and fluidity of social and industrial processes, thus multiplying the “burdens of government”¹⁵⁴ and enhancing the need for organization and planning. The telegraph alone had grown and accelerated collective forging of social relations to the extent that it, in the main, disintegrated the very order on the basis of which it had developed, and the telephone increased many times the level of the complexity and the rate of social processes.¹⁵⁵ On the other hand, communication, especially in the form of developed communication technologies, could be seen at the same time to be the central tool for resolution of this problem,¹⁵⁶ for communication systems such as the telephone enabled better control by increasing the efficiency of coordination. Furthermore, telephone systems constituted in themselves a giant industry the network structure of which provided a recognizable visual representation for grasping the new conditions of societal activity in which distant actions seemed to have immediate and perceptible effects. Therefore they could be viewed as models for making the governance of society more effective and business-like, which was what the contemporary critique desired in opposition to the “corruption” of the government.

After the telephone and the immediate interpersonal communication it set up was socially established, it emerged as an indispensable resource with respect to the governance of numerous activities, becoming an “absolute business and social necessity.”¹⁵⁷ This was manifested in both the increase in telephones and telephone lines, and the growing use of them on a routine basis. So, the telephone was no longer just an auxiliary device in social practices but was instead taken for granted as the precondition of these practices. “Organized society,” stated a contemporary, “cannot exist without inter-communication, and the quicker and more certain it is, the greater is the uplift of humanity in the intimate relations of social units.”¹⁵⁸ The telephone was a definite foundation not only of the corporate domain but also increasingly of the functioning of the society itself.

The instrumental and conceptual means provided by communication systems were given the necessary buoyancy required for the significant collective project of structuring social practices more in accordance with a general plan by and in connection with “scientific method,” as successfully pursued in the natural sciences, in the light of which the full potential of communication was to be realized within a rational guidance system. The nature of this method consisted in a number of things. First, it separated the incidental and insignificant from what was essential and necessary, and in doing so forged a relationship to truth. Secondly, it replaced contingent, subjective opinion by a rational and objective procedure that did not leave

room for individual interests or preferences, being thus beyond value laden disputes. Thirdly, this procedure had a coherent, endlessly repeatable nature, which did not change with time and context, whereas its objects, in turn, appeared independent from the method, which only revealed them without having any influence on their existence as such. Lastly, the method was insensitive to its objects: it could be applied in principle to any object regardless of their particular type or distribution. This method constituted the foundation on which the social in its variability could be thought as an object of scientific control, but also laid the basis for communication becoming a focus of systematic production of knowledge. From the technical point of view, the latter virtually formed a precondition of the former, as communication in the form of telecommunication required dependable and effective transmission systems which both necessitated scientific research and were an outcome of it. Furthermore, and more essentially, scientific practices depend naturally on communication in a more original sense by being necessarily communicative practices. They are therefore intelligible only in the realm of communicative relations, which were also a precondition of these relations themselves becoming objects of scientific investigation. In the course of its becoming measurable and determinable—and its nature thus being revealed, as it seemed—communication (telecommunication) increasingly created opportunities for the determination of social relations too, at least insofar as it is conceived as constituting both a means and object of scientific practices.

Scientific interest in communication strengthened concurrently with the improvement of technologies of communication. It was connected to the growing sentiment that communication as a social process, after having been analyzed and formalized, could be used to engender and maintain the social system.¹⁵⁹ Thus clarification of the communication process was not merely an academic, but also a thoroughly political question. Despite the fact that the scientific control of society was presented as a collective mission, the actual determination of social relations, as it were, did not depend primarily on conscious decisions. Modern communication, relating to the institutionalizing of scientific research, set a matrix in which many relations, especially in the economic realm, were capable of being performed by telecommunicational means. Telecommunication determined social relations by engendering and differentiating positions, practices, and connections prior to and alongside discourses on rationalization and social planning. It routinized forms of interaction and specified operational chains of action, allowing the reformulation of tasks and necessitating rearrangement of organizational structures. Through creating classes of action and types of organization, it was also involved with the realization of conscious schemes and systems. But most importantly it fulfilled an underlying precondition, inherently exposed to the scientific estate, that allowed for the determination of

communicative relations within the social. This is because of the abovementioned double role of communication as both means and object of science: if science is only possible as communicative practice, it is the nature of this very communication that is at stake in modern scientific institutions from anthropology and economics to engineering and information systems. Whether it manifests itself in the form of rituals or lines of impact, or in mediation of interests or transmission of signals, what these approaches have in common is precisely a need to explain “communication” relevant to a given discipline. Though the significance of language and communication from the administrative point of view was evident by the turn of the century, it was especially cybernetics that made it a science in the middle of the twentieth century. For the cyberneticians it was clear that “language is a necessary subject to study for any scientist.”¹⁶⁰ It is in this connection, that is, in the conjunction of communication and science, where free, irreducible communicative relations are inscribed into the body of the scientific edifice and translated into their special vocabularies. In this respect, the determination of social relations is indissociable from the linguistication of communication.

Thanks to the historical linkage between communication and a general method or law, communication was considered as capable of being brought within the sphere of conscious command, which reflected the ambition and hope of society taking control of its own destiny. While communication, in the form of social relations and processes, was wanted under rational control, it was however this same communication which would perform the control required. Seen from this perspective, concern about communication not only reflected the need to direct the course of society and thus to take the responsibility for its own being, for it was communication which established the space and defined the ways within and by which this concern could be expressed: if communication was a means, it was a means for society to exist and maintain itself as a society, because it is this very communication which makes sense of the community.

The concept of society based on the idea of a founding law as a mode of social governance was gradually given explicit formulation through the view of society as an integration of different social groups which replaced the old idea of it as an aggregate of atomistic individuals. This, in turn, was a fundamental part of the process that prepared the ground for a more positive view of the state and for national planning evolving as a major issue of American public policy.¹⁶¹ Progressive thinkers like Charles Cooley, Herbert Croly, Walter Lippmann, and John Dewey, attempting to formulate the outlines of a new, industrial liberalism, agreed that the supposed natural harmony of economic competition was not capable any longer of maintaining social stability, which depended instead on the idea of cooperation. In this context, the exposition in

the second half of the nineteenth century of communication in terms of competition was rejected. It is easy to read from the contemporary discourses that during the time of the telegraph it was communication which was the integrating social power: it united the community as a community, while the prevailing political economy, in turn, defined communication as a universal competition between atomistic individuals pursuing their own egoistic self-interest. Now, however, communication assumed a novel character because the idea of competition did not correspond any longer to experience of the present situation or the requirements it placed on social action. The great industrial systems that were seen as epitomizing the intrinsic nature of modern technical society established the conceptual frame of reference within which communication came to be considered. As the central processes of society were depicted as systemic, and as it was understood that what characterized the society as such was no longer competition but cooperation and the aspiration for smooth and efficient action, the concept of a system became the reference point through which the progressive idea of the use of scientific methods in administration was entwined with the aim of efficiency.¹⁶² In contrast to the European tradition, social governance was not naturally organized as a comprehensive program in American political thinking, but insofar as the political tradition marked by localism and fragmentation became increasingly restructured on the basis of law and a general method,¹⁶³ it was impossible to disentangle communication as a systemic instance from the realization of this law.

Lester Frank Ward was the first person in American social science to articulate the notion that history was subject to scientific control and direction, and would have had sociology mobilized into systematic disclosure the rules according to which social laws could be controlled.¹⁶⁴ For Ward, distancing himself from the static social Darwinism of William Graham Sumner, movements within society appeared not as preordained for, although still following natural laws, they were now seen as governable in just the same way as natural forces have proved rationally governable thanks to the natural sciences. Here, the model of natural sciences provided a way for Ward to rethink the status of social laws, because if the same laws governed both physical world and human society, discovery of these laws would allow rational control. This let him conceive politics as the governance of these laws “just as water, wind, and electricity are controlled.”¹⁶⁵ In this way, politics as the sphere in which social relations were articulated was to be supplanted by the “scientific” control of social laws. Thus, communication, the voice and mark of the social, became something that could be subjected to communal regulation, because the laws which directed its course could be formulated not only for analysis but also for manipulation.

In this respect Ward paved the way for technocratic thinking by articulating a program to capture the inherent “essence” of society in the form of social laws and to control these laws in a systematic, methodical manner. Politics, in this program, came to be replaced by a set of supposedly uncontroversial and objective rules, based on “scientific” analysis. Insofar as for Ward the possibility of directing the development of history and our own fate was important, it was this very aspect that was removed discourses of social engineering proper. In those, the instrumental dimension of effective social control excluded questions concerning common objectives and the direction of history, in other words the whole possibility of politics. Nevertheless, Ward demonstrated how easily the concept of controllability of the social was translated into a question of technology. This was not, however, just accidental, for the increasing awareness of the general significance of instrumental efficiency constituted to a great extent the social context within which the early twentieth century American society and its future were posed as objects of thought.

This notion, which substituted Sumner’s ineluctable natural development by scientifically generated progress, and competition, as manifested in the survival of the fittest by natural selection, by mutual cooperation and rational negotiation, opened up a new relation to thinking about communication as well. For insofar as they appeared to enable the general economy of social interaction, the conditions of communication were translated from natural laws external to human authority to principles pertaining to the inherent nature of human society itself. Although still remaining within the sphere of natural law, these principles were now included as workable elements of the human realm. In this way the practical, instrumental viewpoint lent itself naturally to dealing with social questions. So, communication, a sign and signal of the social, became subordinated to social direction and regulation by virtue of the fact that the underlying laws that determined its course could be used for manipulation by sociological investigation. The forms of multifarious communicative relations appeared in the perspective of this applied, “dynamic sociology” no longer as reflecting an unchangeable blueprint, but were seen instead as following an intelligible and, eventually, controllable law.

What appeared as the most crucial question, as opened up and addressed by the reform Darwinism which Ward systematically articulated, was not so much concerned with historicity, but controllability of the social: instead of considering the social as being realized in the course of its becoming articulated, it drew attention mainly to methods for the proper organization of social life. The gesture by which politics was replaced by technique was legitimized by so called scientific method, which established the domain within which controllability could be carried out. This method, being essentially “analytical and rational,” was viewed as opposed to

the “instinctive, emotional, rule-of-thumb operations of historic politics.”¹⁶⁶ In addition, it lead unavoidably to the right decisions relative to the situation: “it calls for the collection of pertinent facts, the formulation of conclusions on the basis of facts, and the execution of policies in accordance with the requirements of the fact situation.”¹⁶⁷ So, through the coalescence of Darwin’s conception of evolution with scientific method, a possibility arose for a new relationship to the social. The far-reaching significance of this should not be underestimated, for this is why a whole sphere of practices became firmly entrenched on a foundation of law—in the sense of predetermined relationships and unchanging, systematically applicable procedures. This was related to the fact that the possibility of control was only conceivable by virtue of the scientific edifice which was itself grounded in the same principle of controllability.

As the changed circumstances demanded a rational recasting of society, a mechanism for reform was thus discovered, not in evolutionary theoretical interpretations by social Darwinists, but rather in the repeatable method of science that posed the conditions of communication as a factual structure. In this way a still extant project was initiated, in the course of which these conditions showed up as able to be understood in consistent and quantifiable categories. At the same time they were irrevocably enshrined in the system of metaphysical science as something conceptually uniform and numerically definite. It is this project—although heterogeneous as well as discontinuous, and so losing any sense of predetermined historical or thematic consistency¹⁶⁸—wherein communication assumed a growing “beingness” in terms of the forms in which it was introduced as an object of scientific analysis. However, the question is not of a juxtaposition of eventfulness and beingness (an event can be as being-like as a being eventful), but rather of the types of form through which communication was expressed within a sphere of systematic thinking. Of course, there is nothing accidental in this, for scientific method isolates its objects and thus causes, to a large degree, being-like existence to be tested, measured, and assessed. Therefore it is not surprising that communication adopted an inherent structure and mechanism of its own out of the indeterminate oscillation wherein it both conditions and is being incessantly conditioned. Hence, what has defied a comprehensive definition, namely the always elusive “nature” of communication, started to get considered as a positive term.¹⁶⁹ Yet the positivity introduced here is always its own positivity, not an external quality attributed to it. What the emerging figure of communication was suggestive of, in a way, was society’s own image in that the scientific practices that evoked it became an ever more integral part of a society that was constituted, in the final analysis, from communication.

American System of Communication

Alongside the utilization of technical models for rationalizing the practices of various systems, Frederick Winslow Taylor formulated a sophisticated concept of control wherein the requirements for efficiency and methodical clarity were combined into the form of a regimented, scientifically managed organization.¹⁷⁰ This was encapsulated in what became known as scientific management, and after World War I, industrial management. It concretized the major focus of social reform at the local level by creating a realistic program of rationalization to be implemented in industrial organizations.¹⁷¹ The concept of the stability and controllability of communication found a first promising model from engineering method because it seemed to be capable of fulfilling the vision of a scientifically governed society by serving as a means of replacing social contention with indisputable answers.¹⁷² Scientific management synthesized engineering method, the “scientific” approach, and the previous doctrines of efficiency experts and job designers into a consistent system of theory and practice. It established a perspective that gathered together the theoretical formulations of organization, the idea of standardization, the physical movements of workers, and material conditions for the workplace, allowing them to be analyzed within the same conceptual framework. It is of utmost importance from the point of view of the history of administration of and by communication to take cognizance of this development, as it was in factories and workshops that communication was not only formulated as a distinct object of thought but also in which the formalization of communication took its first steps. This is related to the fact that at the beginning of the twentieth century it had become apparent that the possibility for scientific planning of social development was based on the factual structure of communication, not on its assumed immutable principles.¹⁷³ The Taylor System provided the context wherein this structure could be translated into specific laws in order to rationally direct not only industry, but the whole nation, as the method of governance was seen to be basically identical in both cases.¹⁷⁴ The charm of Taylorism from the administrative point of view was naturally that it suggested the possibility of specifying the “one best way” for any social activity, and this was the reason it soon assumed the form of a general socio-political program.

It can be proposed that the experience of a limit to social development was linked with “the passing of the frontier,” or “the Turner thesis,” in that experience was now accumulated through markets, through the fact that profit had to be made more and more through competition rather than by extending markets infinitely. Experience of limits was thus tied more and more to experience of the finiteness of market relations, and it is at this point that Taylor entered the picture by presenting a “scientific” approach to the problem of the increase

in production required. Scientific management was a method for meeting the need, expressed from the last decades of the nineteenth century on, for finding a way to coordinate operations and control workers in order to increase the level of production. Against this background, Taylor can be regarded as having forged a new relationship to the experience of limit, because it is in the context of the new awareness of the limits of the market that his system has left a lasting mark.

Yet Taylorism is to be understood not only as a theory of management but also, and perhaps more importantly, as a way of thinking about communication within the circumstances of modern industrial society. Seen from this angle, it can first be said to have established communication as one of the means by which the manager could control work done on the shopfloor, thus expressing the relationship between manager and worker in terms of communication. Although it was not the only relevant perspective within which work was conceptualized, communication was viewed here as an integral part of the production process. Thus the success of scientific management, according to Taylor, relied on, for one thing, “the intimate cooperation of the management with the workmen, so that they together do the work in accordance with the scientific laws which have been developed, instead of leaving the solution of each problem in the hands of the individual workman,” as he pointed out in his classic book *The Principles of Scientific Management*, which was first published in 1911.¹⁷⁵ The theme of an underlying law brings us to the second point. Taylorism articulated a perspective which enabled work as communication process to be thought of as a regular activity controlled by a general law which could be fully revealed in each particular case by the methods of scientific management. Taylor was firmly convinced that “laws of this kind, which apply to a large majority of men, unquestionably exist, and when clearly defined are of great value as a guide in dealing with men.”¹⁷⁶ These laws were not, however, imposed on action from above, as a principle foreign to it, but stemmed from the specific procedures and motions needed in a given task. So the law, gathering communicative relations and events under one conceptual whole, was fundamentally a law derived from the activity in question.

It was by and through the scheme introduced by Taylor that a line between a system and its “outside” was drawn. The system represented what was rational, ordered, and efficient, whereas its outside, the “other” of the system, comprised all that was not in line with these characteristics, things and processes external to the system which endangered the order laboriously created and maintained. What exactly was this externality, this other, then, with respect to Taylorism? By the systematic organization of work and communication Taylor sought to efface 1) practices based on habits, 2) subjective, incongruent activities, and 3)

differences in views and inner inconsistencies. This can be perceived as a crucial move in the politics of communicative administration and the administration of communication, being incessantly reiterated, applied, and elaborated later, through which the mechanism of a system was synthesized and formalized out of its previously heterogeneous parts and described in terms of its intrinsic nature, seen as a logical whole. For the first time in a “scientific” sense, communication assumed a thoroughly rational structure, taking the place of what used to be an incoherent set of distinct, often incongruent or overlapping practices.

An impersonal, uniform structure was to displace time-consuming and incoherent traditional practices that, from the point of view of a rational system, usually only led to confusion, disagreement, and endless negotiations. “Scientific management will mean,” argued Taylor, “the elimination of almost all causes for dispute and disagreement between men.”¹⁷⁷ These differences of opinion and disordered practices constituted, according to Taylor, the ultimate enemy of a perfect system. And it was communication, first and foremost, which provided the means of overcoming the state of disorder, for “more than all other causes, the close, intimate cooperation, the constant personal contact between the two sides [a manager and a workman], will tend to diminish friction and discontent.”¹⁷⁸ Yet the infinite exchange of views to be eliminated, in this connection, is precisely what could be called politics. From the point of view of Taylorism, politics made the functioning of a system inefficient, expensive, or dishonest.¹⁷⁹ Seeing it as a hindrance to working order, Taylor attempted to overcome politics not by another set of politics as other reformers did, but by truth. That is, he aimed at identifying the most effective method for any task by discovering the inherent laws that controlled it.

This necessity to eliminate negotiations by establishing a law forged a new relationship between a system and a non-system. Even though a law-based order took the place of disorder, the latter could not be completely eliminated for it was essential to the existence of the former. Upon further scrutiny, the outside of a system is defined as outside concurrently with the implication of the method, that is, when the constituent parts and processes are reconstructed on the basis of their necessary logical structure. Consequently, what happened here, in fact, was that the outside remained part of inside, part of the system, in the sense that the latter could not be considered as completely bereft of human imperfection. Rather, through methodological principles it was possible for the system to regulate inconsistencies in a rational manner. So, what is at stake here is the administration of internal uncertainties by exploiting and refining relevant objects with respect to two things, namely, the fixed goal of a system and what was external to it. In a word, it was a question of constructing a norm in terms of efficiency.

This said, it is clear, though, that what fuelled the appeal and spread of this approach was precisely the vision of the possibility of reconstructing the whole system as a machine. It was Taylor who gave work and communication, understood in terms of a system, a mechanistic foundation. It tied the manager, workers, factory, machines, and the actions and routines needed for the work to one and the same mechanistic whole. It also forged a new relationship to time available. The most economical rhythm of motion became the standard for expenditure of time and removed any discretionary power to take turns working. As a consequence, man and his work, as well as the means and methods of production were all conceived as part of a consistent mechanistic system through physical and functional separation of tasks, standardization of production, and through bringing time in as an essential factor in production. In this way, if technology was previously viewed, to some extent, as a resource external to work, now Taylor built it into the organization of work itself.

The mechanistic approach inherent in Taylorism, and, in the main, also in its successors, constructed a consistent, recursive chain of action that, in the specific circumstances of any given case, would establish the one best, unchanging way to get a task done. Once the chain was established, there would be no need to change it. Only persistent monitoring would be needed to check that the planned line of action was maintained and no deviations or interruptions occurred. It was this rigid methodical approach, remaining the same in every instance, that, if followed strictly, would demonstrate the immanent order of communication, and its connection to the production process. Communication, hence, was articulated in between the mechanisms of science and those of the market. Moreover, it was in this “between” where communication received its innermost rational structure.

In this sense Taylor can be considered to have built on the legacy of Ward, for he formulated a method for the systematization of functional action, thereby trying to define the very logic, the hidden mechanism of communication at the core of this action. In a Platonic vein, Taylor sought to identify a simple, rational, and true foundation underlying the heterogeneous and variable world of appearance and to subordinate this apparent multiplicity to a founding law. By deriving this law through a controlled variation of isolated elements, he applied scientific method to the field of functional communication in order to make it more effective. The uncovering of the elementary elements of a given activity and their rearrangement in accordance with the requirements of the tasks in question was seen as a prerequisite for the efficient organization of communication. By undertaking the task of specifying the scientific laws of communication, Taylor can be said to have laid the foundation for thinking about communication as a factual and fully determinable entity at the service of administrative

functions. In this respect, he became the central metaphysician of communication of the industrial age America.

What was central to his concept of an efficient organization was the idea of *repetition*: communication consisted here of regular and controlled reiteration of similar kinds of routines. In this context, every routine performed a certain function within a given productive whole, and communicative operations were then standardized and made interchangeable like machine parts, according to the “American System” in the second half of the nineteenth century. An essential feature of this procedure was that a recurrent, predetermined series of action and communication routines constituted the foundation for efficient production, in which more important than the content of communication was its performance, its occurrence, and its formal renewal. Because the contents of these acts were already preestablished in relation to the desired outcome, the more vital was their task-related repetition and repeatability. Communication assumed here for the first time the character of a scientifically produced and controlled function, being subordinate to the needs of the industrial organization it belonged to.

It is possible to perceive this idea of repetition, as put forward by Taylor, as epitomizing the industrial interpretation of communication by reducing the number of its diverse realizations to its lowest common denominator, that is, by reducing a multiplicity to a standard. This concept became expressible only in an industrial age, from the needs of which it received its conditions of meaningfulness: what Taylor did to work and communication paved the way for what Henry Ford did later to automobiles and transportation in general. By reflecting the realm of mechanical technology, the concept of repetition formulated a crucial principle of the modern industrial society. Its effectiveness lay in the fact that it was not restricted to any particular application but in theory enabled optimal performance to be determined for *any* industrial purpose. Hence it became a generalized tool that not only advanced industrial production but was also itself a product of industrial functions, for it was expressed through them at least in two senses. Firstly, it did not bring into them anything that they did not already contain, but only reorganized their internal sequences of action according to the law immanent to them. Secondly, and more essentially, it formulated operational laws of movement from the perspective of industrial institutions, and in so doing remained inside the industrial order. What was fundamental, of course, was that this idea of producing and modeling serial processes became possible on the basis that this modern industrial order had laid down in the late nineteenth century. This is how communication pushed ahead along the road of “standardization and efficiency,” in the words of telephone historian Herbert Casson in the early twentieth century.¹⁸⁰

It is important to note that the efforts to systematize work and communication were not restricted solely to the discursive domain. Scientific management was consequential in its effects on organization and governance in American society. For public administration, it was an “inspiration, model, and source,” according to Dwight Waldo.¹⁸¹ The wave of rationalization permeated gradually a whole range of governmental practices with the introduction of management techniques related to reorganization of offices and rationalization of work flow.¹⁸² Moreover, communication was interpreted along the lines articulated by Taylor in industry and in the systems that made a business of it: the ideas of scientific management were not only external to the industrial production of communication but were an essential way of comprehending the nature of this business in some of its most prominent institutions. The American Telephone and Telegraph Company (AT&T), being both the main industrial player in the field and also one of the largest corporations in the United States and the world, took the theories of scientific management in earnest and actively implemented them, consequently turning the process of producing and wholesaling communication into a question of establishing the right method.¹⁸³ It seemed that if social development was capable of being planned centrally by using “scientific” methods, so the telephone system, insofar as it were to keep pace with development, must be similarly centrally directed as a single entity.¹⁸⁴ As Roger Burlingame, a historian of technology, put it in the 1940s, AT&T became “a symbol of the collective phase,”¹⁸⁵ for it crystallized the impetus toward scientific administration in a way that created a model not only for other corporations but also for social governance in general.

The idea of the telephone company as the model for governance had been presented already by Charles P. Steinmetz, the most famous engineer after Taylor, according to whom the government should take as its model the corporation, and thus introduce supposedly disinterested and unambiguous methods for decision making.¹⁸⁶ AT&T (or in general “the Bell System”) was proposed as an explicit model for the successful management of an immense organization especially in the *Technocracy Study Course*, a book that encapsulated the central ideas of the technocracy movement in the 1930s. According to the *Course*, the Bell System “maintains in continuous operation what is probably the most complex, interconnected array of physical apparatus in existence,” by “continually changing the apparatus with which it has to deal, and remoulding the organization accordingly.”¹⁸⁷ The Bell System established a pattern by way of which rational coordination was practiced successfully against a background of continuous and uninterrupted transformation of the whole system. This was not, however, a novel perception as Casson, for instance, had emphasized the dynamic structure of the system in question as early as 1910,¹⁸⁸ and the exemplary model of this giant monopoly as regards style of management and satisfying customers’ needs did not escape other contemporary

commentators' notice either.¹⁸⁹ The question of social change was an immediate political problem of the time, which is why it was vital, as Wallace Donham said in 1932, "to introduce into our American industrialized social organism methods of dealing with change without loss of fundamental economic and consequently social stability."¹⁹⁰ Here, it should be noticed that the question presented itself naturally in terms of lack of a method, which when found, would give organization of the social a solid foundation. For the technocratic branch of progressivist thinkers, in any case, the Bell System came to serve as a model for a dynamic organization which mastered its own development through formalization of action, and in so doing exemplified the basic design, as anticipated and planned by the technocrats, for the larger social realm to come.

Thus the technocracy movement focused on the methods formulated by the Taylor System—standardization, the interchangeability of elements, and the maximum economy of a set of actions—which had been introduced into some, although nowhere near all the key institutions of modern American society, from the beginning as applicable to society as a whole. Even though Taylor had also thought of his system in relation to society and not only to the industrial establishment, the technocrats' project was explicitly to carry out rational planning directed at society as a whole. For the technocrats, however, there was only one question of importance regarding communication, namely, "of two equally effective modes of communication which has the least energy cost per unit?" The unit was defined as "a given number of words transmitted a given distance."¹⁹¹ Here, the idea of communication as purely the transmission of pre-existent, independent contents, was given its strongest and most resolute expression within the heritage that can be traced back to Ward. Communication became exclusively a matter of organizational efficacy, for it was of interest to the technocrats only in terms of its effects on the replacement of manpower by advancing the automatization and mechanization of society as a whole. Clearly, in the hands of these thinkers it was rendered a completely self-enclosed instrumental system: it was not only viewed as being subordinated to the industrial aims it seemed to serve and express but also as receiving its positivity, value, and social meaningfulness through the predetermined and unquestioned objectives of the system itself. So, its seemingly infinitely variable forms could in principle be identified and determined according to their social function and the level of energy consumption, and thus produce the best communication model for each purpose required.

The technocrats, who largely received their original inspiration from Thorstein Veblen's book *The Engineers and the Price System*, published in 1919, held that because contemporary social problems, as they saw them, were predominantly technological in nature, it was the engineer

and not the politician who must take over the management of the country.¹⁹² This opinion reflected the general sentiment among progressives that the growing complexity of the industrial society made the expert a prominent figure, although only the technocratically oriented branch was willing to grant the expert authoritative powers. By articulating the engineer's point of view, the technocrats capitalized on the prevailing impulse to use clear, objective methods to reach unambiguous solutions, avoiding a political dispute. Whereas politics was subordinated to free market in the classical liberalism, in the context of a new, industrial liberalism it had a tenacious disposition to become subjected to technique. It is clear that community for these thinkers was not a *political* community, for it did not allow disagreement or debate, that is, questioning of the conditions of commonality. They held that [any competent functional organization] “*has no political precedents. It is neither democratic, autocratic, nor dictatorial.* It is determined by the requirements of the job that has to be done - -.”¹⁹³ What the technocrats wanted to do was to erect a machinery that would recognize only one norm—that of smooth operation of the industrial system. As the disinterested and impersonal methodological approach appeared the only valid basis for this, the uncontroversiality of the method brought about the apoliticality of governance. Because social matters largely became questions related to the choice of appropriate rules of conduct, politics became an interlinked set of practices and precepts, a body of instructions rather than an argumentation. Here, instructions are to be understood not only as a set of precepts concerning the functioning of the social apparatus but also as the product of the “machine-likeness” of the society itself, as a response to questions which became expressible only within this conceptual context.

What seemed to be the logical result of the development of science and technology was an efficient yet nondemocratic government. The efficiency schools rejected “both politics and the political,” according to Karl, and centered on the rational and economic system.¹⁹⁴ It is not that politics would be completely removed or eliminated, though. It is rather that rational technology would engender a regime of truth wherein politics would be exhausted through unambiguous methods and procedures. Politics, insofar as it existed, would definitely not be defined in terms of contention or dispute, but rather in those of efficiency and stability.

Mechanical Systems

The rational reform movement initiated the project that placed communication, and thus the social order, on a scientific footing, wherein applied sciences were combined with the

engineering model. This movement was concerned with institutionalizing communication in a way that would correlate with industrial organization, and in this sense also with modification of the conditions of communication in line with this objective. These conditions were conceived of in this project in an instrumental way, as an enabling structure for a certain communicative action to take place. They thus appeared no longer as a set of unchanging natural laws but instead for the first time as a modifiable order, subordinate to rational design. But as communication had assumed an unprecedented positivity and social effectiveness resulting in the systematic study of its mechanisms and channels, so the conditions of communication were seen in this instrumental light, which placed its ontological dimension in a technological context. In this way, as the progressives articulated society as an administrable whole, the need to take the reins pushed the dimension of communication as an instrumental means to the foreground. It began to be thought of within a technicized framework that was based on the dichotomy of means and ends, the former taking priority and causing the latter to recede in importance. This field of growing technicization, of course, laid the very foundation for the general possibility of the idea of being able to control the direction of society.

Communication research took shape in and through this perspective of administration and control; in fact, it was, in the final instance, this very perspective that made it possible as an institutionalized practice. As Herbert Croly expressed the view that the extreme concentration of industrial and financial power had resulted in the disintegration of political order and that what should be done was to restore social stability and a sense of national unity,¹⁹⁵ communication as a social process was immediately politized and embodied in one whole and political purpose. So, communication research was given a social function within the political movement that was only strengthened during the war: to provide knowledge about communicative means, practices, and effects in order to maintain the stability of the political system.¹⁹⁶ Here, there was a notable break with communication as understood within the framework of the natural-rights doctrine of liberty of contract, which positioned it as an interindividual mechanism. Although also aiming at engendering a sense of unity, this mechanism proved unfeasible as it apparently led to the dissolution of political order. It conflicted precisely with what the progressives were struggling to achieve: it was what they wanted to abolish so to give way to a concept that was predicated on collective, not inter-individual processes.

On the other hand, the demands of industry resulted in the development of methods and techniques that would aid in rationalizing production systems. Communication, particularly new communication technologies, if they seemed support this objective, were integrated sooner

or later into this scheme. This is also why the Taylor System must be seen as applying directly to communicative practices, too. It is also important to notice that it was not limited to purely industrial activities, but spread throughout society and grew as a common conceptual horizon within which the question of rationalization was expressed and executed. Given this, it created an environment also for prosecuting broader political interests along the lines of progressive thinking. As Bowman has pointed out, underlying the practical application of the idea of social balance was the norm of efficiency. This was the source of the attractiveness and viability of Taylorism and other efficiency schools: they supported the political cause by providing mechanisms to restore social balance, for free contractual relations proved unable to maintain it.¹⁹⁷ Efficiency could be sustained only by efficiency itself; in other words, where previously there was a loose set of connections between rationalized industrial plants and practices, one should create a comprehensive and consistent social machinery. This is how social stability was combined with a hierarchical principle of organization,¹⁹⁸ and with this conceptual bond communication as a social process was connected to a hierarchical system as well. Although this kind of total system was not, of course, brought into being, Taylorism provided a model that framed the political discussion on how to retain the beneficial consequences of efficiency without its detrimental effects.

Thus, in his book *Progressive Democracy*, Croly argued for the creation of “industrial democracy” within a system of “scientific management.”¹⁹⁹ These two terms were not independent of each other but, on the contrary, seemed to be inherently linked by their common goals of efficiency and stability.²⁰⁰ If scientific management was first and foremost a political technique, then its practical application was not restricted to management of business but was felt essential for industrial democracy in general. There was also a second reason why scientific management seemed to be suitable for Croly as a political technique for maintaining and engendering democracy. This is that scientific management—not unlike Croly’s progressivism—rested on the idea of a single whole. For Croly, harmonious social structure implied a concept of society as an interrelated and efficient totality,²⁰¹ and scientific management seemed to provide a theory not only for setting it up, but also for continuously thinking about the various social processes within one conceptual framework.

Now, along with the move from an individual to a group, as well as from competition to cooperation, the telephone—together with other communication systems—appeared as a communal technique which would not only tie separate individuals to each other but would engender communality. If communication constructed the community, as was acknowledged, then by controlling the means and structure of communication one could keep the social as one

governable whole. This idea, although not often explicitly articulated, was reflected in various forms in contemporary developments. One of these was clearly the drafting of the Sherman Act in 1890, through which freedom of contract was subordinated to national regulation, as it seemed out of touch with reality in the eyes of the progressives. The same idea—of maintaining social stability through a regulative system—was proposed also in connection with social conversations over telephone lines.

It found expression in early discourses on the telephone, especially those produced by telephone companies and which first attacked social chat over telephone lines. Chat, so telephone companies and probably most of the people at that time believed, only kept lines busy and conflicted with the idea of their economical use. Therefore, in order to maintain the “efficiency” of the communication system, chat had to be eliminated. Thus, the editorial of the *Telephone Engineer* in April of 1920 (XXIII:4), for instance, regarded proposals to “eliminate such abuse of the telephone privilege” as a “brilliant reform [idea],” though judged it as probably “unworkable.” Although it is obvious that it was motivated partly because of the tendency to continue to think of the telephone in terms of its telegraphic heritage as strictly a tool of business,²⁰² there is also another reason for this. It is possible to regard this episode as a way in which arguments about a communication system attempted to direct and maintain the governability of the social—at least by establishing limits—following the ideals of rationalization. The rise of efficiency discourses during the time resulted in chat appearing as the enemy of well-ordered communication facilities: like politics, it represented the same endless exchange of opinions that only seemed to undermine the most economical use of the system. The influence of Taylorism is thus clearly visible. In a sense, this demonstrated the idea that one could, within certain limits, engender and strengthen efficient social structure by controlling communication. Here, though, the idea was presented in a negative form, as the telephone companies’ objective was to limit or pre-empt unwanted ways of using and organizing the communication network.

Administration of communication was important, but not less important than administration through communication. Communication took center stage in the organization of community, and the technical means of doing this were naturally in the spotlight. This is why the primary responsibility for constructing the communicative domain was given to communications companies, unlike in Europe where telecommunications was a governmental service, which thus formed the vanguard in seeking to tie the community with communicative bounds into a single consistent administrative whole. This, then, implies without doubt the centrality and, at the same time, delicacy of communication. Of course, engendering forms of the social must not be

understood narrowly, here, as in the United States this meant largely strengthening and unifying the national basis of communication and, as is the case here, supervising and preventing unwanted practices from taking place. As this activity, however, took rather prolonged forms which did not change until after World War I when the use of the telephone for social purposes began to be actively encouraged, systematic monitoring of the use of communicative means must be viewed in its politicality: it expressed a concern of the social viewed as a whole. Yet communication did not appear as a major political issue as such, particularly due to the inclination to see it through intrinsically rational, rather than political systems.

The rise of communication as a theoretical and administrative concern must thus be seen against this background. During this period communication became conceived of as a distinct and determinable object of systematic, institutionalized discourse. At the national level, the advent of communication as a separate administrative category was consolidated when interstate telephone and telegraph were included under the regulation of Interstate Commerce Commission in 1910. This marked the moment when telecommunications came under national control and became an established category of national policy. At the theoretical level, one of the first definitions that ascribed a discrete conceptual identity to communication, formulated in 1928 by I.A. Richards, an English literary critic and author, stated that “communication takes place when one mind so acts upon its environment that another mind is influenced, and in that other mind an experience occurs which is like the experience in the first mind, and is caused in part by that experience.”²⁰³ Clearly aiming at universality, the definition rested on an instrumental view of communication, seeing it as an effective social relationship. Here, the concept that extracted a core, an essential substance of communication from all the processes in and within which it occurred, started to get articulated in positive terms. This largely reflected the general professionalization of social scientific disciplines in terms of the natural sciences model, narrowly understood. If communication proved an attractive object to these institutional practices, it was the development of new communication technologies and systems, coupled with advances in scientific research, that was the context for this rising interest.

What gathered these scientific interests and technical means of communication into one distinct issue, was the perspective of control, which was only emphasized during the World War I. In fact, the birth of communication research as an academic discipline has been attributed to the study named *Propaganda Technique in the World War*, written by Harold D. Lasswell in 1927. In this work, the author construed propaganda as one of the most influential forces of modern world: one which welds separate individuals together into an integrated mass.²⁰⁴ It has

been noted in various contexts that the beginning of mass communication research in the 1930s—for which the *Propaganda* book prepared the way—and the break it caused with previous thinking on communication with its emphasis on empirical research, was occasioned by the administrative need for concrete social information.

In this period, the political technologies of communication established, for the first time, the theoretical basis of communication viewed as a structured system. “Communication” constituted an object of ever increasing theoretical interest and became part of the administrative structure both in business and politics. Along with the strengthening of the federal government, Taylorism paved the way for the generalization of the idea of planning at national level, with Herbert Hoover becoming the first president to develop consistent national engineering within a scientific framework.²⁰⁵ Here, communication served as a resource in the general process of rationalization. While almost invariably attention was directed at the effective relationships of communication, interest was focused on formal organization of communication. This is not, however, to imply that communication systems coming to the fore implied a shortcoming, pure and simple, in thinking on the ontology of communication. Here, we do not hold that an original Beginning would have been concealed by this tradition, or that the tradition would have to be destroyed in order to inaugurate a return to this Origin. Instead, every contribution in the tradition forges a relationship to the ontology of communication, albeit from different angles and because of distinct aims. They are inevitably ontological contributions as well, as they conceptualize the question of the limits of communication.

How, then, was the question of the limits of communication addressed in Taylor? Now, it is important to keep in mind that scientific management did not remain a contribution to efficiency discourse but developed into a general conceptual framework, becoming, according to Stephen Waring, the political philosophy of bureaucratic government.²⁰⁶ As a conceptual horizon embraced within the majority of subsequent theories and practices of administrative communication and the administration of communication, it also set limits for thinking about communication within this tradition. It was in and through this perspective that communication began to receive a distinct positive identity which inevitably was related to its converse, namely to what it was not but to which it retained an inherent relationship.

Taylorism distinguished between what was common, that is, objective and defined, as opposed to what was not, that is, to its “other.” A mechanical system was not only a mechanism for producing standardized artifacts, it also introduced identity and consistency into the action in question. In the norm in practice, a whole range of activities was excluded, and could be

approached in negative terms only. Typically, hierarchical systems depend on mechanisms of exclusion. They establish an interior which abolishes and subverts something that can be interpreted as politics, aiming at substituting law for discussion. Yet, at the same time, the other—what is left out, what is abolished and displaced—always remains inside the system that establishes the norm—as a trace that cannot be totally eliminated because it is essential to the functioning of the mechanism of exclusion. Thus subjective opinions and habits, the real enemy of an efficient system, constitute, as the human element, the very precondition of a system. Seen from this perspective, the concept of communication implied here is formed in between the conceptual “whole” of a regimented system, on the one hand, and the actual forms of its realization, on the other, which together determine the field in which it can appear as an object and a means of action.

Without doubt, Taylorism set the framework for “scientific” thinking on management and communication, and certainly on communication as management as well as management of and through communication for years to come. For communication, at least within the tradition outlined here, this implied that it became difficult to separate it from managerial problems: the modern fate of communication was interweaved with the politics of governance. What is more, problems relating to management and control were precisely what allowed communication to appear as a distinct concept and a category of action; it was through discursive chains of management and control that communication was conceptualized—first as a tie between individuals, then as a mechanism of the social itself. In both cases, though, communication served as a method of engendering and organizing the social as a whole and, at the same time, assumed a status of its own in the course of this very process.

After Taylor, thinking on communication was closely connected to the way contemporary capitalism operated. Communication, it is true, would not have been possible in its modern forms without capitalist markets which, generally speaking, defined the domain within which communication became an object and means of systematic thinking. By starting from corporate practices and needs and not from communication as such, Taylor gave this relationship a theoretical basis that permanently intertwined the history of communication with that of capitalism. Although impossible to disentangle from communication, the domain of corporate capitalism, here, determined the terms in which communication was conceptualized.

The Taylor System was not a philosophy of capitalism but rather one that operated within it. While questioning the conditions of productive action it remained firmly inside the horizon of capitalism. What this implied, among other things, was that communication was to be thought

of as fundamentally apolitical and, at the same time, as a mechanism to ensure and maintain this apoliticality. It was based on the aim of doing away with disputes over values, relying on centralization and specialization. Yet it also created problems without being able to solve them. Much of the later development of administrative communication and the administration of communication can be seen as a series of attempts to overcome these problems, linked with the tendency in Taylorism to create conflicts and operations that could not be controlled through the means provided by it. While one school responded to the problems by developing participative methods of management in the Progressive spirit, another school formulated mathematical and mechanical techniques in order to make bureaucratic management more efficient.²⁰⁷ In the succeeding chapters, we will follow largely the latter line, as the former school, in general, accepted centralized power and specialized tasks too, the two main tools of bureaucratic technique that unified the subsequent history of communication until the 1970s.

Taylor formulated a way of talking about communication under growing corporate power and the increasing influence of formal techniques. Communication was something to be regulated by rational means, constituting at the same time the mechanism for this regulation. It is important to notice this “at the same time,” because the mechanisms introduced emerged, ultimately, out of communication itself. Thus there was no conflict between the objects and means of control, no violence done to the intrinsic nature of communication, as it were, as the way it was organized depended on the elementary constitution of communication, on the inevitable parts and processes of it. Contemporary capitalism was, for Taylor, the context that brought out this communicative structure that varied according to the task in question. It constituted the horizon which not only laid bare but, in fact, produced the practices and series of action Taylor sought to systematize.

It is perhaps possible to consider the cybernetics of Norbert Wiener a kind of culmination of this development, as it is here that communication as a law or a method was given probably its most resolute expression and in which it at the same time is linked with a new, computer-controlled horizon. Let me first, however, elaborate in the next chapter on the component position of the telephone system with respect to the growth of centrally directed organizations. For they were the reference point on which the studies of Taylor and the technocrats—as part of the general thinking which took as its subject the changing conditions of social operations—were focused and which thus constituted the terrain within which communication became to be thought about. At the same time they provided the context in and with regard to which it was only natural for Wiener to formulate his theoretical views, which can be seen as a

modernization of the model built on and around the idea of a center to correspond to the circumstances and conceptual possibilities of a period of automated technology.

4.2. Industrial Communication

It is possible to conceive of the discontinuity caused by and in telephonic communicability from two distinct perspectives. On the one hand, the telephone can be seen as a means for horizontal distribution of information. It was customary, especially in the Progressive tradition, to view horizontal communication as a force for unifying the nation. Within this tradition, scientific methods and knowledge attempted to overcome social factionalism as well as conflicts and disputes, and it was the task of communication and education to accomplish this general social harmonization. Yet on the other hand, the telephone—if not the technology, at least the model of the system it provided—can be regarded as closely connected to centrally directed hierarchies. In this view, communication imposed law, as opposed to education, as the method of politics. As part of the same process, the nervous system and the concept of center it included were consolidated in a system that encompassed the whole of society. If society did not, however, become a huge nervous system with its diverse functions and processes linked together and controlled from a single executive center, the idea of this kind of system certainly evoked enthusiasm, mobilizing plenty of energy, and resulted in some very concrete arrangements, practices, and effects. Not only had the idea of a mechanically controlled whole real consequences for various schemes and procedures, but it also, and more importantly, provided, to a great extent a conceptual perspective in which these schemes could be articulated in the first place, and in this way forged the limits within which the social was understood.

Even though both perspectives on the telephone appeared here as distinct from each other, they should not be thought of as logically or temporally separate but rather as views that are aggregated and arranged, according to their own laws, around an event that is being investigated at any given time. We can define the first case, in which the telephone is seen as a means of horizontal communication, in terms of a relationship, the function and parties of which are not given and the formal occurrence of which is not determined. Instead, in the second case, in which the telephone was viewed as an integral part of centrally directed hierarchies, its function and parties are determined by the system. A communicative relationship here is a relationship internal to the system, and its functional nature is thus prestructured as regards its formal characteristics.

In both cases communication was conceived of as a more or less coherent and closed process. It was thought of in and as a conceptual whole. There was a change, though, in the way the whole was viewed as we move from the telegraph to the telephone and related discursive forms. Whereas atomistic individuals defined the earlier viewpoint, and communication was seen as an addition between already established identities, now the viewpoint moved from individuals to the broader social group they belonged to, and communication was more and more regarded as a factor that maintains the integrity of the group or system. It was the social system, that now constituted the basis of thinking about communication, and although communication was a precondition of this system, it became systematically regarded as only a means to sustain the unity of the system.

This is why the hierarchical aspect is the one that has been emphasized here. Since the beginning of the century, and alongside scientific projects of rationalization and optimization, new forms and systems of communication, with the telephone being without doubt the most important one, have been thought about within the bounds of a rational system. But it is significant that the telephone, as a system, played an integral part in bringing about the conceptual form of this system. Therefore the history of the telephone is inherently tied to the development of hierarchically organized and rationally controlled systems, although its history cannot certainly be reduced to just this development.

Machines of Speech

Scientific management standardized basic units and courses of work and reorganized a given functional whole according to the most economic sequence of actions. In doing this, it anticipated and recorded all possible variations and compressed them into a set of necessary rules. This led to a hierarchical system wherein communicative action was to be controlled by a predetermined method. It was here that a “rational” center, replacing the “subjective” manager in a conventional organization, emerged as a founding *modus operandi*. In Taylor’s theory, all managerial power was concentrated on this single locus, the superintendent’s office, from which executive work was planned, put into effect, and supervised. In a manner similar to the way the brain directs the movements of the hand, the thinking organ of the organization, it was assumed, told the workers the exact way to do their job. “All possible brain work,” Taylor wrote “should be removed from the shop and concentrated in the planning or laying out department.”²⁰⁸ The cornerstone of this scheme was a rational, repeatable program which

identified what was essential from the apparent diversity and multiplicity and defined a system of communication for the instructions to be transmitted.

As systemwide actions were controlled from the center, it was telecommunication, here that made, to an extent, control possible, as Taylor describes in his book *The Principles of Scientific Management*:

“In this office [of the superintendent] every laborer’s work was planned out well in advance, and the workmen were all moved from place to place by the clerks with elaborate diagrams or maps of the yard before them, very much as chessmen are moved on a chess-board, a telephone and messenger system having been installed for this purpose.”²⁰⁹

If scientific management was in the final analysis a matter of communication, at least in that it was meaningful only in a communicative context, the telephone system, for one thing, was the means by which it was carried out. Insofar as the functional whole appeared to be a communication machine, the telephone was an integral part of the control system that this whole depended on. It was this formal structure, itself an outcome of the organizing role of communication, which systematized the functional performance of a given system. This is, at the same time, why the necessary communication systems cannot be conceived only as auxiliary instruments external to work practices but instead as what made the system possible as a organized whole in the first place.

From the background to the history of the idea of a hierarchical system, a whole series of diverse, irreducible, and discontinuous historical constructions can be found, especially as implemented in different military and political systems since the time of Frederick the Great of Prussia. Yet, it was the invention and proliferation of machines, coupled with the scientific method, that laid the ground for a hierarchy as a powerful mechanism for distinguishing between “objective” and “customary” ways of organizational performance in its modern sense. The hierarchy manifested the scientific method’s principle, which Taylor, for his part, exploited and applied, of substituting subjective decisions by an objective rule. Hierarchical architecture put formal criteria in the place of changeable practices based on custom and experience, and in this respect can be considered as a kind of counterpart, application, or embodiment of the scientific method in the social domain. Yet, it can be argued, the hierarchy appropriated this method not for truth but rather for efficiency: whereas scientific method separated what was incidental and random from the essential and unvarying, and thus forged a relationship to the truth, as it were, the hierarchy created a realm of efficiency in the midst of

diverse and incompatible social practices. Insofar as efficiency sought to shed light on the underlying “laws” of the given process, however, it cannot be separated from ontological questions in any straightforward manner. In both, the necessary and general was derived from what was contingent and arbitrary by the constraints imposed by a rational method. If scientific management apparently dealt only with efficiency, then it did so with a view to truth.

On the other hand, and on a different register, insofar as the hierarchy proved to be an influential social ordering principle as well as a useful conceptual tool in thought about modern societies in general, as Max Weber demonstrated in his contribution on the proliferation of bureaucratic forms of organization, it was to a great extent the network structure of the railways and the telegraph systems that prepared the ground for the hierarchy. This is because the chaining together of series of actions with enabling physical structures into a consistent operational whole made it possible to organize interrelationships between events in an integrated way. The idea of a planning and directing center took shape notably in early telecommunication systems, as in the municipal telegraph systems, the network nature of which enabled uniform, systemwide operational control with separate hierarchical levels of regulation. This is undoubtable the context, too, that must be seen as the point of departure for Taylor as he generalized from prevailing institutional practices and arrangements using scientific method as his guiding canon, the idea of the center with multiple levels of control into a general managerial principle. Therefore it is possible to see Taylorism as a powerful combination of scientific method and a centrally directed hierarchy. Through the influence of his theory, coupled with the growing dominance of big corporations, the internal functioning of which the former aimed to enhance, Taylor contributed to telecommunication’s entrenchment as the organizing mechanism of the industrial order predicated on the concept of vertical lines of communication in hierarchical organizations. Because improved communication systems—especially the telephone system which allowed instant, two-way communication—figured as the key factors in the transformation of the whole communication economy in the period in question, they must also be viewed as the forces through which hierarchy as a social category should be analysed.

The telephone created a basis for more and more accurately determined needs of governance in modern society by permeating the communal sphere and becoming a mechanism—as part of the increasing professionalization of social organizations—by means of which this sphere could be controlled. Namely, it enabled systematic and institutionalized gathering and distribution of information and quick reaction to phenomena taking place within the range of its operations. Thus it became increasingly a part of daily operations in the private sector as

well as in many fields of public administration. The Weather Bureau introduced it swiftly into its operations as well as many other public bureaucracies like the coast guard, fire department, and the police.²¹⁰ In this way, the telephone divided society into distinct, although interlinked and partly overlapping sectors, each of which administered its own areas of responsibility on the basis of the same principle of instant two-way exchange of information—the gathering of information from the field and the transmission of instructions from the center within the framework of a functional, hierarchically arranged whole.

In police communication systems in 1910, this two-way communication meant that “the patrolman reports to the desk sergeant from the telephone box on his beat, and then receives any special directions which the chief wishes to give.”²¹¹ This principle, with the operational advantages of efficiency and coordination it enabled, also provided a setting for the construction of huge national systems in an age of big conglomerates. Though centric systems were introduced on a large scale in the era of the telegraph, it was not until the advent of the telephone with its superior properties that the foundation for truly professionally organized, nationwide systems was laid. The telephone systems of the government and the War Department were among the largest private exchanges in the world,²¹² and it was easy to perceive them—being contemporaries of the consolidation movement that created monopolies and trusts—as having mainly a centralizing effect on governance and communication.²¹³ However, as with commercial organizations, they supported simultaneously both centralizing and decentralizing processes in the functioning of these public institutions: if the telephone system made it possible to centralize power at single point, it also allowed decentralization and differentiation of operations to become possible and, from the point of view of a centrally organized system, often rewarding as well. Thus big communication systems becoming established as founding institutions of social activity does not lead directly to centralization of social power, because the center always decentralizes action as well. The center can therefore never monopolize the sphere of action of which it is a part. But this is not all, for the center also cannot cease to differentiate, which is exactly what positions the center as a center. In other words, the differentiation which is possible because of the center, and the results of which it counts within its sphere, is not external to its inherent “nature,” as it is this very differentiation and separation which is its basis and defines what it is: if the center engenders differentiation, the possibility of becoming independent of this action creates a prerequisite for the existence of the center. This is why the interlinked movements of centralization and decentralization always need and feed off each other, whilst still in conflict with each other.

Yet, by enabling even more effective control of very complex processes and series of action from a single point, compared to the telegraph, the telephone necessitated a center for both institutional and operational reasons and from this angle was connected more closely to hierarchical power structures than to decentralization. It was conceived, like the telegraph had been, still largely through the analogy of the nervous system: the telephone took the shape of the nervous system of a modern industrial society,²¹⁴ its metallic nerve cells organizing the social body into a united organism capable of controlling itself. Thus Frank Jewett, AT&T's Vice President and the President of Bell Telephone Laboratories, was able to express the idea in 1936 that when there are no longer economic barriers to full usage of telephone lines, "society for the first time -- will -- have a complete nervous system."²¹⁵ Against this background, it is possible to see the telephone as the nervous system of the social organism in having highlighted the concept of the center at least in three different respects:

1) It created centers in local and regional purpose-built systems following the example of municipal telegraph implemented in major metropolitan areas. Thus, the police communication system based on the telephone that provided immediate connection between police headquarters and the patrolman on the beat as well as between different departments and units, served as "the central nervous system of a highly integrated organism for the suppression and prevention of crime."²¹⁶ Similarly, the teletypewriter system, originated somewhere in between telegraph and telephone technology, which enabled almost instantaneous transmission of messages to numerous different places simultaneously, was introduced widely in business for it helped to rapidly coordinate the activities of factories, warehouses, and sales offices in different cities. But it also constituted the foundation for the extensive eight-state alarm system that provided the means for the police to coordinate their widely scattered State Police posts, municipal police departments and state Motor Vehicle and Criminal Identification bureaus.²¹⁷

2) It strengthened the notion of the center as an operational necessity for the system as whole, because in contrast to the telegraph, the telephone system required central offices and switches in order to interconnect large numbers of telephone devices.²¹⁸ Thus, even the architectural structure of the telephone system necessitated a more conspicuous center than the telegraph had. Whereas the telegraph interconnected locations, it was the mission of the telephone from the beginning to link people together, a capability made feasible by the central exchange, "the solar plexus of the telephone body,"²¹⁹ as Alexander Graham Bell had envisioned already in a letter discussing the "grand system" written in 1878:

“In a similar manner [as in the network of gas-pipes and water-pipes], it is conceivable that cables of telephone wires could be laid underground, or suspended overhead, communicating by branch wires with private dwellings, country houses, shops, manufactories, &c., &c., uniting them through the main cable with a central office where the wire could be connected as desired, establishing direct communication between any two places in the city. -- I believe in the future wires will unite the head offices of the Telephone Company in different cities, and a man in one part of the country may communicate by word of mouth with another in a different place.”²²⁰

The telephone network was created in the division between the “route lines” (later termed “trunk lines”), on the one hand, and the “distribution lines,” on the other. Trunk lines interconnected major centers, whereas distribution lines branched out from each center over a given area. In practice, these centers appeared to users chiefly as the voice of telephone operators, as they—primarily young women—manually connected incoming calls to the numbers desired. This was why “the Central” became almost synonymous with the telephone for callers in the early twentieth century America. It gave a conceptual form to the coherent nature of the telephone system in a way that was in harmony with both the contemporary sentiment searching for the possibility of scientific direction of society and the still effective organismic thinking. Thus the telephone system makes up a “single unit from end to end,” being “a single entity, almost a living organism which, if disturbed at one point, reacts throughout.”²²¹

3) The telephone enabled an accelerating concentration of private power and an unparalleled accumulation of financial capital which created new conditions for social life. For this reason this period was also called “the Age of the Telephone.”²²² It was not an invention like other, only superficially similar objects of use, because, in the words of Casson, “it is nothing less than the high-speed tool of civilization, gearing up the whole mechanism to more effective social service. *It is the symbol of national efficiency and coöperation.*”²²³ It was established as a condition of modern social order alongside and related to new ideas in science and commerce,²²⁴ and these conditions seemed to assume the form of a strongly centralizing movement. It was Taylor’s idea to combine this presence of a center with scientific method as a way of rationalizing the functioning of industrial organization in order to make production more efficient and to recast the institutional structure of society to meet the new *de facto* standards of performance introduced by technological development.

The significance of the early local systems cannot be underestimated, for it was essentially in relation to these diverse systems that the model of organized communication was formulated and subsequently used more generally. In the United States Army, for example, three general classes of telephone system were operational in 1911. First, there was a system enabling instantaneous communication between all parts of an army post, analogous to a good regional telephone service. A second class of military communication system was designed to carry all communications relating to sea-coast defense, and the third was a system enabling communication between troops in the field and the command post or base of supplies.²²⁵ The functional structure of the military communication systems naturally followed the same order of predetermined hierarchical relationships that was the basis of the military institution. As some of the first and foremost examples to exploit the centered communicational arrangement, they were to prepare the way for a general model for organized communication in large establishments outside the military. Yet, they were not the only source and setting for a rationally ordered communication system.

Thus, the New York Police Bureau, for instance, used at least three different telephone communications systems as early as 1909, the aggregate effect of which was so considerable that it constituted a model to be followed. First, there were seven switchboards in New York “tied to and centralized upon the switchboard at the Manhattan headquarters --. Each switchboard is localized in its own borough, radiating to the courts, morgues, hospitals, humane and animal societies, police precincts, etc. The connections of each switchboard are brought direct to the central switchboard at police headquarters, Manhattan.”²²⁶ Thus, “while the central headquarters in Manhattan can connect with any precinct in any borough, -- no local switchboard can communicate with a precinct outside of its own borough without going through the Manhattan switchboard.”²²⁷ This is how the communication structure of the Police Bureau was centralized on one location which organized the flows of interaction between the different parts and units of the system. Secondly, in addition to and independently from this arrangement, there was a signal box system, consisting of 900 lines and 38 switchboards. It ran from precinct posts to local precinct houses only, and was used by patrolling policemen, in addition to emergency situations, to make their calls required, “once an hour,” to their local stations. The increase in this kind of controlled repetitive routine was part of the professionalization of public bureaucracies in this period. Finally, there was a system of 43 leased lines running to the homes of administration and executive staffs so that should an emergency arise, “the executive staff would be hauled out of bed the first thing and told what to do and where to do it, while dressing.”²²⁸

A combined police telephone and signal system enabled the chief of police “to get in touch with patrolmen in any section of the city in an emergency, and, further, makes it possible for the patrolmen to send special information to headquarters and to record it there --.”²²⁹ These communication systems, complementing each other, indicated the growing importance of creating and organizing communication practices according to an institutionally executed, general scheme, and provided a feasible model for doing this for a number of social assemblages outside the field of policing. This model came down essentially to a predetermined communications relationship between the center and the terminals radiating from it, in which the latter reported locally gathered information to the center, which, after having processed the incoming information, sent instructions back to the terminal branches. One scheme of this kind was the Associated Press news service that was organized by telephone. Here information, gathered first all over the country by local reporters and news offices, was sent to the Associated Press head office in New York from which, after filtering and editing, it was sent to subscribing members nationwide by telephone in one call.²³⁰ Here, the Taylorian division between “thinking” and “doing” found its expression again, as the center had no first hand experience of what was going on, and the communication line terminals had no final discretion concerning decisions to be made.

Thus it is clear that increasing use of the new systems of communication was inherently linked to prevailing social practices and discourses that, taken together, constituted, generally speaking, a framework for their reception and utilization. But the effective relationships ran also in the other direction, as we have seen, with technical structures being conducive to the formation of conceptual approaches. Local and regional communication systems, then, must be seen as having been created in the midst of diverse forces, and as always retaining an inherent relationship to current discursive practices regarding the technicization of communication. Therefore, although these communication systems reflected the influence of Taylorism to varying degrees, at the same time they set in motion practices that reinterpreted classic scientific management in the light of local demands. Nevertheless, Taylorism undeniably formed the perspective for the telephone seen as a political technology.

With the rise of Taylorism, the telephone was quickly harnessed to the service of rationalization, although, as mentioned above, it has been pointed out that the telephone did not play a significant role in the emerging formal communication system.²³¹ Yet its role should not be ignored either, as it clearly contributed to techniques exploited in scientific management and efficiency engineering. This was perhaps most instantly recognizable in train dispatching. The telegraph had already established a practice of using telecommunications to coordinate the

movements of the trains. Now, the telephone achieved the same ends more efficiently: “the use of the telephone is so quick in every way and so much more flexible that the dispatcher gets far more detailed information of what each train is doing than was possible by the use of the telegraph.” It allowed more personal conversations, it was quick to use, and the weather did not make any difference to its operational dependability. But more importantly, it enabled detailed control not only over the movements of trains, but also over what engine drivers were actually doing at any given moment: “with the telephone it is possible to arrange apparatus so that the superintendent can at any time supervise the actual work of train handling.”²³² This was a decisive improvement in the overall coordination of such vast and complex organizational structures as the train companies were. Of course, the use of the telephone in personnel management did not remain confined to the train companies. Thus, “the telephone makes [a telephone] official efficient, reliable, painstaking and ever prompt in the transaction of the business brought before him.”²³³ It provided a means to bind the workforce into part of a great industrial machinery.

The telephone played a part in industrial intercommunication systems too. This kind of system commonly consisted of “a series of jacks, which are numbered to correspond with the different departments of the plant. A plug, hung on a conducting cord, is inserted into the desired jack and the pressing of a button immediately rings the signal bell in the corresponding department. -- Every department in the plant may be reached by simply transferring the plug, without removing the receiver from the ear.”²³⁴ With the automation of telephony, its industrial role increased both in terms of technical solutions and the conceptual visions it supported. The automatic switchboard, it has been noted, was in a sense the prototype or conceptual model for the automatic factory that came to represent the whole industrial order in many cultural products of the 1930s, but which did not get a serious chance to be realized until 1950 alongside the rise of the so called system sciences.²³⁵

Just as the brain was conceived to interpret signals sent to it by the central nervous system, it was the telephone exchange in which the “brain” of the telephone network was embodied.²³⁶ Rudimentary exchanges were already in use in 1878, but they were not properly established until the technology developed in the next decade, when the first automatic switchboard was patented.²³⁷ This made it possible to dispense with manual exchanges, for now callers could contact numbers desired without the help of “Central.” The automated telephone system encouraged more spontaneous and frequent use, which eventually established the telephone as a standard mode of communication in the industrial era. It is not incorrect to propose that in most of the organizations of the period, it was management which became a switchboard. This

is partly because management was commonly seen as representing the thinking agency in an organization, as opposed to the doing agency, not unlike the brain in the nervous system. In addition to this, however, management became a switchboard because it was the point in and through which key connections were made and which established the internal pattern for the communication structure. Thus, it engendered the directions and routes of formal communication relationships between central and middle management and executive departments as well as the detailed ranks and orders of interpersonal lines of communication. What management did was to organize communication within a hierarchical structure, yet it was already, of course, itself organized by and through the communication that continuously rearranged the social order, and with it, the corporate institution.

The Taylor System can be seen as the conceptual culmination of the development in which social relations and processes were enshrined in a general law or method which was a precondition for the intelligent control of society. Unlike in previous cases, this law was dynamic and more sensitive to relationships between its elements and to changes to them and was not meant to fix them definitely in an immutable structure. The concept of a system coupled with the requirement for a central planning agency encapsulated expectations and requirements relating to adequate governance of how an assemblage consisting of diverse and constantly changing elements functioned. It opened up a field wherein it became possible to outline the essence of modern society in a situation where old concepts did not seem to work any longer and the new ones were not yet established.

This conceptual alliance between the system and the center lent itself to thinking of automation as the general, uniting force, thus addressing this relationship in terms drawn from the technological register. Automation supported the idea of the system having an intrinsic nature, on the one hand, but acknowledged also the need for regulating principle, on the other, and incorporated both into a consistent whole. Yet, before automation was introduced on a larger scale, and before cybernetics capitalized on the conceptual content of it, the idea had already been articulated in connection with the regulation of social processes. Hence Wallace Donham, for instance, expressed in 1932 the idea that social control operations should be based on automated routines. He suggested creation of a mechanism “which will absorb the shocks [in society’s adaptation to the environment] automatically --.”²³⁸ This is where, perhaps for the first time in this connection, the idea occurs of bringing the center and the system together through controlled and repeated routines, as exemplified in an automatic mechanism. This brought out the routine-based nature of automation, and in so doing illustrated at the same time

the potential benefits of large-scale routinization of social processes within a controlled framework.

The notion of the center got firmly entrenched in social life after the mobilization experiences during the world wars and the related special arrangements. Despite the fact that temporary administrative arrangements, set up for the needs of the wars, which strengthened the position of a central power, were not sustained after the wars, the concept of center got strengthened as a cultural fact and increasingly formed a point of departure for the structural organization of many associations functioning in different social fields: the coordinating center and the sectional units grouped under it began to constitute the model on which especially commercial and political organizations depended.

The center is not to be understood, however, only in its structural sense as part of an organizational model, since it was associated with a whole set of practices that permeated the social order. This was related to a process in which bureaucratic control, having taken shape in the late 19th century, brought the traditionally decentralized and predominantly locally administered American society into its sphere. During the course of this, social relations became rationalized through professional national bureaucracies (the army, the tax authorities, the police and fire departments, for example), although the role of public bureaucracies remained limited in comparison to that in many European nation states. In any case, the concept of a rational and efficient whole, which took a distinct shape from the operational models provided by communication systems, largely provided the basis for discourses and conceptual forms applied to thought on society and a starting point for the gradual but resolute process of quantification of communication.

This viewpoint allows us to go one step further and delineate schematically the relationship between centralized power and the formalization of communication: the former can be conceived of as seeking the optimal elimination of noise (multiplicity) by rationalization of innate system functionality, as it were. This aim, reflecting and using scientific method, constituted the conceptual and institutional terrain in which communication, both as signs and signals, began to be formalized. Though communication is not, of course, reducible to the former alone, for it has its own local histories, thought about it was anyway moving into contexts in which scientific method figured as a predominating measure of the truth of it. Communication was exposed to the objective norm in order to eliminate anything merely incidental to it and to reveal its essential core: what was of interest was only its hidden, necessary logic as knowledge of this was assumed to give access to the desired organizational

rearrangements, thus improving general system functionality. But the center was one of the most outstanding outcomes of organizational rearrangement during the period in question. Therefore it is in no way independent of the methodological explanation of communication. On the contrary, whereas professionalization of scientific practices determined the true nature of communication by separating noise from it, it was precisely the center which carried out this separation in terms of the social, that is, in terms of improved efficiency. Another way to describe this relationship is to say that as institutional requirements necessitated a center, it was the systematic examination and regulation of communication—the task imposed by the method as encapsulated by the center—that called for the institutional reform. Thus, while scientific method forged a relationship with the truth of communication, the center built one with the efficiency of communication, because for the latter the separation of what was random from what was necessary was always more a question of control rather of knowledge, although these aspects, it is true, cannot be disentangled in a clear-cut way from each other.

Telephonic Constellation

We have attempted to show how a new relationship was gradually forged between “communication” (as both a concept and a process) and “telecommunication” (as the set of interrelationships between distinct technologies, institutions, and discourses) during the period from about the turn of the century until World War II. It can be seen that two developments especially came to the fore and opened up a new relationship to communicability. First, scientific management became the political technology of bureaucracy, and secondly, the telephone was established as a precondition of modern community, being the very embodiment of advanced communication. Together they laid the foundation for a change or displacement that occurred in the communicative constellation. Let us now take a closer look at how this constellation, as an alliance between technologies, discourses, and practices, unified diverse communicative events under the same whole: a whole that was serial or mechanical in nature, on the one hand, without being, however, independent of or preceding these events, on the other.

Chester I. Barnard, in his seminal book *The Functions of the Executive* published in 1938, developed the idea that all successful organizations depended on cooperation, and that it was the task of managers to create it through communication. He subordinated communication to a social whole whose function it became,²³⁹ hence operating within the tradition in which communication had been conceived as both an object and a tool of administration. Yet he

systematically promoted the constitutive characteristic of intercommunication as part of a theory of formal organization. Barnard explicitly described the system of communication as an essential part of any organization: “communication technique,” according to him, “shapes the form of and the internal economy of organization.”²⁴⁰ Moreover, the system of communication “is a primary or essential continuing problem of a formal organization. Every other practical question of effectiveness or efficiency—that is, of the factors of survival—depends upon it.”²⁴¹ He made communication an explicit object of analysis during a time when its quintessential role in organizations was realized but not yet generally studied, contributing thus not only to the theoretical understanding of communication but also to the institutionalization of the theory of organization. “In an exhaustive theory of organization,” he stated, “communication would occupy a central place, because the structure, extensiveness, and scope of organization are almost entirely determined by communication techniques.”²⁴² Barnard thus made communication the focal point of theories aimed at understanding the functioning and dynamics of modern organizations.

As communication became conceptualized, the formal, hierarchical structure of communication was particularly emphasized, as a large part of communication in organizations was informal.²⁴³ Accordingly, it was the task of the manager to establish an objective hierarchy of lines of communication out of a sea of informal, spontaneous, and habitual communicative relationships. This required channels of communication to be defined, formal channels between the manager and every member of the organization to be determined, and conflicting communication be avoided by establishing procedures concerning the use of the channels defined. This idea of a formal or objective ordering of communication would not, of course, have been possible without the contribution of Taylorism, from which it received its theoretical grounds. As important as the goal, however, was the idea of the whole within which this ordering took place, and this whole resembled closely the nervous system, with the manager being the center through which all relevant information flowed. As in the nervous system, it was the function of this center of communication “to translate incoming communications -- into outgoing communications --.”²⁴⁴ Thus: “the functions with which we are concerned are like those of the nervous system, including the brain, in relation to the rest of the body. It exists to maintain the bodily system by directing those actions which are necessary more effectively to adjust to the environment, but it can hardly be said to manage the body, a large part of whose functions are independent of it and upon which it in turn depends.”²⁴⁵ The primary executive function, according to Barnard, remained “the establishment and maintenance of the system of communication.”²⁴⁶ Through Barnard, the common view that the structure of communication of a given system could be used as a means for advancing its efficiency was given theoretical

legitimacy. Moreover, the fact that certain communication systems had been taken as conceptual models on the basis of which complex social and industrial systems could be both understood and directed appeared to gain more theoretical justification.

Now, it would surely be an overstatement to attribute some kind of privileged status to these communication systems with respect to a rationalization process that was not limited to the business realm. Yet there has always been a connection between these kinds of systems and the existence of and as a community. Comments such as “the civilization of a country seems to advance in proportion to the development and extension of its communication systems,” as a commentator remarked in 1929,²⁴⁷ were indicative of this strongly felt relationship. Therefore it is not far-fetched to assume that communication systems were a formative part of the great rationalization movement, especially as it was at the local level where the main focus of the reform lay.²⁴⁸ Thus they can be said to have prepared the ground, for their part, for generalization of the substitution of a technique for endless negotiation through the gradual institutionalization, growing, and merging of diverse local systems into a more or less unified view of an organized whole. These systems, combined with the rational planning discourse and available communications technology, formed an essential part of the history of the formalization of communication and its generalization within a common horizon—a line of development the organizing of which was associated rightly with the seminal contribution of Taylor. The New Deal period embodied this generalization of the belief in rational planning on a national scale with its emphasis on the politically neutral science of the administrative process.²⁴⁹ In line with experience of the New Deal, the 1934 Communications Act shaped the institutional framework for national telecommunication regulation in the form of Federal Communications Commission. Now all communications problems could be referred to a single office which divided them into three separate categories; broadcasting, telegraph, and telephone. Moreover, telecommunications policy became an institutionalized concern of American politics.

It is true, of course, that the tendency toward increasing rationalization by way of centralized decision making cannot be reduced to a few managerial tenets, for these ideas were rather representations of a larger conceptual state of ferment wherein social order was articulated as a result of administrative reorganization. It was during this process also that conceptualizations concerning society itself became reformulated. Whereas in the late nineteenth century it was common to understand society in terms of a biological organism, it soon became evident that, with the drastic changes in conditions of living, theories concerning the underlying nature of society needed to be reshaped. Though the analogy of a nervous system remained in use, it was

now conceived of in an altered, more technological context. The network of communicative contacts in which the causes and consequences of human action formed complex institutional structures and unexpected and impersonal chains of effect undermined the idea of a natural, harmonious social order. Instead it suggested a vision of an intricate system, the mutually interacting parts of which formed an efficiently functioning machine. It was communication between the component parts that formed a system out of an apparently heterogeneous whole, or, as the political scientist and philosopher Arthur Bentley put it in 1908, “in living beings there is no function that is not systematized.”²⁵⁰ It was in this system, or rather machine, that the social organism assumed its new, industrial identity.

As it became evident that the parts and processes of society were linked together like the components of a machine, biological analogies were gradually replaced by mechanical ones, or at least were interpreted in the light of them. The image of society as an enormous, “highly integrated machine” or “mechanism”²⁵¹ made possible a new understanding of communication as a hierarchically organized system rather than as an apparently chaotic multiplicity of “organically” developing relationships. In this way, distinct communicative phenomena, even though superficially independent of each other, could be understood as ultimately forming a dynamic whole. Hence, for instance, according to the abovementioned *Technocracy Study Course*, “the general function of communications (–)—mail, telegraph, telephone, and radio—automatically constitutes a functional unit.”²⁵² Thought on social order became established in a framework in which this order’s previous unstructuration was replaced by a highly organized whole. In it, each event and instance had its own place and function: the concept of the system became the absolute measure of the organization in late nineteenth and early twentieth century American society.²⁵³ The ultimate structuring principle of the world was now recognized as hierarchical through the intervention of technical systems; and no pains were spared to determine the composition of this hierarchy, to standardize the elements belonging to it, and to designate the inherent place of each element and establish their interrelationships. Social relations were thus systematized in a functional system of hierarchically organized components.

Systemicity was not only a neutral, intrinsic principle of the structure of society, but also something desirable in itself. Mechanisms that increased systemicity by multiplying interconnections between components of the system was seen as contributing to the functionality of the whole. Improvement of communications was naturally the key goal, the significance of which had become evident by the 1920s. Rexford Tugwell, for instance, a social planner who acquired fame particularly during the New Deal, regarded communication, against

this background, along with transportation and exchange markets, as the nerve and coordinating center of the economic organism. As it develops, “the organism functions in a more complete fashion, more intelligibly, more as a whole. -- When, then, we link a continent with telegraphy and especially telephony -- we quicken the nervous system.”²⁵⁴ Insofar as division of labor, specialization of function, standardization of technique, and rationalization of operations became the basis for industrial production,²⁵⁵ communication became a system that was definable in mechanistic rather than biological terms and prepared the ground for models inspired by the mechanical automaton.

If the functioning of society as a complex whole was not satisfactorily describable as a natural evolutionary process, then the biological analogy turned out to be at least equally problematic. The crux of this changed conception resided in the insight that society had an intrinsic functionality at a systemic level. It was believed that there was more than one social coordination point and that the harmonious functioning of society was based on some kind of logic of cooperation at a systemic level. This underlined the need for an overall centralized control over interlinked parts and processes, which society, as opposed to the biological body, did not possess. The biological analogy proved unsatisfactory because at the time there was no “brain for our social organism.”²⁵⁶ Machinery with adequate connections existed, but the social body seemed not to have a central organ corresponding to the physical facilities in order for it to be feasibly likened to a biological body. It was, however, exactly this kind of coordinating organ that was desired, for the social organism “must have a mind.”²⁵⁷ The idea of a center implied an unprecedented importance in the operational position of, in the words of the abovementioned Wallace Donham, a “central thinking agency” as it would “anticipate the slow trial and error of organic evolution.”²⁵⁸ In this line of thinking, the notion of a rational center was strengthened, but was now seen as an agency for maintaining the “intrinsic” functionality of the system. The center did not itself generate this system functionality but could only use precepts based on social laws which social research would discover over time. Hence, the analogy of a machine introduced the idea of system rationality into concepts of society in which the theme of a coordinating center figured ever more strongly.

The roots of this concept are not remote from the field studied by the quoted writers, for they can, in the main, be traced back to centralized systems and various related discursive practices based on telecommunications. The telephone as the main form of electric communication seemed to assume a special role in this connection, because it provided an operational model not only for modern communication but also for industrial institutions. These dimensions were, of course, inherently intertwined: industrial society requires and produces communicative

practices corresponding its needs and communication in its modern forms provides the basis for the prevailing social order. What is especially noteworthy is that communication as the precondition of industrial production becomes at the same time a prerequisite for thinking about society, because when speaking about contemporary societies we have to presuppose the role of the highly developed communication systems that make these societies possible. Modern communication, in other words social life based more and more on technical communication systems and on relationships created by them, now constitutes a necessary precondition for thinking about community. And it is exactly from the sphere of communication that not only the technical means but also largely the still extant conceptual forms for thinking about this relationship have emerged.

Thus according to Frank Jewett, for example, the network of various communication channels constitutes, in practice, one machine. This was an idea that was generalized in cybernetic thought through an analogy combining the concept of the nervous system with the computing machine:

“The communication channels which interconnect the switchboards within a great metropolitan area, and the long distance lines which criss-cross the country and form the interconnecting network between cities, towns and hamlets, are in the last analysis merely the extended wires which link together parts of a single switching machine. -- they are functionally no different in their purpose from many of the wires which connect together different parts of a switchboard within the same central office.”²⁵⁹

While the idea of communication as a machine created a platform for planning and formalization experiments and gradual consolidation of certain modes of creating organization out of disorganization, what constituted the whole within which this all took place was, as shown, none other than the nervous system. “[Thousands of central office switchboards] are merely parts of a single complex organism --,”²⁶⁰ constituting the “nervous system of the whole social structure.”²⁶¹ It gave a common name to the diverse systems and processes of organization, as well as the structure through which the organization could be realized. Hence, it was the form of the organization, that is, a conceptual means for conceiving the field of relationships as a whole, as well as what was organized in the course of this that was this whole itself. The nervous system, thus, served as both the means and the objective of these projects which gave rise to the organized system of communication.

Politics as a formalization of social functions emerged from the possibility of thinking about modern western community through the machine metaphor. In this metaphor thinking about commonality was expressed as a demand for adjustment and regulation rather than as a matter of negotiation around different interests. It is important to notice that the notion of communication as a set of rules concerning the functioning of a whole, as proposed by the technocrats and later elaborated on by the cyberneticians, was firmly entrenched in the thinking that characterizes the history of communication as the objective and means of administration. It suffices to quote a renowned telecommunication theorist in late fifties:

“Communication is a social function. -- the whole, the organization or organism, possesses a structure which is describable as a set of *rules*, and this structure, the rules, may remain unchanged as the individual members or elements are changed. By the possession of this structure the whole organization may be better adapted or better fitted for some goal-seeking activity.”²⁶²

The machine metaphor becoming established through efficiency rhetoric and especially through scientific management did not appear in contemporary discourses as a distinct conceptual construction but rather as a result of changes in the structure of production in an industrializing society and as a response to the problems of such a society. It formed, hence, the boundary within which issues pertaining to reorganization of the social were conceptualized and means of achieving it were addressed.

The machine-likeness of communication was reflected in the concept of a communicative whole that consisted of interconnected parts differing functionally from each other. This manifested itself after Taylor mainly in the separation of planning from doing, with both of these functions setting their own rules and practices for communication, the communicative relationship between them consisting largely of instructions from the former domain to the latter one. This arrangement established formal and unequivocal chains of command and by so doing set free the potential for more efficient functioning of the whole. It emphasized the functional separation of action as the basis of communication: a whole should be as adapted to its purpose and program as possible. Division of tasks was implemented through the way the mechanical assemblage standardized goals, specialized roles, routinized practices, and regularized communication.

New means of communication, coupled with the related discourses, changed the tasks and functions of communicative practices into part of a larger communicative whole, with social and

institutional actors influencing the way this whole was continuously reconstructed. After Taylor had separated thinking from doing, it became clear during the development of modern management that their functional relationship was far more complicated than he had given occasion to think. This understanding of the complexity of an organization was interweaved with the vision provided by the analogy of the nervous system that now had been given a mechanical interpretation. The center of a hierarchy did not only assign functional departments according to some prethought plan, but in the same way that the functions of a body were largely independent with respect to the brain, so functional departments in modern business organizations assumed a fairly self-governing role. Of course, they remained accountable to management but their interrelationship could be characterized better as a complex structure, directed through intermediate levels of regulation, than as a straightforward relationship of command. What is more, the center presupposed this functional relationship as a condition of its existence.²⁶³ It was this terrain that cyberneticians came to work on, thus becoming involved in the history of communication.

5. Self-Regulating Assemblages

After World War II a completely new form of communicability that emerged as a result of the interweaving of two fields or processes began to take shape. First, the systems scientific approach spread and became common, and secondly, systems based on information and communication technology developed and came to be seen as a necessity. These two processes were not separate but, on the contrary, fed each other in a symbiotic relationship. Systems sciences and especially cybernetics and information theory were established as the theoretical sources for systems of communication and computation,²⁶⁴ and computers enabled the realization of systems scientific applications. Together they engendered a fairly consistent system of communicability that did not start to weaken until the 1970s. The position and significance of emergent digital computing technology was absolutely crucial to the ontology of communication. This technology, coupled with fields of knowledge becoming institutionalized, made society a huge information structure. Accordingly, the totality within which communication was thought about changed from “communication machine” to “information system,” rendering it a far more exact quantity than previously.

Communication becoming something more and more precisely definable in numerical values was, of course, not just of interest in academic discourses; it did not arise solely out of them and was not an object for them only. It was, above all, the result of the rhythm of telecommunication itself, of the process of its realization (which was and is not an event distinguishable from the related discourses). Physical implementations of telecommunication posed questions about communication that were given appropriate formulations in their fields by telephone engineers and mathematicians. Behind it all was chiefly a need to make communication economically profitable by using as few lines as possible to transmit the greatest possible quantity of information.²⁶⁵ The quantification of communication is essential to the reliability of a telecommunication system, and becomes problematic, according to contemporary critique, only when increasing numbers of communication events, outside the engineering field, are considered in quantitative terms.

It was precisely telecommunication systems which mainly constituted the environment in and through which communication assumed a distinct, theoretically determinable identity with a nature of its own—a nature that could be captured exactly in mathematical terms. Since the very beginning of electric communication, questions relating to the speed and capacity of transmission of “intelligence,” as it was commonly called—anticipating and paving way for the concept of “information”—and subsequently leading to communication theory, had constituted a mathematical basis for communication. This was possible through the concept of “the quantity of information” which was useful in analyses focusing on the problems of reliable and rapid transmission of signals, and was subsequently regarded mainly as a technical question of modulation.²⁶⁶ This is how communication was established as an object of systematic, institutionalized investigation by professional scientists and technicians, as something that could be described primarily in quantitative and temporal terms.

This quantification of technology became possible only in the social historical phase in which it had been given a market value, in other words, in the stage in which it was incorporated into the capitalist production process and made a commodity. Communication, however, has never been external to this process, like something which would have been sucked into the market mechanism only at a certain stage of development as a resource or reserve. On the contrary, and as noted above, communication, especially in the form of telecommunication, was the very force, linked to a number of social processes, which revolutionized the social conditions of economic activity and paved the way for a new, industrial social order.²⁶⁷ Thus, the commoditization and objectifying of communication cannot be disentangled from its own history and reality; similarly, its quantification is not external to communication in itself—in its modern mode—but is instead an inseparable part of its own historical existence. Yet it is possible to draw a distinction between communication and telecommunication and propose that the fate of the latter is not reducible to that of the former; but two noteworthy points relate to this gesture. Firstly, it can be noted that telecommunication largely establishes nowadays the social environment within which communication is thought about. It forms the frame of reference in and through which a communicative relationship is accounted a social relationship; in other words, it organizes communication as something socially significant and collectively constitutive. Moreover, there is a danger here in postulating an original, privileged, and with respect to its particular historical realizations, independent realm of existence for communication; it is anyway impossible for communication is nothing other than the passage of history in which everyday social relations are expressed and thought about.

Yet communication can be differentiated in principle from the changeable forms of its historical manifestation, as noted above, even though it does not differ from those in any way, due to the fact that social relationships and orders articulated through them constitute in any given situation what communication *is*. This differentiation is not a determination of any meaning external to communication, but is not based, either, on any existing difference: it is nothing substantial in itself. The point where the distinction between communication as such and its historical modes can be drawn is in the communicative existence itself. There is nothing being-like or substantial in this communication, no ideal source of significance that would enable its expression in positive terms. Though the distinction *is* not, it is always made, and this making always gives rise to existence insofar as it is understood as communicative existence. However, what this also means is that differentiation is not dependent on individual choice but is instead something derived from existence itself, and in the final analysis is nothing but this existence.²⁶⁸ Thus we can conceive that the development of communication into something that can be dealt with by formal means and expressed in terms of numerical quantities is indistinguishable from the politics of communicative administration and the administration of communication in our times—and, hence, indistinguishable also from our own historical destiny.

Projects in and through which attempts were and still are being made to formalize communication are compelled to postulate some form of authenticity, typically in the form of a communication system understood as a totality. Thus the modern history of communication, intertwined with social communication projects, assumed forms in which a certain founding logic presented both the possibility and the limits of its realization. Here this logic is understood as a law: it is the comprehension and treatment of communicative relationships in the context of a more general order that determines in which forms they can occur. It goes without saying that because communication always connects with discontinuous processes and practices, it cannot be simplified into a certain form or disposition, not even into the most influential and unchallengeable one. However, what makes this special link between the ever more precise description of communicative events and things in different domains of the social—in other words, the link with the social understood as a law—of paramount importance, is that it reveals the style, manner, or structure of our coexistence insofar as our time can be seen to be characterized by scientific research and applied technology (as they are commonly referred to together, although it is clear by now that technology is not only applied science). But, as it was noted above, one has to keep in mind that communication itself was in the main both the starting point and the object of this need for objectification, which naturally was not restricted to the laboratories of telecommunications engineers but became an integral part of the

development that characterizes the whole of western culture in its modern industrial form. In this process, communication became an instrumental means of organizing the social as well as of its self-organization. But at the same time, in the course of this very social shaping, it created the cultural conditions within which this organization could take place and assume its social shape. This shape was more than ever before based on law, but now the law appropriated qualities that changed it from being a stable and unchanging principle into a self-governing autonomous mechanism.

The social shaping power of communication could be seen, for example, in telecommunications' founding of a system that enabled different social practices to be accomplished in a predetermined and routinized way. What this meant exactly can be illustrated by referring to the numerous but formally similar implementations of different systems, in terms of their objectives and routinization, ranging from intra-organizational communication systems, including vast governmental configurations, to nationwide mass communication schemes, all of which were based on the transmission technology provided by telecommunications. In this way communication, through its own existence, that is, in the process of its own formalization and not in some external register of reality, prepared the ground and the need not only for objectification of communication relationships, but also for making social processes into the object of formalization.

In what follows, we will examine the practices within which communication emerged as a distinct subject and means of administration in the age of the computer. Because of the dominant positions of cybernetics and information theory as points of intersection of theoretical, technical, and administrative lines of discussion and practice during this period, the first part of the chapter will investigate formation of the concept of communication based on these theories, whereas the second part is devoted to the relationships these ideas opened up with thinking about the social through mutually articulated theoretical discourses and their practical applications.

5.1. Automating Communication

The engineering and managerial models in and through which communication was concretized into rational systems and which were first formulated at the beginning of the Progressive era, found their highest expression in the 1950s and 1960s.²⁶⁹ It was the rise of the so-called system sciences with their mathematical tools that ultimately embedded them in institutional practices in science and management.²⁷⁰ According to Thomas Hughes and others, it was the emphasis on science and method that linked the postwar spread of the systems approach to the spread of the earlier scientific management movement, with equally revolutionary results.²⁷¹ In fact, the formal techniques developed during and after World War II, the use of which was common to all the systems sciences, also provided a response to some of the problems of Taylorism. Although claiming to be able to overcome these problems, these techniques departed from Taylorism only in their methods, not in their premises, remaining thus inside the conceptual domain of bureaucratic management.²⁷² Yet, not unlike Taylorism, they developed into an influential conceptual vision that immensely shaped contemporary sentiments and practices regarding communication.

These forms of knowledge, in turn, developed hand in hand with information and communication technologies that made it possible to fashion practical applications from systems theoretical thinking. If the conceptual models of communication can be said to have their origin in the need for control and surveillance, it was the coalescing environments of communications technology, computerized information processing, and their fields and methods of application, coupled with the developing disciplines of systems thinking, that marked the culmination of the control perspective from around the middle of the century. During this period, the emergence and establishment of theoretical discourses based to a great extent on these technologies allowed diverse questions and traditions to be bound together into a unified theory of control.

As for how communication became both a means of administrative strategies and a subject for research, the years after World War II were crucial. At that time, a new communicative whole began to take shape as a result of an intertwining of several theoretical discourses, technological inventions, institutional organizations, and political ends and practices. For our purposes, two theoretical contributions of this period sharing the same view of communication are of foremost importance. The first can be identified as centering around the work by Norbert Wiener, whereas the second is based on the ideas of Claude E. Shannon. Taken together, these two figures laid the most important part of the theoretical foundation for a new

communicative constellation and specified the conceptual principles which enabled subsequent schemes for automated systems as a managerial response to the shortcomings of Taylorism to be formulated. In what follows, cybernetics and information theory will be discussed from the point of view of administrative communication, as well as the administration of communication. After this, some general remarks will be made concerning the recast concept of communication in the new form of knowledge.

Cybernetic Constructions

One of the most central cornerstones in the formal approach to communication, synthesizing much of the previous work done during the war on self-regulating machines, was a mathematical theory of control mechanisms by Wiener for which he coined the term *cybernetics* in 1947.²⁷³ As a general theory of self-regulation, it created a language that, together with information theory, allowed for the integration of disciplines and themes traditionally held as separate from each other. In and through this integrating language, a set of diverse questions, ranging from animal goal-seeking behavior to the operation of anti-aircraft weaponry, and a whole range of disciplines such as statistical mechanics, communication engineering, the theory of control mechanisms, and biology, could be brought together and dealt with within the same perspective, made coherent by the theme of “communication.”²⁷⁴ Thus the cybernetic discourse made it possible to compare disparate chains of questioning, fields of institutional practices, and physical machinery and technical solutions as commensurable elements of a single conceptual framework. It is hard to overrate the significance of this approach to the self-formation of a wide range of academic disciplines during a period of over three decades. As regards thinking about communication, its influence was absolutely fundamental.

Wiener was well aware of the central position of communication and particularly of the institutional role of it for the modern age as the “cement which binds [society’s] fabric together.”²⁷⁵ In seeking to construct a unifying basis for the interpretation of this “cement,” he interwove “communication” with “control”—concepts that appeared in the subtitle of his *Cybernetics*. This was the age of perfection of a line of thought through which communication became inextricably understood in terms of system, the structure of which was thus systematized and explained within the frame of reference set by automated control structures rather than by purely mechanical ones. “If the seventeenth and early eighteenth centuries are the age of clocks,” he proposed, “and the later eighteenth and the nineteenth centuries

constitute the age of steam engines, the present time is the age of communication and control.”²⁷⁶ On the basis of the interconnection between these two notions a whole new landscape for thinking about *communis* was opened up.

Wiener combined these concepts under circumstances in which their former contents had changed. He redefined their respective contents in a way that took into account recent improvements in technological development, particularly in computer technology, and laid the ground for thinking about communication as an automated process. The notion of communication as something with not only a systemic but also a self-maintaining nature can be seen as an effort to accommodate the concept to new computerized conditions. In this way, cybernetics bridged the ages of the telephone—which was a product of the industrial organization—and of the computer—which became a model for the new concept of organization. At the same time, interest in questions relating to energy and energy consumption, which largely determined the direction of analysis in the technocracy movement, had to give way to issues of communication and information. Hence, modern control theory, coupled with computer technology, seemed to synthesize the routines and practices of a given system—what efficiency engineers, culminating in the efforts of Frederick Taylor, have tried to do since the beginning of the twentieth century.²⁷⁷ Thus, if Taylorism mechanized production, then Wiener wished to automate Taylorism. As a result, generalized control began to shift from bureaucratic organizations to computer technology, as Beniger has pointed out.²⁷⁸

What is absolutely central in Wiener from our point of view is that his project was to formulate the logical form of exactly the same operational model facilitated by the telecommunication systems from the telegraph to the telephone and implemented in a number of organizations and industries over the previous decades. For him, this model became a general form for any system, in that every system is necessarily a communication system. Thus,

“the operation of the living individual and the operation of some of the newer communication machines are precisely parallel. Both of them have sensory receptors as one stage in their cycle of operation: that is, in both of them there exists a special apparatus for collecting information from the outer world at low energy levels, and for making it available in the operation of the individual or of the machine. -- In both of them, their *performed* action on the outer world -- is reported back to the central regulatory apparatus.”²⁷⁹

The functional division of a system, analyzed with the help of biomechanical comparisons, was thus reorganized in the light of the principle of self-regulation. Whereas still in Taylor it was divided between decision-making and action, in which the manager was responsible for the first and the worker for the second part, self-regulation split the first of these over again. If previously it was the manager who performed both the monitoring and control functions, now supervision became an inbuilt part of the automatic system. The decision-making element turned into two structurally distinct components concentrating on perception, on one hand, and control, on the other. So, whereas with mechanical systems the functional whole was organized on the basis of an interplay between two independent elements, the self-regulative system required a functional distinction between perception, decision-making, and action. This distinction could be achieved by three separate yet interrelated elements comprising perceptrors, controls, and effectors, respectively. Control was thus relegated to self-regulatory structures and became immanent to its functioning.²⁸⁰

Issues such as self-regulation and control naturally have long premodern histories, but it was not until World War II that they were subjected to consistent critical review in terms of a scientific approach and regarded as a source of general metaphors. The background to interest in the theory of control and communication was provided by the work done during the war on tracking radar and anti-aircraft guns, which brought to the field a large number of mathematicians and physicists. At that time, hand in hand with the formulation of cybernetic theories by mathematicians, computer engineers, and neurobiologists, the formal parallels between machines dealing with information and organisms—especially the brain as part of the nervous system—formed the central object of analysis.²⁸¹ It was because of the new interest in machine-organism analogies that the nervous system was introduced again as an object of explicit theoretical analysis. The nervous system no longer, however, functioned merely as a general metaphor for a communication system, as was commonly the case during the early development of telecommunications, but its similarities and differences with digital communication technology were investigated at neurobiological level also.

As in the era of the telegraph, it was both the structure and function of the nervous system that was of primary interest. The structure was known as a reflex arc. In it, the sensory nerve endings, after they have detected what is happening, pass the information back to the central nervous system via the “afferent” nerve fibres, after which the nervous system passes instructions back to the muscles via the “efferent” nerve fibres.²⁸² What the cyberneticists were interested in was the quite automatic, or reflexive, functioning of this system, called an autonomic nervous system, to maintain constant conditions inside the body. Because the

regulation process of this system corresponded to those of some machines, it seemed possible to create a general language to discuss the operations of self-maintenance in both machines and organisms. Accordingly, as a result of discussions Wiener had with Howard Aiken, one of the pioneers in computer technology, and John von Neumann, the remarkable mathematician, on the interrelationships between, for example, communication engineering and the communication and control aspects of the nervous system,²⁸³ the engineering and neurology aspects coalesced into essentially one because they seemed to follow the same mechanical laws.²⁸⁴ Given the group's interest in control mechanisms, the central nervous system was viewed more as an automaton than as an organism: whereas Wiener treated it "like an automaton,"²⁸⁵ for von Neumann it was a "large natural automation."²⁸⁶ Against this perspective, it is not surprising that the thermostat was taken as the mechanical symbol of the functioning of the nervous system of the body.

During this close collaboration von Neumann and others sought to systematize the communicative functioning principle of the nervous system and devise logical models of so-called formal neuron structures that, in turn, would lay the conceptual foundation for a range of organizational structures, whether mechanical or social.²⁸⁷ The nervous system and the automatic machine were considered functionally alike for they made decisions on the ground of past decisions. In both cases, information about the environment is fed back from the nerve endings/sensors over nerve fibres/closed loops to the nervous system/central control system, which directs the muscles/effectors in such a way as to maintain the desired state inside the system. Consequently, exactly as perceptors (nerve endings) transform the energy of a stimulus into nerve impulses, the system sensors convert environmental changes into information. Moreover, just as the brain passes instructions back to internal muscles, so the control system executes the necessary internal readjustments on the grounds of the information received. In both cases, finally, whether in an organism or in a machine, the information flows around a functionally closed system.²⁸⁸ The logical relationship between perceptors, controls, and effectors, became the pivotal frame for analysis and a reservoir of more analogies for the study of communication and control mechanisms.

In this fashion, while elaborating the theoretical possibilities of the notion of the nervous system, Wiener came to the conclusion that "the closest mechanical analogue to the nervous system is the computing machine."²⁸⁹ Thus the computer assumed in his thinking, but also increasingly in other sciences and popular culture cutting across cybernetic circles, a symbolical place as the central nervous system of modern industrial society, a role previously played by the telegraph and after it the telephone. The latter, nonetheless, retained its central

position because computers constituted a proper system only through a telephone network. This popularity of the computer metaphor ran parallel with the spread of system thinking through the sciences.²⁹⁰ The idea of a connection between the brain and electrical communication has, however, a history preceding the computer age, in that John Mills, for instance, spoke as early as 1934 about the telephone system as an “electrical brain.”²⁹¹ Yet, it was not until the forties, with the development of computer scientific analyses, that this relationship could be taken as a subject for more precise theoretical investigation, and with Wiener, it became finally a primary focus of analysis and the conceptual center for his cybernetics.

In connection with electrical communication and related discourses, it is possible to identify another source of the interest in the old biological analogy within this context. After it became known that the activity of the nervous system was based, along with some chemical interaction, on electrical discharges, the old link with the analogies provided by telecommunications rhetoric assumed an ever more exact, scientifically justified character. The similarities between the nervous system and telecommunications made it possible to analyze both in the light of signal transmission. Thus, while it was shown in the 1930s that the intensity of the signal, caused by strong stimulation of nerve endings, was based on the time interval between successive discharges, its precise equivalent seemed to be found in telecommunications. In the latter, the same type of frequency-modulated system of signaling, in which intensities were translated into frequencies, was known as “pulse frequency modulation.”²⁹² More generally, the joint question was about the electrical discharge—ultimately information in an electrical form—that propagates along either the nerve fibre or the coaxial cable. Yet at the same time, although a common point of departure, the electronic aspects were de-emphasized after realization of the significance of logical functions by von Neumann and others. Both nervous and communication systems are not only electrical but also, and above all, logical systems, and it was this logic that needed to be developed in mathematical form. Cybernetics, therefore, can be conceived of as a project that aimed at formalizing the nervous system by interpreting it as a mechanical principle whose logical form could be transcribed into elegant mathematical equations.

The pivotal role granted to the computer in Wiener justifies considering him as a kind of culmination in our age (insofar as computers and computer networks can be viewed as determining the age we live in) of the discontinuous sequence of development of which the first formulations were presented by William Channing in the middle of the 1900-century in connection with the plan for the Boston telegraph system. This is to say that Wiener can be

understood as a theoretician who rearticulated and reworked thematically interlinked system analogies to meet the requirements and theoretical promises of the computer age. At the same time the concept of the entity that unifies a community and supervises and coordinates its functions—the nervous system of a modern society—changed from being an organism to a mechanical apparatus, and in Wiener further to a digital automaton—a computer. Despite his cautiousness when trying to avoid overgeneralizations concerning the suitability of automatic control to social processes, Wiener still used the same analogy that thinkers who worked with communication systems and sought to conceptualize their functioning had used throughout the whole history of electrical communication: “[T]he computing machine furnishes us the greatest promise for an adequate central nervous system in future automatic-control machines.”²⁹³ The computer now began to form the conceptual terrain from which thinking about communication started out and to which it returned.

While the control mechanism of the nervous system, from the cybernetic point of view, allowed diverse disciplines and orientations to be gathered under a common concept, it was the principle of feedback that designated the nature of this mechanism. The thermostat became in this discourse a central conceptual node for it was the general technical model of this principle. The feedback mechanism, which characterized the whole of cybernetic thinking to the extent that the latter can be characterized as a theory which investigates its conceptual scope and possibilities, has a long history that can be traced back to antiquity. In Europe, it was known in the late eighteenth century especially in the form of the steam engine governor developed by James Watt.²⁹⁴ However, the modern meaning of the notion of feedback is related to the emergence of communications engineering. The idea of feedback, which subsequently strongly affected views of how a communication system functioned—especially in military defense systems—derives from the invention in 1927 of the negative feedback amplifier, made in the Bell Laboratories by H.S. Black, which gave birth to the modern transmission technology of the telephone.²⁹⁵ By the end of the decade, the mathematical basis of feedback structures for control devices, then called servomechanisms, was established.²⁹⁶ Hence it was a question which related directly to communication, namely of how to design a dependable telephone network, not a theoretical problem external to it.

This principle of negative feedback, to which H. Nyquist subsequently gave a theoretical basis, and which led to the development of the theory of servomechanisms,²⁹⁷ can be seen as having been generalized by Wiener from a technical question of amplification to a general principle of a communication system. This was shown in a seminal article written by Wiener with engineer Julian Bigelow and neurobiologist Arturo Rosenblueth in 1943, in which the concept of

“negative feedback” provided an essential tool for a unified description of the behavior of living organisms and machines.²⁹⁸ It has been pointed out, though, that it was in the end Black’s discovery that opened up a perspective from which cybernetic generalizations could evolve.²⁹⁹ However, the roots of the feedback principle in telephone engineering did not go unnoticed by Wiener either. If cybernetics is a method for conceiving and organizing information and communication essentially by means of feedback mechanisms, it is this very communication that defines the field in which cybernetics found its origin. Wiener stuck firmly during the early phase of the cybernetic research program’s formation to the thought that cybernetics as a distinct discipline or orientation was based on the communications engineering. “The newer study of automata,” he held, “whether in the metal or in the flesh, is a branch of communication engineering --.”³⁰⁰ Hence cybernetics, which subsequently strongly influenced the development of a number of diverse disciplines, emerged and was articulated precisely from studies undertaken within the sphere of communication systems. Even all the cardinal notions such as “noise,” “quantity of information,” “coding technique,” and so on, were taken over from communication engineering.³⁰¹ It was thus not a theoretical perspective external to the domain of communication, but sprang from the immanent progression and occurrence of communication itself by simultaneously reorganizing this process of development of which it was itself a part. Cybernetics, seen from this angle, was the very self-image of modern communication.

The feedback principle, coupled with the vacuum tube, transformed the basis of machine technology from a highly constrained to a flexible one. Whereas in the former only the predetermined sequence of actions is executed, in the latter the feedback loop develops a sequence of actions that achieves the fixed outcome by making corrections in line with changing conditions.³⁰² So, what was unchanging in the former was invariant mechanical performance, as manifested in the Taylor System, while in the case of feedback-based systems, instead of a sequence of actions, the goal desired was fixed. Although such a machine responds to changes in its context, it is however unimportant for the machine, as it pursues the target value through the feedback mechanism, to recognize what caused any variation in particular or its nature. Of course, this is exactly what makes this principle so efficient. When responding to its context, this system does not recognize the cause or nature of the changes in itself, but only to the extent that they trigger continuous compensations for maintaining the prefixed outcome. The system with a feedback mechanism, hence, takes context into account as a source of information from which it can correct its own behavior. While it is not untrue to state that it is changes in the environment which control the changes in the system,³⁰³ the

environmental changes have a significance only in terms of maintenance of the system. This is why the behavior of the system is based on a prefixed norm rather than any particular context.

External variation is both a source of error that must be eliminated and a factor that continuously checks and corrects the coherence of the system. Hence it represents, on one hand, a hostile element the influence of which is to be abolished in order for equilibrium to be restored, but on the other hand it is itself a prerequisite for this self-correcting system since without it the system would not have any identity of its own. Without this change the system would not have any means to monitor and control its own functioning, and it is the monitoring and control that makes what the system is about.

The concept that designated the principle against which cybernetics was directed, and hence what defined cybernetics as a project, the “noise source,” as it was first termed in Shannon’s communication model, was later associated with the notion of *entropy*. The second law of thermodynamics, according to which entropy is steadily increasing, postulated disorganization as the inescapable fate of the world. In cybernetics, entropy appeared as a problem immanent in communication. For Wiener the major problem of communication lies in the fact that it can be distorted in transmission. The principal opponent of “normal communicative discourse,” says Wiener, is the “entropic tendency of nature itself.”³⁰⁴ Entropy, thus, was a name for the object against which cybernetics was organized in the first place. “In control and communication,” he states, “we are always fighting nature’s tendency to degrade the organized and destroy the meaningful; the tendency -- for entropy to increase.”³⁰⁵ Against this background, it was the task of cybernetics to develop a means by way of which the organized could be maintained and, if possible, enhanced as well. Cyberneticians saw themselves fighting against the unavoidable disintegration of order, not unlike the Clerk Maxwell demons, by devising control systems that represented islands of negative entropy in the ocean of growing disorder.³⁰⁶ In this picture, “entropy” meant very much the same as “change” or “variation” did in relation to the self-regulating system, as demonstrated in the last chapter.

What is important for us here is that means of preserving the organized are communicational in their nature. Communication represents order and meaning, against which the lack of it is contrasted as disorder and chaos, or more precisely, as a state of disintegration. This disintegration is noncommunication: it is both incommunicable and uncommunicational. Because it is not within the sphere of communication, it is designated as the “other” of communication. Yet, exactly because this other of communication, what we cannot understand through everyday communication but what can be depicted in terms of science, is, according to

Wiener, a characteristic of nature itself. Communication, not unlike science, is conceived as a struggle against nature. Consequently, while communication is for Wiener something always organizing and being organized, this double process is thought of as belonging to the sphere of the rational. This is what paves the way for formal systems of representation as a more exact way to formulate methods of maintaining the self-identity of communication against its other.

This is also what brings in the theme of repetition. As it is of central importance for a communication system to develop efficient controls in order to maintain its structure and function, and, as we know from the discussion above, these controls are based, in cybernetics, on the principle of feedback, the coherence of the system depends ultimately on incessant repetition of the process of feeding back. Seen from this perspective, as important as the mechanism itself is its ceaseless repetition. Wiener generalized this idea to apply to the law. According to him, the problems of law are those of “orderly and repeatable control of certain critical situations.”³⁰⁷ What was dear to cyberneticians hearts was the possibility of error-free communication and the optimal elimination of noise. While the “key to the reliable transmission of information is redundancy,” noted Leonard Schwartz, “in its simplest form redundancy is repetition.”³⁰⁸ If noise is another name for politics, cyberneticians can be said to struggle against politics by means of controlled repetition, which led to the development of codes for the purpose of detecting and correcting errors.

Information as a System

In the same year as Wiener’s *Cybernetics*, there also appeared a very influential communication theory by a former student of Wiener, communication engineer and mathematician Claude Shannon, who worked at the Bell Laboratories. It was Shannon who proposed a general model of communication and a conceptual link between communications and the computer in two journal articles which were republished a year later as *The Mathematical Theory of Communication*. This included a contribution by Warren Weaver who helped to popularize and apply the theory to the field of human communication in a separate chapter of the same book.³⁰⁹ It’s point of departure was indistinguishable from that of cybernetics, so the two can be viewed as sharing the same theoretical perspective toward communication, the main preoccupation being to discover the mathematical laws underlying it.³¹⁰ Shannon’s theoretical project was based on the concept of “information,” superseding that of “intelligence,” and he approached the question of communication’s measurability by

using the term “bit” for the unit of information. In this way, a theoretical basis was laid for quantitative measures of communication and of the capacity of various systems to transmit, store, and process information.

The theory enabled accurate determination of the capacity of a given communication channel—Shannon’s framing of the question was grounded in the research done on the telephone and telegraph systems³¹¹—with respect to the transmission of “information.” Here, the communication question was approached through the notion of a network of channels that transmit information, examples of which were not only telephone cables but also the nerve system—an enduring source of inspiration for a number of communication theorists.³¹² Because the nervous system, it was shown, not only transmitted information in an electrical form, but also maintained a high degree of reliability because of the communication between elements of the systems, it became the reference system for information and control theorists, as demonstrated above.³¹³ Hence, despite the mathematical nature of the focus on communication, the biological analogy was never far away. On the contrary, as the most common analogy regarding communication, it was the very object of this mathematization. As in the cybernetic project more generally, it was precisely the logic of the nervous system’s mechanism that produced adaptive behavior that it was sought to develop in mathematical form.³¹⁴ Communication, here, received its mathematical value within the framework in which it was seen as an object of speech throughout the history of telecommunications; that is, within the nervous system.

The concept of information became a general unifying thread for a whole range of different approaches to communication. In this respect, Shannon did for communication what Louis Pasteur did for hygiene, if we follow Bruno Latour’s interpretation of the latter. According to Latour, the “microbe” was a tool for Pasteur to concentrate all the widely distributed and thus ineffective actions of the hygiene movement on one precise point with testable results.³¹⁵ In a similar manner, “information” served for Shannon as a means of focusing on one defined element and thus of overcoming problems followed from attempts to take into account all possible variants and forms of communication.³¹⁶ Information conceptualized what was universal, from the mathematical point of view, in communication, regardless of its particular type, the contents of the messages transmitted, or the persons involved. Secondly, it introduced a new cohesive terminology to many distinct perspectives and gathered the disparate fields of computing science, electrical engineering, physics, and molecular biology within the same conceptual terrain. Lastly, on the basis of information, Shannon rendered communication testable, which was crucial for the communication systems presupposed by modern society. By

these gestures, Shannon effectively standardized the field and created a uniform conceptual framework for the mathematical study of communication.

The most well-known and influential contribution of the Shannon and Weaver theory was the establishment of a conceptual model for a general communication system. It is difficult to overestimate the long-lasting hegemony this model gained throughout the sciences and lines of thought that had taken communication as their object of analysis. The famous model depicts the transmission of information, or a “message,” from an information source to its destination, as traveling via a given channel from the transmitter through the receiver, with a noise source influencing the communication process.³¹⁷ On the basis of this general communication model what was suggested as the fundamental question of communication started to be expressed in terms of a relationship between a *transmitted signal* and a *received signal*.

Although it was made clear from the outset that information or communication theory focused exclusively on the technical side of communication, the accurate transmission of electrical signals, setting aside both semantic and pragmatic questions, it is apparent that its influence was not limited to the mathematical problems of signal transmission but rather obtained its significance as a general description of communication. At the time, it was well understood among many contemporary commentators that “the theory in fact covers much more than these technical problems.”³¹⁸ As a matter of fact, information theory can be seen from two different angles. On the one hand, it is an integral part of the cybernetic program in that it is the first attempt to formulate a precise mathematical definition of communication. It is this aspect of the theory that has been of the utmost importance for work done on the mathematical architecture of telecommunication systems, leading to the science of the digital computing machine. Yet on the other hand, it demonstrated the potential for a general and consistent communication theory. In this second sense, it can be viewed as “a precise theory of communication, which may be applied to any situation where information is passed, or communication takes place.”³¹⁹ Albeit having its origin in telecommunications engineering, the theory was taken to be applicable in principle to the general structure of any communicative situation: “The comprehensiveness of the [communication] theory is undoubted. It applies to all possible relationships between identifiable elements in all possible systems. It can be used for social situations of every kind, and represents the application of systematic science to that situation.”³²⁰

This is why the initial positioning of communication as an engineering problem and the linear model that was based on electrical communication not only set the framework for the study and

construction of telephone networks, but pervaded a range of other sciences and theoretical orientations too. This theory seemed to give a form to otherwise indeterminate communication processes: information, as a universal principle, “[gave] shape to the shapeless,” according to Jeremy Campbell.³²¹ As a result, Shannon’s terminology and his model were rapidly embraced and widely applied in thinking about communication in general, extending beyond the borders of information theory proper. In particular, in the field of communication research, a linear, effects-oriented approach to communication, as adapted to the practices of a new discipline, was eagerly adopted, not least because it seemed to provide the scientific rigidity communication scholars had pursued in their attempts to professionalize the discipline.³²² There is little doubt that, for communication research, Shannon’s theory was fundamental. According to Everett Rogers, the Shannon and Weaver paradigm was “the most important single turning point in the history of communication science.”³²³ After it had permeated the field, the theoretical perspective it encapsulated started to function as the standard view and as the basis for a growing number of revised models of the same, enduring until the 1990s.³²⁴ It standardized the field by defining its objects, terminology, and method. It laid a whole new basis for the understanding of communication, if it was desired to take this as a scientific concept, by establishing what was its actual structure, how to determine the relationships involved, and how to interpret the results.³²⁵

By jettisoning what was only circumstantial and accidental, this orientation sought to identify the essential and necessary variants in the innumerable forms of diverse communication processes. It opened up a perspective within which these processes could be seen as repeating similar patterns, following the same intrinsic laws, which could now be discovered by means of two tools: the concept of information and the model for applying it. The formal approach to communication separated the relevant from the irrelevant, so that the basic communicative relationship could be explained without the need for taking into account all the possible variants and contexts of its occurrence. Yet, this logical form also produced the empirical form, insofar as researchers studied empirical communication events.

Cybernetics and information theory embraced a particular view of communication that was directed against misuse of and misunderstanding over words, while at the same time trying to set aside the power aspect inherent in the occurrence of communication. This it sought to achieve by means of a precise language, the unambiguousness of which would not allow any negotiation or discussion over the meaning of words. One can identify at least two separate, though interlinked reasons for this. Firstly, unequivocal linguistic relationships are regarded as necessary in order to exercise control. Although the development of a control language can be

seen as both a technical and a historical question, the technical approach in fact also to a large extent sets the context for the historical question. In this sense, cybernetics (and information theory) marks a crucial point of intersection where the administrative dimension of language (language both as the object and means of control) is given a technical form. Secondly, the demands of scientificity required cybernetics to create a description system that would allow clear and precise references to be made. An adequately objective and unequivocal system was a precondition for reaching a scientific standard, and any linguistic structure that did not meet these standards was doomed to stay outside the scientific realm proper. Here, the idea of science, of course, comes from the narrow understanding of the practices of natural sciences, the ultimate goal being a system of measurement by which all relevant objects could be viewed as commensurable and all interrelations between objects could be precisely identified, assessed, and formalized. In cybernetics, both the demands of control and scientificity were met in a language that would harmonize its internal relationships while being capable of dealing with external changes.

It is misunderstandings over words, their undecidability and simultaneous utterance that amount to noise, the principle against which information theory is directed in the first place. Michel Serres has noted that the English word *noise* was taken from an ancient French word written similarly, meaning both a row and outburst of anger, on the one hand, and a quarrel or dispute, on the other. According to him, whereas English appropriated the former meaning, French retained the latter sense of the word.³²⁶ It is the task of cybernetics to, if not to totally eliminate this noise, in the sense of a discord and a disorder, then at least to regulate it according to some rational principle. This regulation can be regarded as being based on the idea of a contract. Shannon conceived communication as a contract—a regulated structure with defined relationships between the sender and the receiver. Here, one can recall the analogical relationship that there was between the telegraph as an intercommunication system and the contract principle: both the sending and the receiving stations, and ultimately the communicating persons, on the one hand, and the contracting parties on the other, had the same interest in combating the surrounding noise which could drown their own voices. It is this same need to stabilize and formalize interrelational conditions and thereby control noise that can be found at the core of Shannon's conception of communication.

Contracts define the boundaries of a common area.³²⁷ In the dominant tradition within which communication has been viewed as an interrelationship between independent communicating parties, Shannon reintroduced the idea of a contract as a counter to noise by giving it not a technical or juridical but an exact mathematical formulation; all changes “in the transmitted

signal,” in his theory, were called “*noise*,” the common name for all that could impair the transmission.³²⁸ Now the legitimacy of the contractual principle was no longer dependent on a formal authority but instead was built into the very communication system, the task of which was to guarantee that the desired signals pass through the entire system. The contract consisted of the promise to ensure the best possible reception of a message sent over a given channel and thus bounded an acoustic connection between the communicating parties. This set aside, to an extent, the material conditions of communication, from the point of view of the parties involved, and made the communicative situation look transparent and technically mundane—one reason why telephony, for instance, has not so far been sufficiently studied from the social point of view. Yet this state of affairs inevitably links communication inherently to law understood as a regulated set of positions and relationships by which multiplicity and polyphony is closed and stabilized into formalized rules.

Both cybernetics and information theory sought to formalize a mechanism by means of which a system would deter disorder. The former approach was based on gun-control research in anti-aircraft weaponry, understood as a problem of information theory. Each shell fired was regarded as a message, and information about its accuracy was used to direct the next shot.³²⁹ If for Wiener the criterion for the success of “messages” was their hit rate, for Shannon it was the exact reproduction of the signals transmitted. Communication, for Shannon, was fundamentally about reproducing at one point a message sent at another point.³³⁰ Therefore, in both cases, a strictly determined relationship between a starting point and an end point, in terms of a message to be sent, exemplified the rationale and cohesion of the system. Anything that could compromise this relationship would undermine the self-identity of the whole system.

If incessant negotiations on ways to get a job done represented for Taylor a source of disturbance and disunity that were to be eliminated by a scientific approach, the “other” for Wiener was “entropy,”³³¹ and for Shannon, “noise.”³³² From different yet interchangeable angles they defined what was essentially a mutual problem. Seen from this perspective, these ideas pointed to the two principal subject areas against which mechanisms of exclusion were set in motion, as practiced in cybernetics and information theory. Thus, it is the task of cybernetics to exclude disorganization and loss of meaning. In fact, control systems were seen as islands of negative entropy which were running against the main flow of the tide of disintegration, thus preserving order and meaning.³³³ As for information theory, it excluded, first, distortion, and secondly, interruption, factors that could prevent accurate reproduction of a signal at the receiving end. The aim of both was to engender and maintain a delimited area of order in order to allow a coherent communicational environment within a permanent state of

unfixedness and decay. Entropy and noise, in consequence, did not remain outside the area of order; rather they constituted the ever-present tendency against which order was established and constantly maintained. Nevertheless, they defined the other side of order and organization and, at the same time, the source of their self-identity.

To the extent that cybernetics and information theory brought about a concept of communication that was closely tied to the objective of maintaining order, they can be said as being a privileged example of subordination of what cannot be presented by any system of representation, and what has been variously termed by different theorists a multiplicity, becoming, or difference, for instance. This multiplicity, polyphony, or incommunicable—that is, politics—is here a derivative term, before which comes, firstly, complete transmission, the perfect correspondence between the transmitted and received message, in other words the self-identity of the message. Secondly, before the multiplicity but after complete transmission, comes a message that has been exposed to disturbance, being incompletely received, distorted and garbled. This second type of communication represents what should be avoided, a kind of failure, against which the self-identity, truthfulness, and authenticity of the message is mirrored and determined. Thus, the enemy proper, in this scheme, is the noise, which corresponds to what is unpredictable, indeterminable, undecidable, and which hides behind every meaningful message as a threatening and chaotic principle. It is this very noise (politics) against which information theory deployed its strongest weapons and defenses. At root, information theory was a battle against noise, on the basis of which it received its identity and meaning. It made a cause out of defending order, anticipation, and clarity against ambiguity and unpredictability.

Yet one of Shannon's fundamental ideas was precisely that noise is not external to communication, but is rather always inherent in it. It was his aim to calculate the values that would show how information could be best preserved during its dispatch from sender to receiver. If information was garbled because of noise, one should either amplify or repair the flow of bits. Noise, then, was an integral part of the communication process, and information theory a tool to preserve and defend communication from itself; that is, from the disintegrating tendencies intrinsic to it. By thus separating communication from its noise, mathematics enabled communication as communication; in other word, as meaningful interaction through sensible messages. The "other" of communication in information theory, therefore, was nothing other than its limit as communication.

Given this, it would be too simplifying to assert that if in Taylorism the most efficient mode of action established the standard for expending time and removed the possibility of exercising

one's discretion over work, then, in the same way, Shannon excluded the noise from the communication system. This is because just as rest is a precondition of work and cannot be regarded as independent of the activity involved, noise is a precondition of communication. Similarly all the individual and disordered constituents that were the focus of attempts at systematization and uniformity proved resources necessary to the system's functionality.

The major problem of communication, however, remained the fact that messages can be garbled or distorted in transmission. In the final analysis, the idea of a pure mediation or complete, faultless transmission is nothing other than the Enlightenment's conception of a world entirely permeated and illuminated by truth. Yet, as shown above, because it was understood that distortion could not be totally eliminated from communication, the issue became more complicated. Insofar as this distortion was caused by human activity, and not just by "nature itself," it belonged to the realm of power, or that of politics. An indisputable mechanism was to exclude the effects of multiplicity on action, in the form of law. "[Law] is the process of adjusting the 'couplings,'" stated Wiener, "connecting the behavior of different individuals in such a way that what we call justice may be accomplished, and disputes may be avoided, or at least adjudicated."³³⁴ Thus it was law which defined optimal relationships *in* communication. But even it was not insulated from the effects of distortion. What annoyed Wiener was the politics, or "game," as he termed it, inscribed into the practice of law, the fact that the conflicting parties seek to jam the messages of the opposing side, as the situation was seen from his viewpoint. Politics, alongside legal practices, was for him a game that only jammed the movement and reception of intrinsically unequivocal messages. If human life, however, is not conceivable, in principle, without politics in some form or another, then apparently distortion is a necessary part of it. As Wiener and Shannon were provenly aware of this, their project must essentially be regarded as an attempt to find a model of equilibrium between action and the necessary conditions that are always part of the action itself.

In its attempt to avoid ambiguity and vagueness, the cybernetic project (including information theory) was forced to view natural languages as too imprecise to allow the exact values and relationships required. The need for technical terminology rather than ordinary usage of words and precise syntax rather than natural linguistic grammar resulted in manufactured or artificial languages, especially in the mathematical representation system. This should not, however, be seen as a reduction or distortion of communication. Formalization did not impose any rule, structure, or principle anterior to communication. The measures or values introduced by formalization were always immanent to communication. Therefore, it neither established an external criterion nor was independent of the phenomena to which it referred. The mathematical

relationships it produced were communication's own relationships. Yet, the history of communication as an object and means of governance is not bounded by the mathematical domain. Shannon's contribution, seen from this perspective, rather created a whole new standard for the study of communication that it was sought to generalize, as Weaver's original step in this direction proves, to human communication while still trying to retain scientific rigour. Like many communications experts and theorists before him, Weaver thought of communication instinctively within the field of command. If the history of communication is fundamentally the history of standardization, administration, and control, then Shannon must be seen as the one who first articulated law not as an external rule violently imposed on its subject, but as the immanent principle of communication.

By and through Shannon's work, communication, understood as information, was irrevocably connected to the realm of *science*, and especially to that of mathematics. It is because of the immanent logic of communication expressible as mathematical formulas that coding, transmitting, and decoding of signal sequences—crucial for designing and understanding self-regulating systems—becomes possible.³³⁵ Since this connection was made, it has been almost impossible for systematic thinking on communication to escape from the sway of this theory. Of course, communication as science cannot be said to be attributable to Shannon's contribution alone, for it has its own history of knowledge irreducible to information theory. However, Shannon can be regarded to have perfected the project of quantification, or rationalization, of communication, the roots of which can be traced back at least to Ward but which only got its modern *sense* through the increasing need for and influence of formal analysis. Though the systematic quantification of communication can be said to have its inception at least in the requirements imposed by early telegraph systems, it was not until mathematical communication theory arrived that communication became a quantitatively determinable subject in a scientific sense.

Practices of Autocommunication

From the perspective of signal transmission, a system based on the feedback principle is circular, and circles are precisely what determine the conceptual domain of cybernetics. Recursive circular processes characterized not only more or less confined systems but also, in principle, the social, viewed as a system, which makes this perspective a general world-relation. "The social system," we recall, was, for Wiener, "bound together by a system of communication, and -- it has a dynamics in which circular processes of a feedback nature play

an important part.”³³⁶ In a circular information structure like this, action is manifested in terms of messages transmitted, processed, and fed back. It is no accident, then, that the dominant conception of what communication is has predominantly been message-driven since cybernetics and information theory.³³⁷

Now, taking cybernetics as a more or less continuous project, the ever-refining model of a circle can be regarded as not just a theoretical contribution but also, more fundamentally, as the next major break, rupture, or displacement, after the scientific management, in the administrative history of communication and by communication. If communication, in scientific management, was based on chains, here it is grounded in circles. This theoretical turn is reminiscent of one of a more practical nature effected by William Channing in relation to telegraph lines. As shown in chapter three, whereas telegraph lines were used to connect different locations distant from each other by means of direct lines, Channing, when planning the municipal telegraph system of Boston, twisted the lines together into a complex and multi-level circular structure. This gesture, although clearly taking place in a different age and context, implies a similar aim to that at play in the move from Taylor’s chains to Wiener’s loops. The circular structuration, intrinsic to communication systems, is given a more exact theoretical formulation in Wiener, and if the explanation and understanding of this structuration were based, in Channing’s initiative, mainly but not entirely on practical reasons, in Wiener’s case it was approached through an already institutionalized discursive tradition.

The theoretical legacy of cybernetics, taken broadly, was crystallized in the view that central to communication is its pattern, generated by its repeatable control, not its specific content. This idea was manifest in all self-regulating systems in the form of feedback loops. How communication is organized according to these loops depends on control systems, which is why the main focus was on the theoretical investigation of the mechanics of control. As Shannon’s communication model and the term “information” spread and became common, communication appeared more and more as a patterned organization in which the mechanisms to code and decode—to process—the flows of information came to the fore.

To perceive cybernetics as a study of self-governance under the circumstances of constant change required it to be understood within the realm of control. For it was against change, unforeseen and uncontrollable transformation, that formal approaches to administrative communication and administration of communication, the history of which has been traced here, were constructed. Within this line of development, form has always been pitted against content, and method against goal. For example, it is evident in the way the Turing test

distinguished the content of a communication process from its form, thereby laying the foundation for the principle that any precisely specified problem can be solved by a computer.³³⁸ This is to say that, notwithstanding variations and exceptions, empirical changes, remain irrelevant with respect to the logic of action. Whereas in the Taylor System this logic resided in the formal organization of the functional whole, in cybernetics it was built into the behavior of the system itself; yet in both cases, whether a hierarchy or a self-regulatory system, a preset norm, albeit of a different nature, differentiated what was acceptable from what was unacceptable. In both cases, in addition, the “we” of the action was determined prior to the action.

What connects Wiener and Taylor is the fact that they approached their respective systems presupposing a certain methodological identity or consistency, whether in the form of “negative feedback” or “the one best way,” that gathered chains of action together under one principle. The essential ideal for both cybernetics and Taylorism was to design a system that would eliminate any need or purpose for negotiations over a course of action. Instead of imposing a foreign principle forcefully on a system, they sought the immanent laws inside it and tried to incorporate them in a standardized terminology. The measures and relationships, although analytical, derived from communication itself. Yet it was not communication as such that was of central interest, but rather the mechanisms *in* communication that would determine the limits of communication.

In the case of a hierarchical structure, the line between a system and its outside, or a norm and a disorder, or even the field of truth and that of corruption and distortion, was drawn by a formally determined set of interrelationships and positions. The decision concerning the structure of internal relationships was made prior to, but not independently of, the action proper. It maintained unvarying links between its components while excluding all redundant or unwanted actions, thereby producing a system with invariant functioning.³³⁹ Thus, its point of view was exterior to communication. In essence, it was an articulation of communication prior to its happening, from a perspective insulated from communication. When the principle of self-regulation made this unchanging system, unable to deal with change, responsive to its environment, the concept of change was defined as part of the purview of the system itself. Environmental change, or the multiplicity that the system must cope with, does not modify in any way in systems based on the feedback principle, the prefixed goal or the internal state desired. Rather it is the system, then, that constantly maintains its unity and self-identity against the environment. Yet the point of view here, in contrast to that of a hierarchy, is interior to communication. The articulation of communication takes place *in* communication, in the course

of and during realization of the interrelationships between the system and its exterior, by means of continuous compensations. This is what is meant by the fact that control mechanisms were not seen as uncommunicative with respect to the information they regulate, but rather as having themselves communicative nature, as pointed out by Karl Deutsch, following Wiener on this.³⁴⁰ Although a distinction has been made between a signal and information, the signal being the operation and information the control of a communication system,³⁴¹ it is clear that, coupled with the appropriate theories, technologies, and institutions, both information and signals constitute a system in which communication is both its functioning and control of this functioning.

Given the fact that systems thinking focused on relationships rather than on objects, these relationships appeared to be thoroughly communicative in their nature. If scientific management, too, operated from the basis that control of action was communicative, here communicativity of control was incorporated into the structure of the action itself as a self-correcting principle. Within an information system, communication, through various physical, social, and conceptual solutions, set the norms for its own performance. It can be argued that, even in the first cybernetic machines, both performance and the rules controlling this performance were subject to adjustment in the course of the system's functioning.³⁴² So in cybernetics, communication and its conditions were mutually defined—within certain predetermined limits—in the process of communication becoming articulated. It was communication and its mechanism, now, that defined what was fundamental, not the rules or hierarchies that were supposed to tie an action to a system, although this latter aspect remained necessary, in one form or another, to the formal approach to communication. Yet, a change in thinking about communication occurred when communication as a continuous, constitutive process began to take shape alongside thinking of it merely as a totality *for* these processes. This was made evident by a conceptual shift which took place within the cybernetic project away from emphasis on equilibrium and homeostasis and towards the concept of feedback and reflexivity.³⁴³ Although communication was still thought of in and through a conceptual whole, the form of this whole became more porous and reflective in relation to its environment. In effect, this introduced a more profound change in the perception of communication.

The systems approach tied communication to a perspective in which it no longer featured in terms of mutual relationships between independent subjects but in which these communicative relationships created the subject positions involved. Communication was no longer, contrary to conventional wording, a bond between distinct subjects. It is true that the status of communication in relation to community still tended to be expressed in this way, which

explains Wiener's references to communication as the "cement" which binds society's fabric together.³⁴⁴ Here, communication was regarded as a kind of addition—albeit an important one—to a pre-existing social whole, the actions of which it then adjusted and bound together. While this view was still presented in various forms in the early twentieth century, coincidental with the rise of systems thinking if not earlier communication itself became the central focus of attention, not because of its relevance as an adjunct to administration of a whole (machine, system, community), but because it constituted the whole. Now, as pointed out, these perspectives are not mutually exclusive, since it was the dimension of control that unified the systems approach to communication. Rather, control now found for itself an immanent basis in the intrinsic nature of communication: control became internalized into the self-execution of communication itself. This was linked to a general process in the course of which communicative wholes were transformed into information systems, not just in the sense that information was more important to their functioning than energy, but rather in the sense that their functions were none other than the functions of information—the interactive gathering, storing, processing, and transmission of information.

This is what allows us to regard this era as the one in which a new way of thinking about communication came into being. Here, communication was no longer about interrelationships between pre-existing subjects, as had been the case in discourses and practices relating to the telegraph and to the early telephone. Neither was it *exclusively* about the original whole that tied the subjects closely to the system, a system that enabled them to be articulated as subjects, as had been the case in the age of the telephone and scientific management. The new conception, though, insofar as it was linked with systems thinking, could not shake off the idea that the social was a determinable totality. The social, then, was not thought of as such, but continued to be approached as an original whole. Communication was the mechanism which bound all self-regulating systems and assemblages into wholes made up of interdependent parts. From the point of view of cybernetics, insofar as communication is defined primarily as recurrent transmission and control of information, then the "self-mechanisms" of a system, in other words, the techniques and practices that maintain self-identity, are based on the transmission of messages and on their serving as information for other messages, thus directing messages round in an endless circle. These self-mechanisms, being completely communicational, constitute a system, and are not subsequent additions to it. The system *is* because of these mechanisms, it "is" these mechanisms.

This brings us to what is new in the constellation of communication based on systems thinking. Although clearly remaining stuck in the perspective of a conceptual whole, because of

the communicational nature of controls, thought about communication was directed from the beginning from the point of view of the “between” that communication is. Communication, for the first time in the course of the history of its formalization, was not approached solely from the viewpoint of communicating entities but rather through communication itself, not through objects but relationships. This became clearer in the “second order cybernetics” in which observation and action formed a circular system where no stable ontological basis was presupposed. The reference structure of communication had no substantial foundation, although the prefix “auto-” became increasingly important. After this change in perspective, everything remained unchanged but at the same time was quite different.

The cybernetic system was essentially a model of equilibrium, as it represented a mechanism that enabled a dynamic system to be in harmony with its environment while continuously adjusting itself to the changes. Although remaining within the realm of closed systems, it positioned the mechanisms of enclosure and exclusion as immanent to the operation of communication. This makes cybernetics and information theory stand out, within the administrative history of communication and the history of its administration, as the culmination and final major self-articulation of this loose tradition before its gradual downfall. There are two related reasons for the latter. First, as control became immanent to communication, interest in studies concerning how control was manifested gained increasing grounding in theoretical discourses on communication, undermining the significance of a general theory of control. And secondly, a general theory of the cybernetic type could no longer provide a satisfactory framework for thinking about communication, because communication started to be thought of without a constituting whole. This is what gave communication, seen as action, an independent existence, as it were.³⁴⁵

Yet the model of cybernetics, it should be kept in mind, was not that of a perfect system in a mechanical sense. Whereas for a rigid hierarchy changes represented a potential menace, for a feedback-based system they were essential. Thus, the system was based on importing differences, not on their exclusion as was in the case of hierarchical structures. Consequently, not only does the intrinsic mechanism draw a distinction, following a distinct logic, between the system and its exteriority, thus creating a difference, it also creates the changes as difference. Environmental variations, then, are constructed as a difference, as a source or origin of differences, without which the system could not be functional. For this reason, the mechanism of equilibrium can be said to have given an impetus to the development in which the noise and multiplicity are no longer viewed as interference to the system but instead as a necessity.

It is not incorrect, however, to argue that what has been at stake in the technical history of communication, seen from the viewpoint taken here, has been formalization of interrelationships between the system and its outside. During this history, these relationships have been defined and organized on the basis of a method intrinsic to, and thus characteristic of, the system. The method is thus what draws a demarcation line within a set of practices between those that are conducive to a given goal and those that are not, between what is needed and what is not or poses a risk; in other words still, between communication and noise. It simultaneously gathers in a new way the actions already there and excludes the rest. It separates a friend from a foe, and the same from the other.

This allows us to view cybernetics and information theory as interlinked efforts to formulate a theoretical foundation for the process of self-organization, understood as a general principle of communication. In this respect, it follows previous attempts to propose the telephone system as the model of governance for a continuously changing system.³⁴⁶ An issue here is the old theme of rational self-maintenance of a community under constant change, that is, a conscious self-governance in which the means of control are exposed to a process of incessant reorganization. The structure of communication, as it were, was here the entity that controlled its own operation.

This became an explicit subject for research in the next wave of the cybernetic program. It can be identified with Heinz von Foerster's "second order cybernetics," according to which people construct their models out of the systems they work upon all the time. From then on began a broader application of cybernetics and systems thinking to a number of distinct fields, including psychology and the study of social systems. This second wave reached its mature phase with Humberto Maturana's and Francisco Varela's *Autopoiesis and Cognition*, which articulated the view that organisms, in addition to being self-organizing and self-regulating, are also autopoietic, or self-making.³⁴⁷ The technocratic dimensions of cybernetics, particularly in the form of the pursuit of unidirectional control, were called into question. At the same time, observation and action constituted a circular system without any fixed ontological foundation.³⁴⁸ Effectively, there was a change in focus from causality to autonomy and from action and reaction to interaction.³⁴⁹ Of course, it can be pointed out with good reason that the profound change in the theory of knowledge that seemed to occur here was already implicit in Shannon's information theory, if not earlier.³⁵⁰ This is because noise viewed as what was external to the system, in his theory, was not, in fact, a quality belonging to the world itself. The receiver is not capable of distinguishing between noise and the signal, in Shannon's view, independently of the theory. On the contrary, it is on the basis of the theory alone that the

distinction can be made; the theory determines what is the signal and what is noise, as well as their mutual relationships, within a particular communication channel. This theoretical shift, in which communication was not regarded any longer as independent of its context (theoretical and/or physical) became the explicit starting point for second order cyberneticians, from whom it received a detailed theoretical treatment.

5.2. The Rise of Information Systems

After the war, a close tie was forged between communication and politics, in the light of which communication became, or rather continued to be although in a different way, a political question, and politics became articulated more and more in terms of communication. This manifested itself in different forms and contexts. On the institutional level, the relationship appeared, perhaps in its most visible form, as one between science and government. The study of communication, that is, the diverse disciplines from communication engineering to computer science as well as from psychology to linguistics, were all harnessed to serve national interests during World War II, and retained the close connection after the war.³⁵¹ But the relationship between politics and communication in the post-war period also manifested itself in terms of the politics of administration as a general sphere of action. The theories formulated by Wiener and Shannon constituted a unifying conceptual terrain within which questions of control, whether as practices of business management or national discourses on political governance, could be posed in terms of communication. As in the case of Taylorism, the new approach was embraced in distinct projects and systems, although now their scope had grown in size and complexity. And as in Taylorism, what was significant in these projects was not their specificity but, on the contrary, their becoming part of a common perspective in which a number of other projects were planned, compared, and accomplished. Communication, in the form of new technologies, theories, and practices, became a key field of systematic development during the Cold War era.

Although certainly varying in their particular aims and methods, different projects, from local to nationwide in scope, reflected models that were essentially the same in their inherent characteristics. It was a model based on the deep-rooted metaphor of the nervous system which had remained recognizable while undergoing reinterpretation by cybernetic theorists. Thus the elaborated nervous system constituted, in the last analysis, the form in which different political interests, technical arrangements, and theoretical discourses germane to a given project were

thought of and, taken together, articulated as a consistent whole. If it is true that the nervous system was precisely what allowed communication to be thought about in its essence, it was no doubt also the whole within which various social questions and technological imperatives of the post-war period were met, expressed in terms of a self-corrective and autonomous communicative pattern.

The discourse on generalized control found expression in and through diverse systems being developed throughout the country, but at the same time, construction of these systems was propelled to a great extent by this vision of control. With large-scale computerization and the formation of specific fields and techniques out of and alongside the theoretical foundation laid down by Wiener and Shannon, the perspective of technological control acquired a political meaningfulness that seemed able to overcome the previous difficulties linked with Taylorism. The computer, as a “tool for managing the mass society,”³⁵² coupled with new mathematical instruments, became a new social icon because it could keep up with the increasing number and pace of processes resulting from technological development. Now, the cybernetic technology of governance that established an immanent mechanism between communication and control seemed to be applicable, for the first time, to managerial problems in general, not only to those in some limited expert systems, provided that they were operationalizable in principle.

This depended on the possibility of completing the project of mathematization of the social in its essential characteristics, as it were. Attempts to find mathematical laws governing communication, following and extending the program initiated by Wiener and Shannon, found expression in a number of system scientific disciplines and discursive practices. The general objective, based on communication theory, was to “produce a predictive theory of humans and machines in group activity, and in certain industrial situations.”³⁵³ The system theoretical ideals lost the position they had held, however, when the “human” component started to assume an increasingly important role in the planning of computer systems during the 1970s. At this time, hierarchical systems began to be replaced by more flexible networks based on personal computers.

During the era of formal automated systems society certainly did not change into an automatic machine based on formal rules, but the idea of this kind of machine shaped social thinking. This applies to all the concepts of communication dealt with throughout the technocratic history of communication. Our concern has not been to study how different forms of organization developed or to identify their mutual effective relationships. Moreover, we have not undertaken the task to show the specific routes and mechanisms through which the distinct

concepts were generalized and spread throughout the society; it is doubtful if that is feasible at all. In other words, we have not analyzed the forms through which administrative relationships have been generalized and turned into immanent communicative relationships. Instead, what we have done here is to examine the discursive forms (metaphors, theories, models) inherently related to the development of modern communication systems. These discourses have been considered as part of the historical line along which communication has been taken as an object and means of administration and along with different relationships have been forged with the limits of communication. This does not mean, however, that we have been operating solely within the discursive sphere either. Certainly, these discursive practices and forms of knowledge do have concrete effects on the social, in its administrative, technological, scientific, and commercial aspects for example. The underlying idea here, however, has been that the social in its different aspects is indistinguishable from communication. This is why the processes of development have been approached as assemblages consisting of certain discursive forms, institutional frameworks, subject positions, national politics, cultural beliefs and habits, physical structures, and organizational methods, all of which get their identities as part of the interrelationships, and especially the *ethos*, that give coherence to the given constellation.

In what follows, we will address the practices of automation, that is, the theoretical discourses, institutional routines, and technical systems that allowed the social to be conceived, in principle, as a self-regulating system with management of its key sectors and problem-areas to be automated one at a time. After this, we will look at the way the communicative constellation changed and the new form of communication this gave rise to. Let us start, however, from the local and national information and communications systems that allowed contemporaries to cherish the idea of the birth of a rational and predictable social environment within the framework of a nervous system.

Constructing Information Systems

The language of cybernetics gained popularity as the new communication and computer technologies became common.³⁵⁴ It was through this language that computer power was combined with the politics of management, thus emphasizing the appeal of the cybernetic perspective. For Wiener it was evident all the time that “the importance of information and communication as mechanisms of organization proceeds beyond the individual into the community.”³⁵⁵ Yet he was reluctant to generalize the methods of cybernetics to the social as

such, as many social processes seemed to remain beyond the scope of operationalization. Though Wiener admitted that it was possible to formulate a mathematical description for only a part of all social and communicational processes, this did not conceal the fact that for him such a description was the ideal form through which they could be analyzed scientifically. If the social was not mathematizable in itself, the conceptual clarification of its formal properties as well as the uncovering of its logical relationships was in any case the way to scientific understanding of society.³⁵⁶ Although Wiener did not believe in the operationalizability of social sciences, he certainly would have wished it to be possible. For only if this had been the case, would the social sciences and historiology have achieved, in his eyes, the standards of objectivity required for a proper science. Until that moment, according to Wiener, “there is much which we must leave, *whether we like it or not*, to the un-‘scientific,’ narrative method of the professional historian.”³⁵⁷ Regardless of some of his reservations, he thought, at the end of the day, that cybernetic principles were more applicable in social sciences the more they assumed quantitative methods.³⁵⁸

Now, if Wiener showed clear inclination for thinking about society in terms of cybernetics but refrained from applying this in practice, it was his followers who undertook the task of incessantly and assiduously testing out the applicability of cybernetics to social problems, especially as seen from the point of view of management. While doing so, they worked out, reinterpreted, and tested the flexibility and explanatory capacity of the cybernetic program with regard to the most interesting object that had been left out of the scope of the founders’ formulations, that is, to the whole social system in itself. In the late 1960s, cybernetics and the sciences influenced by it almost invariably included social organizations as a relevant subject.³⁵⁹ This is why we have to turn to these individual organizations and projects as links or points of oscillation between specific interests, practices, and problems, on the one hand, and the instances of realization and development of what was a general conceptual perspective of governance.

The Cold War era was marked by the design and implementation of ever more complex national information systems, especially in the automation of air defense. In his study on the speech about and the construction of national defense systems during the Cold war era, Paul Edwards showed the way in which the history of the computing machine was linked with the defense needs of the United States through the concepts and discursive practices of cybernetics, artificial intelligence, and cognitive psychology.³⁶⁰ In all these fields a central aim was to outline the feasibility of constructing a system in which all circumstances of a given area of life, in this case the concern over a nuclear attack, would be taken into account and

programmed as possible variables enabling the system to respond automatically and largely independently of human interference. In this way, discourses and related practices maintained the idea of a kind of transparent and self-reflective world wherein all the major characteristics of potential states of affairs and their mutual relationships were prearranged so that the system would be able to retain automatic control and dependable functioning.

The first large-scale, computerized command, control, and communications system, SAGE (Semi-Automatic Ground Environment), which became fully operational in 1961, divided the United States into eight distinct sectors, each controlled by a real-time information processing combat center. Not unlike the models based on functional similarities with formal neuron structures, it formed a huge integrated whole with simultaneous information flows on many hierarchical levels organized into one logical structure. Its two main functions were to gather information and to direct defense. Radar systems would detect all aircraft and feed their positions over telephone lines to be received, processed, and evaluated by the combat centers responsible for generating an overall view of the situation at hand. The direction centers, for their part, each connected to a radar installation, would produce surveillance information to assign and direct the defense systems.³⁶¹ The important point here is that SAGE provided not only a technical basis for the development of military systems, but also a discursive environment for speech about such systems, reinforcing the need to create a centralized defense arrangement. In this way, computer technology and the related discourses that represented the world as a logically closed system were mutually articulated in an inherent relationship with each other in which each shaped the development of the other. It was SAGE that laid a foundation for all future military as well as industrial computer projects working toward centrally coordinated, real-time systems.³⁶² Most notable among them, whether operational or only as prototypes in the late 1960s, were the American Stock Exchange's computerized quotation service, Amquote, the American Airline's automated reservation system, SABRE, and the American Bankers Association's still unnamed real-time system.³⁶³ For all these systems, the overall aim and method of managing all the processes would be essentially the same, involving the need to keep up with constant change by means of an integrated computer system.

It is understandable, against this background, that the operational position of centrally directed communication systems grew in importance with the increase in power of electronic digital computers. Even though he himself was careful not to directly support centralization of power,³⁶⁴ Wiener was still inclined to think about the benefits of a centrally controlled social system. At any rate, not only the increasing presence of systems based on computers,³⁶⁵ but

also the presupposition, central to Wiener's thinking, of the role of a control mechanism to maintain the stability of the system, influenced in the shaping of the frame of analysis in which discourses relating to and inspired by cybernetic research came to be expressed in ever more unambiguous formulations. Thus, for instance, in the early 1950s, Kenneth Boulding, Professor of economics at the University of Michigan, stated that the "the barest essentials of any organization -- is a control mechanism consisting of a system of communication and transformation."³⁶⁶ His views can be seen as an expression of how in cybernetics a system predicated on the organismic analogy was formulated into a principle of an automatically functioning whole. A communication system, according to Boulding, consisted, firstly, of *receptors of information* (thermometers, sense organs, or salesmen were the examples given) which collected information about the environment and transmitted it over a *communications system* (nerves, speech, letters) to an *executive* (furnace control, central nervous system, manager) whose business it was to take the received information and to transform it into *instructions*, which were finally communicated to *effectors* (furnaces, muscles, workmen) which, following the instructions, adapted their behavior to the environment or even changed it.³⁶⁷ Here, communication as an automatic system was generalized into a generic model, linked up with basically the same biological concepts as were operational from the early telecommunication systems on.

Clearly, SAGE was a perfect manifestation of this functional structure. It embodied elements from two direction: first from the ideas that were inherited from the old biomechanical metaphors, and secondly from those that were elaborated within cybernetics and information theory, leading to the systems sciences. These sources, of course, were not independent of each other, as we have tried to show in this study. On the contrary, the nervous system was exactly what the latter theoretical tradition aimed at formalizing, interpreting it as a mechanical principle. Yet both the use of biological metaphors and the tradition based on the contributions by Wiener and Shannon do have distinct historical origins, albeit sharing, at the same time, also many points of contact. Now, in SAGE these ingredients seemed to have been given a solid physical manifestation. It was not an existing structure, the nature of which the ideas relating to biological metaphors and theories based on them would then attempt to explain. Quite the reverse, it was a purpose built defense system that was predicated on this very discursive tradition.

SAGE defined the functions a national computer system would need. Macbride identified those as follows: "a set of 'sensors,' or remote terminals, located wherever information from local sources is fed into the system," "a central 'exchange,' where information from local

sources is assembled, sorted, and stored and dispatched to those who need to use it,” “a central ‘control unit’ which generates programs and specifications for the use of information,” and “a set of ‘outlets’—again, remote terminals—located throughout the country and particularly throughout Government departments, to which orders, instructions, and commands are dispatched.”³⁶⁸ In a sense, then, SAGE was the first uniform nationwide realization of the ideas being developed in the discursive fields that aimed to find and codify the principles of automated communication systems. It was, in other words, the automated nervous system of the nation.

It was during this period that the most grandiose schemes for rationally managing diverse sets of transactions and processes by using real-time computer systems were proposed, constructed, and put into use. If computer systems resembled telephone systems in that both allowed multiple access, the former also made a break with the latter. Whereas the telephone system only enabled connections to be made, the computer system monitored the content of each message.³⁶⁹ This was something different from the telephone’s linear way of operation. Now information generated at many different sources could be fed, processed, and used as a basis for subsequent, perhaps completely automated, messages to be sent to remotely located devices. What is more, not only could a potentially immense system be controlled by computer, it could also control itself within certain pre-given limits. Computers, then, helped control become internalized into the system itself by directing message traffic throughout the system and by generating new instructions out of the data processed: it was the system’s instrument of self-governance. The biomechanical theme thus assumed a new, computerized identity. As Gerard Piel, publisher of the *Scientific American*, put it in the 1960s:

“The new development in our technology is the replacement of the human nervous system by automatic controls and by the computer that ultimately integrates the functions of the automatic control units at each point in the production process. The human muscle began to be disengaged from the productive process at least a hundred years ago. Now the human nervous system is being disengaged”³⁷⁰

The theme of an automated system of governance and control presented in the framework of a nervous system was mainly articulated in three distinct yet interconnected discourses. Let us now take a brief look at each of these fields. The first of deals with “automation” and methods of refining a self-correcting principle, applicable to management of the social; the second is the vision of a national scheme emerging out of the grid of local systems; and the third is a

perspective characterized by the end of ideology, thanks to the comprehensive national system with its political methods of self-regulation.

1) “Automation” was one of the most influential features that marked social development until the 1960s, when it became known as “technological change.”³⁷¹ Automation constituted the prevailing conceptual framework through which technology appeared as a political question. The notion, coined in 1947 by Del S. Harder of the Ford Motor Company and brought to broader public attention by John Diebold in 1952,³⁷² provided a way to conceptualize what was characteristic of a time enthused with concepts such as computers and control. It signified the substitution of mere mechanization by something qualitatively different, that is, by a process with self-regulatory characteristics.

The first public statement of the problems posed by automation and the computer revolution, entitled “The Triple Revolution—An Appraisal of the Major U.S. Crises and Proposals for Action,” was published in 1964.³⁷³ It spoke fervently in favor of managing the economic destiny of the nation, especially in connection with the immense power of the “developing cybernated system.”³⁷⁴ Within the same year, President Johnson established the National Commission on Technology, Automation, and Economic Progress, which issued its first report in 1966. It was through these and similar accounts that, at the level of national politics, the concept started to take shape of computers, while being one of the most important single sources for sociotechnical change in “the age of automation,” being also a means of controlling the consequences of this change and the attendant instability. That is, computers as a means to control their own effects.³⁷⁵ This view had already been introduced, though not elaborated further, in the proceedings of the National Advanced-Technology Management Conference held in 1962, in which the issue was presented in terms of communication. So, whereas “-- in spite of improvements in communication media -- managers of government and industrial organizations find communication an increasing problem --,” on the one hand, “technical breakthroughs in data processing equipment have provided an opportunity for development of integrated systems of information flow,” on the other.³⁷⁶ Thus, once information systems had become common, the computer assumed the same strategic role as the telephone earlier, as both the cause and the cure for increasing instability. Yet as a result of experience gained from the telephone, attempts were made to use the computers to harmonize its own adverse consequences far more purposefully than was the case with the earlier system. By appearing to be the major socioeconomic control devices, computers seemed to form the “essential stepping stones to the Great Society.”³⁷⁷

The issue was considered mainly in terms of the effects of automation on manpower, which constituted generally the framework within which the computer was treated as a national question at that time. One of the first statements that articulated this view was in the final report of the Senate Subcommittee on Employment and Manpower, formulated as a question: “Can the very devices which are playing an important role in present changes in manpower requirements contribute to the solution of manpower problems by adding to the accessibility and analysis of manpower data?”³⁷⁸ The question was motivated by a concrete proposal for an “early-warning employment-prediction system,” a computerized nationwide service for matching people to jobs. This Great Society project was included in the Automation Commission’s report, mentioned above, where it was depicted as a complex, hierarchical system to coordinate manpower allocation: “With local centers feeding into regional centers information relevant at that level, and these in turn feeding into a nationwide job and manpower bank, the service could provide detailed information on the manpower requirements of job vacancies and the personal characteristics of job seekers.”³⁷⁹ There was no need, however, to limit this or subsequently proposed systems to considerations of employment alone, the underlying idea being that a set of interconnected systems would ideally cover most aspects of society. These systems, with similar systems already in use in industry, would move society a step closer to a truly self-governing social whole in line with cybernetic machines based on the feedback principle. The “early-warning employment-prediction system” was clearly planned to be the first civilian SAGE, aimed at automating the self-governance of a crucial sector of the social, in which problems would be solved by unequivocal and formal techniques, not by politics.

This embodied and made concrete the idea of how “computer-caused problems are met with computer-based solutions,” as Macbride put it in 1967.³⁸⁰ Computer technology facilitated new quantitative approaches and planning schemes for forecasting and coordinating societal processes: mathematical models of these processes began to be used at the federal level along with new computer and management information systems and the contribution of physical and social scientists who had been integrated into American public policy.³⁸¹ The ultimate vision was of a social structure that could maintain and control itself, to a point, with the help of computers. By their availability, so it was thought, it would be possible “to spot trends long before they would otherwise be visible, to carry out the necessary discussion and to develop policies before the need for action develops.”³⁸² This was not a depiction of a state to be reached sometime in the future but of a mechanism which, practically speaking, was already there; it was only the manner of proceeding that was open to discussion. All the necessary technical devices for social self-regulation were already in place, it was believed, and now it was

only a question of how they would be connected together and assembled into a whole. The local systems already developed constituted the crucial precondition for this structure.

2) The evolution of local government computer systems was, after its initial disorganized phase, rapid and comprehensive. One of the early governmental systems was the New York Police Department's "CORRAL," which went into operation in 1965. It was a computer surveillance and detection system aimed at identifying traffic offenders and stolen cars on the streets. Once the computer recognized the license number that was fed into it by a police team stationed on a busy highway as one of a "wanted" vehicle, it reported the match back to the team who, then, sent the information to a second police team further up the road, which stopped the vehicle. This was a starting point for the planning of a "total system," in which the computer would not be just an operational tool but rather become a means for integrating the functions of the whole New York City Police Department, according to Captain Adam D'Alessandro of the Planning Board of that Department.³⁸³ Yet even this "total system" marked only the beginning of a remarkably large-scale project wherein all local information systems would merge into each other and form an immense network for the Federal Government. Although out of step with political tradition, this future loomed in the distance as the way to the Great Society. As it seemed in the late 1960s, "the future utilization of a vast centralized computer system encompassing in some respects virtually all of the ferment of the local government systems, and, to a lesser extent, most big commercial systems, is as probable as the use of its decentralized alternative."³⁸⁴

What would best serve as a model for this national computer system? Although SAGE naturally set the pattern for future real-time systems, it seemed to be too purpose built to suit as a model for a system with a necessarily more unconnected and heterogeneous structure. This is because the national system would be assembled out of existing arrangements and in response to a more complex situation, whereas SAGE had been built as an individual project in response to a well-determined task. At this point, the Bell Telephone System was revived as a paradigm again.³⁸⁵ What was of interest here was how a balance was achieved between the functions of existing individual companies and the management of the network which integrated these units into a whole. In the Bell System, the innumerable subsidiaries throughout the country operated with considerable autonomy, while the AT&T, as the owner of the companies, took care of technical aspects and ensured compatibility between all these subsystems.³⁸⁶ This solution seemed to point the way for the emerging national system, too.

It became evident in the 1960s that computer systems were not limited to a few specialized applications, but were bound to permeate every part of society. The line of development from a computer solution for a specific problem to a whole range of practices, discourses, and institutions enabled by a computer implied the establishment of a new framework for thought and action in the midst of the communicative relationships largely based on linear telephonic assemblages. The computer, thus, like the telegraph and the telephone previously, was not only an auxiliary device but rather a precondition for modern society and for the communicative practices characteristic of it. It was recognized that one had to acknowledge the reality and constitutive power of the computer, especially in the form of large-scale digital computer systems, and “the inevitability of their evolving into a unified national system affecting every important socioeconomic area of our lives.”³⁸⁷ In the computer’s everyday use, then, a relationship to the ontology of communication opened up: out of the basically mundane and repetitive routines of gathering, storing, classifying, and comparing information evolved a network of ideas and practices that was seen to be essential to society. It was within this framework that the growth and expansion of computerized relationships and processes could be seen as part of an integrated system. But, on the other hand, the spread of computerization formed the meaning-content of the integrative perspective; it could not be distinguished from it because it constituted exactly what this general system “was.” This framework, furthermore, did not originate in the technological sphere alone, as if consisting only of rapid computerization and automation, seen as a process that reduces to specific devices and machinery. Rather, it was the result of a mutual articulation of technological systems and discursive practices. This led to a concept of politics as traditionally understood coming to an end.

3) Within the later cybernetic tradition, the “political sphere” as such seemed to be amenable to systematization and formalization. Every social and political institution was given a specific function in line with concepts based on mechanical models of the nervous system. Thus,

“a constitution is a program defining the nature (activities) and interrelations of the formal loci of political power. The outputs of the political system are enforceable laws defining the interrelations of persons and groups within the society. Demands on the political system are communicated by petition, by representatives of organized groups, by publicists, and other means including elections. Legislative decisions are made in the form of laws and resolutions. The executive puts the laws into effect and the judiciary serves a control function by comparing specific individual actions with the law that programs such action.”³⁸⁸

With the political sphere being only one area of the social amenable to systemization, politics appeared to be a mechanism with a particular role for receptors, controls, and effectors, inputs and outputs. What is noteworthy is that relationships in the realm of politics are realized here entirely on a formal basis. In other words, all relationships within this domain are predetermined in their functional characteristics, with no room for other relationships. Basically, then, it is a closed system in which, if the desired state can be agreed on (which is, of course, the endless task of politics), would maintain this state by comparing information about the overall behavior to the given norms and by making any corrections necessary. What is more, the whole process would be carried out without disputes or negotiations, thanks to technological rationality.

The belief that mathematics could separate administration from politics became a hallmark of the “end of ideology” in the late fifties.³⁸⁹ Political decisions were evaluated in terms of efficacy, with the scientific approach setting the standards for success. The underlying presupposition, no doubt, derived from the vision of a perfect self-enclosed machine. Within a total system of this sort, overall performance could be stabilized in spite of outside disturbances. Here, the influence of these disturbances, constituting a potential risk to the functioning of the system as a single determined whole with a distinct identity, has been actively neutralized by the feedback principle, which maintains fixed order in changing circumstances. In a nontrivial sense, this has been the aim of numerous influential attempts at social planning and system engineering since Taylorism at least. Throughout history, projects to develop a perfect social design, predicated on a presumed set of invariant principles that, “if represented in community rules, would create a self-regulating social life, free of conflict and change,” (namely politics), have occurred.³⁹⁰ Especially during what has come to be called modernity, these projects, accompanied by and articulated in connection with a scientific authority, have assumed an immense role and brought about profound effects on how the social has been thought of.

This is perhaps the culmination of the history of communication as an object and means of governance, as the explicit undoing of politics, in the sense of seeking principles of control that would not admit several interpretations, turns here to politics itself as an institution. Despite the original reservations concerning the applicability of cybernetics to social problems, this view already figured strongly in Wiener’s writings and highlighted society as such as the focus of thought. Wiener considered cybernetics precisely as a general social theory, not as a specialized discipline: the concepts of communication and control revealed the common principles which can be found in humans, machines, and whole communities, too. They laid the

foundation for the universalization of the message, that is, of information content separable from the communicative context. In this sense, cybernetics provided a general and integrated theoretical framework for thinking not only about communication, but also of community in itself. Here it followed the discourses that aimed to conceptualize the history of modern communication systems into general formulations and models, which are always at the same time comments on society itself and its conditions. Although extremely complex in comparison to what Taylor could have imagined, communication as a pattern continued to be thought of in terms of not only a structure but also a perfectly rational one that, so it seemed, brought politics to an end. Not until about twenty years later was a discursive genre established that emphasized that communication engenders relationships and processes that defy rationalization, and moreover, that communication, by its nature, is not something that can be thought of or captured as a whole.

The idea of society as a closed circuit found cogent expression in Wiener, who considered society essentially as a communication system. He held that “society can only be understood through a study of the messages and the communication facilities which belong to it --.” The stance that communications are the integrating element of society, the cement which binds its fabric together,³⁹¹ was repeated in various works influenced by Wiener’s ideas. If communication was the cement that made organizations and societies, as Wiener put it, and if it was inherently unequivocal, which was what the cyberneticians had to presuppose in order to pursue the laws of communication, it could in principle be codified into a consistent set of rules, which was exactly what the cybernetic project produced as its theoretical legacy and what bound this project to the tradition followed in this study. Thus, according to Karl Deutsch for example, these rules, although far more complicated in social communication than in machine communication nevertheless conformed to the same grammar.³⁹² Society, in this project, became a machine, and in contrast to the machine analogies in Taylorism, was capable of continuous self-correction. In this sense, it was more an information system than a machine proper.

Communication, here, was considered in the light of a functionally consistent system. This system, which could be defined as “an organized collection of interrelated elements characterized by a boundary and functional unity,”³⁹³ was not characterized by continuous questioning of its conditions of existence and purpose but, on the contrary, by its “essenceness,” the immutable principle organizing its way of existence being taken for granted. It was encapsulated in the concept of negative feedback, which was exactly what made possible erection of the theoretical frame of analysis within which communication became an

action susceptible to automation. Thus, communication appeared to be an action implementing in a reflex-like manner the functional unity of a system and receiving its meaningfulness from its pre-given purposes. In this respect, communication in cybernetics assumed its strongest system theoretical expression in the set of articulations in which thinking about communication was linked to the concept of a system and in which its functioning was conceived through the category of law. For communication became substantially a mechanism for maintaining the system's state of equilibrium. That mechanism was ideally completely automatic in a self-enclosed way, an effect of the predetermined purpose of a system; communication did not have a part of its own in the formulation of the purpose, only in its implementation. Communication appeared in this line of thought as a control function, and the servomechanism was its most telling mechanical exemplar.

Managing Decision-Making

In the course of the development through which computer systems came to form a general framework for communication and control, certain discourses emerged centering around these systems as managerial tools. These discourses sprang also from changes which occurred in business organization and in the environment in which businesses operated. As organizations grew in size and complexity, resource coordination and allocation had to be rethought because the Taylorian solution based on "diagrams and maps" would no longer be adequate. More detailed and timely information was needed in order for management to keep up with complicated and rapid organizational processes.³⁹⁴ As a result, the systems approach was widely introduced into managerial practices after the war as a response to the shortcomings of Taylorism, especially as the systems way of thinking met the needs and aims of technocratic managers and social planners. The reason for the rapid spread of the systems approach resided in its potential, as seen by the enthusiasts, to govern complex sociotechnical systems, the functioning of which could be controlled and monitored through computers.³⁹⁵ In what follows, we will not provide a systematic account of the initiation of discourses resulting in the establishment of disciplines such as management science and information systems. Rather, we will show the general line of development along which ideas based on cybernetics and information theory were instituted in the managerial practices, systems, and discourses, in the framework of what came to be called "management-by-computer."³⁹⁶

Systems sciences, operations research being the foremost of these, created a conceptual basis for the thinking and functioning of organizational strategy in terms of rational, formal models.

Operating with a set of standardized tools, they created a language of their own that linked numerous institutions, technical arrangements, and discursive practices with the shared objective of quantitative problem management. Faith in a political and unequivocal system of governance by mathematical means not only made systems theorists part of the tradition of administration of and by communication, but also marked its end because these means internalized control as part of action.³⁹⁷ Control was now an immanent quality of the self-performance of communication. As the ideal of mechanical governance increasingly lost favor in the 1970s, the idea of control being immanent to communication remained, albeit in different forms.

Operations research formulated an academic language to translate problems to be tackled into technical issues in line with the formalized world of the discourse that centered on the idea of an automated control system. In 1951, Philip Morse and George Kimball synthesized methods used during the war so that they could be applied to business problems.³⁹⁸ Their work laid the ground, along with the first textbook by C. West Churchman, Russell L. Ackoff, and E. Leonard Arnoff,³⁹⁹ for the institutionalization of a new theoretical line of thought which converted military techniques into standardized ones for civilian use. It aimed at formulating a “scientific basis for solving problems,” replacing mere “experience,” “intuition,” “opinion, vague generalities, or lore.”⁴⁰⁰ Thus, the “other” of scientific problem solving technique was not unlike that of the Taylor System. Indeed, what projects that sought to formalize managerial methods all shared was the attempt to substitute inefficiency and disputes originating from subjective beliefs and inherited habits with a standardized, systematic approach based on “scientific” procedures. For this reason it has been argued that no meaningful line of demarcation can be drawn between operations research and scientific management or between scientific management and management science.⁴⁰¹ Common to all was a persistent search for quantification and systems in management.⁴⁰²

Some differences, however, can be identified. Whereas the Taylorists saw a system as composed of isolated operations and chains of operations, operations researchers viewed it in terms of interrelated mathematical quantities and relationships. The systems metaphors that permeated operations research were appropriated from information theory and cybernetics, in which systems were fundamentally communication systems and communication information expressible in mathematical form. Moreover, the system, which for the Taylorists consisted mainly of the accomplishment of a set of tasks, appeared to operations researchers rather as a way to solve problems.⁴⁰³ In short, then, although operations research was a response to similar problems to those in Taylorism, it implied an altered concept of a system. Now, the

system was viewed as 1) a thoroughly interconnected pattern which 2) consisted of mathematical relationships, and 3) concerned problem solving. While retaining the whole as consistent, and thus maintaining connections to the historical figures of speech relating to communication systems, it differed not only from the Taylor System but also from the system of cybernetics in a crucial way. In cybernetics, the system, although equally mathematical in its nature, remained contained within a realm of expert systems, broadly speaking. In operations research, however, the processes and relationships being optimized were no longer those of more or less limited systems but those of the social in itself. Therefore, they came to cover all kinds of managerial problems, provided that they were operationalizable in principle.

Concurrently with the development of computer technology, operations research was institutionalized within the corporate domain as experts hired originally on a temporary basis started to be appointed as staff specialists with a permanent assignment. The growing capacity of computers to process large amounts of data encouraged establishment of internal departments to rationalize planning for a whole organization.⁴⁰⁴ With increased speed and improved efficiency, computerized systems processed more operations and did so more rapidly, creating new information that was utilized to solve other problems, thus continuously stimulating the whole process. In this way, computer systems themselves, while performing their operations became a source of new information already in machine-readable form that was used as a basis for new operations. Here, the crucial point was that, because of the automated systems, information could be used about information, not only about things.⁴⁰⁵ Thanks to computerized systems, information was able to become autonomous to a point, in that it established a domain wherein information worked on information according to rules that were themselves, from an operational point of view, nothing other than information. And while it was on this domain that new management practices attempted to capitalize, its coming into being was largely due to systematic and intensive subjection of communication to administrative procedures along the lines followed in this study. Therefore, the domain of information, understood in this sense, was a result of historical developments in which communication has played a double role both as an object and a means of action.

The introduction of special departments for organizing and managing corporate information systems created a need to develop and systematize practices that constituted an ever-growing part of management in large organizations. This led to development of institutionalized practices to organize information so as to facilitate managerial decision making. In contrast to Shannonian information theory, the information systems school, as well as the later systems approach in general, was concerned with the meaning and effect of information. This approach

broadened the linear communication model of Shannon by dealing “not with one communication link at a time but with a large number of them simultaneously, not with binary communication relations between a single sender and a single receiver but with many-valued relations among a possibly large number of communicators, not with one-way processes of communication but with interaction and complex circular flows.”⁴⁰⁶ It was through this tradition, it can be said, that the theoretical legacy of cybernetics and information theory was institutionalized as a technology of governance in the framework of an organizational structure. The organizational structure in question appeared, then, largely as a circular information system, with management information systems as its center. Therefore, the later systems approach as embodied in practices to systematize technologies, systems, and theories in terms of management was, to a great extent, a continuation of the cybernetic tradition in the social domain, as opposed to some limited expert systems the scope of which Wiener himself hesitated to exceed.

The growing use of operations research with its mathematical techniques for solving managerial problems intensified in the 1960s, with AT&T becoming one of its major corporate users. It was largely the faith that managerial problems could be scientifically formulated, modeled, and solved, thus eliminating intuition in decision making for standardized routines, which encouraged the use of operations research in business.⁴⁰⁷ Spreading from military projects into government and industry, with the help of the computer it rationalized and centralized administration in the Department of Defense under Robert McNamara, and eventually every federal agency and department, especially through Lyndon B. Johnson’s Great Society programs.⁴⁰⁸ This was in line with the way Herbert Hoover had attempted to plan the economy and coordinate interests by using apolitical, scientific experts as mechanisms to achieve his “associative state,” and the way associative institutions were converted into a regulatory state during the New Deal.⁴⁰⁹ The Great Society programs utilized the systems approach in seeking to introduce the mission oriented, not discipline or department bound, approach applied with good results in the earlier massive national projects.⁴¹⁰ These programs, then, can be regarded as a way to organize the social by scientific methods, being to this extent an heir to the approach formulated by Taylor.

As far as business organization was concerned, new fields of knowledge and practice were brought into being. Management science, for instance, a new discipline emerging largely from the theoretical foundation laid down by cybernetics and information theory, on the one hand, and by experiences obtained from the 1950s’ large national projects such as SAGE and Atlas, on the other, in its emphasis on communication systems and organizational structure

established itself as an independent branch of science distinct from the mechanical models of operations researchers.⁴¹¹ Yet the conceptual terrain out of which management science emerged, along with parallel and overlapping discourses on questions of governance, was influenced by the same ethos of control that had permeated a whole range of distinct disciplines. Therefore, these discourses were closely tied from the start not only to cybernetics but also to the biomechanical metaphor. Let cite three prominent theorists of the field, namely, Jay W. Forrester, Stafford Beer, and Herbert Simon, each of whom wrote seminal contributions on thought about communication in the age of the computer from the perspective of administration.

For an information system to be practicable, relationships between its parts have to be optimized to minimize the sources of error in the system. This was achieved more and more through a model based on the feedback principle. According to Jay W. Forrester, the feedback principle in information systems is involved when “the environment leads to a decision that results in action which affects the environment and thereby influences future decisions.”⁴¹² In other words, feedback concerning the functioning of a system determines the direction of further measures. He launched a program based on a feedback-system perspective for the design of industrial and social systems, which he called “industrial dynamics.” Forrester likened the planning of a technical system for desired performance to the planning of policies for social systems, and hence the task of a manager or politician to that of an engineer.⁴¹³ Certainly, this program needed the whole history of control of and by means of communication as a precondition. Forrester seemed to combine reliance upon formal methods with the idea of the feedback principle into a consistent system dynamics on the basis of experiences learnt from nationwide system projects. In the hands of Forrester, a social system resembled SAGE, with feedback loops being generalized as the hallmark of all social systems. Whereas in SAGE surveillance information was fed into the computer center and compared to preprogrammed models which determined the corrections to be made when needed, in system dynamics a feedback mechanism revealed whether a social project was moving toward the intended goal or whether it needed any adjustments.⁴¹⁴ The essential structure of social systems, being abstracted from complex processes, could be modeled, processed, and manipulated by the computer.

In the 1960s it became clear that what was considered as the guiding center of a communication system was, in fact, a whole hierarchical universe of its own. It was seen as being composed of a number of interlinked subsystems, between which information flowed along both vertical and horizontal lines and was processed on several distinct levels of

hierarchy. Stafford Beer, one of the pioneers of the information systems tradition, developed a theory of any viable system, based on biological connections. His model consisted of a complex structure of interrelating groupings of several distinct subsystems. Beer systematically elaborated the view of a firm as an organic information system by “tracing the physiology of a control system in terms of a model of the human nervous system --.”⁴¹⁵ Instead of remaining at the level of neurophysiology, however, he aimed ultimately at moving on to neurocytology in terms of the level of detail to be taken into account.⁴¹⁶ He saw firms, understood as information systems, as instances that collected, stored, processed, and generated quantitative information about the operational world. Starting from the general cybernetic framework of control, he assumed that “control is what facilitates the existence and the operation of systems.”⁴¹⁷ Yet unlike in the simple mechanical model of the nervous system, Beer developed the idea that the control function was spread throughout the system, not located in one place. Moreover, and related to the former point, he held that hierarchical control was only one dimension of control, not its only type.⁴¹⁸ These should not be seen as deviations from the classic nervous system model, however, but rather as its more rigorous and detailed application to management theory than before. In fact, in Beer exploitation of the biological model reached its peak, as it was at his hand that its potential was exhausted through a meticulous, scrupulous, even pedantic systematization in the service of management science.

This is not to say, however, that the conceptual formulations that were mutually articulated with communication systems throughout modern history would be gradually given up. On the contrary, they remained as a founding resource for thought, as evidenced by Herbert Simon. Building on Chester Barnard, Simon, who has been called the leading post-Taylorite theorist,⁴¹⁹ developed theories of human and bureaucratic rationality that sought to go beyond scientific management. However, by sticking to the premises of centralized power and specialized operations, he undoubtedly remained within classic Taylorism.⁴²⁰ According to Simon, the effectiveness of bureaucratic rationality depended on communication of authority. Once successfully set in place, “the organizational values and situation,” not “personal motives,” determined “the one and only one ‘best’ decision.”⁴²¹ Like Barnard, Simon saw organizational communication largely through the idea of the nervous system. Organizations were portrayed as kinds of institutionalized nervous systems that divide, routinize, and bound decision-making process to make it manageable.⁴²² It was a two-way process in which information flows both to a decision making center and from it. Although communication process take place at many organizational levels simultaneously, the totality of this mechanism ultimately arranges events into one whole. Simon admits, it is true, that formal communication channels constitute only one part of the total network, but this part is absolutely fundamental:

informal communication is only a supplement to a formal one.⁴²³ It was the formal hierarchy of an organization, not unlike that of a nervous system, which determined the nature of communication.

In his second phase, one influenced by developments in cybernetics, computer science, and artificial intelligence, Simon aimed at applying the functioning of the mechanism based on circular structures to human thinking and problem solving in general. In this project, he used computer metaphors to explain information processes common to both computers and people. According to Simon, both were controlled by the same laws of rationality, and therefore, both were similarly programmable. What this meant for the theory of management was that management appeared essentially as a feedback mechanism. The manager became the central node through which information circulated and by whom communication flows were structured and controlled; it was the responsibility of the manager to ensure that the action taken met the goals fixed. Managers, in this scheme, “were corporate servomechanisms adjusting behavior by communicating deviations from goals,” as Waring put it.⁴²⁴

In this way, the systems theory, as well as discourses inherently related to it, operated, as did its predecessors, within the framework of corporate capitalism which determined the position of communication as an object of analysis. Because of this precondition of relevance, systems theory made organizational goals, practices, and relationship appear to be constants inherent in nature.⁴²⁵ It did not question these relationships, but worked on the basis of them. Rather they designated what allowed systems science to become a distinct management theory and technique. In this task, it aimed at formalizing decision making by using scientific methods and mathematical language. It was faith in formal techniques that took Taylorism, according to Waring, to a logical conclusion in the systems approach.⁴²⁶ Of course, there was an apparent connection between the increasing use of mathematical tools and the fact that computers could efficiently handle numerical information. Therefore, ever more multifarious processes and relations began to be given an exact mathematical representation. So, while the mathematical form of information made digital computing machines possible, the increasing power of the latter lead more and more problems to be analyzed by mathematical tools. What marked discourses during this era of the computer, at any rate, was faith in the applicability of “automation concepts,” together with “electronic systems,” in administrative control.⁴²⁷

Self-Mechanisms of Communication

Establishment of systems theory as the founding framework for discussion of communication and control, and the computer becoming a precondition of modern social life, together laid the foundation for the discontinuity and displacement of the contemporary communicative constellation, reflected in both discourses and techniques. This emerging assemblage combined disparate communicative events into its circular movements, on the one hand, but it consisted of these events alone, being nothing external and prior to them, on the other. Cybernetics and systems thinking tended to capture all communicative events into their recursive circles and thus to defy the ineluctable yet slow process of the disintegration of order and dispersion of communication. They made, it can be said, the collective process of social development appear as inherently structured and, thus, controllable by rational means. What ultimately unified the whole tradition of communication seen as both an object and a means of administration is this perspective of control. This perspective was not only the common thread within this history of communication, forming a way for the theorists to conceptualize communication in terms of a whole, but also forged a relationship between this whole and the limits of communication. Let me finally try to characterize the emerging shape of communicativity in relation to what we have discussed above.

The taking shape of several discursive and institutional practices that exploited the heritage largely based on the work of Wiener and Shannon can be seen as having instituted, in diverse ways, a new conception of communication. At the same time it is clear that these distinct theoretical discourses on communication were articulated with each other in the framework of a society that was becoming increasingly computerized. These discourses constituted not only the conceptual terrain where this computerization could be thematized, but also, insofar as they resorted more and more to formal systems of representation, the source of quantitative information that encouraged and intensified the very process of computerization. Large national projects as well as business specific schemes engendered, besides the technical environment, new discursive forms which buttressed and legitimized similar projects in the future.

If cybernetics and information theory laid down the theoretical framework within which communication was conceptualized, three separate yet related lines of influence, taking shape within this framework, were central to the formation of the new communicative constellation. While irreducible to any single idea, practice, or technique as such, the convergence and codevelopment of the emergent science and technology of digital computing, institutionalizing

theory and research into communication, and the discipline of operations research along with management science and management information systems set the stage for the displacement of the communicative assemblage. This displacement, although inevitably heterogeneous in nature, brought about, to a certain extent, a shared conceptual terrain on the basis of which communicativity could be approached in a new way in its diverse manifestations. It yielded the same conception of communication, fundamental to which was the idea of a number of hierarchical levels and controls which, taken together, constitute a complex information system within which the functions, meanings, and effects of an individual channel could be identified and analyzed. It was this aspect that came to dominate the communication research.

Modern communication theory was formulated within the same discursive field in which the cybernetic perspective was introduced to the social sciences. A most important conduit through which this took place was a series of conferences arranged between 1946 and 1953, sponsored by the Josiah Macy, Jr. Foundation. Working within this discursive environment, a sociologist called Paul F. Lazarsfeld, who was one of the initial members of the Macy group but who subsequently dropped out, articulated, with Elihu Katz, an approach to communication that laid the theoretical basis for what became American communication research, later renamed as mass communication research.⁴²⁸ It was the empirical-quantitative approach of this program that formulated the conception of communication that became the standard view at least until the 1970s. The vision and perspective set up here presented mass communication as a new unifying force, analogous to the nervous system, which reached every single individual.⁴²⁹ As the leading paradigm under which communication processes were studied was taken from the practices of natural sciences, narrowly defined, it was thought possible to independently measure communicative processes and reliably demonstrate their causal relationships, much as in a laboratory environment. The process of communication was held as being divisible into its smallest natural components and the elements isolated in this way could be named, their respective roles and functions determined, their interrelationships conjectured, and the whole process given a cogent scientific basis.

Upon further scrutiny, the treatment communication has been subjected to here does not constitute a break in the way the subject has traditionally been approached in scholarly practices. On the contrary, the same type of methodological approach that found sophisticated formulation in Taylor has only been redeveloped here according to modern scientific standards under the influence of cybernetic discourse. If Taylor discovered the irreducible prime particles of a circumstantial performance, the standard view of Lazarsfeld and Katz sought a generalized structure for any effective communication process. So, whereas Taylor divided a given work

process into its smallest relevant elements, here the same has been done to human communication *in general*, regardless of the context in which it occurs. Thus it also simultaneously extended Wiener's conception of communication whilst following the same *ethos* and the idea of science.

Yet there is no doubt that it was the Shannon and Weaver paradigm that unified American communication research. To a great extent, the whole field from the sixties to the eighties was based on the conception of communication to which Shannon gave an influential theoretical form, and for which he bequeathed the perspective of linear causality. This encouraged subsequent, relatively straightforward research programs, which attempted to identify and isolate the linear impact of one or more variables on another variable. The point to be noticed here is not, however, so much related to the linear logic of the model, or to any single constitutive part of the communicative constellation, but rather to the underlying concept of the explainability of everything relevant to human communication, and particularly media effects that were of interest at the time, becoming common. It opened up a theoretical perspective within which effective relationships could be identified and the structure of a communicative process, once isolated, formalized. Yet, just as theoretical contributions create, enable, and open up, they also dissolve, efface, and conceal. What this orientation missed in particular, so the critique held, was the collective nature of communication, the fact that the positions of sender and receiver are not isolated and independent nodes which define the communicative situation, but on the contrary are conceptual entities that are defined already by and in communication.⁴³⁰ It is not accidental that the tradition of functionalism that gained a strong footing in social sciences during that time was criticized for similar reasons, as it constituted one of the foundations for the rise of communication as a theoretical concern.⁴³¹ The perspective of a functional system did not, however, provide the conceptual framework for thought about communication, pure and simple, because it was, in the last instance, communication itself from which the idea of functionality can be derived.

System scientists retained a close relationship to research going on into communication systems, which was one cause for systemness emerging as an object of systematic investigation in social sciences. Yet the "being" of the communication systems cannot be separated from the scientific theories and conceptualizations they presuppose as practicable systems; it was precisely these kinds of theory that formed part of the conceptual texture of cybernetics. Thus, Peter Galison, for instance, has pointed out that the impact of the system perspective on social sciences which was particularly strong in the 1940s and 1950s had its origin in the turn-of-the-century networks of telephony and power.⁴³² The Macy conferences,

held at that time, introduced the cybernetic perspective, with its inherent relationship to communication engineering, to social sciences. If the notion of system did find inroads into the conceptual framing of broader social questions independently of systems sciences, it was precisely the perspective adopted by cybernetics, however, that subsequently permeated a wide range of social sciences and became used in contemporary social and political rhetoric. During this process, a system became a dynamic concept and lost its static character of hierarchically arranged elements with an intrinsic nature.

While communication research largely adopted the linear interpretation of the Shannon and Weaver model, a number of different disciplines from organizational theory to political theory and social psychology started to analyze social groups as communications systems characterized by a multiplicity of feedback loops.⁴³³ Moreover, along with the shift within the cybernetic movement itself, many theorists influenced by the ideas being developed in this movement turned to the concept of feedback instead of to that of homeostasis, as did, for instance, Karl Deutsch.⁴³⁴ What the diverse theorists and disciplines shared was the same information-processing metaphor that differentiated a system from its outside by means of an inbuilt mechanism of control. In the process of cybernation of communication, so to speak, the mechanical metaphors through which it used to be conceived were replaced by new ones. Though they bore traces of mechanical technology, too, what was essential was that they exploited the new world of computing technology in that the relationships they conceptualized were logical, not physical. The world portrayed by the systems approach was based on a view of the mutual internal relationships of nodes of communication, the overall structure of the continuous exchange of these dispatched messages being organized by the principle of self-regulation. This view of a system correcting its own functioning took the place of the previously held view of rigid mechanical performance. Gradually leaving mechanical metaphors, communication now entered the sphere of influence of information system analogies.

The inevitable consequence of systematic recourse to formal systems is that the more the technical or methodological aspect was emphasized, the more attempts were made to integrate the human element into the system as component part as it implied a factor of insecurity. To control this element, the machine metaphor still provided a useful tool; on the other hand, it was within this very conceptual framework that human behavior became seen as problematic in the first place. In order to overcome this strange situation, there was an inclination—especially among systems scientists and practitioners—to emphasize an unambiguous formalism, coupled with refined conceptual tools.

The reformulated machine metaphor, that is, the information system metaphor, provided a model for thinking about and planning the social in a similar way as the previous metaphoric conceptualizations did in their time. Especially, the idea of a computer system played an important role in both understanding and organizing the social. In fact, the computer system, it was thought, tended to determine the form of socioeconomic planning systems.⁴³⁵ This is not, of course, surprising, as many of the key concepts that have come to account and symbolize some central aspect of society can be traced back to communication and transportation systems. Like the telephone system earlier, the computer system seemed to provide a model for the entire organizational structure of the social, with the model being understood at this time largely in terms of an information system.⁴³⁶ The computer, then, was used to build, in the words of an air force colonel, “a servomechanism spread out over an area comparable to the whole American continent.”⁴³⁷

As for organizations, the information systems view had a powerful effect, as many organizations increasingly came to rely on information systems.⁴³⁸ In the 1960s, Ulric Neisser grasped the profound influence the metaphoric use of the computer had come to have in public intercourse. By referring to the impact of cybernetics in several notions such as “the brain is like a computer,” “man is like a machine,” and “society is like a feedback system,” he brought out the increasing role of the computer in contemporary sentiment.⁴³⁹ It is clear that the displacement in the communicative constellation did not imply just some adjustments in technological development or in theoretical thinking: it changed the scope of what was possible within the social. It forged a new relationship to conception of what was possible and what was not and in so doing updated the ontological presuppositions of the age. Thus, the computer and related discourses and practices did not operate only on an instrumental level. Rather they introduced a new conceptual framework through which novel ontological conditions were consolidated and intensified. Surely, although the emergent constellation could not claim any independent consistency outside of its case-specific realizations, its influence nevertheless was very concrete in contemporary practices in the administrative use of communication and the administration of communication.

As it was agreed that an information system was necessary for management to carry out its primary functions, the system itself was conceived fundamentally in terms of cybernetics, through which the feedback structure became the model for the system. Even the classic cybernetic terms, along with those derived from communication technology, remained in use for framing problems of information management. Thus, “the senders and receivers [in an information system],” as was stated at a conference held in 1962, “must be ‘tuned,’ and there

should be a minimum amount of 'noise' in the channel."⁴⁴⁰ In fact, the perspective of information systems seen as feedback structures was not only fairly coherent, it was also very widely adopted. It constituted the conceptual framework for many contemporaries through which they could explain to themselves what was going on in their societies. Jay Forrester encapsulated this view by proclaiming that "everything we do as an individual, as an industry, or as a society is done in the context of an information-feedback system."⁴⁴¹

If at the beginning of the cybernetic line of research, information handling became a more central problem to systems analysis than handling of energy, now questions relating to transmitting, storing, and processing information began to be connected ever more directly to institution of the social: they were seen as properties characterizing profoundly the social as such. In this framework every system was treated as an information system that opened up a whole new territory for methods of control. The convergence of computer technology and systems scientific methodologies seemed to finally provide the necessary means for overcoming politics in governing the social. "Given the resources of modern technology and planning techniques," stated Macbride, "it is really no great trick to transform even a country like ours into a smoothly running corporation where every detail of life is a mechanical function to be taken care of."⁴⁴²

This constituted, then, the new whole within which communication became conceptualized. It had four main characteristics. It had the capacity to, first, sense and monitor its environment; second, relate this information to the operating norms that guide system behavior; third, detect deviations from these norms; and finally, initiate corrective action when discrepancies were detected.⁴⁴³ What is of interest here is that communication became a function of this whole, which defined its nature and its identity. It could not have been thought of independently of this whole, since it was only because of its functionality that communication appeared as communication, that is, as an object and means of administration. On the other hand, this whole did not exist prior to the communicative functions, because it was nothing other than the "whole" of these functions, the "totality" of their taking place. It was held that the information processing system was discovered rather than constructed, implying that the principle resided in all natural systems. If it in fact replaced some traditional modes of human interaction, this was because of conscious utilization of an innate principle of nature; in other words, it was a natural evolution of communication itself. Thus, it did not impose any external qualities on communication; on the contrary: it "was" only what this communication represented. Order emerged from ongoing communicative processes themselves, not from any unchanging set of artificial instructions. Given this, despite the discontinuity and displacement

in the communicative assemblage which determined what communication “is,” it did not lose anything of its “naturalness.” The whole—the model of equilibrium between communication and its environment—retained its close relationships to the origin of communication or original communication. Thus, if a new relationship to its conditions opened up from communication itself, these conditions appeared as profoundly original, it was only their form that changed.

Thinking about communication has always been dependent on a totality that has been the source of its identity. Communication, as such, could not have been conceived without this kind of whole, for it is dependent on the discourses and relationships that form a context for its becoming an object of speech. On the contrary, the nature of communication in being relative to its conditions of existence is what made it conceivable in the first place. As is known, these conditions, understood as a whole, were seen in terms of a system in the tradition in question. It was exactly the systemic nature of communication therefore that allowed it to enter into the sphere of control. Now, it seems that the character of this system underwent a change as we move to a new constellation of communicativity. It made communication appear in a form that could be managed by numbers, as Waring has put it.⁴⁴⁴ In fact, one can go further and propose that communication, here, was nothing other than numbers, a system of numbers. In a similar vein, the intrinsic nature of communication, revealed by and within the theoretical framework, is what enabled it to be controlled. Whereas this nature was earlier associated with the concept of a system, now this system was thoroughly mathematicized. Mathematical relationships, as the rational basis for control, thus became the immanent relationships of communication itself.

This is also a conjunction that helps us to see systems approach’s relationship to the question of the limits of communication, which continued to be conceived in the framework of an original whole, whether in an animal or in a machine, as the subtitle of Wiener’s *Cybernetics* proposed. Systems thinking conceived communication as a mechanism that was constitutive of the preceding whole (nervous system, machine, community). In this tradition, the whole of communication was always an immanent totality, because it is self-sufficient and does not include any relationships to anything else except the mechanism of exclusion. This mechanism, of course, implies the existence of something (other) to be excluded, but this other assumes its form from the immanence of communication itself. For this reason, all the new departures relating to bringing communicative relationships themselves to the fore, instead of focusing on phenomena separated from each other, must be seen as subordinate to the concept of dominant totality. In fact, although it is correct to ascribe thought about communication itself to the systems approach, it was only after the dissolution of the formalistic program that communication could be thought of as independent of a constituting whole.⁴⁴⁵ This

development was linked with many contemporaneous processes, including the spread of microcomputers and computer networks and the proliferation of instances and relationships of communication, leading to a change in the whole communicative constellation.

A good example of the simultaneous tension between remaining attractive and becoming problematic to thinking from and through the basis of a closed whole was the Strategic Defense Initiative, which attempted to replace the idea of a semiautomatic system by a fully automated one. Although the large-scale military arrangements in question could not take into account the inevitably changing and unpredictable nature of real world situations at the level required, this state of affairs did not hinder the ascendancy of the computer as the central factor in both a high-technology nuclear shield and a vision of centralized command and control.

Generally speaking, however, an increasing tendency toward a decentralized system seemed to point the way for the future of communication. Large system projects since the 1960s, along with the development of computer networking and the launching of ARPANET, changed decisively the way complicated processes and dynamic organizations were approached. Moreover, in the 1970s the technocratic strand of management science lost much of its former appeal because of the American manufacturing crisis, and came to be replaced by “soft” techniques developed by Ackoff and Churchman.⁴⁴⁶ Hard mechanisms aimed at producing efficiency only veiled disagreements about values and goals which were never eliminated and the inevitable political nature of governance. Technique, then, is always indissociable from the political. Accordingly, a new communicative constellation, with a novel concept of administrative communication which opened itself up to the political more than previously, was brought into being, coming from the business realm. Thomas Hughes has depicted it, from an administrative point of view, as including “a flat, collegial, meritocratic management style as contrasted with a vertical, hierarchical one; the resort to transdisciplinary teams of engineers, scientists, and managers in contrast to reliance on discipline-bound experts; the combining of diverse, or heterogeneous, physical components in a networked system instead of standardized, interchangeable ones in an assembly line; and a commitment by industry to change-generating projects rather than to long-lived processes.”⁴⁴⁷ Basically, what is at play here is a change in the way a communication system worked. Whereas these systems, from the telegraph to voice telephony, were traditionally built top down; computer communication systems, by contrast, were constructed bottom up.⁴⁴⁸

Hand in hand with the development of new information technology, with its undermining effects on hierarchical structures now viewed as rigid and inflexible, a whole literary genre

criticizing hierarchical systems emerged. This cannot, of course, be called a direct causal relationship, for whereas the new technical systems and organizational forms based on them made up an object and a place for discursive investigations, these discourses generated new institutional practices and structures too. It is nevertheless at this stage that a change in perspective from hierarchical to horizontal communication occurred. This was largely because of two converging trends. Firstly, rigid corporate hierarchies were replaced by more flexible systems based on horizontal relationships. Secondly, improvements in information and communications technology facilitated decentralization whilst maintaining managerial control.⁴⁴⁹ As mentioned earlier in Chapter 4.2, the horizontal aspect has never been missing from the technical history of communication, but during this period it certainly came to the fore and paved the way for the concept of contemporary communication. On the other hand, centralized power hierarchies, although entering into a new era, did not vanish either. It is rather a question of a new power distribution in a constellation that facilitated horizontal relationships more and with different intensity than previously was the case.

The line of development in communications that could be construed as a comprehensible sequence from the early telegraph to the rise of microelectronics weakens in the age of information networks. This seems to be because these networks do not have any single model or functional dynamics. The information technology environment consists of distinct overlapping and parallel strata that cannot be unified under any single conceptual principle. Whereas the systemicity pertaining to the telephone system, for instance, still had identifiable boundaries, current computer networks are in a state of constant alteration with continuously shifting boundaries. This is why, in the age of computer networks, a centralized system could no longer provide a model for an experience of the changed conditions of what was going on. Although centrally directed systems did not lose their social position—rather the contrary—they could no longer furnish a conceptual model for thinking and speaking about society. This state of affairs did not, however, prevent continuing use of the biomechanical vocabulary. Thus, once switches are computerized and transmission digitalized, all elements of a communication system belong to the same digital circuit, forming nothing other than—a “digital nervous system.”⁴⁵⁰

However, if society became undepictable by means of a single communicative model, the identity of communication itself underwent a radical transformation and lost its consistent nature. During the eventual dissolution of the systems scientific project, at the same time that information technology and microelectronics became common, the lucid and positive nature of communication gave way to its infinite transformability and flexibility. With this development,

the hopes for a unified science of communication that arose in the 1970s from general systems theory proved unrealistic. Seen from this perspective, communication could not retain any specific administrative characteristics, such as those referred to in bio-mechanical metaphors, and instead assumed innumerable convertible and variable qualities, not reducible to any single structure or function. Endless reconstructability was a theme pointing the direction for the development of communication.

6. Conclusion: Communication and Its Modern Fate

Although inevitably schematical, this study has tried to bring out the essential points of intersection in the history of the relationship between communication and telecommunication. It is through these constellations (or *dispositives*) that distinct chains of command, bureaucracies, managerial theories, committees, as well as telephone lines and digital circuits can all be conceived of as an integral part of the history of governance of and by “communication.” What unified this path of development was the idea that questions of communication could be seen as administrative problems. In other words, communication manifested itself as an object and means of administration.

It is possible to conceive, as we have done here in this study, of the irreducible discourses operating in different registers of speech, from the emergent analogy of nervous system to sophisticated mathematical models, as historically determined attempts to define communication, its “essence” and “limits.” Surely, the clumsy biological metaphor, while in its infancy, articulated a different “communication” and its social occurrence than did the later formal theories and models of research, emerging from the institutionalized study of telecommunication. All the same, they had without doubt the same object and aim: to seek to explain and understand, by means of the conceptual tools at hand and within prevailing regimes of cultural practices, the core of “communication.” In other words, they sought to capture the essential characteristic of what had come to be thought of as communication, in whose formation the new communication systems played a crucial part. It is also clear that these conceptualizations of communication were not independent of each other, but rather mutually articulated. In fact, it is the metaphor of the nervous system itself that has served as the central conceptual stage for understanding and explaining communication throughout the history of telecommunication. The nervous system gave a name to the whole that made different and heterogeneous systems and projects ultimately uniform in terms of their objectives and functioning, bringing a certain unity to the different mechanisms and constellations of communication. It constituted the whole in which communication was positioned as a focus for systematic thinking throughout the history of administrative communication and the administration of communication.

The nature of the whole, designated by the nervous system, did not remain the same but changed according to changes and displacements in and of communication from an organic to a feedback structure, and it is precisely this change that has been the line of development of and by communication studied here. Thus, while it has constituted the whole within which communication has been able to be formalized, it has also become formalized itself in the course of this process, and gained more and more precisely articulated structure in a scientific sense. In other words, the nervous system, being increasingly formalized, has formed the whole within which communication has become both the object and means of action. Yet at the same time, during this development within which thought about communication has been formalized, ever more accurate mathematical systems have come to represent the essence of the nervous system, since thought about communication is, in the final analysis, dependent on the formalization of the whole that is its precondition.

For this reason thought about communication, within this history, has always been closely tied to an anterior whole, from which it has not been able to dissociate itself. This origin, then, has drawn the line that distinguishes communicative relations from noncommunicative ones. However, this cannot be directly conceived of as a restriction or as some kind of shortcoming because the conceptual whole represented by the nervous system is the very entity that has made it possible to think theoretically about communication, as well as being an outcome of this very thinking. At the same time, it has influenced the practical design of communication systems in many local contexts, which have been the points of origin for certain general communicative assemblages, discourses, and practices.

Communication takes its place as a finite relationship between the occurrence and withdrawal of instances of it.⁴⁵¹ Communicative manifestations and relationships bring something into being; they appear in communication but are not communication itself. On the one hand, this communication in “itself” cannot be expressed in communication, because a manifestation of communication is not capable of expressing the fact that there *is* communication, but on the other hand, in order to “work” communication presupposes linguistic representations of the whole of communication, in other words, the objectification of communication. This objectification, essential for the functioning of a communication system, is manifested in two related registers that constitute each other. While communication needs conceptual, necessarily reductive descriptions that represent it as a “whole,” it also requires technical systems with the attendant quantification of communication for its practical fulfillment. Both of these ways of objectification are inherently linked together so that even though it is possible to analytically distinguish between “conceptual” and “technical” elements, in a given historical process they

are indistinguishably tied together. The nervous system has provided a concept that, throughout the history of communication followed in this study, has amalgamated these aspects into a concrete whole. This continuous oscillation between the necessity to objectify communication, on the one hand, and the fact that while being objectified communication is not expressed in “itself,” on the other, determines the scope of communication.

This scope of communication has, in this tradition, always been conceived of within a conceptual whole, which has both enabled it to be thought of it in itself and set its limits. Communication, here, was a function of a whole constructed as a hierarchy of channels with a control unit organizing the flow of incoming and outgoing messages. Moreover, it was mainly a formal function in that the type of communication regarded as constitutive of the whole was determined through formal lines of communication. Finally, what was fundamental was its repetitive character, not any single meaning-content as such. Although constitutive of the whole, communication, at the same time, depended on it, because it was only within this pregiven totality that communication could emerge as communication. It integrated the plenitude of diverse events and relationships into a conceptual whole and allowed them to be seen as controlled by some underlying laws amenable to formalization.

Although the whole was nothing other than the realization of communication, nothing prior to it as such, it provided the means for organizing communication. Throughout the whole history studied, attempts have been made to codify communication in formal procedures, routines, and designs. By means of these, engineers, managers, and theorists set the boundaries between the system and its outside, enabling systematic regulation of their interrelationships in many different situations. Yet this history in and of communication is not a “cause” or a “source” of it becoming formalized. Instead, the constellations involved embodied and reflected a more general principle, the ontological condition of our modern existence, which Heidegger termed *Gestell*, translated into French by Michel Haar as *dispositif*—a term used also by Foucault, albeit in a somewhat different sense. According to Haar, “science that pursues the mathematization of nature is not an autonomous project. It reaches conclusions beforehand about what the real is; it only admits of the objectifiable and calculable. It is in the service of the more general project of technological enframing (*Gestell*) --.”⁴⁵² Thus, the drive to render communication quantitative, seen from this perspective, came about because of an already established world-relation, namely, because of the modern *Gestell*. What made this project so consistent is that the key figures and discourses belonging to it operated firmly within the limits of this relationship simultaneously articulating its nature and scope in terms of communication. The history followed here, as well as scientific research and technological

development as inherent parts of the history of communication, are therefore indistinguishable from this project which characterizes the whole modernity.

The history of administration of and by communication has, since the beginning of the century, been closely tied to the idea of total control. This is not to say that the history studied here is alone in its connection to this idea. Naturally, many other systems, typically of a technological nature, have been connected to the idea of total administration, so that this idea has been expressed in and through these systems and related practices. Yet communication systems and related discourses constitute a central part of this history. Now, it is possible to conceive of Heidegger as a thinker relevant to the modern processes of communication and the administration of communication, as his thinking was themed, especially during his later period, largely in relation to the idea of generalized technical control. He thought especially about communication's modern lines of governance, but at the same time, these lines set the limits within which this thinking could operate as a contemporary critique or as a philosophical analysis of modernity. Heidegger was preoccupied with, even bound to the idea of centralized power, which is why he is—also—a major philosopher of bureaucratic power, insofar as it is this very power that is seen as characteristic of technological dominance. Communication has been inherently connected to the history of control and domination, not least because of the fact that it was largely in the sphere of institutional intercommunication that the systems, discourses, and images of communication that were subsequently generalized and established culturally were brought into being. The threats and hopes invested in these were the main object of commentary by contemporary intellectuals. This was emphasized with the improvement of communications when the technological “system” seemed to assume a strongly consistent and even autonomous character. Although clearly Heidegger's thinking cannot be reduced to it, the very threat of this total system constituted the intellectual context of thinking on technology for Heidegger and for his contemporaries.⁴⁵³

Subsequent developments and especially the advent of computer networks altered, however, this general pattern and undermined the concept of the dominating center. Thought about community could not rely any longer on the idea of a strong center, method, or law, although it was clear that implementation of centrally directed systems certainly did not reduce but rather increased and sped up. Let us now, however, turn to Heidegger, as he is undoubtedly the leading figure in twentieth century philosophy when it comes to theoretical analysis of the conditions of the history of communication pursued here. After this, we will make some remarks on the position and fate of modern communication and communicativity on the basis of the historical lines of development traced here.

Heidegger and Communication

It has been prevalent in the twentieth century to think of technological development in terms of increasing domination. As is well known, Max Weber considered that the inner logic of scientific-technological development would finally lead up to an “iron cage” where there would be no room for divergent modes of action. Subsequent critical sociology, especially its leftist variant from Theodor Adorno and Max Horkheimer to Jürgen Habermas, has appropriated this concept of the colonizing nature of “instrumental rationality” and the ensuing standardization and homogenization of the social. This line of thought took on, among certain intellectuals, new vigor with the rise of information technology that was seen, partly justifiably, as enabling a more integrated control over society. Information technology did indeed support concentration of power as the use of large and expensive mainframe computers was confined to the principal societal institutions. The introduction of microcomputers and the principle of networking changed that situation, but the threatening potential of information technology together with its ever-increasing influence have not evaporated from the minds of contemporary commentators.

What has been common to many thinkers of this school, drawing mainly on Heidegger, is to conceive of the present state in terms of a closure. In order to get access to the system of public communication, according to this line of thinking, one has to already be formally part of it through having adjusted to its rules. This, however, prevents the flow of anything new into communication and cuts off the relationship between communication and a living communality. Although popular, this idea is also problematic, because the system, it can be said, is nothing other than the order that becomes articulated in mutual relationships between discourses, being the “wholeness” of these discourses. Therefore there could be no “basis” for a transcendental principle that would transgress this continuously reconstituting whole and be expressed as a consistent set of rules. It follows that if we are looking at the (later) modern fate of communication, we must indubitably locate the types, areas, and systems in which it manifests itself and through which it is given its current forms. Yet historically, and particularly during the modern period of our study, this approach has been subordinated to the line of thinking that wishes to retain the idea of communication coherent. Communication is, here, in its essence One, for its varying forms have the same foundation, which often however remains unexplained. The view relating to the claim of a formal consistency for individual discourses and interests as a precondition for their access into the public domain reduces discontinuity and the multiplicity of contextual conditions into one conceptual category which does not acknowledge differences. This comes down to the idea that public communication has formally

only one context. What is at issue here is a concern for something original that threatens to be eliminated or become estranged in the maelstrom of abstract and formal system dynamics.

According to the melancholic view of Heidegger, which influenced a whole set of subsequent contributions, the linguistic and communicative capability intrinsic to humans is becoming more and more commoditized and separated from human commonality. This is also one of Giorgio Agamben's themes in his book *La comunità che viene*.⁴⁵⁴ But whereas the thorough technicization opened up for Heidegger, ultimately, a possibility which he characterized in terms of *ereignis*, and whereas language becoming independent enabled eventually for Agamben the experience of language itself, that is, the fact that there *is* language, there is a tendency within this approach to ignore the perspective of solace or salvation and to remain obsessed with the idea of a more and more tightening net of social communication. The central commanding view is the idea of a confrontation between unique singularities and an instrumental system of communication, in which the latter controls and regulates the free articulation of singularities so that their independent sphere of expression is almost reduced to nothing. It is this ethos that has characterized the line of thought that, moving from Heidegger through the Frankfurt School to Habermas and beyond, has ended up defending human communicativity against instrumental system logic, the forming of which we have traced in the study at hand in relation to communication.

Yet it is also possible to think of communication, at least today, without having recourse to the consistency of the concepts of singularity and system. Insofar as singularity is not anterior to its context or a message to the communication system in which it is expressed, it cannot be thought of any longer as a primary or original instance. Singularity is concurrent with the relationship that articulates it as a singularity, and the concrete, nameable communication systems, all of which have a contextual historicity of their own, have a central part in forging this relationship in our times. On the other hand, social communication loses its primary consistency, because it always consists of relationships and fields of relationships between singularities without having any integrating principle. It does not have only one logic or form of expression, but is divided into a plurality of distinct discursive chains, irreducible to each other. In this way it is also possible to question Heidegger's idea of the completion of metaphysics as the technological domination of the world, as Alain Badiou, for example, has done. Yet, as his influence cannot be overstated, we must now delve a little deeper into Heidegger, not least because the concepts presented above owe their inspiration mainly to his contribution.

Heidegger was without doubt one of the most influential contemporary thinkers to articulate the perspective which framed technology and themes such as automation and mechanization for intellectuals and commentators by the end of the period under discussion. For this reason alone, he must be taken into account in discussion on philosophical technology critiques of the twentieth century. Heidegger's central concern can be regarded as Being (*das Sein*) becoming thought through what is (*das Seiende*) and consequently through category of technology, in that Being is approached as an issue requiring technical solutions. Thus this theme of a sweeping technicization of western culture, characteristic of the whole of his thinking, seems to have been given perhaps its most lucid icons, within the line of thought followed here, in the systems of scientific management and cybernetics. At the same time, the underlying *ethos* of this tradition can be seen as having found its most profound philosophical analysis in Heidegger himself. As is known, when arguing that sciences had assumed the role traditionally held by philosophy in his famous *Spiegel* interview *Nur noch ein Gott kann uns retten*, Heidegger named "cybernetics" as the very field of knowledge and practice that was about to take the place of philosophy.⁴⁵⁵ It was above all cybernetics instead of philosophy, so it seemed, that determined the fundamental formation of the modern world by providing the generalized form for its becoming a calculable object for rational action.

This is why Heidegger held cybernetics as the moment that marked the coming to fruition of metaphysics in the form of all-encompassing technology. In cybernetics, everything becomes actualized as an object of rational calculation. As the science of self-regulation, it was based on the instrumentalization and operationalization of communication to the extent that every central ontological relation was dispensed with.⁴⁵⁶ Thus, as is well known, Heidegger held that presence becomes finally completely reduced to objectness in technological domination: metaphysics has reached its end in the total technological organization of the world. In this phase, the thinking that has aimed at establishing a grounding and a stable basis, ends up seizing beings in a comprehensive structure of design and calculation. Here representation becomes established as the mode of being of thought that lays the foundation for being as such. Technology represented for Heidegger a kind of total closure, an absolute extreme of reduction of everything into the present at-hand, calculable, codifiable structure of objects, in which the whole sphere of human life is wrapped in systematic, technological rationality. As mentioned above, Heidegger characterized this total system of reification by the concept of *Ge-stell*, translated by William Lowitt as "enframing."⁴⁵⁷ It is to be understood as the totality of putting everything in place, determined by modern technical imperatives. As metaphysics is propelled by the will to attain the truth, and thus to put everything in place, so modern technology, especially in its cybernetic form, can be characterized as the final phase of

metaphysics for it integrates everything into its circular structures and puts everything in the system of its own rationality.

According to Heidegger, *Ge-stell* as the name of the essence of modern technology reveals the actual as standing-reserve. This can also be regarded as a common feature in thought about communication in the age of modern science and technology. Following Heidegger, it can be stated that during this period communication does increasingly “report itself in some way or other that is identifiable through calculation and -- remain orderable as a system of information.”⁴⁵⁸ Communication, appearing here as a kind of field of calculation, does not display “the character of the occasioning that brings forth.”⁴⁵⁹ In other words, what is characteristic of communication, namely its inexhaustible unfolding which is not based on or derived from any figure or form anterior to it as such (communication takes always place in and through some form, but the latter does not close or exhaust communication), is excluded from its appearing.

Although Heidegger conceived the essence of modern technology, namely enframing, as a mode of revealing that sets upon what is as standing-reserve, it is possible to think, although he seemed not to, that this particular mode of revealing, regardless of its immense power in our time, does not suppress all the other potentialities and practices of revealing. Although he insists that “where enframing holds sway, regulating and securing of the standing-reserve mark all revealing,”⁴⁶⁰ one can question, to some extent, this line of thinking. This is because even if there were no room within the enframing for different ways of revealing, this particular mode is not capable of monopolizing the whole of bringing forth, but remains as only one yet a central form of revealing, and thus, of truth. On the other hand, this form can be regarded as porous and discontinuous rather than seamlessly consistent, as Heidegger tended to think. It is in this sense that his thinking can be seen as still being under the sway of the idea of strong center in which a dominant, formal principle, whether in the form of a method or a law, sets the limits and forms of human experience. With the benefit of hindsight, we can see that it was no doubt the apparently totalizing perspective created by the systems of science and technology at the time that was invoked in the way Heidegger spoke of enframing as the “ostensibly sole way of revealing.”⁴⁶¹ This was not unusual, as it was common among contemporary continental intellectuals to regard growing technical rationality as a frightening instrumental order that would trample down everything humanly unique.⁴⁶²

There is, in fact, a dimension in Heidegger’s thinking that precludes any straightforward way of reading his critique of the technological organization of the world as including a view of

technology as a totality or foundation. This is due to the fact that Heidegger considered the *Ge-stell* not only as the totality of placing, but also as *Heraus-forderung*, pro-vocation.⁴⁶³ The technological system puts nature continuously to new uses, connects it with novel aims and functions, and is itself transformed because of these new demands. Although remaining objects, things lose their rigidity in the process of instrumental organization as they are continuously pro-voked, that is to say, put to new uses. This universal manipulability undermines the immutable characteristic of Being that metaphysics has attributed to it.⁴⁶⁴ Yet technology, insofar as it displayed a particular world-relation maintained its rather consistent nature in Heidegger's thinking, and there is an apparent reason for this.

This relates to the fact that, as Gianni Vattimo has proposed, Heidegger remained stuck in a vision of technology dominated by the image of the motor and of mechanical energy. Technology, according to him, could only engender a society dominated by a central power that sends its orders to a passive periphery.⁴⁶⁵ What Vattimo thinks is that we have to change our conception of technology in order to be able to dissipate the metaphysical representations that are dominant in our age. Yet the technology that holds the greatest potential in this respect is not "the technology of the engine—with its rigid, unidirectional movement from the center to the periphery," argues Vattimo, but rather "the technology of communication: the techniques of collecting, ordering, and distributing information."⁴⁶⁶ The increase in the number of interpretive agents that comes with this technology could bring about the dissolution of objectivity as something given and make room for the notion of a world that would derive its meaning only from a resonance between interpretations.

According to Vattimo's interpretation, therefore, *Ge-stell* undergoes a fundamental transformation as we move from mechanical technology to the technology of information and communication, for now it becomes possible to think of technology without presupposing a dominating center. Increasing social communication makes it impossible to maintain the idea of a unilinear history, as it would require the existence of a center around which historical events are ordered, whereas the most evident consequence of the generalization of new communications technology has been the birth of "new centres of history."⁴⁶⁷ The development of easily available communications facilities has unleashed local and singular expressions of interest and liberated differences. With the demise of the idea of a central rationality of history, the world of social communication, according to Vattimo, has split into a multiplicity of local languages and rationalities. This liberation of local elements, which leads to the loss of a single, objective, and fundamental reality, can be seen in positive terms, according

to Vattimo, as *disorientation*,⁴⁶⁸ an experience of ambivalence constitutive of the being which is not, but happens.

It is evident that the concept of a mass society, associated with the rise of an industrial society, has been replaced in the course of societal development by the notion of ever more scattered and fragmented communities gathered around special interests. The mass society, linked to a central organizing principle, has splintered into quickly moving, heterogeneous, and unstable interest groups, forming complex, ever changing networks of interactive relationships. Simultaneously, the forms of publicity of modern age are changing and becoming organized with new media that are arranging the social communication economy around ever more specialized issues, on the one hand, and ever more diverse possibilities for communication, on the other. This is the reason why the total, general domination by technology, feared by thinkers from Weber onwards, has become unthinkable. The advent of new media allows plurality of interpretations of reality, thus undermining the authority of any single dominant concept as the final truth. The categories of impurity, plurality, inconstancy and unbounding have become increasingly important throughout this process of generalized communication to account for the experience of our current condition. In so doing, they no longer allow us to stick to metaphysical paradigms, as man and being have lost precisely the qualities with which metaphysics has endowed them. In Vattimo's thinking, it is this fact to which the liberating potential of the *Ge-stell* is linked.

This is a concept that is found in many contemporary commentators in different forms. What they all share is an optimistic view of the emancipatory potential of new communications technology, as opposed to the older, mechanistic technology.⁴⁶⁹ However, the change in question is not as much of a change in technology as one might conclude from the discussion above. As this study has tried to demonstrate, the idea of a center and communications technologies are not at all on opposite sides of an assumed axis. On the contrary, the ideas of a center as an organizing principle and communications technology were mutually articulated right from the beginning. Therefore, the change, in fact, does not occur between technologies but rather *in communication*, that is, in the communicative constellations. The disintegration of models predicated on organic and subsequently on mechanical metaphors took place in communication, within the constantly unfolding networks of communicative relationships and practices. Hence, it is neither alien nor newer to the historical process of the realization of these relationships but rather has to do with the self-formation of communicative constellations themselves.

Given this, there is perhaps no point in trying to find a positive place for the thought on technology that admits the disorientation or homelessness of being. Its location is not thinkable in any institutional sense: the thinking of being does not occupy any specific place—it is homeless (*spaesamento*). At most, it can be allocated a non-space, in a similar way as thought on communication. For this reason the idea of a fundamental ambiguity of being should not be thought in terms of an imaginary totality, but rather as an outcome of specific historical processes and thus as reflecting our contemporary experience.

Insofar as there occurred a change, discontinuity, or displacement in the communicative constellation dominant in the middle of the century, it seems possible to rethink some of Heidegger's concepts. In the 1960s, several events that contributed to the change came into being, of which just the three most significant ones suffice to be mentioned here. Firstly, a critique of technological systems and the systems approach was intensified and organized because of the rise of counter cultural activism and of the influence among students and intellectuals of theories linked with the Frankfurt School. Secondly, management questions, broadly, ceased to appear predominantly as technical problems and were rearticulated in corporatism's terminology. And lastly, the leading edge of technological systems moved from large hierarchical structures with tangible powers to interactive, computer-based information networks, the effects of which, although immense, could not be located in relation to any given system. Thus, the fragmentation of Being and loss of a consistent meaning-content, brought about by metaphysics itself, seems to be incompatible with the idea of a rational world-order and a total organization of human life, brought about by modern technology according to Heidegger.

Insofar as occidental history has been closely tied to the formulation of ever more precise definitions and formal analytical frameworks, it is inevitably also about the multiplication of these forms and practices and the emergence of novel, mutually incompatible and alternative discourses. This is exactly what Vattimo referred to when speaking about the birth of new centers of history in his *La società trasparente*⁴⁷⁰ as well as, in somewhat different terms, in the paper discussed above. As a result, although these discourses incessantly generate ever more accurate fields of calculation, as Heidegger holds, it is not possible to conceive any general and unifying perspective. This is due to the fact that rival interpretations, at times conflicting and at times overlapping with each other, render impossible any single and consistent frame of analysis. Likewise, it is increasingly difficult to imagine a dominance of any one discursive interpretation, especially in human and social sciences, although this still seemed conceivable, to a point, up to the first half of the twentieth century. Although discourses

have perhaps become more technical, this tendency is not apparent in all discourses, and above all, there is nothing holistic in this as the processes of technicization are numerous.

At the same time, it must be noted that neither do discursive practices based on formal modes of representation comprise anything that could be characterized as universal. It is true that formal representation, regardless of the intrinsic nature of a given problem, has made it possible to bring together and examine diverse, otherwise incompatible processes and relationships within a single framework. In this respect, it has created a general enframing in the Heideggerian sense as a way of revealing and conceptualizing. Consequently, it constitutes the way our world-relation is organized, though this organization is not solely a formal relationship. However, the possibility of a formal system of representation should not be associated with the development of anything total and consistent as such, as Heidegger tended to think. Expositions exploiting formal tools are always expressed as part of the given context, as circumstantial enunciations in a dialectical relationship the structure of which is constantly being changed as the discourse progresses. Because the structure of the discourse is, by definition, not static but always in motion, then naturally the respective positions of interlocutors change in line with the course of the discourse, and no individual enunciation can express the “whole” of the discourse, only refer to it.

This becomes clearer, I think, in the era of computer networks. It is true that a technical approach to the engineering problems of communication is a prerequisite of dependable telecommunication. Yet whereas this approach could still be seen as supporting the idea of a rational and uniform system in the heyday of the telephone, as this was in any case the environment in and to which it was most intensively applied and developed, in the age of computer networks this concept does not seem to work anymore. This is because the digitalization and networking of information have increased users' choices in organizing information as they please. At the same time, technology forfeits its former consistency. A flexible, open-ended network allows many routes through the system, and as many sources of errors, breakdowns, and blockages.⁴⁷¹

Against this historical background to the tradition of critical thinking, computer networks and especially the Internet are presented as natural new objects for reflection on the extension of technological rationality. In this connection, the concern is not only related to establishment of a comprehensive technological structure, but also to the whole process of objectification, of making everything present at-hand through the principle of representation, as noted by Heidegger. Let me take a little closer look at the Internet, as it exemplifies many of the technical

and institutional characteristics of new information and communications technology. The Internet can be seen, justifiably I think, as a complete system of representation in its own terms. From the point of view of its “internal” structuration, its whole functionality, what the Internet *is*, is based on the principle of representation. The system of representation is the way the Internet works, being the principle of mediation between the computers of a customer and a server, and between a user and the resources. Furthermore, the Internet clearly represents a world without a history. We can speak about the history of the Net, but what we cannot do is to speak naturally about its “internal” history, a history that would take place within it. All that there is is ready at-hand without previous modes of representation contributing to current ones in any actual sense. On this basis, it would be possible to suggest a closer relationship between Heidegger’s assertion of the completion of metaphysics in the form of technology and the Internet as an excellent example of this closure.

This conclusion, however, is precipitate. The Internet is not a stable and closed system. Quite the contrary: it is an inherently open system consisting of heterogeneous and ever-changing configurations of connections, standards, communities, and sites. There is no single institutional or principal instance that could control it. The representations, for their part, refer not to essences but rather to events. This is because the reference points of representations are themselves representations; they are interlinked and supplementary to each other, and fleeting and shifting rather than firm and fixed, in the same way as the representations themselves. As the Internet has often been seen as a crystallization of the characteristics of new information and communications technology, observations made about it can be applied at a more generalized level; for what applies to the Internet, applies to a large extent to information technology in general. In immense variety, the forms and convergences of information technology are in an ever-changing process of movement, lacking any single common denominator that could determine the nature or “essence” of it. Concept like that of “family resemblance,” coined by Ludwig Wittgenstein, is much more useful in understanding the mutual relationships between the diverse forms of this technology. Thus, information technology consists of processes that interconnect, but not without gaps and changes.

The Internet destroyed the concept based on the model of modern media that publicity consists of a sequence of similar messages from one to many. It is, however, not solely a communications medium. It can be considered as a first multidimensional communicative space proper that enables, in addition to communication, various interactive activities. This is the central illustrative notion of the Internet: the metaphor of space. The concept of space used here is not equivalent to a neutral, objective field mutual to all parties who can encounter each

other in a genuine sense, simultaneously retaining their own singularity. The public space thus produced is rather fragmented and incoherent, as it is distributed among all the computers and resources connected to it. To speak about a space in a real sense is misleading, since publicity is a fabric scattered in different locations and in which the individual parties do not have a relationship of dialogues between each other. In the Internet there is no objective frame of reference acceptable in principle to every potential party, by virtue of which it would be possible to evaluate the relative position of each in relationship to any other, and thus no genuine meeting of interests on the level of resources or information sources. In other words, diverse interest groups as well as information resources appear to the user as a rich fabric of distinct sites and locations. On the other hand, the identities of connected parties and their expressions of interest retain their original forms; the formulations are not translated into any more general form as in the journalistic publicity.

The concept of spatiality in relation to the Internet illuminates, however, the change occurring in communication in the age of computer systems, that is, the dissipation of assemblages based on one whole. It seems to me that it is at this very conjunction that we must locate Vattimo's argument concerning the liberating potential of a new concept of technology that would no longer rely on a dominating center. Meanwhile, centralization and the control of processes with unforeseen complexity, supported by information and communication technology, made new strides again. Yet at the same time, distributed communicative activities, unmanageable through any single whole, became diversified, proliferated, and assumed novel forms and modes of realization. The change in question cannot be satisfactorily encapsulated in the conceptual dichotomy of centralization and decentralization. Instead, it has rather to do with reaching a certain saturation point where communication lose its instrumental, object-like character and becomes something environmental-like that defies objectification. Here, it changes from being an object waiting to become explained and categorized to one that cannot be similarly accounted for because it is no longer a thing conceivable prior to theoretical definitions. It is true, of course, that if computer networks are embedded in the systems they enable, so mechanical technologies too could only exist as parts of the local communities and the systems of institutional, commercial, and cultural processes and components they consisted of. The interdependence and mutual constitution of the various elements involved underlines the fact that it is not possible to make the traditional distinction between technology and the social, as technical systems are always already social, just as the social always presupposes and produces technical solutions. The way in which information technology is differentiated from mechanical technology lies in the fact that unlike the latter, the former is dispersed into logical, functional, and institutional relationships which do not constitute a whole outside of popular rhetoric. If

traces and effective relationships were difficult to be identified in systems of mechanical technology, they have become undetectable in principle in the age of information systems. For this reason information technology as networks of overlapping and parallel assemblages cannot be viewed as a distinct socio-technical entity, like for instance a solitary hydropower station or a factory, which are similarly part of a larger system, although there has been a tendency in popular commentaries to do just this.

This is an analogous turn to the one Paul Edwards has thematized within computer networks as the move from systems with one or several well-defined functions and central control, via networks consisting of groups of related functions and partially distributed control, to internetworks with clusters of networked functions and widely distributed control.⁴⁷² Whereas singular systems still had fixed or slowly-changing boundaries, internetworks, or “webs” according to Edwards, have fluid and rapidly changing ones. Seen from this perspective, the shift in the way technical systems are constituted has profound reverberations in the ontology of communication and communicativity. For if it is true that in the age of internetworks there is no locatable focal point of control, only innumerable heterogeneous networks with complex functional structures, the terms through which communication is conceptualized have to be revised. Internetworks, it can be said, created a communicative environment that broke the privileged relationship with centers of hierarchy and hierarchical centers, thus becoming impossible to think of in terms of a whole as traditionally understood in the history of communication.

This loss of certain object-likeness is perhaps the most fundamental reason why information and communication technology has become a very difficult object for national regulation. Whereas relationships and practices with an adequately steady character can still be controlled by means of traditional policy instruments, current information technology has become a general environment of ours, not unlike Foucault’s ubiquitous relationships of power/knowledge. Although always exploited by established concentrations of power, such as the sovereign or the state, because of their inevitably local and circumstantial nature, these relationships could not be defined solely in terms of traditional political terminology. In a similar manner, the forms and practices of current “information technology” cannot be captured in terms that are still suitable for describing the previous mechanical technologies. This brings us back to the question of the ontology of communication. It could allow us to regard this transformation of technology from a nameable practice, relationship, or system to a general condition of the objects and entities to be identified as the very kind of event which

Heidegger called *ereignis*—an event that reveals the transcendental dimension of the development of technology.

The Fate of Communication

Let us now, lastly, complete our study by presenting some general insights on communication in the modern period. What characterized the tradition followed here was an emphasis on a common code, form, or method, a contract perhaps, that maintained and protected meaningful communication from misunderstanding or distortion.⁴⁷³ It was this common order that set the limits of communication by excluding the multiplicity that always risks blanketing it out. It is here that the shared form was protected at the expense of what was purely idiosyncratic by virtue of a mechanism of exclusion: it eliminated what could not be shared, the “irrational” part of communication, in other words noise. The form of communication, thus, is primary and noise, from the point of view of communication’s functioning, a disturbance. At the same time, however, communication cannot do without noise, because it is an inherent quality of the substance in and through which communication takes place; that is, it is the empirical part of communication. Noise, therefore, is essential to the possibility of communication.

As such, noise is the absolute prerequisite to communication and the place in which multiplicity finds its expression. It is not something that would or should be abandoned in order to agree common ground, but rather the origin of all communication. It exposes communication to interference and disorder—to contention, it is true, but without this communication would not be possible. Communication is about constant exposure to what is undividable in noise, which incessantly threatens to swallow it up. This is why any successful communication, of necessity, is about excluding noise. As noise remains an integral part of communication, this exclusion both takes place in and is directed at communication: it is here that communication is born as communication. When successful, communication finds equilibrium between the noise that all the time threatens to overwhelm it and the commonly agreed form that would enable accord. Communication cannot totally remove noise because it is its precondition, but what it can do is to optimize the relationship between a multiplicity and a unity in a manner conducive to continuous communication. For this it needs a method immanent to the system of communication, the task of which it is to maintain this equilibrium. To establish this kind of mechanism, however, requires the formalization of communication.

Michel Serres has noted that formalization is a process whereby one can move from noise to consensus, from contention to unanimity, or from politics to technology. Formalization, here, is about optimal elimination of noise, not about its complete eradication. Nevertheless, it breaks the relationship with the historical context of its origin, because for the common form the particular context in which it manifests itself is not important. Moreover, it is formalization and the ensuing elimination of the empirical that enables science to be created. Of course, a common form or communication is possible only empirically, and cannot be separated in its appearance from the practices, forms, and technical systems in which it manifests itself. Yet communication does not reduce to the empirical, but presupposes something common that exceeds its practical forms of realization; and it is not possible to recognize what is common without excluding the very empirical it relies on.

As we move from the early analogies to a nervous system to a systematic modeling of communication, the link with the historicity of communication is continuously reconstructed. Whereas the first biomechanical analogies sought to conceptualize experience of the prevailing understanding of the social, the description and explanation of communication by means of mathematical tools presenting themselves as objective and apolitical that continued to be carried out within the framework of the nervous system constituted a field for thinking about the historicity of communication in a decidedly more technical way. Of course, this shift is inseparably interlinked with the development and professionalization of the scientific estate, and with its opening up of new research practices and object definitions for the academic institution, spearheaded by modern natural sciences. This approach created the basis for the apprehension of communication in a *technical* framework and for relating it to the question of efficient organization of action. It is in this sense that thought about the conditions of communication as a technical question corresponds to and expresses the prevailing experience of the social. But at the same time this historical experience conflicts with the fundamental historicity of the social.

On the other hand, these processes of formalization did not emerge outside communication. On the contrary, they came into being within the very communicative networks that they sought to formalize. Communication cannot be separated either from the whole that makes it communication, nor from the technical system that embodies this whole in a practical organization. Yet it is not reduced to these wholes and systems; they are no more “real” than communication, and, in fact, “are” only because of communication. The scope of communication is thus defined as a continuous and indeterminate relationship between the

“absolute structure” of communication (what enables communication as communication), on the one hand, and the forms assumed by communication, on the other.

Communication has always operated here as a tool for cutting across, eliminating, and ignoring conflicts and disputes. This is one apparent thematical line that integrates the history traced here. Communication has performed the task of undoing politics, although it is itself nothing other than politics, in that it can be understood only on the basis of politics. If politics constitutes community, then it can be said that communication, in this line of development, was also a mechanism for undoing community as community. That is, it undid community as a social whole characterized by endless negotiations and discussions concerning the coexistence of people. In its place, it laid a regimented whole that was based on constellations consisting of relationships, practices, and systems of communication.

We must emphasize, however, that there is no single figure for a given historical communicative constellation. Rather what is at issue here, is an attempt to localize and specify the *telos* of communication at work in each constellation: that is, the aim and goal of its formulation and use, the projects it serves, and the mode of being it enables and supports. It is not a question of totalizing descriptions of particular concepts and practices, but rather of the way by which, to use Mitchell Dean’s formulation, “various programmes of conduct and regimes of practices have enfolded within them definite teleologies.”⁴⁷⁴ Thus, although distinct communicative constellations have “definite teleologies” that allow us to draw a line between them and consider them as having certain individual consistency, and although the nervous system no doubt has operated as a conceptual model enabling this consistency in each case, the communicative “wholes” should be not understood as general terms but rather as names for related regimes of discursive practices and fields of technology.

Now, it was not until after the appeal of cybernetics and information theory started to vanish that there occurred a kind of “French Revolution” in thought about communication. Whereas previously communication was conceived of from the perspective of good governance, it now began to be regarded as a unit that governs itself as control became immanent to communication. Yet these two perspectives on communication are not necessarily separated from each other in a clear-cut manner. In fact, the whole history of communication, where it is seen as both an object and means of governance, can be depicted in terms of steersmanship, or the “science of piloting,” from which cybernetics obtained its etymological roots. It is indissolubly tied to concepts of command and control, but these have to be understood in the marine context in which there is no possibility of withdrawing to a private place as one can do

on land. Captain, crew, and passengers, taken together, constitute a social whole that is based on constant coexistence. As Serres has pointed out, this community is closed behind a line drawn by the safety fence, and the only option outside the rope is drowning.⁴⁷⁵ This is why the governance put into practice is necessarily self-governance, too. It deals with the course and actions to be taken within a dynamic community sharing the same goal. So, work in Bethlehem Steel Company or AT&T was not suspended while it was rationalized according to Taylor's program, and the air defense system was not made idle during its automation. For this reason, too, the telephone system could be seen as the model for self-governance under circumstances of constant change. Here, as in a ship, there is no place to withdraw to from the unceasing responsibility for the functioning of the whole.

The methods used, however, especially if followed to their end as a principle, do not conceal their nature as formal, general rules of steersmanship. This is what makes the history of communication, ultimately, the history of control. In a closed community as in a ship, it is of foremost importance to eliminate any misunderstanding or ambiguity over the course of action. What is essential is to do away with any possibility for negotiation whatsoever. This calls for a system of perfectly understood set of rules and routines of action that stabilize complex activities into a uniform system under the command of a supervisor. In many organizations with clearly defined goals, formal methods for setting up lines of command and the respective relationships between actors were thus absolutely necessary.

It is true that the environments these formal methods were applied to did not resemble a ship in any literal sense but had a much more open and systemic nature. They were, however, the loci in which the means and structure of intercommunication became of central importance. It was in these very settings, understood as distinct systems, that communication began to be systematically thought of as a fundamental ingredient of a given action. In addition, from these local and specific contexts emerged the theories, models, and systems of communication that spread throughout society and were generalized to be applicable to various different yet ever broader environments outside their sites of origin. Wiener understood this well, which makes him, for our purposes, theoretically the most interesting figure at the end of the line of development followed here.

At the same time, it is clear that because of these reasons communication, insofar as it has been considered within the sphere of systematic thinking, has always been linked to some pre-existing origin. Within the history of communicative governance and the governance of communication, communication has continuously been thought of on the basis of an origin, of

an original whole. Typically, communication systems, along with the various discursive practices and metaphors with which they have always developed in tandem, have served as this type of privileged whole. As a result, this privileged essence has distinguished communication from what does not belong to it, encapsulating the criteria for demarcation. Yet this essence is not and has not been noncommunicative but is communicative in nature, with the demarcation stemming, hence, from communication itself. Consequently, discourses of communication are usually practices of exclusion, in and through which the mode of communicativity proper is constantly engendered and its boundaries monitored and maintained—*within* communication. Whether it is a question of incessant negotiation, signal distortion, or increasing disorganization, the operation of exclusion is always the same, as is the aim of this operation; namely, to strengthen the communicative whole and to give it an identity of its own.

Common to all the thinkers and theorists discussed in previous chapters is the fact that they thought about communication in the light of a *method* or a *technique*. They conceived of communication largely as a rationalization process that was “perfected” with the help of scientific method. The main stages and experimental scenes of this rationalization were modern business organizations. For this reason, the thinkers discussed viewed communication—its rationalization—naturally from the point of view of the objectives and functions of these organizations; the business-driven approach was inbuilt in rationalization of communication becoming an issue in the first place. Yet this is also the reason that connects these thinkers to the tradition of metaphysics, where communication does not appear as a precondition of identities and structures but a determinable structure in itself. Because the aim of these thinkers was to optimize a system’s functionality by formulating its intrinsic scientific laws, they remained stuck within this functionality. Their thinking remained subordinated to the particular organizatory forms in and through which this functionality was realized and which provided the historical context for their theoretical work. This is not to be taken as a judgment, however, as it is the very modern fate of communication which cannot be disentangled from the administrative history of communication that has been our concern here. The lineage from Sumner to Simon and from Ward to Wiener can be seen as representing and epitomizing what have been the most influential and lasting elements in the formation of thinking about communication in the modern period.

The attempt to exclude the actual multiplicity and variety from communication must be seen as an attempt to think about the transcendental conditions of communication, or to put it another way, the *limits* of communication. This is not only because the formalization of communication, the history of which we have followed here, was never external to

communication but rather immanent to it. This in itself meant attempts to represent its intrinsic structure were necessarily constructions in which the limits of communication, variously understood, became articulated. However, it is also because the formalized structure of communication was conceived as a *universal* form which would underlie all meaningful communication processes irrespective of their variable contents and historical contexts. It captured in a coherent form what was within the limits of all thinkable communication in a given constellation. In this respect, both scientific management and cybernetics, from their respective points of departure, can be seen as attempts to seriously think about the limits of communication. For Wiener, at least, this seemed clear from the outset. Thus, much of his book *The Human Use of Human Beings*, according to him, concerned “the limits of communication within and among individuals.”⁴⁷⁶

The more definitely the system draws the demarcation between communication and the incommunicable, in other words, defines the conditions for communication, the more rigorously it excludes what is external to it; which, however, is in itself a condition of all communication. This was absolutely clear in Taylorism, which excluded the multiplicity that did not fit the code of its functionality. The system was defined here as a machinery that does not take new ingredients from its environment; on the contrary, these were exactly what it aimed at eliminating. In the cybernetic system, however, the field of action has to be defined time and again, unlike in Taylorism where, once defined, it was regarded as remaining unchanged. It was characteristic of cybernetics to integrate the multiplicity into a common framework. It did not recognize any instance that would have been excluded in principle from communication, implying that ontological difference between communication and noncommunication, or the common voice and noise, could not be sustained as rigorously as in Taylorism. This is because it incorporated change and variety into the system. This was implicit in Shannon, and became the starting point of analysis in the second wave of cybernetics. Therefore, whereas the Taylor System had to anticipate in one solution all the contingencies it could face, the feedback-controlled system did precisely the opposite; it exploited contingencies as information that directed its behavior within certain pre-given limits. Although also in the latter system, it is true, the “state” or “internal unity” had to remain stable in order to enable continuous communication, the idea of a system differed: whereas for a mechanical system it was a perfect and unchanging machine, for a cybernetic one it was a continuously self-correcting one.⁴⁷⁷

This perspective was a precondition to thinking about these limits as an ontological structure for all communication, and thus to generalizing it as the condition of existence of

communication as such. But, of course, these conditions are inarticulable, because if they were articulable, communication would not exist, for it would be self-enclosed into the stillness of its unbroken sameness. On the other hand, what was going on in these communication projects was crystallized in the fact that they objectified communication according to the model of ontology of presence, to borrow Derrida's expression, and disregarded its fundamental irreducibility. Not only were these types of projects attempts to think of a permanent "essence" as an unchanging condition of historical communication, they were also manifestations of a cultural sentiment which was encapsulated in the concept of the intrinsic nature of communication, and thus of society. They expressed an aspiration to understand the "sense" of a community as something that can be presented in terms of a general law. Yet, insofar as it is impossible to articulate the conditions of communication, it is equally impossible to formulate the law of this communality as a law.

This does not, however, deprive these kinds of communication projects of the meaning they have as testimonies to the need to think about our own present time and to conceptualize related problems in a way that speaks directly to us. As marks of the present, they open up a historical relationship to the absolute basis for communicability, although this opening is not entirely dependent on subjective decision. In fact, one can say more than that. Although we cannot know the absolute basis or the enabling condition in its difference from what is, we nevertheless inevitably make references to it. Even if thought cannot conceptualize it, making this difference is necessary to communicative existence. As Walter Benjamin held, philosophy actually anticipates it in the existent.⁴⁷⁸

In the history of administrative communication and the administration of communication, "communication" was interpreted in terms of efficacy and legitimacy, for it was impossible to separate it from those instances that promoted and implemented social efficacy. As we move from an instrumentality of this kind to the constitutive dimension of communication, it becomes clear that communication not only produces effectiveness but that the latter, combined with the scientific-technological rationalization of society, becomes increasingly a general social category, within which communication takes place and gets its meaningfulness. Yet, this category of effectiveness does not constitute any system of coordinates or unitary frame of reference for communication, for it is the latter which gives rise to these measurement systems and to their social establishment. It is also the actual "mechanism" for the rationalization of society: communication paves the way for it and marks its course, but this course is nothing other than communication itself, the rationalization of this communication.

If communication was conceived of through a mechanical model inspired by the engineering and natural sciences, this is not to say that historical thought about communication need have been constantly in decline. Firstly, what we have done above is to bring out a history of only one thread of communication. The presentation has followed a lineage in which communication has to an increasing degree been rendered an ahistorical object, but it goes without saying that communication is not reducible exclusively to this single history. As it is constituted historically in and through the process of its being-articulated, communication cannot be thought of as a single, unified, and continuous entity, the history of which could be placed in a preexisting and unchanging framework with respect to the everyday realization of communicative relationships. A line of the thinking about communication can never be coherent, let alone linear. The path of development highlighted here is rather a sequence of interrelated but discontinuous formations and constellations of thought and practices. They are united by like style, manner and purpose, and the same historical destiny that is also our destiny, and it is precisely due to this community of fate that this path of development becomes significant for us.

Secondly, and related to the previous point, the processes of increasing technicization of communication cannot be conceived of exclusively in terms of a value judgment, because what they express and at the same time constitute is the historical context in which thinking about and articulation of communication can take place and in which it can assume its historical modes. The instrumental processes of thought about communication, being attempts to comprehend the always-incommunicable conditions for communication, thus reflect the particular historicity of the development of communication itself insofar as it is thought of as being historically determined. This is because, as concepts of communication open up and establish a relationship to conditions for the social and give birth to temporary and discontinuous forms by way of which this relationship can be thought of and be exploited, they necessarily express the historicity of the social which is only conceivable within the realm of communication. Attempts to conceptualize communication are therefore always at the same time endeavors to think about the conditions for community. And, in the process of this thinking, they constitute a historical domain or perspective within which thinking about community is possible. This is why communication is nothing other than the unfolding of the social and thought about this historical unfolding.

¹ The whole history of philosophy is, of course, an attempt to think the conditions of thinking. Thus insofar as it is considered of constituting human community, communication is thought of primarily inside philosophy. However, the most comprehensive and continuous tradition of thinking about modern communication is not found in philosophy, but rather in those fields in which communication has been linked with telecommunication.

² See Burchell et al., 1991.

³ Rose and Miller, 1992.

⁴ Beniger, 1986.

⁵ Edwards, 1996.

⁶ Debray, 2000.

⁷ Debray, 2000, 103.

⁸ Deleuze, 1995, 31.

⁹ Brian Massumi has translated the terms, respectively, as 'apparatus' and 'assemblage' in Gilles Deleuze and Félix Guattari, *A Thousand Plateaus. Capitalism and Schizophrenia*. Trans. Brian Massumi. The Athlone Press, London, 1988. The concepts are not, however, identical in their meaning as Deleuze considers the *dispositifs* of power to be a component of *agencements*.

¹⁰ *The Use of Pleasure*. Volume 2 of *The History of Sexuality*. Translated by Robert Hurley. Pantheon Books, 1985.

¹¹ Foucault, 1990, 93.

¹² Foucault, 1990, 81.

¹³ A New Latin Dictionary, American Book Company, 1927.

¹⁴ The New Encyclopaedia Britannica, Vol. 28, 15th edition, 1995.

¹⁵ The term "the social" is understood here as the instance that allows us to recognize and define social activity *as* social. Similar definition applies to "the political" with regard to political activity.

¹⁶ Heidegger, 1987, 91-5.

¹⁷ This, of course, is reminiscent of the Heideggerian theme of the forgetfulness of the question of being. It is true that the thought about communication as a fundamentally irreducible movement by way of which alone any relationship becomes articulable is indebted to Heidegger's antecedent work on being.

¹⁸ Regarding the complex nonconcept of *différance* by Derrida, which refers to the inarticulable conditions of meanings, as well as the production of meaning in general, the conditions of communication, although being the conditions of meaning, constitute at the same time conditions of power. Secondly, the unstructured structure of these conditions is thought of here in the free "fall" which is their historicity, not as the inevitable law of laws, which is Derrida's main concern.

¹⁹ See Nancy, 1991.

²⁰ See Simmel, 1950.

²¹ See Duncan, 1962.

²² See Fynsk, 1996, in which the theme has been subjected to a thorough analysis.

²³ See Deleuze, 1994, 22-3, on discussion of heterogeneity concerning signs.

²⁴ See Agamben, *La comunità che viene*, Giulio Einaudi editore s.p.a., Torino, 1990. I have used as my source the Finnish translation by Jussi Vähämäki, published by Gaudeamus in 1995.

²⁵ See Foucault, 1990 for the English translation.

²⁶ Reich, 1978.

²⁷ See Nancy, 1991.

²⁸ See Macherey, 1997, 86-7.

²⁹ Macherey, 1997, 88.

³⁰ This is not to say, of course, that telecommunication constituted the only or the privileged basis of the political, but rather that it was an important constituent of this basis.

³¹ Wiebe, 1967, xiii.

³² House Ex. Doc. 5, 31st Cong., 1st sess. (1849).

³³ Senate Ex. Doc. 1, 31st Cong., 2nd sess. (1850).

³⁴ Meinig, 1993, 311-15; Fuller, 1972, 87.

³⁵ House Doc. 156, 19th Cong. 1st sess., p. 24 (1826).

³⁶ John, 1995, 25.

³⁷ Tariello, 1982, 29.

³⁸ Fuller, 1972, 134.

³⁹ Channing, William Ellery, "The Union," *Christian Examiner*, 6 (1829). Quoted in John, 1995, 13.

⁴⁰ John, 1995, 10.

-
- ⁴¹ Quoted in Fuller, 1972, 81.
- ⁴² House Report 187, 28th Cong., 2nd sess., p. 3 (1845).
- ⁴³ Thompson, 1947, 443.
- ⁴⁴ Reid, 1879, 480.
- ⁴⁵ Morse's letter to G. M. Bibb, Dec. 12, 1844 [*italics original*].
- ⁴⁶ Lebow, 1995, 15.
- ⁴⁷ Harlow, 1936, 306-7; Reid, 1879, 414; Ault, 1974, 44.
- ⁴⁸ Quoted in Ault, 1974, 74.
- ⁴⁹ See Marcus and Segal, 1989, 90.
- ⁵⁰ *Telegraph lines*, July 24, 1866. Quoted in United States in America, War Department, Document No. 104, Regulations for the Operation and Maintenance of United States Military Telegraph Lines and General Regulations of the Signal Corps. United States Army, Government Printing Office, Washington, 1899.
- ⁵¹ Communication of Hon. William H. Seward, Secretary of State, upon the Subject of an Intercontinental Telegraph Connecting the Eastern and Western Hemispheres by way of Behring's Strait. Government Printing Office, Washington, 1864.
- ⁵² Du Boff, 1984.
- ⁵³ Thompson, 1947, 248.
- ⁵⁴ Quoted in White, 1958, 14-5.
- ⁵⁵ I thank David Hochfelder for this note.
- ⁵⁶ Thompson, 1947, 252.
- ⁵⁷ Joseph P. Bradley, *Progress: Its Grounds and Possibilities*. New Brunswick, 1849. Quoted in Curti, 1946, 116.
- ⁵⁸ Park Benjamin, *True Patriotism, A Sermon Preached at the Presbyterian Church*, July 4, 1851. Quoted in Curti, 1946, 116-7.
- ⁵⁹ Editorial in *New York Express*, June 1846. Quoted in Burlingame, 1939, 291.
- ⁶⁰ Thompson, 1947, 445.
- ⁶¹ See Garraty, 1968, 333.
- ⁶² Brown, 1989, 286.
- ⁶³ Coggeshall, 1944.
- ⁶⁴ Quoted in Keller, 1977, 91.
- ⁶⁵ *The Reader*, December 1, 1866, [*italics orig.*].
- ⁶⁶ *The Commercial and Financial Chronicle*, No. 1, July 8, 1865. Quoted in Du Boff, 1984.
- ⁶⁷ Reid, 1879, 596.
- ⁶⁸ Morse's letter to Norvin Green, in July, 1855. In Morse, 1914, 345.
- ⁶⁹ Morse, 1914, 85.
- ⁷⁰ Wilson, 1859, 59.
- ⁷¹ Headrick, 1991.
- ⁷² *Daily Chronicle*, 16 November 1847. Quoted in Du Boff, 1984.
- ⁷³ See Deleuze and Guattari, 1988, 40.
- ⁷⁴ Quoted in White, 1958, 14-5.
- ⁷⁵ "The Intellectual Effects of Electricity." *The Spectator*, 63. 9 November 1889.
- ⁷⁶ Tariello, 1982, 12; Fine, 1956, 4.
- ⁷⁷ Fine, 1956, 52-5, 58, 131.
- ⁷⁸ Cited in Tariello, 1982, 21.
- ⁷⁹ Sullivan, 1982, 15-6, 26, 39.
- ⁸⁰ Sumner, 1978, 23-4.
- ⁸¹ Teeven, 1990, 179; Kahn, 1992, 114.
- ⁸² Lustig, 1982, 2.
- ⁸³ Friedman, Lawrence: *History of American Law*, p. 244.
- ⁸⁴ Gillman, 1993, 27.
- ⁸⁵ Stone, 1991, 25.
- ⁸⁶ Clark, 1996, 28.
- ⁸⁷ Hyman and Wiecek, 1982, 42.
- ⁸⁸ See a detailed discussion on the relationship between the telegraph and liberal governance in Barry, 1996.
- ⁸⁹ Schwendinger and Schwendinger, 1974, 38-9.
- ⁹⁰ Keller, 1977, 185.
- ⁹¹ Haskell, 1977, Chapters 1 and 2.

-
- ⁹² Spencer, 1897, Part 2, 592.
- ⁹³ Ross, 1991, 12, 15, 18.
- ⁹⁴ Fine, 1956, 35-6.
- ⁹⁵ "Sociology," in Sumner, 1911, 177.
- ⁹⁶ Hanson, 1985, 203-5; Fine, 1956, 84; Hofstadter, 1969, 57.
- ⁹⁷ Spencer, *The Study of Sociology*, International Scientific Series, 1873, 326. Cited in Schwendinger and Schwendinger, 1974, 40.
- ⁹⁸ Schwendinger and Schwendinger, 1974, 40.
- ⁹⁹ Young, 1969, 1-2.
- ¹⁰⁰ See Hardt, 1979, 44-57.
- ¹⁰¹ Samuel F. B. Morse to Francis O. J. Smith, Feb. 15, 1838, included in Morse, 1914.
- ¹⁰² John 1995, 10.
- ¹⁰³ Channing, 1852, 58.
- ¹⁰⁴ *The Telegrapher*, Oct. 31, 1864, p. 14.
- ¹⁰⁵ Channing, 1855, 6.
- ¹⁰⁶ Henderson, C.R., 1897, 96-7.
- ¹⁰⁷ It was Emile Durkheim who described societal transformation as a movement from 'segmented' to 'organic' society. Haskell (1977) has briefly discussed this conceptualization in relation to the idea of interdependence, p. 38n13.
- ¹⁰⁸ Thompson, 1947, 252.
- ¹⁰⁹ Prescott, 1860, 252.
- ¹¹⁰ Senate Ex. Doc. 1, 36th Cong., 2nd sess., p. 76. Quoted in White, 1954, 487.
- ¹¹¹ Congressional Record, 48th Cong., 1st Sess. Vol. XV (1884).
- ¹¹² White 1954, 487.
- ¹¹³ *The Pensacola Telegraph Company v. The Western Union Telegraph Company*, 1875. Quoted in Lindley, 1975, 229.
- ¹¹⁴ White, 1958, 388.
- ¹¹⁵ Channing, 1845.
- ¹¹⁶ Prescott, 1860, 237.
- ¹¹⁷ Tarr et al., 1987, 56-7.
- ¹¹⁸ Channing, 1855, 8.
- ¹¹⁹ Channing, 1855, 7-8.
- ¹²⁰ Philips & Robinson, 1857, 10-1.
- ¹²¹ *National Intelligencer*, March 1, 1853. Quoted in White, 1954, 487.
- ¹²² *The Telegrapher*, Oct. 31, 1864, p. 14.
- ¹²³ "The Chicago Police Telephone and Patrol System". *Scientific American*, April 23, 1881, 240, 258. Quoted in Tarr et al., 1987, 64.
- ¹²⁴ *The Telegrapher*, June 15, 1867, p. 228.
- ¹²⁵ Philips & Robinson, 1857, 9.
- ¹²⁶ *The Telegrapher*, June 15, 1867, p. 228.
- ¹²⁷ House Ex. Doc. 1, Part 3, 41st Cong., 2nd sess. (1869), p. 1123.
- ¹²⁸ Tarr et al, 1987, 63.
- ¹²⁹ Philips & Robinson, 1857, 9.
- ¹³⁰ Keller, 1977, 102.
- ¹³¹ Ross, 1991, 59-60.
- ¹³² Du Boff, 1984, 576-7; Du Boff, 1983, 253-4.
- ¹³³ Blondheim, 1994, 56.
- ¹³⁴ Innis, 1949, 36-7.
- ¹³⁵ Schwarzlose, 1990, 146.
- ¹³⁶ Brown, 1989, 286.
- ¹³⁷ Weizenbaum, 1976, 18.
- ¹³⁸ Cherry, 1977.
- ¹³⁹ Casson, 1910a, 156.
- ¹⁴⁰ Cherry, 1977, 125.
- ¹⁴¹ Meyrowitz, 1985, 322.
- ¹⁴² See Yates, 1989 21.
- ¹⁴³ See Karl, 1963, 9.

¹⁴⁴ By *modern* - in the context of american society - we have referred in this paper to the industrializing social order as breaking with the agrarian system based largely on relatively self-sufficient localities with local governance.

¹⁴⁵ Harlow, 1936, 341.

¹⁴⁶ Noble, 1977, 6; Stone, 1991, 79.

¹⁴⁷ This formulation should not conceal the fact that telecommunication systems, consisting of innumerable chains of interaction between individuals, machines, practices, codes, rules, formations of knowledge, institutions, and cultural and economic climate, are not considered here as an "agent" or the only cause of social change in general. Rather, by focusing on the historical configuration of (social) communications systems it becomes possible to investigate this change within a horizon in which the relationship between communication and telecommunication becomes meaningful.

¹⁴⁸ Cooley, 1912.

¹⁴⁹ Beard and Beard, 1930, 6.

¹⁵⁰ Cited in Young, 1991, 81.

¹⁵¹ Bethell, 1913, 184.

¹⁵² Kingsbury, 1917, 146.

¹⁵³ It was especially John Dewey who understood community fundamentally as communication, existing *in* communication, not just *by* communication. Dewey, 1917.

¹⁵⁴ Beard and Beard, 1930, 6.

¹⁵⁵ See Burlingame, 1940, 130.

⁵ As for technology in general, see Soule, 1932, 269.

¹⁵⁷ Bohn, 1920, 20.

¹⁵⁸ Chandler, 1920, 17.

¹⁵⁹ Hardt, 1992, 14.

¹⁶⁰ George, 1959, 77.

¹⁶¹ Wilson, 1980, 26.

¹⁶² Karl, 1963, 67.

¹⁶³ As Christopher Dandeker has noted, the motivation to create a consistent national power structure grounded on law inhered largely in the special arrangements caused by war and civil and industrial unrest. See Dandeker, *Surveillance, Power & Modernity. Bureaucracy and Discipline from 1700 to the Present Day*. Polity Press, Cambridge, 1990, 124.

¹⁶⁴ Ross, 1991, 91.

¹⁶⁵ Ward, 1884, 3:334.

¹⁶⁶ Beard and Beard, 1930, 8.

¹⁶⁷ Beard and Beard, 1930, 8.

¹⁶⁸ To what extent can we speak of the transformation of communication per se? As already pointed out, we have rejected the option of conceptualizing its development, its historical fate, as a unified history, for it is in the process of a language unveiling its own destiny alone that frameworks are both erected and dismantled through which its "character" can be addressed as an object of thought.

¹⁶⁹ Communication, here, is not understood as an imaginary totality estranged from its own being. What is at issue here is tracing the line of thought through which communication has become understood as a rational system, not implying that communication would or could be reduced to a rational scheme "in itself," as the conception of communication in itself is only possible in these or similar schemes. However, clearly it is predominantly by way of these kinds of discursive frameworks that communication is exposed to us as an object of systematic thinking, which makes them culturally, if not theoretically, the foremost loci for the investigation of the administrative history of communication.

¹⁷⁰ Here, as elsewhere, it is not our concern to delve into the discussion of what was the exact contribution of a putative sole creator—in this case, Frederick Taylor—to a given theory or system and what were the roles of other people often ignored. It is our task here to investigate the conceptual displacements and the administrative practices these ideas provoked, especially from the point of view of communication, not to trace their assumed origins or to identify the right persons to be credited. Taylor suffices to identify the movement in question, although surely he was less the creator of scientific management than he claimed.

¹⁷¹ Wilson, 1980, 26.

¹⁷² Jordan, 1994, 28, 35-6, 39.

¹⁷³ Karl, 1963, 60.

¹⁷⁴ See Valentin, 1912, 407.

¹⁷⁵ Taylor, 1967, 115.

-
- ¹⁷⁶ Taylor, 1967, 119.
¹⁷⁷ Taylor, 1967, 142.
¹⁷⁸ Taylor, 1967, 143.
¹⁷⁹ Karl, 1963, 19.
¹⁸⁰ Casson, 1910, 169.
¹⁸¹ Waldo, 1984, xxxiii. He goes even so far as to propose it having been “a significant, perhaps a major, input to the sociopolitical realm of the United States,” (xxx). See also Wilson, 1980, 26.
¹⁸² Karl, 1963, 148.
¹⁸³ See Pool, 1983, 59.
¹⁸⁴ See Burlingame, 1940, 118. This view was linked to attempts to legitimate the concept of “natural monopoly,” in the light of which AT&T came to be conceived over decades.
¹⁸⁵ Burlingame, 1940, 120.
¹⁸⁶ Steinmetz, 1916, 156.
¹⁸⁷ *Technocracy Study Course*, 1934, 221-2.
¹⁸⁸ Casson, 1910a, 140-1.
¹⁸⁹ See Brooks, 1911.
¹⁹⁰ See Donham, 1932, 26.
¹⁹¹ *Ibid.*, 255.
¹⁹² See Raymond, 1933, 174.
¹⁹³ *Technocracy Study Course*, 1934, 224. Italics in original.
¹⁹⁴ Karl, 1963, 24, 150.
¹⁹⁵ Bowman, 1996, 81.
¹⁹⁶ Hardt, 1992, 17.
¹⁹⁷ Bowman, 1996, 84.
¹⁹⁸ Bowman, 1996, 89.
¹⁹⁹ Croly, 1915, 378-405.
²⁰⁰ Bowman, 1996, 87-8.
²⁰¹ Bowman, 1996, 89.
²⁰² Lebow, 1995, 56.
²⁰³ Entry ‘Communication.’ The New Encyclopaedia Britannica, 15th edition, 1982.
²⁰⁴ Lasswell, 1938, 220-21.
²⁰⁵ Wilson, 1980, 28-9.
²⁰⁶ Waring, 1991, 12.
²⁰⁷ Waring, 1991, 7, 17.
²⁰⁸ Cited in Braverman, 1974, 113.
²⁰⁹ Taylor, 1967, 69.
²¹⁰ Dilts, 1941, 78-82.
²¹¹ Braymer, 1910, 127.
²¹² Pool, 1983, 73.
²¹³ For the part of the collective movement in business, see Burlingame, 1940, 130.
²¹⁴ Casson, 1910, 191.
²¹⁵ Jewett, 1936, 216.
²¹⁶ Leonard, V.A., *Police Communication Systems*, University of California Press, Berkeley, 1938, 6. Cited in Pool, 1983, 3-4.
²¹⁷ Hunter, 1939, 161-2.
²¹⁸ Wasserman, 1985, 3-4.
²¹⁹ Casson, 1910, 149.
²²⁰ Cited in Kingsbury, 1972, 90.
²²¹ Jewett, 1936, 214.
²²² Boulding, 1953, 207.
²²³ Casson, 1910, 238.
²²⁴ Casson, 1910, 222.
²²⁵ Fawcett, 1911, 190.
²²⁶ Rowsey, 1909, 6.
²²⁷ Rowsey, 1909, 6.
²²⁸ Rowsey, 1909, 7.
²²⁹ Braymer, 1910, 127.

-
- ²³⁰ "Associated Press Service by Telephone." *Telephone Engineer*, April, 1910, 291.
- ²³¹ Yates, 1989, 21.
- ²³² "Train Orders by Telephone." (1910) *Telephone Engineer*, III:3.
- ²³³ "Efficiency Engineering in the Telegraph Service." *Telegraph and Telephone Age*, January 1, 1916.
- ²³⁴ Livermore, 1909, 47.
- ²³⁵ Young, 1991, 82-3.
- ²³⁶ Casson, 1910, 143.
- ²³⁷ Kingsbury, 1972, 267, 394-400.
- ²³⁸ Donham, 1932, 34.
- ²³⁹ Barnard, 1968, 49.
- ²⁴⁰ Barnard, 1968, 90.
- ²⁴¹ Barnard, 1968, 175.
- ²⁴² Barnard, 1968, 91.
- ²⁴³ Barnard, 1968, 109, 175, 217.
- ²⁴⁴ Barnard, 1968, 178.
- ²⁴⁵ Barnard, 1968, 216-7.
- ²⁴⁶ Barnard, 1968, 218, 226.
- ²⁴⁷ Blain, 1929, 24.
- ²⁴⁸ Wilson, 1980, 26.
- ²⁴⁹ Wilson, 1980, 35.
- ²⁵⁰ Bentley, 1935, 285.
- ²⁵¹ Arkright, 1933, 81.
- ²⁵² *Technocracy Study Course*, 1934, 221.
- ²⁵³ See Marcus and Segal, 1989, 133-40.
- ²⁵⁴ Tugwell, 1927, 172.
- ²⁵⁵ Marcus and Segal 1989, 140.
- ²⁵⁶ *Ibid.*, 49.
- ²⁵⁷ Donham, 1932, 31.
- ²⁵⁸ Donham, 1932, 49.
- ²⁵⁹ Jewett, 1928, 153.
- ²⁶⁰ Jewett, 1928, 151-2.
- ²⁶¹ Stroud, 1914, 37.
- ²⁶² Cherry, 1980, 6.
- ²⁶³ See Barnard, 1968, 217.
- ²⁶⁴ Heims, 1991, 282.
- ²⁶⁵ As Jacques Lacan put it: "The Bell Telephone Company needed to economise, 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." In Lacan, 1988, 79.
- ²⁶⁶ See Cherry, 1980, 41, 43.
- ²⁶⁷ Again, this is not to say that telecommunication would have been the only or primary agent of change. Rather, it provided perhaps one of the best perspectives to the dynamics of social change.
- ²⁶⁸ Jean-Luc Nancy has aptly elaborated this theme with reference to Heidegger in his essay "The Decision of Existence." See Nancy, 1993.
- ²⁶⁹ Jordan, 1994, 8.
- ²⁷⁰ As Ludwig von Bertalanffy, who first gave scientific form to the systems thinking, put it: "The 19th and first half of the 20th conceived the *world a chaos*. -- Now we are looking for another basic outlook on the world—*the world as organization*." Bertalanffy, 1968, 187-8.
- ²⁷¹ Hughes, 1998, 8, 9.
- ²⁷² Waring, 1991, 20.
- ²⁷³ Wiener, 1961.
- ²⁷⁴ Heims, 1991, 22.
- ²⁷⁵ Wiener, 1954, 27.
- ²⁷⁶ Wiener, 1961, 39.
- ²⁷⁷ Hirschhorn, 1984, 52.
- ²⁷⁸ Beniger, 1986, 6.

-
- ²⁷⁹ Wiener, 1950, 15.
²⁸⁰ Dechert, 1966, 15, 17-8.
²⁸¹ Heims, 1975, 368, 371.
²⁸² Young, 1969, 7-8.
²⁸³ Aiken, von Neumann, and Wiener, letter to E.H. Vestine, 4th Dec. 1944. Cited in Galison, 1994, 247-8.
²⁸⁴ Wiener, letter to Rosenblueth, 24 Jan. 1945. Cited in Galison, 1994, 248.
²⁸⁵ Wiener, 1948, 207.
²⁸⁶ von Neumann, 1958, 51.
²⁸⁷ Schwartz, 1966, 90.
²⁸⁸ Young, 1969, 8-9.
²⁸⁹ Wiener, 1948, 208.
²⁹⁰ Edwards, 1996, 192-3.
²⁹¹ Mills, 1934, 31-40.
²⁹² von Neumann, 1958, 76-7; Young, 1969, 4-5.
²⁹³ Wiener, 1948, 212.
²⁹⁴ Galison, 1994, 261-2, Hirschhorn, 1984, 32-3.
²⁹⁵ Black's solution was inspired by the famous engineer Charles Steinmetz, who saw the telephone company as a model for governance (see chapter 4.2.); Hirschhorn, 1984, 38.
²⁹⁶ Hirschhorn, 1984, 39.
²⁹⁷ Chapuis, 1982, 275, 291.
²⁹⁸ Wiener, Bigelow and Rosenblueth, 1943.
²⁹⁹ Hirschhorn, 1984, 39.
³⁰⁰ Wiener, 1961, 42.
³⁰¹ Wiener, 1961, 42.
³⁰² See Hirschhorn, 1984, 28-9.
³⁰³ George, 1959, 50.
³⁰⁴ Wiener, 1954, 93.
³⁰⁵ Wiener, 1954, 17.
³⁰⁶ George, 1959, 56.
³⁰⁷ Wiener, 1954, 110.
³⁰⁸ Schwartz, 1966, 88.
³⁰⁹ Shannon, 1948 and Shannon and Weaver 1949.
³¹⁰ See Pierce, 1962, 42. The main difference between Wiener and Shannon was that whereas for the former communication was a continuous current, for the latter it was rather an intermittent event.
³¹¹ For instance, Nyquist, 1924 and Hartley, 1928.
³¹² Lilienfeld, 1978, 50.
³¹³ Schwartz, 1966, 90.
³¹⁴ Lilienfeld, 1978, 61.
³¹⁵ Latour, 1988.
³¹⁶ The concept of "information" had been introduced independently by Wiener; Heims, 1991, 97.
³¹⁷ Shannon and Weaver, 1949, 5.
³¹⁸ George, 1959, 58.
³¹⁹ George, 1959, 63; see Pierce, 1962, 9. The same division into limited formal applications and broader practical applications concerns cybernetics as well; see Dechert 1966, 18-9.
³²⁰ George, 1959, 244.
³²¹ Cited in Rogers, 1986, 84.
³²² Krippendorff, 1994, 43.
³²³ Rogers, 1986, 85.
³²⁴ Krippendorff, 1994, 42-3.
³²⁵ Rogers, 1986, 88, 89.
³²⁶ See *Le contrat naturel*, Éditions François Bourin, 1990.
³²⁷ The concept of contract, as used by Serres, comes close to the "Weltbild" of the late Wittgenstein, which constitutes a framework for agreements and disagreements concerning the truth.
³²⁸ Shannon and Weaver, 1949, 8.
³²⁹ Rogers, 1986, 94.
³³⁰ Shannon and Weaver, 1949, 31.

-
- ³³¹ The concept of *entropy* was also important for information theory, being defined by Shannon as a measure of variability.
- ³³² The notion of *noise* was also regarded as a cardinal one in cybernetics; Wiener, 1961, 42.
- ³³³ George, 1959, 56.
- ³³⁴ Wiener, 1954, 105.
- ³³⁵ Dechert, 1966, 17.
- ³³⁶ Wiener, 1961, 24.
- ³³⁷ Krippendorff, 1994, 42.
- ³³⁸ Edwards, 1996, 159.
- ³³⁹ Hirschhorn, 1984, 16.
- ³⁴⁰ Deutsch, 1966, 77.
- ³⁴¹ Latil, 1956, 31.
- ³⁴² Galison, 1994, 258.
- ³⁴³ Hayles, 1994.
- ³⁴⁴ Wiener, 1954, 27.
- ³⁴⁵ Flueckiger, 1995, 21.
- ³⁴⁶ See chapter 4.1.
- ³⁴⁷ Maturana and Varela, 1980.
- ³⁴⁸ See Mingers, 1995.
- ³⁴⁹ Glanville, 1997.
- ³⁵⁰ Constructive theories of different varieties have found a systematic conceptualization in philosophy at least since the “critiques” of Immanuel Kant. What concerns us here, however, is the way mutual articulation of an “action” and its “outside” has been realized within and in connection to the thought about communication as an object and means of governance.
- ³⁵¹ Heims, 1980, 179; Heims, 1991, 3.
- ³⁵² Bell, 1980, 509.
- ³⁵³ George, 1959, 247.
- ³⁵⁴ Heims, 1991, 271.
- ³⁵⁵ Wiener, 1961, 18.
- ³⁵⁶ Wiener, 1964, 88.
- ³⁵⁷ Wiener, 1961, 164 [Emphasis added].
- ³⁵⁸ Wiener, 1964, 87-90.
- ³⁵⁹ Dechert, 1966, 19-20.
- ³⁶⁰ Edwards, 1996. The discussion on SAGE draws mainly on this work.
- ³⁶¹ Hughes, 1998, 52-4.
- ³⁶² Lebow, 1995, 174.
- ³⁶³ Macbride, 1967, 9-12.
- ³⁶⁴ Heims, 1991, 180.
- ³⁶⁵ There were only “computers” at the time we are talking of. The epithet “mainframe” was not coined until minicomputers started to be built at the very end of the 1960s and early 1970s.
- ³⁶⁶ Boulding, 1953, 68.
- ³⁶⁷ Boulding, 1953, 68.
- ³⁶⁸ Macbride, 1967, 104.
- ³⁶⁹ Macbride, 1967, 13.
- ³⁷⁰ Cited in Theobald, 1966, 46.
- ³⁷¹ Macbride, 1967, 54.
- ³⁷² Grabbe, 1957, 20; Diebold, 1952.
- ³⁷³ Macbride, 1967, 46-7. This section on national real-time computer systems draws mainly on Macbrides book.
- ³⁷⁴ Cited in Macbride, 1967, 48.
- ³⁷⁵ Theobald, 1966, 47.
- ³⁷⁶ Kast and Rosenzweig (eds.) 1963, 306.
- ³⁷⁷ Macbride, 1967, 90.
- ³⁷⁸ Cited in Macbride, 1967, 65.
- ³⁷⁹ Cited in Macbride, 1967, 63.
- ³⁸⁰ Macbride, 1967, 75.
- ³⁸¹ Wilson, 1980, 56-7.

³⁸² Theobald, 1966, 47.
³⁸³ Macbride, 1967, 93-4, 95-6.
³⁸⁴ Macbride, 1967, 102-3.
³⁸⁵ See Chapter 4.1.
³⁸⁶ Macbride, 1967, 105.
³⁸⁷ Macbride, 1967, 173.
³⁸⁸ Dechert, 1966, 25.
³⁸⁹ Hanson, 1985, 295.
³⁹⁰ See Hirschhorn, 1984, 57 and Boguslaw, 1965.
³⁹¹ Wiener, 1967, 25, 38-9.
³⁹² Deutsch, 1966, 77.
³⁹³ Dechert, 1966, 24.
³⁹⁴ Introna, 2001.
³⁹⁵ Hughes, 1998, 142-3, 166.
³⁹⁶ Macbride, 1967, 7.
³⁹⁷ This "end" of the tradition of administration of and by communication should not be conceived as termination but rather as "that place in which the totality of its history is gathered in its most extreme possibilities," as Heidegger put it. Cited in Philipse, 1998, 160.
³⁹⁸ Morse and Kimball, 1951.
³⁹⁹ Churchman, Ackoff, and Arnoff, 1957.
⁴⁰⁰ Cited in Waring, 1991, 24, 25.
⁴⁰¹ Simon, 1965, 69.
⁴⁰² Wilson, 1967, 41.
⁴⁰³ Waring, 1991, 25-6.
⁴⁰⁴ Waring, 1991, 31.
⁴⁰⁵ Macbride, 1967, 79, 82.
⁴⁰⁶ Krippendorf, 1975, 158.
⁴⁰⁷ Waring, 1991, 28-29.
⁴⁰⁸ Hughes, 1998, 141, Waring, 1991, 32-5.
⁴⁰⁹ Waring, 1991, 198.
⁴¹⁰ Hughes, 1998, 167-9.
⁴¹¹ Boulding, 1975, 32.
⁴¹² Forrester, 1968, 14.
⁴¹³ Hughes, 1998, 177.
⁴¹⁴ Hughes, 1998, 177.
⁴¹⁵ Beer, 1972, 154.
⁴¹⁶ Beer, 1972, 258.
⁴¹⁷ Beer, 1972, 37.
⁴¹⁸ Beer, 1972, 35, 138.
⁴¹⁹ Waring, 1991, 49.
⁴²⁰ Waring, 1991, 77.
⁴²¹ Cited in Waring, 1991, 57.
⁴²² Morgan, 1986, 81.
⁴²³ Simon, 1997, 208-9, 222.
⁴²⁴ Waring, 1991, 70.
⁴²⁵ Waring, 1991, 26.
⁴²⁶ Waring, 1991, 47.
⁴²⁷ Levin, 1956, 3; Kozmetsky and Kircher, 1956, 2.
⁴²⁸ Heims, 1975, 369.
⁴²⁹ Katz and Lazarsfeld, 1955, 16.
⁴³⁰ See Debray, 1996, 44-5.
⁴³¹ Hardt, 1992, 14.
⁴³² Galison 1994, 256.
⁴³³ Dechert, 1966, 20.
⁴³⁴ Deutsch, 1951.
⁴³⁵ Macbride, 1967, 154.
⁴³⁶ This is not to say, of course, that the telephone or the computer system would have been, respectively, the sole or privileged sources of social self-understanding and self-representation. Naturally there were a number of

other sources that served this purpose. Yet models related to these systems were no doubt absolutely crucial for contemporary discourses concerning the state of society.

⁴³⁷ Cited in Weizenbaum, 1991, 280.

⁴³⁸ Morgan, 1986, 83-4.

⁴³⁹ Neisser, 1966, 72.

⁴⁴⁰ Kast and Rosenzweig, 1963, 295.

⁴⁴¹ Forrester, 1968, 15.

⁴⁴² Macbride, 1967, 187.

⁴⁴³ Morgan, 1986, 86-7.

⁴⁴⁴ Waring, 1991, 20.

⁴⁴⁵ The dissolution of the formalistic program is here associated with the end of the classical cybernetic approach of the late 1960s and early 1970s.

⁴⁴⁶ Waring, 1991, 35, 41.

⁴⁴⁷ Hughes, 1998, 5.

⁴⁴⁸ Lebow, 1995, 189.

⁴⁴⁹ Waring, 1991, 188.

⁴⁵⁰ Edwards, 1996, 195.

⁴⁵¹ Jacques Taminioux has discussed the Heideggerian Being as a difference between its withdrawal and appearance in his "Gestell et Ereignis."- *Recouplements*. Éditions OUSIA, Bruxelles 1982, 118-141.

⁴⁵² Haar, 1993, 81.

⁴⁵³ See McCormick, 1997, especially Chapter 1.

⁴⁵⁴ *The Coming Community*. Translated by Michael Hardt. University of Minnesota Press, 1993.

⁴⁵⁵ *Antwort. Martin Heidegger im Gespräch*, Günther Neske, 1988.

⁴⁵⁶ See Haar, 1993, 82-3.

⁴⁵⁷ Heidegger, 1977.

⁴⁵⁸ Heidegger, "The Question Concerning Technology," in Heidegger, 1993, 328.

⁴⁵⁹ Heidegger, "The Question Concerning Technology," in Heidegger, 1993, 328.

⁴⁶⁰ Heidegger, "The Question Concerning Technology," in Heidegger, 1993, 332.

⁴⁶¹ Heidegger, "The Question Concerning Technology," in Heidegger, 1993, 337.

⁴⁶² See McCormick, 1997.

⁴⁶³ Vattimo, 1988, 71-2.

⁴⁶⁴ Vattimo, 1988, 72.

⁴⁶⁵ Vattimo, 1993b, 222.

⁴⁶⁶ Vattimo, 1993b, 223.

⁴⁶⁷ Vattimo, 1992, Chapters 1 and 2.

⁴⁶⁸ Vattimo, 1992, 8. Vattimo's term is *spaesamento*, which, in addition to disorientation, refers to alienation and homelessness that is connected to Heidegger's *Un-heimlichkeit* or *Un-zu-Haus-sein*.

⁴⁶⁹ See Meyrowitz, 1985.

⁴⁷⁰ *The Transparent Society*. Translated by David Webb. Polity Press, 1992.

⁴⁷¹ Hirschhorn, 1984, 82.

⁴⁷² Unpublished presentation at the "Worlds in Transition" conference held at September 27-30, 2000 at the university of Vienna, Austria.

⁴⁷³ I am drawing here on Vähämäki, 1997.

⁴⁷⁴ Dean, 1996, 225.

⁴⁷⁵ *Le contrat naturel*. Éditions François Bourin, 1990.

⁴⁷⁶ Wiener, 1954, 17.

⁴⁷⁷ Cybernetic systems can only adopt to external phenomena that they have been pre-programmed to recognize, and which must therefore be anticipated. Yet it remains true that for a cybernetic system, in contrast to a mechanical one, external phenomena—noise—is a source of information that directs the system's behavior. Therefore "anticipation" here has a somewhat different meaning, as for the former system what is anticipated had to be defined over and over again whereas for the latter system this was done once and for all.

⁴⁷⁸ See Gasché, 1999, 80.

Bibliography

Official Publications of the United States

Annual Report of the Postmaster General. The Fiscal Year Ended June 30, 1871. Government Printing Office, Washington.

Annual Report of the Postmaster General. The Fiscal Year Ended June 30, 1873. Government Printing Office, Washington.

Recent Economic Changes in the United States. Report of the Committee on Recent Economic Changes. Vol. 1. McGraw-Hill Book Company, New York, 1929.

Seward, William (1864) *Communication of Hon. William H. Seward, Secretary of State, upon the Subject of an Intercontinental Telegraph Connecting the Eastern and Western Hemispheres by Way of Behring's Strait.* Government Printing Office, Washington.

Telecommunications. A Program for Progress. A Report by the President's Communications Policy Board. Washington, March 1951.

United States Congress. House Doc. No. 156, 19th Cong., 1st sess. (1826)

United States Congress. House Report No. 187, 28th Cong., 2d sess. (1845)

United States Congress. House Ex. Doc. No. 5, 31st Cong., 1st sess. (1849)

United States Congress. Senate Ex. Doc. No. 1, 31st Cong., 2d sess. (1850)

United States Congress. House Ex. Doc. No 1, Part 3, 41st Cong., 2d sess. (1869)

United States of America. Congressional Record. 48th Cong., 1st sess. Vol. XV (1884)

United States of America. *War Department, Document No. 104, Regulations for the Operation and Maintenance of United States Military Telegraph Lines and General Regulations of the Signal Corps, United States Army.* Government Printing Office, Washington, 1899.

Periodicals

American Telegraph Magazine

Atlantic Monthly

The Andover Review
The Bell System Technical Journal
Bell Telephone Quarterly
Boston Daily Advertiser
Electrical Communication
Harper's Magazine
Harper's Weekly
The Independent
Journal of Policy History
Journal of Politics
McClures Magazine
North American Review
Political Science Quarterly
Post Office Electrical Engineers' Journal
The Princeton Review
The Reader
Scientific American
Telecommunications Policy
Telephone Engineer
The Telegrapher
Telephony
Yale Law Journal

Printed Sources

“A Fire Alarm System Which Telephones Its Message.” *Scientific American*, May 1, 1920.

“Application of the Modern Telephone.” *Telephony*, August, 1902.

Archer, Charles (1852) *Guide to the Electric Telegraph*. London.

- Barrett, R.T. (1933) "The Growth of America's Communication Needs." *Bell Telephone Quarterly*, XII : 4.
- Barrett, Robertson (1940) "The Telephone as a Social Force." *Bell Telephone Quarterly*, XIX : 2.
- Beard, Charles and William Beard (1930) *The American Leviathan. The Republic in the Machine Age*. Jonathan Cape Ltd, London.
- Bentley, Arthur, (1935 [1908]) *The Process of Government. A Study of Social Pressures*. The Principia Press of Illinois, Inc., Evanston, IL.
- Bethell, Union (1913) *Telephone Engineer*. IX:4.
- Blain, Ray (1929) "Communication Is an Element in National Progress." *Telephone Engineer*, 33:3.
- Bohn, Frank (1920) "The Association and Its Needs." *Telephone Engineer*, XXIV:4.
- Braymer, D. (1910) "New Police Telephone and Signal System." *Telephone Engineer*, Vol. III, No. 3, March.
- Brooks, Sydney (1911) "Politics of American Business." *North American Review*, 93.
- Carty, John (1928) "Ideals of the Engineer." *Bell Telephone Quarterly*, VIII : 2.
- Casson, Herbert (1910a) *The History of the Telephone*. A.C. McClurg & Co., Chicago.
- Casson, Herbert (1910b) "The Telephone as it is To-Day." *World's Work*, 19, April 1910.
- Casson, Herbert (1910c) "The Future of the Telephone." *World's Work*, 19, May 1910.
- Casson, Herbert, (1911) "The Social Value of the Telephone." *The Independent*, October 26.
- Chandler, Murphy (1920) "Regulation of Service." *Telephone Engineer*, XXIII:4.
- Channing, William (1845) "Morse's Telegraph for Fire Alarms." *Boston Daily Advertiser*, June 3.
- Channing, William (1851) "Report Concerning a Uniform System of Fire Alarms." *City Document No. 42, City of Boston*. March 24.
- Channing, William (1852) *On the Municipal Electric Telegraph. Especially in Its Application to Fire Alarms*. Yale College, New Haven.
- Channing, William (1855) *The American Fire-Alarm Telegraph: A Lecture*. Redding & Company, Boston.
- Childs, Frank (1933) "When the Telephone was Young in Washington, D.C." *Telephony*, April 1.
- Coggeshall, I.S. (1944) "A Critique of Communication at the Centennial of the Telegraph." In *American Telegraphy after 100 Years. A Compilation by the Committee on Technical Publication*. The Western Union Telegraph Company, New York.

- Colton, Arthur (1912) "The Telephone Newspaper—New Experiment in America." *Telephony*, 62 : 13.
- Cooley, Charles (1894) "The Theory of Transportation". *Publications of the American Economic Association*, Vol. IX, No. 3.
- Cooley, Charles (1897) "The Process of Social Change." *Political Science Quarterly*, XII : 1.
- Cooley, Charles (1902) *Human Nature and the Social Order*. Scribner, New York.
- Cooley, Charles (1912) *Social Organization. A Study of the Larger Mind*. Charles Scribner's Sons, New York.
- Cooley, Charles (1930) *Sociological Theory and Social Research*. Henry Holt and Co., New York.
- Croly, Herbert (1915) *Progressive Democracy*. Macmillan, New York.
- Danielian, N.R. (1939) *A.T.&T. The Story of Industrial Conquest*. The Vanguard Press, New York.
- Denison, Merrill (1936) *Advancing America. The Drama of Transportation and Communication*. Dodd, Mead & Company, New York.
- Dewey, John (1887) "Ethics and Physical Science." *The Andover Review*, VII : XLII.
- Dewey, John (1902) "The School as Social Center." *Proceedings of the National Education Association*.
- Dewey, John (1917) *Democracy and Education. An Introduction to the Philosophy of Education*. The Macmillan Company, New York.
- Dewey, John (1946 [1927]) *The Public and Its Problems. An Essay in Political Inquiry*. Gateway Books, Chicago.
- Dilts, Marion (1941) *The Telephone in a Changing World*. Longmans, Green and Co., New York.
- Donham, Wallace (1932) *Business Looks at the Unforeseen*. Whittlesey House, McGraw-Hill Book Company, New York.
- Draper, John (1865) *Thoughts on the Future Civil Policy of America*. Harper & Brothers, New York.
- Fawcett, Waldon (1910) "How Uncle Sam Uses the Telephone." *Telephony*, January 22.
- Freund, Ernst et al. (1923) *The Growth of American Administrative Law*. Thomas Law Book Company, St. Louis.
- Gherardi, Bancroft and Jewett, F.B. (1930) "Telephone Communication System of the United States." *The Bell System Technical Journal*, January.
- Harlow, Alwin (1936) *Old Wires and New Waves. The History of the Telegraph, Telephone, and Wireless*. D. Appleton-Century Company, New York.

- Henderson, C.R. (1897) *The Social Spirit in America*. The Chautauqua-Century Press, New York.
- Hendrick, Burton (1914) "Telephones for the Millions." *McClures Magazine*, 44.
- Highton, Edward (1852) *The Electric Telegraph: Its History and Progress*. John Weale, London.
- Hilton, Alice (ed.) (1966) *The Evolving Society. Proceedings of the First Annual Conference on the Cybercultural Revolution—Cybernetics and Automation*. The Institute for Cybercultural Research, New York.
- Hunter, Howard (1939) "The Teletypewriter Helps the Police." *Bell Telephone Quarterly*, XVIII : 3.
- Jewett, Frank (1928) "The Telephone Switchboard. Fifty Years of History." *Bell Telephone Quarterly*, Vol. VIII.
- Jewett, Frank (1936) "The Social Implications of Scientific Research in Electrical Communication." *Bell Telephone Quarterly*, XV : 4.
- Jewett, Frank (1977) "A Quarter Century of Transcontinental Telephony." In George Shiers (ed.) *The Telephone. An Historical Anthology*. Arno Press, New York.
- Jones, Alexander (1852) *Historical Sketch of the Electric Telegraph: Including Its Rise and Progress in the United States*. George P. Putnam, New York.
- Kingsbury, John (1972 [1915]) *The Telephone and Telephone Exchanges. Their Invention and Development*. Arno Press.
- Kingsbury, N.C. (1917) "Co-operation and the Telephone." *Telephone Engineer*, XVII:3.
- Kohlhaas, H.T. (1942) "Milestones of Communication Progress." *Electrical Communication*, 20.
- Lardner and Bright, Edward (1867) *The Electric Telegraph*. James Walton, London.
- Lasswell, Harold D. (1938) *Propaganda Technique in the World War*. Kegan Paul, Trench, Trubner & Co., London.
- Lawson, R. (1912-3) "A History of Automatic Telephony." *Post Office Electrical Engineers' Journal*, 5.
- Lippmann, Walter (1938) *The Good Society*. George Allen & Unwin Ltd, London.
- Livermore, O.N. (1909) "Factory Telephones." *Telephone Engineer*, 1:2.
- Maron, M.E. (1965) "On Cybernetics, Information Processing, and Thinking." In Wiener, Norbert and J.P. Schadé (eds.) *Cybernetics of the Nervous System*. Progress in Brain Research, Vol. 17, Elsevier Publishing Co., Amsterdam.
- Morse, Samuel F. B. (1914) *His Letters and Journals. Invention of the Telegraph. Vol. 2*. Edited and supplemented by Edward Lind Morse. Houghton Mifflin Company, Cambridge, MA.

- Mumford, John (1908) "This Land of Opportunity. The Nerve-Centre of Modern Business." *Harper's Weekly*, August 1.
- Page, Arthur (1932) "Social Aspects of Communication Development." In Arthur Page et al. *Modern Communication*. Houghton Mifflin Co., Boston.
- Park, Robert and Ernest Burgess (1921, 1924) *Introduction to the Science of Sociology*. The University of Chicago Press, Chicago.
- Park, Robert (1955) *Society*. The Free Press, Glencoe, IL.
- Park, Robert (1967) *On Social Control and Collective Behavior*. Edited by Ralph Turner. Phoenix Books, The University of Chicago Press, Chicago.
- Park, Robert (1972) *The Crowd and the Public and Other Essays*. Edited by Henry Elsner, Jr. The University of Chicago Press, Chicago.
- Phillips, William and Charles Robinson (1857) *Phillips' & Robinson's Municipal Telegraph*. No information about the publisher.
- Plum, William (1882) *The Military Telegraph During the Civil War in the United States*. Vol. 2. Jansen, McClurg & Co., Chicago.
- Pound, Arthur (1926) *The Telephone Idea. Fifty Years After*. Greenberg, New York.
- Pound, Roscoe (1909) "Liberty of Contract." *Yale Law Journal*, 18.
- Prescott, George (1860) *History, Theory, and Practice of the Electric Telegraph*. Ticknor and Fields, Boston.
- Raymond, Allen (1933) *What Is Technocracy?* Whittlesey House, McGraw-Hill Book Co., New York.
- Reid, James (1879) *The Telegraph in America. Its Founders, Promoters and Noted Men*. Derby Brothers, New York.
- Rowsey, A. (1909) "Telephones in the New York Police Bureau." *Telephone Engineer*, Vol. II, No. 1, July.
- Scott, Howard (1933a) "Technology Smashes the Price System." *Harper's Magazine*, Vol. 166.
- Scott, Howard et al. (1933b) *Introduction to Technocracy*. John Lane the Bodley Head Ltd., London.
- Scott, Howard (1935) "America Prepares for a Turn in the Road." *Technocracy*, 1 : 7.
- Sears, Vinton ed. (1905) *Telephone Development. Status of the Industry, Scope and Effect of Competition*. The Barta Press, Boston.
- Shaffner, Tal. (1859) *The Telegraph Manual*. Pudney & Russell, New York.
- Shaw, Thomas (1944) "The Conquest of Distance by Wire Telephony." *The Bell System Technical Journal*, XXIII : 4.

- Soule, George (1932) *A Planned Society*. The Macmillan Co., New York.
- Steinmetz, Charles (1916) *America and the New Epoch*. Harper, New York.
- Stroud, H.D. (1914) "Future Telephone Possibilities." *Telephone Engineer*, XI:1.
- Sumner, Graham (1881) "Sociology." *The Princeton Review*, 57, November.
- Sumner, Graham (1978 [1883]) *What Social Classes Owe to Each Other*. Caxton Printers, Caldwell.
- Sumner, Graham (1911) *War and Other Essays*. Ed. by Albert Galloway Keller. Yale University Press, New Haven.
- Schwartz, Leonard (1966) "Communication and the Computing Machine." In Hilton, Alice (ed.) *The Evolving Society. Proceedings of the First Annual Conference on the Cybercultural Revolution—Cybernetics and Automation*. The Institute for Cybercultural Research, New York.
- Tarbell, Ida (1936) *The Nationalizing of Business, 1878-1898*. The Macmillan Co. New York.
- Taylor, Frederick (1967 [1911]) *The Principles of Scientific Management*. W.W. Norton & Company, New York.
- Technocracy Study Course*. Technocracy Inc., 1934.
- "Telephone in Politics." *Telephony*, December, 1906.
- "The Indispensable Telephone." *Telephony*, November, 1906.
- "The Intellectual Effects of Electricity." *The Spectator*, 63. 9 November, 1889.
- "The Telephone in Government Service." *Telephony*, June, 1905.
- "The Telephone in Modern Business." *Telephony*, November, 1901.
- "Train Orders by Telephone." *Telephone Engineer*, III:3, March 1910.
- Tugwell, Rexford (1927) *Industry's Coming of Age*. Harcourt, Brace and Company, New York.
- Turnbull, Laurence (1852) *Lectures on the Electro-Magnetic Telegraph*. R. W. Barnard, Philadelphia.
- Vail, Alfred (1845) *The American Electro Magnetic Telegraph with the Reports of Congress, and a Description of all Telegraphs Known, Employing Electricity or Galvanism*. Lea & Blanchard, Philadelphia.
- Vail, Theodor (1913) "Public Utilities and Public Policy." *Atlantic Monthly*, Vol. 3.
- Valentine, Herbert (1912) "Social Efficiency." *Transactions of the Efficient Society*, I.
- Ward, Lester (1968 [1883]) *Dynamic Sociology*. 2 Vols, Johnson Reprint, New York.

Ward, Lester (1884) "The Claims of Political Science." In *Glimpses of the Cosmos*, 6 Vols. Putnam, New York, 1913-18.

Willey, Malcolm and Stuart Rice (1933) *Communication Agencies and Social Life*. McGraw-Hill Book Co., New York.

Wilson, George (1859) *The Progress of the Telegraph*. Macmillan and Co., Cambridge.

Secondary Literature

Ahvenainen, Jorma (1981) *The Far Eastern Telegraphs. The History of Telegraphic Communications between the Far East, Europe and America before the First World War*. Gummerus, Jyväskylä.

Akin, William (1977) *Technocracy and The American Dream. The Technocrat Movement, 1900-1941*. University of California Press, Berkeley.

Arkright, Frank (1933) *The ABC of Technocracy*. Hamish Hamilton, London.

Arnold, H.D. (1932) "An Introduction to Research in the Communication Field." In Arthur Page et al. *Modern Communication*. Houghton Mifflin Co., Boston.

Ault, Phil (1974) *Wires West*. Dodd, Mead & Company, New York.

Barnard, Chester (1968 [1938]) *The Functions of the Executive*. Thirtieth anniversary edition. Harvard University Press, Cambridge, MA.

Barry, Andrew (1996) "Lines of Communication and Spaces of Rule," in Andrew Barry et al. (eds.) *Foucault and Political Reason. Liberalism, Neo-Liberalism and Rationalities of Government*. UCL Press, London.

Barry, Karl (1963) *Executive Reorganization and Reform in the New Deal. The Genesis of Administrative Management, 1900-1939*. Harvard University Press, Cambridge, MA.

Beer, Stafford (1972) *Brain of the Firm. The Managerial Cybernetics of Organization*. Allen Lane, The Penguin Press, London.

Beetham, David (1996) *Bureaucracy*. Second edition. Open University Press, Buckingham.

Bell, Daniel (1980) "The Social Framework of the Information Society." In Tom Forester (ed.) *The Microelectronics Revolution*. Basil Blackwell, Oxford.

Beniger, James (1986) *The Control Revolution. Technological and Economic Origins of the Information Society*. Harvard University Press, Cambridge, MA.

Bertalanffy, Ludwig von (1968) *General System Theory: Foundations Development Applications*. New York, Braziller.

Bickers, Kenneth (1991) "Transformations in the Governance of the American Telecommunications Industry." In John Campbell et al.(eds.) *Governance of the American Economy*. Cambridge University Press, Cambridge.

- Bierstedt, Robert (1981) *American Sociological Theory. A Critical History*. Academic Press, New York.
- Blondheim, Menahem (1994) *News over the Wires. The Telegraph and the Flow of Public Information in America, 1844-1897*. Harvard University Press, Cambridge, MA.
- Boguslaw, Robert (1965) *The New Utopians. A Study of System Design and Social Change*. Prentice-Hall, Englewood Cliffs, NJ.
- Borchardt, Kurt (1970) *Structure and Performance of the U.S. Communications Industry. Government Regulation and Company Planning*. Harvard University, Boston.
- Boulding, Kenneth (1953) *The Organizational Revolution. A Study in the Ethics of Economic Organization*. Harper & Brothers, New York.
- Boulding, Kenneth (1975 [1956]) "General Systems Theory—The Skeleton of Science." In Ruben, Brent and John Kim (eds.) *General Systems theory and Human Communication*. Hayden Book Company, Rochelle Park, NJ.
- Bowker, Geof (1993) "How to be Universal: Some Cybernetic Strategies, 1943-70." *Social Studies of Science*, SAGE, Vol. 23.
- Bowman, Scott (1996) *The Modern Corporation and American Political Thought. Law, Power, and Ideology*. The Pennsylvania State University Press, University Park, PA.
- Braverman, H. (1974) *Labor and Monopoly Capital: The Degradation of the Work in the Twentieth Century*. Monthly Review Press, New York.
- Breisach, Ernst (1993) *American Progressive History. An Experiment in Modernization*. The University of Chicago Press, Chicago.
- Brock, Gerald (1981) *The Telecommunications Industry. The Dynamics of Market Structure*. Harvard University Press, Cambridge, MA.
- Brock, Gerald (1994) *Telecommunication Policy for the Information Age. From Monopoly to Competition*. Harvard University Press, Cambridge, MA.
- Brooks, John (1975) *Telephone. The First Hundred Years*. Harper & Row, New York.
- Brown, Richard (1989) *Knowledge is Power. The Diffusion of Information in Early America, 1700-1865*. Oxford University Press, New York.
- Burchell, Graham; Colin Gordon and Peter Miller eds. (1991) *The Foucault Effect. Studies in Governmentality*. Harvester Wheatsheaf, Exeter.
- Burlingame, Roger (1939) *March of the Iron Men. A Social History of Union through Invention*. Charles Scribner's Sons, New York.
- Burlingame, Roger (1940) *Engines of Democracy. Inventions and Society in Mature America*. Charles Scribner's Sons, New York.
- Campagna, Anthony (1987) *U.S. National Economic Policy 1917-1985*. Praeger, New York.

- Campbell, Ballard (1995) *The Growth of American Government. Governance from the Cleveland Era to the Present*. Indiana University Press, Bloomington.
- Campbell, James (1995) *Understanding John Dewey. Nature and Cooperative Intelligence*. Open Court, Chicago.
- Cannon, Walter (1939) *The Wisdom of the Body* (rev. ed.) W.W. Norton & Company, New York.
- Carey, James (1989) *Communication as Culture*. Unwin Hyman, Boston.
- Carey, James (1991) "Time, Space, and the Telegraph." In David Crowley and Paul Heyer (eds.) *Communication in History. Technology, Culture, Society*. Longman, New York.
- Chandler, Alfred, Jr. (1977) *The Visible Hand. The Managerial Revolution in American Business*. The Belknap Press of Harvard University Press. Cambridge, MA.
- Chapuis, Robert (1982) *100 Years of Telephone Switching (1878-1978). Part I: Manual and Electromechanical Switching (1878-1960s)*. North-Holland Publishing Company, Amsterdam.
- Cherry, Colin (1977) "The Telephone System: Creator of Mobility and Social Change." In Pool, Ithiel de Sola (ed.) *The Social Impact of the Telephone*. The MIT Press, Cambridge, MA.
- Cherry, Colin (1980 [1957]) *On Human Communication*. Third edition. The MIT Press, Cambridge, MA.
- Churchman, C. West, Ackoff, Russell, and Arnoff, Leonard (1957) *Introduction to Operations Research*. John Wiley & Sons, Inc., New York.
- Clark, Christopher (1996) "The Consequences of the Market Revolution in the American North." In Stokes, Melvyn and Conway, Stephen (eds.) *The Market Revolution in America. Social, Political, and Religious Expressions, 1800-1880*. University Press of Virginia, Charlottesville.
- Cmiel, Kenneth (1996) "On Cynicism, Evil, and the Discovery of Communication in the 1940s." *Journal of Communication*, 46: 3, Summer.
- Coe, Lewis (1993) *The Telegraph. A History of Morse's Invention and Its Predecessors in the United States*. McFarland & Company, Inc. Jefferson, NC.
- Cohen, Jeffrey (1991) "The Telephone Problem and the Road to Telephone Regulation in the United States, 1876-1917." *Journal of Policy History*, 3 : 1.
- Cooley, Charles (1998) *On Self and Social Organization*. Edited by Hans-Joachim Schubert. The University of Chicago Press, Chicago.
- Cooper, Dennis and E.L. Harris (1988 [1971]) *The People Machine. An Illustrated History of the Telephone on the Center West Coast of Florida*. Third Edition. GTE Florida Inc., Tampa.
- Cortada, James (1984) *Strategic Data Processing: Considerations for Management*. Prentice-Hall, Englewood Cliffs, NJ.

- Cowan, Ruth (1997) *A Social History of American Technology*. Oxford University Press, New York.
- Cox, Archibald (1987) *The Court and the Constitution*. Houghton Mifflin, Boston.
- Curti, Merle (1946) *The Roots of American Loyalty*. Columbia University Press, New York.
- Dandeker, Christopher (1990) *Surveillance, Power and Modernity. Bureaucracy and Discipline from 1700 to the Present Day*. Polity Press, Padstow.
- Davies, Andrew (1994) *Telecommunications and Politics. The Decentralised Alternative*. Pinter Publishers, London.
- Dawley, Alan (1991) *Struggles for Justice. Social Responsibility and the Liberal State*. The Belknap Press of Harvard University Press, Cambridge, MA.
- Dean, Mitchell (1996) "Foucault, government and the enfolding of authority." In Andrew Barry, Thomas Osborne and Nikolas Rose (eds.), *Foucault and Political Reason. Liberalism, Neo-liberalism and Rationalities of Government*. UCL Press, London.
- Debray, Régis (1996) *Media Manifestos: On the Technological Transmission of Cultural Forms*. Translated by Eric Rauth. Verso, New York.
- Debray, Régis, (2000) *Transmitting Culture*. Translated by Eric Rauth. Columbia University Press, New York.
- Dechert, Charles (1966) "The Development of Cybernetics," in Dechert, Charles (ed.) *The Social Impact of Cybernetics*. University of Notre Dame.
- Deleuze, Gilles and Félix Guattari (1988) *A Thousand Plateaus. Capitalism and Schizophrenia*. Translated by Brian Massumi. The Athlone Press, London.
- Deleuze, Gilles (1994) *Difference & Repetition*. Translated by Paul Patton. The Athlone Press, London.
- Deleuze, Gilles (1995) *Negotiations, 1972-1990*. Translated by Martin Joughin. Columbia University Press, New York.
- Deutsch, Karl (1951) "Mechanism, Teleology, and Mind." *Philosophy and Phenomenological Research*, 12.
- Deutsch, Karl (1966) *The Nerves of Government*. Free Press, Glencoe, IL.
- Diebold, John (1952) *Automation, the Advent of the Automatic Factory*. New York.
- Du Boff, Richard (1983) "The Telegraph and the Structure of Markets in the United States, 1845-1890". *Research in Economic History*, 8.
- Du Boff, Richard (1984) "The Telegraph in Nineteenth-Century America: Technology and Monopoly". *Comparative Studies in Society and History*, 26.
- Dudley, Leonard (1991) *The Word and the Sword. How Techniques of Information and Violence have Shaped our World*. Blackwell, Ann Arbor, MI.

- Duncan, Hugh (1962) *Communication and Social Order*. The Bedminster Press, New York.
- Egan, Bruce (1991) *Information Superhighways: The Economics of Advanced Public Communication Networks*. Artech House, Norwood, MA.
- Eisenach, Eldon (1994) *The Lost Promise of Progressivism*. University Press of Kansas, Lawrence.
- Elsner, Henry Jr. (1967) *The Technocrats. Prophets of Automation*. Syracuse University Press.
- Everitt, William (1976) "Telecommunications—The Resource not Depleted by Use. A Historical and Philosophical Resumé." *Proceedings of the IEEE*, 64: 9.
- Fagen, M. (ed.) (1975) *A History of Engineering and Science in the Bell System. 1. The Early Years, 1875-1925*. Bell Telephone Laboratories.
- Farrah, Barbara and Mike Maxwell (1992) "Building America's Infostructure: Public Policy in the Information Age." *Telephony*, April 20.
- Faulkner, Harold (1964) *American Economic History*. Eight Edition. Harper & Row, New York.
- Fine, Sidney (1956) *Laissez Faire and the General-Welfare State. A Study of Conflict in American Thought, 1865-1901*. The University of Michigan Press, Ann Arbor.
- Fischer, Frank (1990) *Technocracy and the Politics of Expertise*. Sage, London.
- Flueckiger, Gerald (1995) *Control, Information, and Technological Change*. Kluwer Academic Publishers, Dordrecht.
- Forrester, Jay (1968 [1961]) *Industrial Dynamics*. The MIT Press, Cambridge, MA.
- Fott, David (1998) *John Dewey. America's Philosopher of Democracy*. Rowman & Littlefield Publishers, Lanham.
- Foucault, Michel (1997) *Ethics. Subjectivity and Truth. Essential Works of Foucault, 1954-1984, Volume 1*. Transl. by Robert Hurley and others. The New Press, New York.
- Foucault, Michel (1998) *Aesthetics, Method, and Epistemology. Essential Works of Foucault, 1954-1984, Volume 2*. Transl. by Robert Hurley and others. The New Press, New York.
- Foucault, Michel (1990) *The History of Sexuality. Volume I: An Introduction*. Translated by Robert Hurley. Vintage Books, New York.
- Fuhrman, Ellsworth (1980) *The Sociology of Knowledge in America, 1883-1915*. University Press of Virginia, Charlottesville.
- Fuller, Wayne (1972) *The American Mail. Enlarger of the Common Life*. The University of Chicago Press, Chicago.
- Furnas, J.C. (1969) *The Americans. A Social History of the United States, 1587-1914*. G.P. Putnam's Sons, New York.
- Fynsk, Christopher (1996) *Language and Relation....that there is language*. Stanford University Press, Stanford.

- Gabler, Edwin (1988) *The American Telegrapher. A Social History, 1860-1900*. Rutgers University Press, New Brunswick.
- Galambos, Louis and Joseph Pratt (1988) *The Rise of the Corporate Commonwealth. U.S. Business and Public Policy in the Twentieth Century*. Basic Books, Inc., New York.
- Galison, Peter (1994) "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision." *Critical Inquiry* 21, Autumn.
- Garraty, John (1968) *The New Commonwealth, 1877-1890*. Harper & Row, New York.
- Garry, Patrick (1992) *Liberalism and American Identity*. The Kent State University Press, Kent, Ohio.
- Gasché, Rodolphe (1999) *Of Minimal Things. Studies on the Notion of Relation*. Stanford University Press, Stanford, CA.
- Gasman, Lawrence (1994) *Telecompetition. The Free Market Road to the Information Highway*. Cato Institute, Washington, C.D.
- George, F.H. (1959) *Automation, Cybernetics and Society*. Leonard Hill Ltd., London.
- Gettell, Raymond (1928) *History of American Political Thought*. The Century, New York.
- Gillman, Howard (1993) *The Constitution Besieged. The Rise and Demise of Lochner Era Police Powers Jurisprudence*. Duke University Press, Durham.
- Glanville, Ranulph (1997) "A Cybernetic Musing: In the Animal and the Machine." *Cybernetics and Human Knowing*, 4:4.
- Gordon, Colin (1994) *New Deals. Business, Labor, and Politics in America, 1920-1935*. Cambridge University Press, Cambridge.
- Grabbe, E.M. (1957) "The Language of Automation," in E.M. Grabbe (ed.) *Automation in Business and Industry*. John Wiley & Sons, New York.
- Haar, Michel (1993) *The Song of the Earth. Heidegger and the Grounds of the History of Being*. Translated by Reginald Lilly. Indiana University Press, Bloomington.
- Haber, Samuel (1964) *Efficiency and Uplift. Scientific Management in the Progressive Era, 1890-1920*. The University of Chicago Press, Chicago.
- Hall, Peter (1982) *The Organization of American Culture, 1700-1900. Private Institutions, Elites, and the Origins of American Nationality*. New York University Press, New York.
- Hanson, Russell (1985) *The Democratic Imagination in America. Conversations with Our Past*. Princeton University Press, Princeton.
- Haraway, Donna (1991) *Simians, Cyborgs, and Women: The Reinvention of Nature. The Reinvention of Nature*, Routledge, New York.
- Hardt, Hanno (1979) *Social Theories of the Press. Early German & American Perspectives*. Sage Publications, Beverly Hills.

- Hardt, Hanno (1992) *Critical Communication Studies. Communication, History and Theory in America*. Routledge, London.
- Harp, Gillis (1995) *Positivist Republic. Auguste Comte and the Reconstruction of American Liberalism, 1865-1920*. The Pennsylvania State University Press, University Park.
- Hart, David (1998) *Forged Consensus. Science, Technology, and Economic Policy in the United States, 1921-1953*. Princeton University Press, Princeton.
- Hartz, Louis (1955) *The Liberal Tradition in America. An Interpretation of American Political Thought since the Revolution*. Harcourt, Brace & World, New York.
- Haskell, Thomas (1977) *The Emergence of Professional Social Science. The American Social Science Association and the Nineteenth-Century Crisis of Authority*. University of Illinois Press, Urbana.
- Headrick, Daniel (1991) *The Invisible Weapon. Telecommunications and International Politics, 1851-1945*. Oxford University Press, New York.
- Heidegger, Martin (1977) *The Question Concerning Technology*. Transl. William Lowitt. Harper Torchbooks, New York.
- Heidegger, Martin (1982) *On the Way to Language*. Translated by Peter Hertz. Harper San Francisco.
- Heidegger, Martin (1987) *Being and Time*. Translated by John Macquarrie and Edward Robinson. Basil Blackwell, Oxford.
- Heidegger, Martin (1993) *Basic Writings*. Revised and expanded edition, ed. by Krell, David, Harper San Francisco.
- Heims, Steve (1975) "Encounter of Behavioral Sciences with New Machine-Organism Analogies in the 1940's." *Journal of the History of the Behavioral Sciences*. Vol. 11, October.
- Heims, Steve (1980) *John von Neumann and Norbert Wiener. From Mathematics to the Technologies of Life and Death*. The MIT Press, Cambridge, MA.
- Heims, Steve (1991) *The Cybernetics Group*. The MIT Press, Cambridge, MA.
- Hickman, Larry (1990) *John Dewey's Pragmatic Technology*. Indiana University Press, Bloomington.
- Hirschhorn, Larry (1984) *Beyond Mechanization: Work and Technology in a Postindustrial Age*. The MIT Press, Cambridge, MA.
- Hofstadter, Richard (1969) *Social Darwinism in American Thought*. George Braziller, New York.
- Horwitz, Morton (1977) *The Transformation of American Law, 1780-1860*. Harvard University Press, Cambridge, MA.
- Horwitz, Robert (1989) *The Irony of Regulatory Reform. The Deregulation of American Telecommunications*. Oxford University Press, New York.
- Howard, Levin (1956) *Office Work and Automation*. John Wiley & Sons, New York.

- Hughes, Thomas (1998) *Rescuing Prometheus*. Vintage Books, New York.
- Hyman, Harold and William Wiecek (1982) *Equal Justice under Law. Constitutional Development, 1835-1875*. Harper & Row, New York.
- Innis, Harold (1949) *The Press. A Neglected Factor in the Economic History of the Twentieth Century*. Oxford University Press, London.
- Introna, L.D. (2001) "Management Information Systems." In J.R. Schement et al. (eds.) *Encyclopedia of Communication and Information*. Macmillan Reference, USA.
- Irwin, Manley (1984) *Telecommunications America. Markets without Boundaries*. Quorum Books, Westport.
- Israel, Paul (1992) *From Machine Shop to Industrial Laboratory. Telegraph and the Changing Context of American Invention, 1830-1920*. The Johns Hopkins University Press, Baltimore.
- John, Richard (1994) "American Historians and the Concept of the Communications Revolution." In *Information Acumen: The Understanding and Use of Knowledge in Modern Business*. Edited by Lisa Bud-Frierman. Routledge, London.
- John, Richard (1995) *Spreading the News. The American Postal System from Franklin to Morse*. Harvard University Press, Cambridge, MA.
- Jordan, John (1994) *Machine-Age Ideology. Social Engineering and American Liberalism, 1911-1939*. The University of North Carolina Press, Chapel Hill.
- Judson, Katharine ed. (1914) *Selected Articles on Government Ownership of Telegraph and Telephone*. The H.W. Wilson Company, White Plains, NY.
- Kahn, Paul (1992) *Legitimacy and History. Self-Government in American Constitutional Theory*. Yale University Press, New Haven.
- Karl, Barry (1963) *Executive Reorganization and Reform in the New Deal. The Genesis of Administrative Management, 1900-1939*. Harvard University Press, Cambridge, MA.
- Kasson, John (1977) *Civilizing the Machine. Technology and Republican Values in America, 1776-1900*. Penguin Books, Harmondsworth.
- Kast, Fremont and James Rosenzweig (eds.) (1963) *Science, Technology, and Management*. McGraw-Hill Book Company, New York.
- Kaufman-Osborn, Timothy (1984) "John Dewey and the Liberal Science of Community." *Journal of Politics*, 46 : 4.
- Katz, Elihu and Paul F. Lazarsfeld (1955) *Personal Influence*. The Free Press, New York.
- Keller, Morton (1977) *Affairs of State. Public Life in Late Nineteenth Century America*. The Belknap Press of Harvard University Press. Cambridge, Ma.
- Keller, Morton (1981) "The Pluralistic State: American Economic Regulation in Comparative Perspective, 1900-1930". In McCraw, Thomas (Ed.) *Regulation in Perspective*. Harvard University Press, Cambridge, MA.

- Keller, Morton (1990) *Regulating a New Economy. Public Policy and Economic Change in America, 1900-1933*. Harvard University Press, Cambridge, MA.
- Kellogg, Michael et al. (1992) *Federal Telecommunications Law*. Little, Brown and Company, Boston.
- Kieve, Jeffrey (1973) *The Electric Telegraph. A Social and Economic History*. David & Charles, Newton Abbot.
- Klose, Nelson (1964) *A Concise Study Guide to the American Frontier*. University of Nebraska Press, Lincoln.
- Kozmetsky, George and Kircher, Paul (1956) *Electronic Computers and Management Control*. McGraw-Hill, New York.
- Krippendorff, Klaus (1975) "The Systems Approach to Communication." In Ruben, Brent and John Kim (eds.) *General Systems Theory and Human Communication*. Hayden Book Company, Rochelle Park, NJ.
- Krippendorff, Klaus (1994) "The Past of Communication's Hoped-For Future." *Journal of Communication*, 43: 3, Summer 1993. Reprinted in *Defining Media Studies*. Oxford University Press.
- Kurtz, Lester (1984) *Evaluating Chicago Sociology*. The University of Chicago Press, Chicago.
- Lacan, Jacques (1988) "The Circuit." In Jacques-Alain Miller (ed.), *The Seminar of Jacques Lacan*, Norton, New York.
- Lasswell, Harold (1964) "The Structure and Function of Communication in Society," in Bryson, Lyman, *The Communication of Ideas*. Cooper Square Publishers, Inc., New York.
- Latil, Pierre de (1956) *Thinking by Machine. A Study of Cybernetics*. Translated by Y.M. Golla, The Scientific Book Guild, London.
- Latour, Bruno (1988) *The Pasteurization of France*. Harvard University Press, Cambridge, MA.
- Lebow, Irwin (1995) *Information Highways and Byways. From the Telegraph to the 21st Century*. IEEE Press, New York.
- Lilienfeld, Robert (1978) *The Rise of Systems Theory. An Ideological Analysis*. John Wiley & Sons, New York.
- Lindley, Lester (1975) *The Constitution Faces Technology. The Relationship of the National Government to the Telegraph, 1866-1884*. Arno Press, New York.
- Lindley, Lester (1990) *The Impact of the Telegraph on Contract Law*. Garland Publishing, New York.
- Lustig, Jeffrey (1982) *Corporate Liberalism. The Origins of Modern American Political Theory, 1890-1920*. University of California Press, Berkeley.
- Macbride, Robert (1967) *The Automated State. Computer Systems as a New Force in Society*. Chilton Book Company, Philadelphia.

- Macherey, Pierre (1997) "The Problem of Attributes." In Warren Montag and Ted Stolze (eds.), *The New Spinoza*. University of Minnesota Press, Minneapolis.
- McCormick, John (1997) *Carl Schmitt's Critique of Liberalism. Against Politics as Technology*. Cambridge University Press, Cambridge.
- Marcus, Alan and Howard Segal (1989) *Technology in America. A Brief History*. Harcourt Brace Jovanovich, San Diego.
- Marvin, Carolyn (1988) *When Old Technologies Were New. Thinking about Electric Communication in the Late Nineteenth Century*. Oxford University Press, New York.
- Matthews, Fred (1977) *Quest for an American Sociology. Robert E. Park and the Chicago School*. McGill-Queen's University Press, Montreal.
- Matulenas, Raymond (1943) *Communication—A Source of Privileges*. A Dissertation. The Catholic University of America, Canon Law Studies, No. 183, The Catholic University of America Press, Washington, D.C.
- Maturana, Humberto and Francisco Varela (1980) *Autopoiesis and Cognition. The Realization of the Living*. D.Reidel, Dordrecht.
- Mayr, Otto (1986) *Authority, Liberty and Automatic Machinery in Early Modern Europe*. Baltimore.
- Meinig, D. W. (1993) *The Shaping of America. A Geographical Perspective on 500 Years of History. Vol. 2: Continental America, 1800-1867*. Yale University Press, New Haven.
- Melossi, Dario (1990) *The State of Social Control. A Sociological Study of Concepts of State and Social Control in the Making of Democracy*. Polity Press, Worcester.
- Meyrowitz, Joshua (1985) *No Sense of Place. The Impact of Electronic Media on Social Behavior*. Oxford University Press, New York.
- Mingers, John (1995) *Self-producing Systems. Implications and Applications of Autopoiesis*. Plenum Press, New York.
- Morgan, Gareth (1986) *Images of Organization*. SAGE Publications, Beverly Hills.
- Morse, Philip and Kimball, George (1951) *Methods of Operations Research*. John Wiley & Sons, Inc., New York.
- Mott, Frank (1952) *The News in America*. Harvard University Press, Cambridge, MA.
- Mueller, Milton, Jr. (1997) *Universal Service. Competition, Interconnection, and Monopoly in the Making of the American Telephone System*. The MIT Press, Cambridge, MA and the AEI Press, Washington, D.C.
- Mulgan, G.J. (1991) *Communication and Control. Networks and the New Economies of Communication*. Polity Press, Padstow.
- Nagel, Paul (1971) *The Sacred Trust. American Nationality 1798-1898*. Oxford University Press, New York.

- Nancy, Jean-Luc (1990) "Sharing Voices." In Gayle Ormiston and Alan Schrift (eds.) *Transforming the Hermeneutic Context. From Nietzsche to Nancy*. State University of New York Press.
- Nancy, Jean-Luc (1991) *The Inoperative Community*. Transl. by Peter Connor, Lisa Garbus, Michael Holland, and Simona Sawhney. University of Minnesota Press, Minneapolis.
- Neisser, Ulric (1966) "Computers as Tools and as Metaphors." In Dechert, Charles (ed.) *The Social Impact of Cybernetics*. University of Notre Dame Press, Notre Dame.
- Neuman, Russell; Lee McKnight and Richard Solomon (1997) *The Gordian Knot. Political Gridlock on the Information Highway*. The MIT Press, Cambridge, MA.
- Noam, Eli (1994) "The United States." In Eli Noam et al. (eds.) *Telecommunications in the Pacific Basin. An Evolutionary Approach*. Oxford University Press, New York.
- Noble, David (1977) *America by Design. Science, Technology, and the Rise of Corporate Capitalism*. Alfred A. Knopf, New York.
- Nye, Russel (1966) *This Almost Chosen People. Essays in the History of American Ideas*. Michigan State University Press.
- Paglin, Max ed. (1989) *A Legislative History of the Communications Act of 1934*. Oxford University Press, New York.
- Peritz, Rudolph (1996) *Competition Policy in America, 1888-1992. History, Rhetoric, Law*. Oxford University Press, New York.
- Peters, John (1989) "Satan and Savior: Mass Communication in Progressive Thought." *Critical Studies in Mass Communication*, 6.
- Philipse, Herman (1998) *Heidegger's Philosophy of Being. A Critical Interpretation*. Princeton University Press, Princeton.
- Pierce, J.R. (1962) *Symbols, Signals and Noise. The Nature and Process of Communication*. Hutchinson of London, London.
- Pierce, John (1977) "The Telephone and Society in the Past 100 Years." In Pool, Ithiel de Sola (ed.) *The Social Impact of the Telephone*. The MIT Press, Cambridge, MA.
- Pool, Ithiel de Sola (1983) *Forecasting the Telephone: A Retrospective Technology Assessment*. Ablex Publishing Corporation, Norwood, NJ.
- Pred, Allan (1966) *The Spatial Dynamics of U.S. Urban-Industrial Growth, 1800-1914: Interpretive and Theoretical Essays*. The MIT Press, Cambridge.
- Pred, Allan (1980) *Urban Growth and City-Systems in the United States, 1840-1860*. Harvard University Press, Cambridge, MA.
- Quandt, Jean (1970) *From the Small Town to the Great Community. The Social Thought of Progressive Intellectuals*. Rutgers University Press, New Brunswick, NJ.
- Raulet, Gérard (1991) "The New Utopia: Communication Technologies." Transl. Hassan Meley. *Telos*, No. 87.

- Reich, Steve (1978) *Music for 18 Musicians*. ECM Records.
- Robinson, Glen (1989) "Title I. The Federal Communications Act: An Essay on Origins and Regulatory Purpose." In Max Paglin (ed.) *A Legislative History of The Communications Act of 1934*. Oxford University Press, New York.
- Rockefeller, Steven (1991) *John Dewey. Religious Faith and Democratic Humanism*. Columbia University Press. New York.
- Rogers, Everett (1986) *Communication Technology. The New Media in Society*. The Free Press, New York.
- Rose, Nikolas and Peter Miller (1992) "Political Power beyond the State: Problematics of Government." *British Journal of Sociology*, Vol. 43, Issue 2.
- Ross, Dorothy (1991) *The Origins of American Social Science*. Cambridge University Press, Cambridge.
- Russel, Robert (1948) *Improvement of Communication with the Pacific Coast as an Issue in American Politics, 1783-1864*. The Torch Press, Cedar Rapids, Iowa.
- Schiller, Dan (1982) *Telematics and Government*. Ablex Publishing Corporation, Norwood, NJ.
- Schiller, Dan (1998) "Social Movement in Telecommunications. Rethinking the Public Service History of US Telecommunications, 1894-1919." *Telecommunications Policy*, 22 : 4/5.
- Schivelbusch, Wolfgang (1977) *Geschichte der Eisenbahnreise. Zur Industrialisierung von Raum und Zeit im 19. Jahrhundert*. Carl Hanser Verlag, München.
- Schwarzlose, Richard (1989) *The Nation's Newsbrokers. Volume 1: The Formative Years, from Pretelegaph to 1865*. Northwestern University Press, Evanston, IL.
- Schwarzlose, Richard (1990) *The Nation's Newsbrokers. Volume 2: The Rush to Institution, from 1865 to 1920*. Northwestern University Press, Evanston, IL.
- Schwendinger, Herman and Julia Schwendinger (1974) *The Sociologists of the Chair. A Radical Analysis of the Formative Years of North American Sociology, 1883-1922*. Basic Books, New York.
- Shannon, Claude (1948) "The Mathematical Theory of Communication." *Bell System Technical Journal*, 27.
- Shannon, Claude and Warren Weaver (1949) *The Mathematical Theory of Communication*. University of Illinois Press, Urbana, IL.
- Shapiro, Andrew (1999) *The Control Revolution*. PublicAffairs, New York.
- Sharlin, Harold (1963) *The Making of the Electrical Age. From the Telegraph to Automation*. Abelard-Schuman, London.
- Silbey, Joel (1990) "Conclusion." In Ambrosius, Lloyd (ed.) *A Crisis of Republicanism. American Politics in the Civil War Era*. University of Nebraska Press, Lincoln.

- Simmel, Georg (1950) *The Sociology of Georg Simmel*. Ed. by Kurt Wolff, The Free Press, Glencoe, IL.
- Simon, Herbert (1965) *The Shape of Automation for Men and Management*. Harper & Row, Publishers, New York.
- Simon, Herbert (1997 [1945]) *Administrative Behavior. A Study of Decision-Making Processes in Administrative Organizations*. Fourth Edition. The Free Press, New York.
- Skowronek, Stephen (1982) *Building A New American State. The Expansion of National Administrative Capacities, 1877-1920*. Cambridge University Press, Cambridge.
- Smith, Culver (1977) *The Press, Politics, and Patronage. The American Government's Use of Newspapers, 1789-1875*. The University of Georgia Press, Athens.
- Smythe, Dallas (1957) *The Structure and Policy of Electronic Communication*. University of Illinois, Urbana.
- Spencer, Herbert (1897) *Principles of Sociology*, 3rd ed. Appleton-Century-Crofts, New York.
- Standage, Tom (1998) *The Victorian Internet*. Weidenfeld & Nicolson, London.
- Stettner, Edward (1993) *Shaping Modern Liberalism. Herbert Croly and Progressive Thought*. University Press of Kansas, Lawrence.
- Stone, Alan (1991) *Public Service Liberalism. Telecommunications and Transitions in Public Policy*. Princeton University Press, Princeton.
- Sullivan, William (1982) *Reconstructing Public Philosophy*. University of California Press, Berkeley.
- Tariello, Frank, Jr. (1982) *The Reconstruction of American Political Ideology, 1865-1917*. University Press of Virginia, Charlottesville.
- Tarr, Joel et al. (1987) "The City and The Telegraph. Urban Telecommunications in the Pre-Telephone Era." *Journal of Urban History*, Vol. 14, No. 1.
- Taylor, George (1951) *The Transportation Revolution, 1815-1860*. Rinehart & Company, Inc., New York.
- Teeven, Kevin (1990) *A History of the Anglo-American Common Law of Contract*. Greenwood Press, New York.
- "The Historical Search for Significance," in Startt, James et al. (eds.) *The Significance of the Media in American History*. Vision Press, Northport, 1994.
- Theobald, Robert (1966) "Cybernetics and the Problems of Social Reorganization." In Dechert, Charles (ed.) *The Social Impact of Cybernetics*. University of Notre Dame Press, Notre Dame.
- Thompson, Robert (1947) *Wiring a Continent. The History of the Telegraph Industry in the United States, 1832-1866*. Princeton University Press, Princeton.

- Tobey, Ronald (1971) *The American Ideology of National Science, 1919-1930*. University of Pittsburgh Press.
- Towers, Walter (1917) *Masters of Space*. Harper & Brothers, New York.
- Valovic, Thomas (1993) *Corporate Networks: The Strategic Use of Telecommunications*. Artech House, Boston.
- Vattimo, Gianni (1988) "Toward an Ontology of Decline." In Borradori, Giovanna (Ed.), *Recoding Metaphysics. The New Italian Philosophy*. Northwestern University Press, Evanston, IL.
- Vattimo, Gianni (1992) *The Transparent Society*. Translated by David Webb. Polity Press, Cambridge.
- Vattimo, Gianni (1993a) *The Adventure of Difference. Philosophy after Nietzsche and Heidegger*. Translated by Cyprian Blamires with the assistance of Thomas Harrison. Polity Press, Cambridge.
- Vattimo, Gianni (1993b) "Postmodernity, Technology, Ontology." In Melzer et al. (eds.) *Technology in the Western Political Tradition*. Cornell University Press, Ithaca.
- Vig, Norman (1988) "Technology, Philosophy, and the State: An Overview." In Kraft, Michael and Vig, Norman (eds.) *Technology and Politics*. Duke University Press, Durham.
- von Neumann, John (1958) *The Computer and the Brain*. Yale University Press, New Haven.
- Vähämäki, Jussi (1997) *Elämä teoriassa. Tutkimus toimettomasta tiedosta kommunikaatioyhteiskunnassa*. Tutkijaliitto, Hamina.
- Waldo, Dwight (1984) *The Administrative State. A Study of the Political Theory of American Public Administration*. Second edition. Holmes & Meier Publishers, New York.
- Waring, Stephen (1991) *Taylorism Transformed. Scientific Management Theory since 1945*. The University of North Carolina Press, Chapel Hill.
- Wasserman, Neil (1985) *From Invention to Innovation: Long-Distance Telephone Transmission at the Turn of the Century*. The Johns Hopkins University Press, Baltimore.
- Weigley, Russell (1969) *History of the United States Army*. The Macmillan Company, New York.
- Weizenbaum, Joseph (1976) *Computer Power and Human Reason: From Judgement to Calculation*. W.H. Freeman, San Francisco.
- Weizenbaum, Joseph (1991) "Computers, Tools, and Human Reason." In Crowley, David and Paul Heyer (eds.) *Communication in History. Technology, Culture, Society*. Longman, New York.
- Westbrook, Robert (1991) *John Dewey and American Democracy*. Cornell University Press, Ithaca.
- White, Leonard (1954) *The Jacksonians. A Study in Administrative History, 1829-1861*. The Macmillan Company, New York.

- White, Leonard (1958) *The Republican Era: 1869-1901. A Study in Administrative History*. The Macmillan Co., New York.
- Wiebe, Robert (1967) *The Search of Order, 1877-1920*. Macmillan, London.
- Wiebe, Robert (1995) *Self-Rule. A Cultural History of American Democracy*. The University of Chicago Press, Chicago.
- Wiener, Norbert; Julian Bigelow and Arturo Rosenblueth (1943) "Behavior, Purpose and Teleology." *Philosophy of Science*, Vol. 10.
- Wiener, Norbert (1948) "Time, Communication, and the Nervous System." *Annals* 50: 197-219.
- Wiener, Norbert (1954) *The Human Use of Human Beings. Cybernetics and Society*. Da Capo Press, New York.
- Wiener, Norbert (1961 [1948]) *Cybernetics or Control and Communication in the Animal and the Machine*. The MIT Press, New York.
- Wiener, Norbert (1964) *God and Golem, Inc. A Comment on Certain Points where Cybernetics Impinges on Religion*, MIT Press, Cambridge, MA.
- Wiesner, Jerome (1977) "Technology and the Telephone". In Clarke, Arthur et al. *The Telephone's First Century—and Beyond*. Thomas Y. Crowell Co., New York, 1977.
- Willey, Malcolm and Rice, Stuart (1933) *Communication Agencies and Social Life*. McGraw-Hill Book Co., New York.
- Wilson, David (1980) *The National Planning Idea in U.S. Public Policy: Five Alternative Approaches*. Westview Press, Boulder.
- Wit, Dirk de (1994) *The Shaping of Automation. A Historical Analysis of the Interaction between Technology and Organization, 1950-1985*. Verloren, Hilversum.
- Young, John (1969) *Cybernetics*. Iliffe Books Ltd., London.
- Young, Peter (1991) *Person to Person. The International Impact of the Telephone*. Granta Editions, Cambridge.
- Zuboff, Shoshana (1988) *In the Age of the Smart Machine. The Future of Work and Power*. Heinemann Professional Publishing, Trowbridge.