CYBERNETIC CAPITALISM

A Critical Theory of the Incommunicable

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MEANING SYSTEMS

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We are in the position of the man who has only two ambitions in life. One is to invent the universal solvent which will dissolve any solid substance, and the second is to invent the universal container which will hold any liquid.

—Norbert Wiener (1989, 129)

INTRODUCTION

Abstract Ecologies

In the summer of 2023 the UN-affiliated International Seabed Authority (ISA) extended the moratorium on deep-sea mining for yet another year. Mining companies have been looking to dredge the seabed at more than 4,000 meters (13,125 ft.) below the surface, where potato-sized rocks containing silver, copper, and cobalt can be found ready to be grabbed by specialized robots. The operation would not be without risks, however. Environmentalists have cautioned that toxic plumes swept up by the mining will disturb and harm marine ecosystems, permanently damaging a world still largely unknown to science. Yet capital does not mind dredging in the dark, and so the deep seabed has opened up as one of the latest frontiers of capitalist extractivism. Reaching deeper and deeper into its environment, capital enlists the help of the latest "cybernetic" technologies. Artificial Intelligences (AIs) scout out the seafloor for lucrative rocks, sift organic from mineral materials, and steer the "autonomous underwater vehicles" (AUVs) that essentially act as large vacuum cleaners. The robots pilot their way through the vast darkness—feeling, sucking, groping their way about their misty yet rich ecologies, guzzling up valuable resources while leaving behind metal-laden clouds of dust. Like the cybernetic machine, capital precariously navigates its environment, at once making known and leaving unknown.

Environment or ecology here names an *abstract space*—an indistinct outside that may be organic, social, geological, technological or something else entirely. Under capitalism, capital must pilot this space, adopting a strategy of control in relation to its ecology. The organization of this strategic relation is what is at stake in the *rationalization* of capitalism. The concept of rationalization has always been a tool for analyzing the paradoxes or "dialectics" of environmental control, notably in the critical theory of Frankfurt School members such as Max Horkheimer, Theodor Adorno, Herbert Marcuse, and Jürgen Habermas.

More than a simple euphemism for corporate layoffs, for these thinkers rationalization functioned as a complex, paradoxical, and critical concept. It captured the rise and expansion of "instrumental reason" (*Zweckrationalität*)—a notion inherited from Max Weber via Georg Lukács—as the West's dark logic of control. More specifically, it referred to a totalizing logic of efficiency and domination that they perceived at work in modern science, large-scale bureaucracies, capitalist firms, and totalitarian regimes alike. Instrumental reason ate up its environment everywhere it went. For the Frankfurt School it meant that modernity devolved into a *closed system*, a "totally administered world" (Adorno and Horkheimer), a "one-dimensional society" (Marcuse), or a "reified life-world" (Habermas), where all struggle for political ends had become eclipsed by the desire for a technical mastery of means. Yet, paradoxically, this elevated the pursuit of optimally efficient means to a political end in itself. Through its perfection, the system of technical control had dialectically turned into political domination. Spreadsheets now dictated the course of history. The closed system of modernity might thus be technically rational, but politically it was violently irrational.

This dialectic of technical reason and political unreason finds its forerunner in the tragic character of Max Weber's sociology. For Weber, who coined the concept of rationalization, it was a sociological device to study the place of the modern individual in its newfound world. In "Occidental rationalization," the mode of rationalization unique to Western modernity, Weber detected the universalization of "purposive rationality" (*Zweckrationalität*), the calculus of optimally efficient means. According to him, this logic originated in the Protestant ethic of "inner-worldly asceticism" and developed into "the spirit of capitalism," finally culminating in the largescale bureaucracies of monopoly capitalism (Weber 2005). The individual became trapped in large technical structures that grew ever denser and that lacked any purpose outside of themselves, resulting in the state of closure summed up in his famous image of the "iron cage" (*stahlhartes Gehäuse*; Weber 2005, 123). Yet Weber also recognized that this experience of total instrumental consistency merely served to hide the true paradoxical fate of the modern individual. In Western modernity, he saw, the means had become ends in themselves, signaling that the tragic irrationality of rationalization lay in the takeover of political autonomy by technical control. For both Weber and the Frankfurt School, then, rationalization served as a central conceptual device by which to explore the paradoxical logic that animated the technoscientific closure of bureaucratized capitalist modernity.

Yet even though technoscience and bureaucracy have only grown more powerful in our own times, the concept of rationalization has all but disappeared from the philosophical lexicon of critical social theory. When encountered, it is

only in a loosely defined sense similar to "professionalization" or "modernization," but never as a developed critical concept. The concept's disappearance is nevertheless relatively recent. It still took center stage in the postmodernism debates of the 1980s and the 1990s, as well as in Zygmunt Bauman's (2007) writings on the Holocaust. As the Institut für Sozialforschung's successor to Adorno and Horkheimer, Jürgen Habermas wrote that a Weberian theory of rationalization "still holds out the best prospect of explaining the social pathologies that appeared in the wake of capitalist modernization" (Habermas 1987, 303). His postmodern contemporaries may have been suspicious of the universalist undertones in Habermas's notion of "communicative reason" (Lyotard 1984; Rorty 1988), but even his central postmodern antagonist Jean-François Lyotard did not dispute the relevance of instrumental reason. In *The Postmodern Condition*, it emerges under the name of "performativity," a technical criterion of efficiency that subsumes and homogenizes the plurality of the "social bond" (Lyotard 1984). As with instrumental reason, performativity is, above all, a force of social closure that eclipses political alternatives. It is why these Weberian theories of rationalization—from Adorno and Horkheimer to Lyotard—may be characterized as *sociologies of closure*.

Yet the debates between Habermas and the postmoderns may be viewed as responses to a decisive—yet at the time still indeterminate—transformation of modernity. The pressing sense of the *postmodern* reveals that something was definitely "in the air." Born of the squashed uprising of the *soixante-huitards*, the revolutionaries of the 1968 revolts, the currents that galvanized the postmodern mood produced a series of shocks more than a revolution. Capitalism came out as energetic as ever, but it had been rewired, revamped, reorganized—or rather, *disorganized* (Lash and Urry 1987). With an emerging world market, manufacturing was offshored to the periphery as the capitalist core deindustrialized; production came to be flexibilized and networked under the influence of new information technologies; the gold standard was abandoned in favor of a financialized world of speculation; the old working class fractured; and new social movements sprang from the rubble. The youth, meanwhile, grew their hair long and zapped and surfed new media, embracing the eclecticism of subcultural pastiche. Whatever the age in which Max Weber and the early members of the Frankfurt School had lived, observers of these phenomena pondered, this was no longer it. Theirs was only a "first modernity"—industrial and smoggy, simple and "reflective," heavy and solid (Beck 1997; Beck, Giddens, and Lash 1994; Beck, Bonns, and Lau 2003; Berman 1988). It was an old age driven by a faith in achieving total control over the natural and social environment, a hope that manifested in the countless technological inventions of industrialization and that finally unraveled in the "totalitarian" impulses of bureaucratic

states and capitalist cartels. This was the age of rationalization, an immovably *closed world*.

This rationalized world, so the story goes, has since been liquidated. The shocks of the 1970s and 1980s dissolved the "first" modernity and brought on a "second," or "reflexive" modernity (Beck 1997). The pretensions of instrumental reason were overhauled by the sobering reality of the side effect, most notably by the momentous side effect referred to as climate catastrophe (Beck 1997, 23). Human beings may have authored the Anthropocene, but it has moved tragically beyond their command. Schemes of total control have thus been deflated into projects for managing risk. The "Joshua discourse" of complete control, to put it in Nigel Thrift's (2005) preferred terms, has been superseded by the "Genesis discourse" of navigating complexity. Faith in instrumental reason's capacity for complete control has declined, as the limits to technoscientific mastery came more clearly into view with the advent of nuclear arms races, probabilistic systems, and acid rain. Rather than being captivated by instrumental means, the inhabitants of second modernity are now said to have become "value-obsessed"—they agonize over which of their many desires should have priority rather than over the means to fulfill them (Bauman 2012, 61). Meanwhile, political leaders have swapped out central planning for market mechanisms, precarity is feared more than totalitarianism, and an openness to new experiences trumps the longing for a safe middle-class lifestyle. Hence, instrumental reason, sociologists like Beck and Bauman have claimed, no longer takes up the same central place in our cultural repertoire as it once did.

Not only has the rationalized world been liquidated, but it has also been liqui*fied*. With instrumental reason's importance receding, the old specialized centers of control broke up into more agile meshworks that were less susceptible to institutional closure. A more fluid world emerged, as boundaries between inside and outside collapsed, and closure gave way to openness. The old social sectors that all had their own specialties—such as law, economy, science, art—now increasingly bled into one another. Media have become aestheticized, businesses now order "ethical audits," and prisons offer therapy. Modern differentiation oozed into postmodern "dedifferentiation" (Lash 1990) or, as Ulrich Beck phrased it, "functional differentiation" made way for "functional coordination" (1997, 27). We find the same intuition in Gilles Deleuze's (1992) well-known proclamation that Foucault's bounded and striated disciplinary societies have been left behind for the open and smooth spaces that mark "societies of control." This is also the point of departure for Michael Hardt and Antonio Negri's (2001) alter-globalization classic *Empire*. What Weber had once called modernity's "spheres of value" (1946, 323) now seemed to have burst open into global "deterritorializing" flows, where the old virtues of centralization and

specialization have been surpassed by the need to remain lean and flexible in the face of fast-changing market signals. The "space of places," as Manuel Castells (2010, 408–9) was one of the first to note, turned into a "space of flows." The closed world of instrumental reason, then, found itself consigned to history, and by implication, so did the theory of rationalization. It has no place in the smooth space of what Bauman (2012) ultimately came to call "liquid modernity," an amazingly *open world*.

Debates on capitalist modernity have also taken a (new) materialist turn with theories of the Anthropocene, Capitalocene, and other cognates. Social theory, this new line of thinking goes, must also develop a sensibility for the social agency of material objects, processes, and devices. While no doubt an enrichment of previous culturalist trends in the humanities, it is striking that the narratives of social openness are mirrored in many of these materialist "metaphysics of flux" (Sutherland 2013). As "the real economy" becomes dependent on financialization, we read in philosophy of science books that "solids flow just as much as fluids do" (Serres 2018, 4); as the production process become reliant on networked collaborative workers, organic cells are reimagined as creative "sympoietic" processes (Haraway 2016b). Theorists tend to view both social and material phenomena as open spaces of networked flows. Similarly, when Bruno Latour (1993) reads the newspaper, he finds that the story about the hole in the ozone layer above the polar regions cannot be confined to any one particular section—it does not quite fit into politics, business, science, or the environment, but stretches out across all four. Alongside sociologists such as Beck, Lash, and Bauman, the sociologist of science Latour therefore concludes that a Weberian differentiation of society no longer exists in our age—if indeed it ever did. The basic theoretical trend emerging from these various currents is clear: what was once solid is now in flux; what were units are now relations; what was closed, is now open. It is the main tendency of what I call *sociologies of openness*.

Yet, however intuitive these sociologies of openness may be, the old phenomena of closure have never disappeared and are perhaps even on the rise. For in spite of the deterritorializing flows that supposedly mark the Anthropocene, it is above all marked by the institutional inertia of carbon and capital lock-ins. Rather than be flexible and mobile, we, creatures of the biosphere, are trapped in fatal feedback loops that spin us off into a dark future beyond the "tipping points." Similarly, those dreaming of reticular horizontalism have awoken to a world in which the network of networks—the internet—has devolved into a set of "platforms" owned by monopolistic corporations (Lovink 2016). Commodification, too, has not slowed its long march of enclosure, as even our "sociability" (Wark 2019) and life itself (Cooper 2008) are turned into

financialized commodities. Furthermore, neoliberal capitalism has not exactly liquidated the bureaucratic state. On the contrary, it has recognized that the Weberian qualities of standardization, quantification, and calculation are necessary conditions for the construction of transparent markets. The emerging "borderless world" of the 1990s is meanwhile giving way to a new multipolar order—exemplified by trade wars between rivaling hegemons China and the United States, the expansion of the BRICS alliance, and a renewed financial and military war between Russia and the West. It is within this geopolitical constellation that industrial policy, too, has made a return on the stage of history, now dressed in the green garments of "Bidenomics" and the EU's Green Deal. The resurgence of authoritarianism at the end of history, finally, has led commentators to start painting a more complex picture, suggesting a confluence of political closure with economic openness (Brown 2019; Hendrikse 2021).

In light of these developments, this book furthers the thesis that what has been theorized as a radical shift from a logic of social closure to a logic of social openness should instead be interpreted as a transformation in the way the persistent tensions that exist between these logics of closure and openness are navigated. A resuscitated concept of rationalization offers a potent tool in elaborating this thesis, since it has always contained a strong emphasis on closure as well as on paradox. It thus suggests an opportunity to think through the tensions between closure and openness as the *paradoxes of the social*. To draw out these paradoxes, this study mobilizes while critically modifying the sociocybernetics of Niklas Luhmann, reimagining his system of thought as a critical social theory. Luhmann's (1995b; 2012; 2013) theory of "autopoietic" or self-producing systems offer a powerful and attractive theoretical architecture that is based on difference, contingency, and immanence. It furthermore works on the basis of a founding paradox of closure and openness. Luhmann's systems, to put it at its simplest, are open to their environment *because* they are closed. This means that Luhmann's systems theory immediately breaches the question of *abstract ecology*: How do systems—be they social, organic, technological, or otherwise—relate to their environment? Working through the paradoxes of rationalization, then, allows us to *think capitalism ecologically*. This means interrogating how capital organizes its strategic relation to its ecology, a task that grows more urgent as the Capitalocene grows more violent (Moore 2015).

This study carries out this interrogation by reopening the conceptual question: What is rationalization? Rationalization, however, does not have a single logic. As the sociologies of openness rightly observe, the rationalization of Western modernity has changed dramatically since the 1970s. We no longer live in the age of Max Weber. To match this historicizing impulse, this study departs from the heuristic position that power and knowledge have no

ontological substance and that, consequently, their rationalization is historically contingent. Here I follow the inventor of the concept of rationalization, Max Weber (1946, 324), for whom rationality referred to a socially immanent type of "consistency" that varies throughout time and space, and that even has sufficient ontological flexibility to include its very opposite, namely, inconsistency or paradox. The great discovery that Weber made, it might be recalled, was that the becoming consistent of purposive reason gave rise to the paradoxical situation in which the means turned into ends in themselves. One may also recognize the method of Michel Foucault in this heuristic, who, as Gregg Lambert has noted, was throughout his life guided by the following question: "If power originates in a manner that is in some ways "irreducible to rationalization," then how does one go about the business of rationalizing it?" (2020, 21). In the absence of an ontological ground, the course of history presents itself as an explanandum, a question, a problem—or, as Luhmann would say: as an improbability. The present, as Frankfurt School critical theory always stresses, demands an explanation. The question of rationalization is thus always already a historical question: What is rationalization today? Or, whatever happened to rationalization?

This book argues that the second half of the twentieth century saw a transformation in what I call the "mode of rationalization." Such a mode of rationalization might be compared to what Foucault terms a "dispositif" (1980, 194): a kind of conceptual "device," summarized by Lambert as "the idea of a generalized strategy" (2020, 49). In the context of this study, "mode of rationalization" refers to a historically generalized strategy of governing the paradoxes of the social through an immanent organization of power and reason. Rather than a radical shift from a logic of closure to a logic of openness, this study argues that there has occurred a transformation in the generalized strategy of navigating the paradoxes that connect these logics. This signals the transformation from what I call the thermodynamic into the cybernetic mode of rationalization, referring to a change in the strategic relation between systems and environments. These two adjectives "thermodynamic" and "cybernetic" name the dominant technoscientific imaginaries that inform society's basic modes of knowing and being known. They might also be designated—to use an early concept of Foucault (2005, xxiii)—"epistemes" or techno-epistemic spaces that structure the modes of rationalization as a "historical a priori." These concepts do not serve to suggest that these modes of rationalization and epistemes are homogeneous and exhaustive wholes, nor that their succession forms the plot of an epic of history. Rather, they are intended as conceptual devices by which to solve the problem posed by the dual questions of "What is rationalization?" and "Whatever happened to rationalization?" Since they are conceptual devices

that track the logic of larger conceptual devices, this study offers a second-order speculative heuristic that permits two operations: first to philosophically draw out the conceptual structure of rationalization, and second to historically situate the transformation of that structure.

The reason why this study singles out thermodynamics and cybernetics as decisive logics for rationalization is that the concept of modern rationalization has always described the proliferation of a technoscientific logic. This should not be understood as simple technological determinism. Rather, as Deleuze observes, "types of machines are easily matched with each type of society—not that machines are determining, but because they express those social forms capable of generating them and using them" (1992, 6; see also Marx 1990, 286). In his famous *Postscript*, he charts three types of machines corresponding to three eras, namely "simple" or mechanical machines (sovereign societies); energy or steam machines (disciplinary societies); and cybernetic machines or computers (societies of control; Deleuze 1992). Perhaps Deleuze was merely following the Ur-father of cybernetics, Norbert Wiener (1985, 39), who wrote in *Cybernetics* that, after the "age of clocks" and the "age of steam engines, the present time is the age of communication and control" (see also Galloway 2004, 20–27). Whatever the exact origin of this periodization, I continue in this tradition here by distinguishing mechanical, thermodynamic, and cybernetic rationalization. Yet since Weber, who wrote at the turn of the nineteenth century, was already situated firmly within the thermodynamic episteme, this study mostly leaves mechanical rationalization out of the equation.

The science of thermodynamics, emerging in the 1840s, sought to subdue the turbulence of fire and heat by establishing "energy" as a universal unit of equivalence. Prompted by the steam engine, the thermodynamic episteme is marked by a dual ethos of the maximization of work (productivity) and the minimization of waste (efficiency) (Daggett 2019). These two virtues became the techno-moral bedrock of an "energeticist" mode of rationalization in which the world was put to work for profit. As Cara Daggett (2019) writes, the Scottish Presbyterians of the nineteenth century developed Weber's Protestant ethic into a "geo-theology" (54) of efficient and productive work with the aim of "perfect managerial control" (82). Political economy and the management of labor came to be modeled after the government of energy. Just as heat engines transformed coal and petroleum into motion, "the human motor" digests nutrients to do work (Rabinbach 1990). Labor, in this vision, turns from a spiritual action on inanimate matter into a natural conversion of energy, thus fitting human "labor-power" within a universal energy economy (Wendling 2009). Controlling labor-power was therefore analogous to governing a steam engine. It entailed fighting the cardinal sin of entropy or the dissipation of

energy—fatigue, play, laziness—through biopolitical discourses such as ergonomics, social hygienics, and the science of work. Consequently, Frederick Taylor's "scientific management" treated the shop floor like a combustion engine that must be optimized in terms of its efficiency in converting a day's labor-power into a maximum of "foot-pounds" of work (Daggett 2019, 89–90). In this thermodynamic episteme, openness and paradox are figures of dissipation and leakage. What is demanded in the age of steam, therefore, is the total "adiabatic" closure afforded by calculability, measurability, and communicability, always with an eye toward maximum productivity and efficiency.

Things are different in the cybernetic age. The term cybernetics was coined by Norbert Wiener (1985) in the 1940s as a name for the transdisciplinary movement connected to the famous Macy Conferences. He named it after the Greek word *kubernētēs*, which is cognate with the Latin-derived "governor" and means "steersman." Distinctive to cybernetics is the way in which it approaches the world as a multitude of "communication machines"—be they biological, social, technological, geological, and so on—that "control entropy through feedback" and information (Wiener 1985, 26; see also Hayles 2010, 322). The thermostat remains the paradigmatic example of such a communication system, controlling temperature through negative feedback signals. While early cybernetics was in many ways as obsessed with control as the technoscience of thermodynamics, the military-centered genesis of cybernetics (Galison 1994) may be counterbalanced by highlighting the "anti-control" central to cybernetic psychiatry and brain research in the United Kingdom (Pickering 2010). Due to what Andrew Pickering (2010, 23) calls its "ontology of unknowability," cybernetic control paradoxically means managing or navigating the uncontrollable. This comes most forcefully to the fore in the so-called second-wave cybernetics of the 1970s, which places a premium on strange post-Newtonian phenomena such as self-referential paradoxes, the emergence of unpredictable order from chaos, nonlinear causality, and indeterminacy (Rasch and Wolfe 2000, 9). The perfect communicability of mechanical and thermodynamic epistemologies thus made way for a new world of incommunicability. After the 1970s the popularity of cybernetics waned, but its basic theoretic tenets were further developed as, among others, chaos theory, complexity theory, adaptive systems theory, fractal mathematics, artificial life, artificial intelligence, and systems biology (Penny 2017, 127). These sciences are therefore part of the wider cybernetic episteme that informs our thought and action to this day.

Yet, as with thermodynamics, cybernetics represents more than simply a technoscientific body of work. Its technical inventions have also revolutionized the forces of production, both within and outside the workplace. Production now relies on myriad information and communication technologies (ICT), all

the way from industrial robots via real-time information "dashboards" to the structures of "digital Taylorism" (Dyer-Witheford 2015, 33; Jones 2021; Delfanti 2021). It is thus no wonder that management theory from the 1950s onward increasingly drew inspiration from cybernetics, complexity theory, and systems theory. Organizations ceased to be thought of in terms of heat engines and instead became likened to information processors. They were "posthuman" entities, in which human workers and machines worked as an assemblage that sought successful adaption to a volatile business environment via quick feedback loops (for overviews, see Dyer-Witheford 2015; McKenzie 2001, 69–73; Williams 2015). As Luc Boltanski and Ève Chiapello (2007, 139–40) note, the three main sources of inspiration for "the connexionist imagination" of post-Fordism were the scientific concepts of communication; complexity; and disorder, chaos, and self-organization. Or, as Nigel Thrift (2005) observes, business schools started to imagine management, not as the quest for total control, but as the precarious art of navigating an uncontrollable environment. In neoliberal political economy, meanwhile, governmental agencies were encouraged to guard the juridical parameters of that vast "mechanism for communicating information" known as the free market (Hayek 1945, 526). This "cybernetic legalism," as Quinn Slobodian (2018, 224) calls it, forms the beating heart of neoliberal capitalism. It reveals the kinship between the "Californian ideology" and its celebration of the freedom of information, and the credos of the Mont Pelerin Society that birthed "neoliberalism" (Barbrook and Cameron 2015; Mirowski and Nik-Khah 2017; Gerstle 2022).

To interpret the current mode of rationalization, therefore, it is pivotal to recognize and decipher its cybernetic logic. What can already be established is that cybernetics, unlike its thermodynamic predecessor, does not share its aversion to openness and paradox. Rather, the science of communication accepts the ultimate uncontrollability, unknowability, and *incommunicability* of the world. It views these qualities not as signs of scientific failure, but as an ontological condition that cybernetic machines must seek to "govern," "navigate," or "pilot." Cybernetics thus informs a radically different approach to rationalization, causing a change in the strategic relation of systems to their environments. Unlike in thermodynamic rationalization, systems now no longer venture to subdue their ecologies into perfect communicability, but instead increasingly seek to put ecological incommunicability to work. To grasp this change in the abstract ecological strategies of post-Fordist production, neoliberal political economy, and capitalist extraction, it will be necessary to work through Luhmann's systems theory and to equip it with a critical edge. This work will be guided by the proposition that only a critical systems theory can shed light on the paradoxical logic of rationalization, on how systems can be

open to their ecologies *because* they are closed, on how capital can make known because it leaves unknown.

This study works with Luhmann's systems theory, since it offers an immanent perspective on cybernetic rationalization. Yet fashioning a critical theory of rationalization on the basis of systems theory immediately runs into thorny epistemological issues. These issues were explicitly fought out between Habermas and Luhmann in the 1970s, when Habermas (in Habermas and Luhmann 1971, 145) dubbed Luhmann's cybernetics the "epitome of technocratic consciousness" and Luhmann (2013, 328) responded by referring to Frankfurt School critical theory as being "quite simply embarrassing."[1] Not wishing to dodge any difficulties, this book opens by confronting this feud. The hostilities may be reduced to two main points of contention: first, the place of the capitalist economy in modern society and, second, the possibility of critical observation. Whereas Marxist critical theory views the capitalist economy as a decisive influence on the rest of society, Luhmann instead stresses the "functional differentiation" of modern society into egalitarian value spheres. Furthermore, whereas critical theory attempts to reconcile theory and practice, Luhmann resigns these activities to the two incommensurable "function systems" of science (*Wissenschaft*) and politics. Thus, in chapter 1, I develop a synthesis of systems theory and critical theory by working through these disagreements. The result is a *critical systems theory* that attempts to think the paradoxical unity of theory and practice in a functionally differentiated society marked by the ecological dominance of the capitalist economy.

Chapter 2 begins the study of rationalization in earnest. It opens with a brief genealogy of the concept of rationalization from Max Weber to the early Frankfurt School and Jürgen Habermas. Even though these authors' theories of rationalization differ in their specificities, we may distill from them a conceptual core of three central elements. First, rationalization designates the proliferation of *instrumental reason*, a technical logic of optimal means-calculation with the aim of achieving preset ends. Second, instrumental reason drives out all alternative modes of reasoning—for example, value-rationality, communicative rationality, and mimesis—in an expansive, self-referential logic of *closure*. Third, the becoming-consistent of instrumental reason runs up against its own limits and reverts into *paradox*. Instrumental reason, when reaching total closure, turns into its very opposite—value-rationality—and the means become ends in themselves. Modern subjects find themselves governed by technocrats who first funnel political options through administrative sensibilities and "realistic" expectations. Rationalization therefore signals the paradoxical situation in which instrumental reason *cannot yet must* supply its own ends.

However elegant and "dialectical" this concept of rationalization may be, its theorists tend to risk separating technical and political rationalities (Feenberg 2001; 2010). In this case, technology is suggested to have an essence—either a logic of domination or a logic of efficiency, or both—that is untouched by politics or history. I suspect that this theoretical defect is one of the reasons that the theory of rationalization fell out of fashion. In the rest of chapter 2, therefore, I reconceptualize the concept of rationalization in a way that does justice to the core intuition of the Frankfurt School—namely that rationalization is a process of technical closure—while bringing into play the domains of politics and history. On the basis of critical systems theory and literature from science and technology studies (STS), I examine the logic of closure suggested by theories of rationalization by surveying technologies of communicability such as classification, standardization, and calculation. Specifically, I study a particularly technical mode of communication: measurement. Modern measurement systems, or "metrological" systems, should be understood as autopoietic systems, referring to systems that produce their own structures and boundaries. Metrological systems "spiral into control" through three self-amplifying motions: self-production, self-performance, and self-reinforcement. This technical closure of metrological systems, however, paradoxically gives rise to an openness to the historical and the political—a motif I explore in the last part of the chapter. The closure that marks rationalization always already presupposes and produces openness. Yet under thermodynamic rationalization, systems tend to disavow this paradoxical fact in what I call a strategy of suppression, giving the impression of totalizing technical closure.

If rationalization used to refer to a motion of closure, today it also involves a motion of openness. Chapter 3 tests the limits of the sociologies of openness through the works of Donna Haraway (2016b), Mark Hansen (2009), and Michael Hardt and Antonio Negri (2001). Despite appearances, these authors share important and fundamental presuppositions, not least an ethos of dissolution: a monist emphasis on the total permeability and openness of systems with respect to their environments. Criticizing the idea of self-production crucial to the theory of autopoiesis, Haraway (2016b) and Hansen (2009) introduce their respective notions of "sympoiesis" and "system-environment-hybrids" as alternatives that stress the agency of the environment over the system. This theoretic strategy is matched in the practical philosophy of Hardt and Negri (2001), who conceptualize contemporary capitalism as driven by the *immeasurable* labor of the "multitude": the laboring subject that moves within capital's environment. Analyzing Haraway's and Hansen's innovations and Hardt and Negri's sociology of openness, I show how in both cases one needs to think through the paradoxes of closure and openness to achieve their

theoretical aims. The theory of autopoiesis—which operates on principles of distinction, ecology, and paradox—offers a means to do this. Therefore, in the final section, I critically discuss and defend Luhmann's theory of autopoiesis. I suggest it may be typified as a kind of "mystical materialism," which is a nod to Ludwig Wittgenstein's (1999) thesis that the world of communication rests on an environment that is incommunicable: the mystical. Yet, rather than refer to a supernatural region, the mystical here forms part of the material logic of systems.

Chapter 4 studies how this mystical materialist logic forms the core of the cybernetic mode of rationalization, thus asking what form rationalization takes today. To answer this question, the chapter first traces the collapse of the thermodynamic mode of rationalization by detailing how its metrological systems failed to appreciate their dependence on their environments, thereby indicating the limits of the thermodynamic strategy of suppression. Systems can only deny their openness for so long. To study how the strategy of cybernetic rationalization mitigates this failure, I analyze the post-Fordist work process as well as the political economy of neoliberalism. Comparing this strategy throughout with the Santa Fe Institute's artificial life program "Tierra" of the 1990s, I argue that the paradoxical logic that animates post-Fordism can be captured by its slogan "Simple Rules, Complex Behavior." The rules still form an object of closure, but behavior is left as a site of openness. This means that cybernetic rationalization no longer aims at total communicability, but rather treats incommunicability—the mystical—as a site of capitalist valorization.

Capitalist modernity, then, is energized by a strange dual logic: a paradoxical dialectic of the technical and the political, communicability and incommunicability, closure and openness. However imperceptibly, this has always been the case. Whatever happened to rationalization around the 1970s then, cannot be properly understood as a supersession of the logic of closure by a logic of openness. It is not the case that whatever was solid has now finally, as Marx and Engels (2008, 38) prophesied long ago, "melt[ed] into air." The closure of technical systems under thermodynamic rationalization always already hinged on an openness to history and politics—a paradox that this mode of rationalization nevertheless approached with a strategy of suppression. This explains why the logic of totalizing technical closure lay at the heart of the original theories of rationalization, even if they already intimated its paradoxical conclusion. It is the madness of what Weber (2005) called the "inner-worldly asceticism" of Protestantism, which directs all efforts for salvation toward earthly matters and thus transforms means into ends. Cybernetic rationalization, however, is different. Instead of evading paradox and openness, systems under cybernetic rationalization accept and valorize the paradoxes of closure and openness in

what I refer to as a strategy of exploitation. Closure becomes an instrument by which to provoke ecological complexity, which is to say, the openness to the incommunicable or the mystical. Therefore, under cybernetic rationalization, the capitalist economy does not drive out the mystical in a totalizing logic of closure, but rather employs closure in order to valorize its openness to its mystical ecologies.

This social logic corresponds to Weber's (1946, 326) forgotten cultural attitude, which he noticed as a logical form without historical content, namely the attitude of *inner-worldly mysticism*. It means seeking liberation *within* the world through a direct confrontation with the ineffable. This cultural attitude informs cybernetic rationalisms as much as it does the social irrationalisms that appear to multiply in the past years, as neoliberal capitalism unravels into a mix of authoritarian politics, populist anger, and conspiracy theories. In the epilogue, therefore, I would like to leave the reader with some reflections on the counterpoint to contemporary rationalization: cybernetic irrationalization. The cultural attitude of inner-worldly mysticism, I suggest, sheds light on why our "societies of control" seem so terribly out of control. To understand this point, I lay out the brief history of the co-emergence of cybernetics, neoliberal entrepreneurialism, New Age esotericism, and conspiracy theory in 1960s California. These movements all share a fascination with the incommunicable, identified either as the central property of computers, markets, or minds. Yet they also seek to liberate this mystical potential, either through programming, market design, or esoteric practices. This desire forms the basis for the social irrationalisms that haunt Western societies today, notably in the form of the fusion between conspiracism and spirituality ("conspirituality") that marks movements such as QAnon in the USA and *Querdenker* in Europe. Hence, the epilogue will explain how these movements are the dark shadows cast by neoliberal capitalism, or how mystical irrationalization follows cybernetic rationalization.

1

CRITICAL SYSTEMS THEORY
Ecological Confrontation

In 1984, Jean-François Lyotard famously diagnosed the postmodern condition as an "incredulity toward meta-narratives" (xxiv). The relevance of this thesis endures to this day. Modern societies are irreparably fractured, evolving across a complex division of labor that is itself knit together by elaborate supply chains, fluctuating price signals, and perplexing financial speculation. Opaque algorithms mediate our most intimate relationships, while ecological rupture alienates us from an increasingly hostile nature. Above all, the true, the good, and the beautiful are no longer one. Modern society is "differentiated" into specialized sectors—science, art, law, and so on—that are no longer integrated under a unifying banner, be it God, Morality, or the Nation. Though it is cause for a significant amount of social anxiety, there appears to be no way back from this complexity. No new grand narrative is possible. Philosophically, appeals to overarching principles that grant ontological security are generally deemed suspect and unfeasible. Socially and politically, such principles are interpreted as authoritarian attacks on the autonomy of social sectors such as science, art, religion, and so on. Taken together, this presents a distinct and urgent challenge to social theory. How must we theorize social complexity in a postmetaphysical age? What does it mean for the nature of the political? Importantly, what form, if any, can critique still take?

Niklas Luhmann's (1995b; 2012; 2013) systems theory departs from the fundamental premise of social complexity. A prominent figure in the cybernetics movement, Luhmann understands society as a complex "autopoietic" system that produces and reproduces itself through time by navigating an even more complex environment—or, synonymously, an "ecology." The social system is a self-referential flow of communications governed by "strange" feedback loops (Hofstadter 1999). As a result of its self-referentiality, the system is thoroughly paradoxical and lacks unity—its only unity resides in its difference. To make

matters a little more tangible, the social system's difference materializes as society's myriad subsystems: organizations and function systems such as law, politics, science, and religion. These subsystems, too, are autopoietic and operate on incommensurable "codes," resulting in a Weberian, functional differentiation that precludes the possibility of a unifying narrative. Social complexity triumphs, for functional differentiation is, paradoxically, the internal complexity by which the social system reduces the complexity of its environment. Modern society, therefore, is difference all the way down and all the way up (Luhmann 2012).

Although Luhmann's dazzling theoretical architecture contains all the features of a compelling postmetaphysical social theory—a stress on immanence, difference, contingency, paradox, self-reference, nonlinearity, and so on—his systems theory has not caught on to the same extent as, for instance, the closely related poststructuralism.[1] While Luhmann remains popular at German and some Danish universities, especially in sociology and law departments, his influence is relatively limited in Anglophone academia (for Luhmann's reception, see Roth 2011). Perhaps it is because Luhmann's entry into U.S. academia primarily proceeded through German language departments and lacked an American journal dedicated to social systems theory (Wolfe 2010, 3–4). That many of his texts have not been translated into English certainly does not help. Furthermore, it might be noted, Luhmann's technical prose can demand a lot of patience from readers. Yet, whatever the causes, Luhmann's paradoxical social theory is an impressive and versatile tool that deserves more attention than it currently receives.

In the context of this work, Luhmann's complex systems theory offers a unique opportunity to conceptualize the paradoxical nature of rationalization. Yet it is not possible to fashion a critical theory of rationalization from Luhmann's cybernetics without further work, since critical theory and systems theory are traditionally positioned as opposing and mutually exclusive approaches to social theory (see Brunkhorst 2018). Indeed, Luhmann himself vehemently disapproved of the critical theory with which he was familiar—the critical theory of the Frankfurt School—which at one point he referred to as "quite simply embarrassing" (Luhmann 2013, 328). Such remarks stem from two main problems that Luhmann has with Marxist critical theory, namely its privileging of the capitalist economy and its idea of critical observation with practical intent. With respect to the first point, Luhmann holds that the functional differentiation of modernity has produced an ecosystem of formally equal subsystems. To his mind, critical theory fails to recognize this facet of modernity by assigning the capitalist economy a dominant and structuring influence over the rest of society. With regard to the second point, functional

differentiation means that science (*Wissenschaft*), including sociology, has become a self-referential system of truth-oriented communications. Political or practical considerations have no place in this system—they belong strictly to the environment of science. For Luhmann, therefore, critical observation is simply bad science and vulgar moralism (Luhmann 2013).

In recent years academic work has appeared reflecting on the opposition between critical theory and systems theory, with some even trying to reconcile them.[2] This chapter is a contribution to these efforts. It is an attempt to design a *critical systems theory*. This will require a precarious balancing act, since what is at stake is the question of whether a Marxist critical theory is possible that works within the Luhmannian confines of functional differentiation. Critical systems theory, as we will see, is an ecological pragmatism. It is a ceaseless confrontation of thought with its environment that attempts, paradoxically, to think the dominance of the economy and the unity of theory and practice in the face of their impossibility in a differentiated society.

NIKLAS LUHMANN'S SYSTEMS THEORY AND HIS DUAL CHALLENGES

The work of the German sociologist Niklas Luhmann emerged from the second wave of the cybernetics movement. The movement sought to understand the world as a multitude of communication systems that control entropy through feedback and information (Wiener 1989, 26). Born in the 1940s, the cybernetics movement was transdisciplinary by design, spanning a wide range of fields, including (among many others) psychiatry, engineering, mathematics, biology, anthropology, and management theory. The cybernetic feedback loop, where outputs are reentered as inputs, was central to paradigmatic technical inventions such as the thermostat and the anti-aircraft missile. In the second wave, these first-order feedback loops were extended to the cybernetic observer itself, giving rise to paradoxical systems of self-referential loops observing self-referential loops. After the 1980s the popularity of cybernetics waned. Yet its central theoretical principles were taken up and developed further in new fields such as artificial intelligence, chaos theory, complexity theory, and systems biology (Penny 2017, 42)—fields that continue to shape contemporary science and technology today. Representing a fundamental break with the Newtonian-Euclidian certainties of the mechanical-thermodynamic episteme, the basic principles of cybernetics and its successors are instead premised on notions such as circular or nonlinear causality, indeterminacy, paradoxical self-reference, systemic holism, and the emergence of unpredictable order from random energy (Rasch and Wolfe 2000, 9).

Luhmann's systems theory is couched firmly in these notions, and for him society must be understood as a complex system. Yet here complexity is a technical cybernetic term that should be contrasted both with simplicity and complicatedness. The concept indicates, first, that a system cannot be fully understood as a whole by analyzing its constituent elements or by reducing the interactions between those parts to simple causal laws (Cilliers 1998, 3–4; Luhmann 2012, 83). Complex systems, in other words, cannot be deciphered in the key of simplicity. Second, systems can be complicated without being complex if they consist of numerous elements that are all connected to each other. Instead, complexity designates "the necessity to sustain an only selective connection between elements" (Luhmann 2012, 79–80). In the face of complexity—a surplus of possibilities—the system must *select* which connections between elements it actualizes, and which ones will remain merely a possibility. In other words, the system needs to reduce complexity.

The first and foremost way in which the system reduces complexity is by distinguishing itself from an environment. In drawing this fundamental distinction between system and environment, inside and outside, the system constitutes itself. This weird self-constitutive operation, however, can be carried out by the system only if it draws the system/environment distinction within the system itself, that is, on the system side of a previous system/environment distinction. With a technical term derived from George Spencer-Brown's logic, Luhmann (2012, 53) states that the system/environment distinction is "reentered" into the distinction itself. This means that the system is always already caught within a self-referential feedback loop, the end of which it can never see.

The implications of this paradoxical and confounding operation are twofold. On the one hand, when the system observes itself, it always observes itself via a newly made system/environment distinction. The distinction from which it observes itself, then, withdraws beyond the horizon as soon as *it* is observed (see Rasch 2013). On the other hand, when the system observes its environment, it in fact only observes itself. It observes the environment in a system/environment distinction that is drawn on the system side of a prior system/environment distinction. The system can thus engage in both self-reference and other-reference, even though both are, strictly speaking, forms of self-reference. Luhmann's systems are *second-order systems* that always refer to themselves referring. Since systems are self-referential entities, they are unavoidably enmeshed in self-referential paradoxes, such as the paradigmatic liar's paradox ("This sentence is a lie"). Consequently, Luhmann's sociocybernetics offers a vision of social systems that, as a result of their self-incurred binary cuts, are essentially incomplete, radically differential, and inescapably paradoxical.

The self-constitution of the system, the creation of its own elements and structures, is what Luhmann (2012, 32) calls *autopoiesis*, a concept he borrows from biologists Humberto Maturana and Francisco Varela's work on cells. According to these Chilean biologists, a cell functions as an autopoietic unit, since its enzymes produce both other enzymes, and its own boundary—namely, the cell membrane—which in turn sustains the reproduction of the complex network of enzymes (Maturana and Varela 1987, 44–47). Luhmann's defining move is to transpose this biological framework to a sociological context, with society constituting the autopoietic unit, albeit one running on *communications* instead of enzymes. Communications (or distinctions or operations), Luhmann (2012) argues, produce both new communications and the boundary between communications and noncommunications (i.e., between the social system and its environment). As society produces its self-referential network of communications, it achieves "operational closure"—a term synonymous with autopoiesis (Luhmann 2009, 150). Operational closure means that the system's communications (or operations) gain their specific meaning from their connections to previous communications and existing structures—a mechanism called *recursion*—rather than from a one-to-one correspondence with their environment. This means that the system does not receive direct input from the environment, but rather reworks seemingly random "irritations" from the environment into processable communications. The differences of the system itself determine their meaning (Luhmann 2012).

Yet this may all appear unacceptably solipsistic, since operational closure and self-reference seem to confine the system to a conversation within its own walls. Thus, in Luhmann's theory, to take science as a concrete example, the scientific observations that are the basic operations of the scientific system are not unilaterally determined by the empirical data it receives. Instead, scientific observations only observe other scientific observations. To evade solipsism here, Luhmann's systems theory posits a fundamental paradox: The system's "operational closure" produces a "structural openness" to its environment (Luhmann 1995b, 62). This means that the system is only able to handle the indistinct "perturbations," "irritations," or "noise" triggered by its environment on the basis of immanent structures that translate such noise into order. In this manner, the system reworks irritations into *information*, or "differences that make a difference" (Luhmann 2012, 45)—a phrase borrowed from Gregory Bateson (1972, 381). In the case of the scientific system, empirical data can only be processed by the scientific system if there exist methods, research practices, and methodologies that structure how such data is collected, calibrated, interpreted, operationalized, and so on. This means that the system always handles perturbations on its own operational terms, rather than their being determined

by inputs from its environment. It is this very fact that allows the system to process energy from its environment at all. Shockingly, therefore, Luhmann's system is always *at once* open and closed.

Luhmann, again following Maturana and Varela, elaborates upon the "structural openness" of the system to its environment in terms of "structural couplings" (2012, 66). Autopoietic systems are coupled by way of structures to their environments, including to other systems in these environments. Legal constitutions serve as an example of a structural coupling in the social system. They are shared by both the political and legal system, ensuring their mutual adaptation (Luhmann 2013, 112). Yet while these systems share this constitutional structure, they nevertheless operate on this structure in incommensurable ways: Politics observes the constitution in terms of power, whereas law analyzes it in terms of legality. This structural coupling, then, limits the exercise of power to the rule of law and adjusts the development of law to evolving political circumstances. As these systems evolve over time, their constant adaptation to this coupled structure creates a particular track of coevolution with causality running in complex feedback patterns. The paradoxical synthesis of operational closure and structural openness therefore requires systems analysis to examine the various forms of agency that act on a given social system (Luhmann 2012; 2013).

The communications of the social system, or society, operate in the medium of meaning (*Sinn*). In the manner of autopoiesis, the social system does not find meaning in its environment, but rather produces meaning itself: "Society is a meaning-constituting system" (Luhmann 2012, 21). It constitutes meaning by drawing distinctions and hence making something intelligible in contrast to something else (Arnoldi 2001). What makes meaning, then, are communications. For Luhmann (2012, 42), therefore, neither human beings nor human actions, but distinctions or communications, are society's basic components. Luhmann explicitly states that his theory of society is "anti-humanistic" (12), with human beings being located in the environment of the social system. Indeed, Luhmann contends: "Humans cannot communicate; not even their brains can communicate; not even their conscious minds can communicate. Only communication can communicate" (169). Thus, communication is an autopoietic process that *emerges* from its own activity, rather than being constituted or linearly caused from the outside. Communication is therefore no longer tied to a human subject that does the communicating, but rather functions autonomously in a posthuman social system. This is not to say that human beings are unimportant or inconsequential for society: Human beings indirectly "cause" much, if not most, of the communication in society. In fact, as Luhmann asserts, putting humans in the environment enables a "radical individualism"

(in Moeller 2006, 98), since the alternative would be to reduce humans to mere playthings of the system. It does mean, however, that human beings cannot directly inform society or unilaterally control "their" communications. How "their" communications will be taken up by society is based on the recursive workings of society itself, rather than on their intended meaning—an insight that will be familiar to poststructuralist scholars (e.g., Barthes 1977).

Human beings are structurally coupled to society through the media of language and sense: The human being thinks in them, while society communicates in them. As Luhmann suggests, they stand in a relation of "interpenetration" (2012, 60), or extensive mutual influence, that causes a process of coevolution. More precisely still, Luhmann argues that the human being is split across three different operationally closed systems, namely the mind (psychic system); the body (living system); and society (social system). Society is structurally coupled to human minds and human bodies. The mind, in turn, is structurally coupled to the human body, which again is coupled to other living systems such as the brain, the visual system, or the immune system. In this way, there emerges a complex picture of an ecosystem of autopoietic systems, all of which operate autopoietically according to their own recursive logic and are connected to each other through structural couplings and nonlinear causality. No one system can take control over another, such as the brain over the body, or the mind over society (Luhmann 1995b, 210–54). In this manner, Luhmann deconstructs familiar Western dualisms between body and mind, individuals and society, and therefore radically decenters the traditional picture of the human as the central agent of society (for an excellent discussion on this topic, see Moeller 2012, 19–31).

In society, too, we find a multiplicity of autopoietic social systems. According to Luhmann (2013), following a Weberian impulse, the unicity of modernity consists in its differentiation into incommensurable and self-referential function systems such as science, art, politics, law, and religion. These function systems operate autonomously on the basis of unique "codes"—binary distinctions such as truth/falsity (science) or possessing power/not possessing power (politics)—that orient their communications. As with the social system as a whole, these function systems are irreducibly paradoxical as a result of their constitutive self-referentiality. In line with Weber's and Lyotard's analyses of the legitimation crisis of modern science, for instance, Luhmann agrees that science cannot prove the truth of the truth/falsity distinction itself without running in tragic circles. Yet the functional differentiation of society has also blocked off the paths to legitimation by an overarching metanarrative that unifies society into a nonparadoxical substance. Indeed, the social system itself no longer offers support. Society is not a substrate on which differentiation takes

place, but rather the name for this differentiation itself. As Luhmann likes to say, society is the "unity of difference" (1995b, 473). The undivided unity of society, however—the unity of system and environment—recedes irrevocably beyond its division, like a paradise forever lost: "All this presupposes the operationally functioning unity of what is differentiated, comprehensible only as paradox, but not observable" (Luhmann 2012, 25). In the absence of ontological solace, the system finds itself in a whirling loop of self-referential paradoxes that it must continuously "unfold" in order to reproduce itself through time. As Dirk Baecker succinctly states, Luhmann's systems theory is "the deconstruction of its central term" (2001, 61).

Niklas Luhmann's systems theory, in sum, operates on the basis of radical immanence, difference, and paradox. The sociologist, who communicates about society within society, is not spared from these complexities (Rasch 2002, 3). Sociological knowledge of society is always partial, incomplete, and contingent. Yet the limitations of knowledge are not a result of the deficiency of observers, but rather arise out of the very incompleteness of the system itself. It reminds one of Derrida's observation in *Structure, Sign, and Play*: "It is not because the infiniteness of a field cannot be covered by . . . a finite discourse, but because the nature of the field . . . excludes totalization." This is, Derrida continues, because "there is something missing from it: a center which arrests and grounds the play of substitutions" (1978, 365). The fact that the system is necessarily incomplete and paradoxical means that contingency (or, in Derrida's terms, "play") belongs to the very core of the social system. Complex systems must select from a surplus of possible communications because of their inherent incompleteness—their complexity. This selection process is necessarily contingent, since there is no complete center to unequivocally guide it. As Luhmann (2012, 19) writes: "The system becomes incalculable for itself." The only criteria for linking earlier communications to a following one are the immanent structures of the system itself, even though these can never exhaustively determine the next selection. The contingent and differential logic of complex systems thus bears an affinity to central poststructuralist logics, like Derrida's "*différance*" (Luhmann 2002, 94–112), or Lyotard's "*différend*": "To link is necessary; how to link is contingent" (Lyotard 1988, 29).

Niklas Luhmann's systems theory therefore offers an attractive basis from which to theorize the rationalization of capitalist modernity. Systems theory works with a dazzling yet powerful architecture that places a premium on principles of immanence, difference, and paradox, and has the added benefit of establishing a link beyond the humanities (see Rasch and Wolfe 2000). The concept of operational closure, moreover, affords a promising vantage point from which to conceptualize the process of closure that was central to theories

of rationalization from Weber to Habermas—a point that is explored in the next chapter. In addition, Luhmann's theoretic sensitivity to paradox as the driving force of the social suggests a further affinity with the paradoxical movement of capitalist rationalization, if not an opening to grasp its inherent crisis tendencies, antinomies, and antagonisms.[3] Nevertheless, Luhmann has had a strained relationship with the members of the Frankfurt School, to say the least. For instance, his strictly antinormative and neopositivist outlook, together with the early cyberneticists' fascination with control and homeostasis, led Habermas (in Habermas and Luhmann 1971, 145) to denounce Luhmann's systems theory as "the epitome of technocratic consciousness."[4] In particular, Luhmann presents two challenges that stand in the way of the development of a critical systems theory.[5] These two challenges are Luhmann's rejection of the Marxist privileging of the economy over other function systems, and his insistence on sociology as a strictly apolitical affair.

For Marxism, the capitalist economy is not like any other social sector, but instead exerts a dominant influence over the rest of modern society. In classical Marxism, to which Luhmann mostly responds in his work, the material base determines society's superstructure and social evolution results either from the development of the productive forces or from class struggle. The Marxism of the Frankfurt School, while adding cultural complexity to this view, nonetheless regards the instrumental rationality of capital accumulation as society's crucial drive. Yet, according to Luhmann, these are fundamentally misguided propositions. Marxism's privileging of the economy, he claims, falsely substitutes a part for the whole on the basis of an Aristotelian essentialism that pins down human beings as producing creatures (Luhmann 1991b, 81–83). After the breakdown of vertically integrated feudal societies, Luhmann maintains, there is no societal subsystem that provides a total vantage point over the whole. In functionally differentiated modernity, function systems—such as science, medicine, and religion—are instead specialized "self-substitutive orders" that cannot replace one another's functions, thus foreclosing the possibility of any single system possessing "functional primacy" (Luhmann 1981, 209).[6] Furthermore, the analysis of a totalizing process of economic rationalization is complicated by Luhmann's notion of operational closure, which implies that function systems cannot penetrate or "colonize" other systems without violating their autopoiesis. Modernity is thus irrevocably fractured. It is, as Luhmann puts it, "a society without an *apex* or *center*" (1990b, 31). No type of social relation, such as the class-based relations of production, can claim priority over all other relations. The Marxist primacy and expansionism of economic reason, concludes Luhmann, is thus fundamentally at odds with modernity's pluriverse of function systems.

In addition to the analysis of capitalist society, the hallmark of critical theory is that it simultaneously offers a critique of this society. Even if it does not put forward outright normative ideals such as emancipation or equality, it at least operates with reflexive sensitivity to the political status and situation of theory itself. Throughout his writings, however, Luhmann scorned the political overconfidence he sensed in the ideology critique of the Frankfurt School (Luhmann 1994; Luhmann 2002, 187–93; Luhmann 2013, 323–34). Furthermore, in his published debate with Jürgen Habermas in the early 1970s, Luhmann passes some critical remarks on the relation between social science and politics. According to Luhmann (in Habermas and Luhmann 1971), the distinctions between left and right, progressive and conservative, and apology and critique no longer apply to the social context, already giving Luhmann's remarks a distinctly postpolitical flavor. Luhmann argues that Habermas baselessly turns the scientific indeterminacy of these concepts into political opposition (Habermas and Luhmann 1971, 399). He then goes on to make two further points: First, he claims that there is no clear-cut causality between scientific statements and political effects; it is neither evident nor predictable how scientific theory (the scientific system) influences political practice (the political system). Conversely, Luhmann also challenges the possibility of steering society from the political system as a social center (Fuchs 2013, 103). Second, Luhmann (in Habermas and Luhmann 1971) argues that Habermas, and critical theory more generally, confuses the two incommensurable perspectives of the scientific system oriented toward the truth/falsity code on the one hand, and the political system oriented toward possessing/not possessing power on the other. Luhmann insists that mixing these is a sociological *faux pas*.

Summing up, Luhmann offers an impressive social theory premised on philosophic principles of difference, immanence, contingency, and paradox. For him, society is a complex cybernetic system consisting of communications that works to reduce the complexity of its environment precisely by building an internal complexity of structures. His vision of modernity is one of a multiplicity of self-observing systems, all with incommensurable codes and connected to each other by structural couplings and nonlinear causality. Yet this functional differentiation of society leads Luhmann to renounce the possibility of a functional dominance of the capitalist economy. Moreover, the self-referentiality or autopoiesis of science means that science is a strictly value-free undertaking in which the practical intent of critical theory has no place. It raises the question of whether a critical systems theory that accepts functional differentiation is even possible at all.

Luhmann's view of society as a multitude of operationally closed subsystems inevitably raises the question of how those systems are interrelated. Indeed, even a quick glance at society makes clear that it is far from a neatly compartmentalized whole. It also appears that certain subsystems—such as the mass media or the economy—place their stamp on society more than, for example, sports do. And what does one make of hybrid systems such as business ethics, creative industries, or militarized police? A recurring criticism of Luhmann's theory is therefore that he either underplays the systemic interrelations that make up the social realm or, even worse, blocks our understanding of them. Although I disagree with this criticism, there is some merit to it, since Luhmann does typically stress the relevance of functional differentiation in his sociological writings. His successive monographs on individual function systems, such as *Das Recht der Gesellschaft* (1993), *Die Kunst der Gesellschaft* (1995a), *Die Wirtschaft der Gesellschaft* (1996), finally culminating in his magnum opus *Die Gesellschaft der Gesellschaft* (2012; 2013), offer signs of this prioritization. It raises the question of the possibility of the *primacy and expansionism* of the economy in functionally differentiated society. Can we theorize the dominance of the economy despite Luhmann's warnings that there can exist no "functional primacy" of any single system? Can, as Frankfurt School critical theory claims, economic rationality overreach and colonize its neighboring social spheres without violating the principle of operational closure?

Approaching these questions, it has proven appealing to rush in with a blunt ax. The case for functional differentiation is often thought to have been overstated. Instead of equal function systems, one may think there exists one dominant social sector. At this stage, two logical options present themselves, which we may phrase as dominance from above and dominance from below. Sociologist Klaus Türk (1995, 175), as an instance of the former, posits a kind of metacode —"a dominant code overarching the subsystems"—that ensues from the basic mechanisms of capitalist society. Yet such a metanarratological solution to the problem of economic dominance sacrifices the autonomy of society's other subsystems and thus undoes all the merits of Luhmann's brand of difference philosophy (see Prien 2013, 93). An example of dominance from below is found in Erkki Sevänen's (2001) argument that contemporary society has been "aestheticized" as a result of its dedifferentiation, which could be viewed as a template for economization. Society has dedifferentiated into an amorphous tapestry, weaving a dominant aesthetic or economic logic into all its patterns. The claim is exemplary for sociologies of openness—Sevänen invokes the work

of Lash and Urry, Bauman, and Beck among others—that stress the blurring of sectoral boundaries. From this perspective, Luhmann's vision of autopoietic systems is deemed "purist" and unable to "tell us much about the relationships between the different sub-systems" (Sevänen 2001, 86–88). Sevänen echoes one of Luhmann's most prominent critics, Richard Münch (1995, 28), who charges that Luhmann tends to take function systems as "immutable and sacrosanct."[7] Functional differentiation, claims Münch (1991), is no more than a myth that stems from the sociologist's urge to wish analytical constructs such as autopoietic systems into empirical existence. Social life instead takes place in "zones of interpenetration" or overlap between systems (Münch 1990, 441–64; 1995, 30). Could this be so?

For Luhmann, it appears to be out of the question. Society is partitioned into bubbles of operations organized around their very own "codes." Codes are the founding binary distinction on which a system runs, such as system/environment (for systems in general) or true/false (science), legal/illegal (law), and having power/not having power (politics). Codes are, as Luhmann (1989, 38) writes, "totalizing constructions" that exclude all third terms. The autonomy of these codes thus hardly seems to allow for the empirical messiness of society, nor for the dominance of one social sector over the others. To remedy this shortcoming, Sevänen proposes three corrections to Luhmann's cybernetics. First, no single code can regulate all communications within a function system. Second, different systems may use similar media and codes. Third, autopoiesis is not a matter of either/or but rather one of degree (Sevänen 2001, 86–87). The result, argues Sevänen, is similar to Richard Münch's zones of interpenetration. A similar intervention is proposed by Franz Kasper Krönig, who, in a highly technical argument, finally formulates the concept of the "side code." By way of the side code of "quality management," for example, the health system can incorporate considerations of efficiency from the economic system into its communications (Krönig 2007, 121–26). Quality management establishes a feedback loop between efficiency and the promotion of health: What is efficient is also health promoting, and what promotes health is efficient. Side codes such as quality management, concludes Krönig, can therefore explain how operationally closed function systems (in this case, the health system) become economized at the level of the code itself (Krönig 2007). Both these interventions aim to *relax* Luhmann's vision of isolated systems, allowing more flexibility in what operations swerve along what codes. Yet, it should be asked, are these interventions possible or even necessary?

The answer is a firm "no." It is important, however, to see that the interventions are not necessary *precisely because* they are not possible. Autopoiesis cannot be a matter of degree, since its logic is premised on a self-constituted binary

distinction between system and environment (Luhmann 2012, 27–28). The system is either autopoietic or heteropoietic, it is on or off, 0 or 1: *tertium non datur*. The system's constitutive distinction between system and environment enables it to continue drawing distinctions on the system side of the binary and therefore to distinguish between self-reference and other-reference. The system's paradoxical operation is thus dependent on an original binary—the aforementioned "code" (Luhmann 1998, 38).[8] At first glance, the nonnegotiability of the binary code may give systems theory a sheen of unbearable rigidity and neatness. Systems operate on the exclusion of third terms. Yet they do so precisely to evade the stultifying effects of unity and totality, since these are only accessible as either tautology or paradox (Luhmann 1989, 37). Science, for instance, does not progress by stating tautologically that truth is true, or by resolving the paradox that it cannot prove that truth is itself true. While the former is operationally useless, the latter would simply short-circuit the system's operations by appealing to nonscientific values such as revelatory truth or pure intuition. Via the binary code, the system instead transforms its paradoxical unity into difference. It continuously oscillates between truth and falsity, thus "unfolding" the paradoxical and unobservable unity of the binary code through time. It is the very binarity of the code, therefore, that discharges a differential motive force to the system. If, conversely, it would succumb to gradation or unity, as Sevänen and Münch wish, it loses its self-reproducing motion and degrades into total entropy—or death (Luhmann 1989).

The autopoietic operation on the binary code is, in this sense, a pristine affair—a matter of a strict either/or. Yet that does not mean that autopoietic systems are unaffected by the messiness of social life. As Luhmann (1989, 49) states: "The world is just not constituted so that events generally fit within the framework of one function alone." The issue with the binary nature of the code is that "binary codes begin as different, highly abstract schemas that, at the same time, leave unclear how the operations of society are actually regulated" (Luhmann 1989, 44). The system requires "dirt"—a certain level of friction—that gives shape to the "connectivity" (*Anschlussfähigkeit*) of communications and regulates the selection of future operations. The code, in other words, stands in need of interpretation. These interpretations are offered by the system's "criteria" or "programs"—structures that detail the rules for further complexity reduction (Luhmann 1989, 40). Scientific truth-statements, for instance, are programmed by theories, methods, and methodologies, each of which provide guidelines for how to achieve and assess truth. As science evolves over time, theories may become outdated, and methods may be subject to innovations or even Kuhnian revolutions. Yet the truth/falsity code remains intact. Crucially, Luhmann (1989, 19) adds that function systems can also operate

on the programs of other systems in the form of what he calls "performances" (*Leistungen*). The education system, for example, can borrow pedagogic theories from science. These programs, however, remain operationalized by education on its own terms: It does not care for the truth of pedagogy, but only for its success in teaching. Hence, the binary code of operationally closed systems, if it is to make any sense at all, requires a context—or rather, an ecology.

The implications of this point are momentous. Operationally closed systems are constituted by a jumbled mass of interrelations precisely because their codes are so clean. The contingency generated by the self-reference of the binary code—what is true may turn out to be false—guarantees that the code can never be exhaustively programmed or structured. Every communication invites new communications. The code itself therefore guarantees its own interpretation or, in other words, the strict binary character of the code secures the reintroduction of the *tertium*: "Thus the differentiation of coding and programming makes the reappearance of the third value possible; but only to co-steer the allocation of the code-values on which it primarily depends" (Luhmann 1989, 41). The third value that was excluded at the level of the code is invited back in at the level of programs, granted that the program still—in the last instance—orients communications toward the binary code of the relevant function system. It is through this dynamic feedback between the coding of programs and the programming of codes that autopoietic systems take shape. The system, furthermore, can also operate on external programs as part of the *tertium* since the system's operational closure at the level of the code produces a structural (programmatic) openness to its environment. As Luhmann writes: "The difference of code and criteria for correct operations (or of coding and programming) makes possible the combination of *closure and openness in the same system*" (1989, 40). The system is structurally open because it is operationally closed; it is commensurable with ecological programs because it is incommensurable at the level of the code.

The gradualist solutions that Münch and Sevänen are proposing at the level of the code, then, are strictly impossible due to its binary character, and yet this is precisely why their gradualist desideratum is already fully satisfied at the level of the program. To recap their arguments, Sevänen first of all claims that no single code can regulate all communications within any system. This is simply incorrect, even though it is empirically true that multiple programs are involved in interpreting the code. Then, second, he asserts that different subsystems can operate on the same code. This is likewise an impossibility, but remedied by the fact that systems can operate on the same programs. Finally, Sevänen and Münch claim that autopoiesis is a matter of degree. This is both a strict impossibility for the theory of autopoiesis and the surest way to lose the

very *tertium* that these sociologists pursue. The main takeaway of this discussion is that the interdependencies and interrelations between subsystems are neither clues to societal dedifferentiation (see Beck 1997, 27) nor evidence for the proposition that differentiation is a myth (see Luhmann 1989, 50). The fact that subsystems operate on one another's programs instead presupposes the differentiation of systems that are not functionally equivalent and that therefore rely on ecological performances. As Uwe Schimank writes, systems theory does not entail a "next to each other, but [rather] multiple crisscrossings of perspectives" (1996, 165). Hence, these interdependencies should not be interpreted as a blurring of boundaries—as the total permeability or openness of systems—but rather as the paradoxical dynamics of systems that are at once open and closed. The sociologies of openness miss the fact that these are paradoxical, nonlinear patterns of structurally coupled systems that share programs and coevolve accordingly.

Krönig's (2007) supplement of the "side code" does not fall prey to the same misunderstanding, but his desideratum of economization can be satisfied by appealing to another form of ecological interpretation of the code: organizations. Luhmann (2000) distinguishes between function systems and organizations. Organizations refer to empirical organizations such as businesses, schools, and ministries that form "segments" of function systems.[9] Organizations are also autopoietic systems that orient their communications to decision making, or to the code of decision/nondecision (Luhmann 2000; Mormann and Seidl 2014). Function systems contextualize or "functionalize" organizations since the latter "take over the binary code of the given functional system" (Luhmann 2013, 150). Political parties, for instance, make decisions with an eye to attaining power. Organizations, meanwhile, further structure the expectations within function systems in various ways (see Nassehi 2005). Function systems and organizations therefore stand in a close feedback relation with each other, each providing the ecological context for the other. The resulting image of society is an ecosystem of nonlinearly interconnected function systems and organizations (Luhmann 2013, 153). It reflects an empirical reality in which there is no function system that is exhausted by a single organization, and where no organization operates within one function system only. As Luhmann (2000, 398) writes, organizations are "meeting rooms for function systems."[10] In a hospital, for instance, medical staff treat patients, while accountants monitor the flow of money and employees engage in office politics. It thus becomes unclear what Luhmann's systems theory stands to gain from Krönig's notion of the side code. Krönig's point that the health system operationalizes economic efficiency through the side code of quality management could be reformulated by Luhmann as hospitals' mediating the economic and medical systems.

Function systems cannot be "economized" or colonized by an economic logic of efficiency, but hospitals can.

Without adding or subtracting anything from Luhmann's systems theory then, there are already two options for thinking about the dominance and expansion of the economy. First, organizations might be thought of not just as "meeting rooms," but also as battlegrounds for operations from various function systems, where some fare better than others. Second, the proliferation of the economic system could be conceptualized as the expansion of its programs—as performances and structural couplings—throughout other subsystems, including both function systems and organizations. Still, these options remain in conflict with Luhmann's thesis that, since function systems cannot substitute one another's functions, none of them can have "functional primacy." Yet this argument, as Ingolfur Blühdorn (2000) and Uwe Schimank (2005, 399–400; 2015, 421) have shown, rests on a non sequitur. A simple analogy of an organization with a boss and three subordinate specialists proves the point. The fact that the boss cannot replace the specialists and the specialists cannot take over the leadership of the boss does not rule out the possibility of hierarchical relations between them (Schimank 2005; 2015). The same applies when the specialists are function systems. So, is there a dominance of the economy and, if so, what are the mechanisms that drive the expansion of certain structural couplings and performances over others?

Both Franz Kasper Krönig and Bob Jessop have, independently of each other, proposed similar notions of "biological" or "ecological" dominance, where certain function systems dominate the larger ecosystem of social subsystems. Krönig analyzes the "economization of society" through the "biological concept of dominance" suggested by the biologist Edward Wilson, with dominance resulting from the "relative abundance of the clade in comparison with related clades" (Krönig 2007, 134).[11] Yet it is, first of all, not clear whether economic payments are indeed more numerable than, say, social media posts, and second, it is dubious whether mere quantity is what affords the economy its extraordinary muscle. Jessop offers a more complex and elaborate story through the concepts of "ecological dominance," which he finds in only two instances in the more than fifty books and three hundred articles spanning Luhmann's oeuvre. Luhmann, writes Jessop, took the concept from Edgar Morin to describe "an *ecological relation* wherein some systems may be dominant but where none dominates" (2008, 6). In this open-ended conception, ecological dominance refers to "the structural and/or strategic capacity of a given system in a self-organizing ecology of systems to imprint its developmental logic on other systems' operations far more than these systems are able to impose their respective logics on that system" (Jessop 2002, 25). Instead of the single criterion

of quantity, Jessop specifies seven aspects of the social that affect a system's capacity for dominance and show the capitalist economy—"with its distinctive, self-valorizing logic"—to have been dealt especially "good cards" (2008, 8).

For Jessop, the crux of the capitalist economy's ecological dominance is that its self-expanding logic of capital valorization pressures ecological systems into structural commensuration. Its dominance is enabled by the "decentralized, anarchic nature of market forces" (Jessop 2008, 10), crystallizing in the price mechanism that processes a tremendous "multiplicity and heterogeneity of elements" and works as a socioeconomic learning mechanism. The money medium can circulate easily across world society through structures that alleviate ecological pressures related to time, such as insurance and futures trading, and those related to space, such as capital flight and tax avoidance. Capital accumulation also takes primacy in the self-descriptions of society, with economic growth and profit-making being assigned central relevance by mass media outlets and becoming sedimented in the "decision premises" of organizations. Yet most important, the economy creates a dependence of subsystems on continued revenue, forcing them to lock their operations into the logic of commodification, profit, and exchange. In this way, the economy "attempts to redesign the environment" by forcing function systems and organizations to adapt to them, pressuring them into developing the relevant structural couplings and pushing them onto a coevolutionary path (11). Over time, these structurally coupled systems coevolve into asymmetric social patterns "in the shadow of ecological dominance" (13), forming especially tight yet nonlinear connections between the economy, law, and politics—or what, in reference to Antonio Gramsci, Jessop (13) refers to as a "historical bloc." This presents, Jessop suggests, "a more precise and testable account of what is at stake for Marx and Engels" (14). With his elaboration of the concept of ecological dominance, then, Jessop provides the means for theorizing the autopoietic dominance of the economy in the last instance while respecting the relative autonomy of Luhmann's self-substitutive orders.

The two challenges that Luhmann raises against the dominance of the capitalist economy—the impossibilities of functional primacy and operational colonization—can therefore be easily parried within his very own sociocybernetic framework. We need the interventions neither of Türk's metacodes nor of Sevänen's and Münch's dedifferentiation, since both proposals eliminate—albeit as mirror images—the radical difference from Luhmann's systems theory. They abolish not only the "relative autonomy" of subsystems, but also their autonomy or autopoiesis altogether. Moreover, the theories of dedifferentiation nullify the very *tertium* or systemic interrelations that in their enthusiasm they pursue. The result is a bland flux of indistinction at the expense of the difference

and autonomy of social units. In contrast to the one-sided stress on openness, Luhmann's systems theory works through the structural openness produced by the system's very operational closure, which enables a complex, nonlinear, and paradoxical account of the "ecological dominance" of the capitalist economy in the wider ecosystem of autopoietic function systems and organizations—an ecosystem known as capitalism (see also Schimank 2015). Concretely, this means that the simplicity of the price mechanism combined with the endless drive for self-valorization pressures the subsystems in the economy's environment into commensuration by forcing them to develop the relevant complexity and structural couplings. Jessop's concept of ecological dominance therefore throws into sharp relief Luhmann's overly horizontal and power-free formalism. It highlights that the differentiation of social structures is not primarily an unforced organic process but requires—just as the Frankfurt School rightly stressed—a cunning of reason that simultaneously requires and produces power. In short, a critical systems theory that includes the ecological dominance of the capitalist economy recognizes that the complexity differential between system and environment is simultaneously a power differential.

COUNTLESS POLITICS OF TERMINOLOGY

These considerations make clear the fact *that* societal differentiation into incommensurable autopoietic systems is crucial for a critical systems theory that values Luhmann's principles of immanence, difference, and paradox. Yet they do not touch on the question of *how* society is differentiated. When it comes to drawing societal boundaries, Luhmann (2012, 28), writing in reference to the work of Spencer-Brown, states: "We understand distinctions, not as existing facts (differences), but as deriving from directives to draw them." What are these directives and from where do they arise? On the basis of what, as Ulrich Beck wonders, does the sociologist draw these distinctions: "An idea? The *Zeitgeist?* The self-understanding of the elites in the respective institutions? On fundamental experiences which the theorist shares—with whom? Or on what else?" (1997, 27). Since the self-referentiality of science creates a fundamental contingency at its core, there emerges an indeterminacy in scientific observation itself. How then might we cut up the social system, which becomes itself a reduction of complexity by sociology—a contingent selection? This raises a critical systems theoretic suspicion, namely that, as Richard Münch suggests, in the "struggle for the societal drawing of boundaries . . . Luhmann's theory of the functional differentiation of autopoietic systems is one instrument of struggle among others" (1991, 377).[12] Discussing the question of how sociologists determine what function systems exist, then, will enable a final examination

of the rigidity that accompanies Luhmann's theory of modernity, as well as a move toward a central question: Does theory have politics?

What function systems are there according to Luhmann? Unfortunately, Luhmann's vast oeuvre does not include an exhaustive list. Thankfully though, Uwe Schimank (1996, 154) has managed to unearth at least twelve function systems from Luhmann's writings: economy, politics, law, military, science (*Wissenschaft*), art, mass media, education, health, sport, family, and intimate relationships. A strange omission that should be added is religion (Luhmann 2013, 74). Luhmann later also came to regard social movements as a distinct function system and speculated on the birth of the subsystem of social help (26). Yet what precisely are Luhmann's criteria for singling out specifically *these* autopoietic function systems from society's diffuse flux of communications or, as he calls it, the "reality continuum of societal communication" (134–35)? His answer is that there is no "theoretically rigorous, i.e. deductive answer to this question," leaving only empirical and inductive appeals (Luhmann 1990a, 421). Luhmann maps existing function systems by historically tracing the "out-differentiation," or becoming autonomous, of systems from premodern hierarchical society (see Luhmann 2013, 65–107). Nevertheless, it is possible to specify some systematic criteria, such as the need for systems to be "self-substitutive orders" that fulfill functions that cannot be fulfilled by other systems, the existence of operational closure, and a binary code (Luhmann 1989, 41; Roth and Schütz 2015, 17; Baecker 1994).

However, the problem, as Luhmann intimated, is that these criteria are still quite abstract and insufficiently detailed to guide sociology's empirical work. It raises a practical issue facing sociology: How does the sociologist manage this indeterminacy of criteria? Two proponents of Luhmann, Steffen Roth and Anton Schütz (2015), who have argued for a canon of ten subsystems after having set out clear guidelines for identifying them, provide a telling example of how sociologists might cope with such indeterminacy.[13] For example, when deciding whether social help should count as a function system rather than as a subsystem of medical health—on which Luhmann speculates and for which Baecker (1994) argues—Roth and Schütz ultimately reject its autopoietic status on the basis of favoring "a conservative politics of terminology" (2015, 21). This moment of clarity shows that, in practice, the indeterminacy of scientific observation invites—or perhaps even necessitates—a pragmatic or political judgment. They bolster their call for conservative judgment by an appeal to what they regard as a *reductio ad absurdum*: If social help counts as a separate function system, then could we not also say that the economy has differentiated into three separate function systems pertaining to physical, psychic, and social forms of scarcity respectively (Roth and Schütz 2015, 21)? Yet it remains unclear if the

suggestion is indeed absurd. Is the appropriate politics of terminology scientifically or politically obvious? If scientific considerations must be supplemented with political judgments, then should this ecological aspect of social theory not be made explicit?

Once one becomes embroiled in the details of functional differentiation, indeterminacy abounds. Why should the mass media system, for instance, not be considered a subsystem of the economy, rather than a separate system? Is it because behind the click-baiting and advertisement there is still a self-referential logic on the code of informational/noninformational? If so, then is it more accurate to say that media organizations are some of those "meeting rooms" for function systems, where mass media and economy pull in opposite directions? Could we then not also discern a particular self-referential logic in the transportation sector? Perhaps, here too, it should be concluded that transport organizations are split between the directives of the economic code of making profit/not making profit and the transportation code of move/keep in place. Perhaps engineering should also be deemed a function system, since even Luhmann (2012, 313) himself admits that it cannot be reduced to applied science, while others have shown there to be signs of autopoiesis in engineering: "Engineers, then, develop their own mathematics, their own experimental results, and their own techniques" (Sismondo 2010, 94). The question of where to make the cut can always be posed. So, what then is the appropriate politics of terminology here? Luhmann (2013, 90) suggests, reassuringly, that "it is possible to distinguish the operations belonging to the system with sufficient practical clarity, and thus to mark off the system's own autopoiesis externally." At this point, not only does a hidden pragmatist criterion ("sufficient *practical* clarity") suddenly surface, but it surfaces precisely in order to ward off a discussion on what counts as "sufficiently practical." Sufficiently practical with regard to what? Practical for whom?[14]

This problem—that of mapping existing function systems—may be pushed to its limits by asking, perhaps scandalously, whether the practice of promising is not a function system. The function of promising, it might be argued, is to stabilize the expectations of future actions in a way no other subsystem can. Its operational closure might be achieved when future communications ("Today, I am going to do x") connect to, and are structured by, earlier communications ("I will keep my promise to do x") without needing recourse to other systems of communication and while allowing new promises on the basis of earlier promises ("I trust you keep your promise just like last time"). Its binary code would be the distinction between breaking and keeping promises. Stretching the denominator of function system to the extent that it encapsulates promising, joking, giving orders, and so on, would lead to a picture of society

that consists of the kind of language games that Ludwig Wittgenstein discussed in the *Philosophical Investigations*. To the question of how many language games there are, Wittgenstein answers that "there are *countless* kinds" (2009, 14). This is not to say that Wittgenstein thinks society actually consists of a countless number of language games. Rather, he uses them as "objects of comparison," as a kind of heuristic device to shed light on philosophical concepts and language use by referring to their place in our relatively stable and sedimented ways of talking and acting (Wittgenstein 2009, 56). He employs the concept of the language game and its "countless" number precisely to draw attention to the *pragmatic element* in our descriptions of the world. One picks out the language games according to what one wants to compare or what one wants to observe— and the options for observing are countless.

This unlimited potential for observation is not simply the result of the practical difficulties of empirical sociology. Its causes run much deeper. The observer's choice emerges from the complexity of the social system itself—the observer must decide what to observe because their very presence prevents them from observing all of it at once. This is precisely what discharges the immense dynamism, contingency, and unpredictability to systems theory which, I want to suggest at this point, remains thwarted by Luhmann's excessive rigidity when it comes to the hegemonic catalogue of function systems. It is this rigidity that triggers writers such as Sevänen and Münch to allege that contemporary modernity has instead seen swaths of dedifferentiation, thus challenging Luhmann's fixed canon. Recall that the codes of function systems are strictly binary, yet must be "ecologized" by third terms in the form of structures, programs, and organizations. These ecological third terms, in turn, are functionalized by the code. The code and its ecology therefore provide each other's context in a creative feedback loop: the context gives the context. They stand, as Thomas Drepper puts it, in a "relation of simultaneous enhancement" (2005, 189). This ingenious move allows Luhmann to hold on to the principle of differentiation as foundational to the modern, while simultaneously inviting a dedifferentiating force into the social system by way of ecological interrelations. It is precisely this latter force, however, that poses a subversive threat to Luhmann's received liberal catalogue of function systems.

Since the code is caught up in a productive feedback loop with its ecology, the meaning and specificity of the code is at the center of a constant renegotiation. This is sharply at odds with the sterility that Luhmann grants the codes of the received catalogue of function systems. Phenomena of "colonization," like economization, are relegated to organizations and structural couplings in order to salvage the purity of the code. Even in the case of an increasing number of organizations becoming "functionalized" by a specific function system,

dedifferentiation or changes in its code are theoretically foreclosed by definition. Yet since the code derives its meaning from its context, should this not have consequences for the content of the code? This is essentially the question that Franz Kaspar Krönig sought to address: "[Economization] concerns not just an—however strongly pronounced—ecological relation to the economy, but a change on the operational level of the system itself" (2007, 121).[15] The logical misstep that Luhmann takes, I propose, is that he slides from the social theoretic designation of the binary code as fixed to the sociological description of equally fixed existing codes. He assigns, in other words, the inertia that the code must have *logically* to really existing function systems *empirically*. Why would codes not be able to evolve? And why would new codes belonging to entirely new systems not continuously emerge? Why can structural couplings, for instance, not harden into new systems?

This question is at stake in Deleuze and Guattari's discussion of the orchid and the wasp: "Wasp and orchid, as heterogenous elements," they write, "form a rhizome" (2014, 10). Roughly translated into Luhmannian language, the wasp and the orchid form a system. Deleuze and Guattari refer here to the phenomenon in which orchids imitate wasps in order to lure wasps into their pollen. Yet "imitation," Deleuze and Guattari suggest, is a description with limited purchase. The orchid does not simply mimic the wasp—it is not "waspized" like the health system might be "economized." Instead, wasp and orchid are involved in a double becoming. They form a "block of becoming": "a becoming-wasp of the orchid and a becoming-orchid of the wasp" (10, 238). The rhizome, or wasp-orchid system, is thus not a simple confusion of perspectives, nor a mere aggregation or combination of the wasp and the orchid. It is a different system altogether. The new system emerges from a process they call "involution," or what Luhmann calls "coevolution," proceeding not by descent and filiation but alliance and symbiosis. Contrary to authors such as Sevänen and Münch, Deleuze and Guattari stress that involution does not regress from an origin into "something less differentiated," but is instead "creative," meaning it differentiates further across existing differences and "runs its own line "between" the terms in play" (238–39). Hence, if we take this as an analogy for the "economization" of another system, Luhmann's objection that it is impossible to operate on two codes simultaneously does not apply here. Indeed, there are not two, but three codes at work here.

Sociological description should assume an open attitude toward the possibility of the emergence of new systems from the coevolutionary path of systems through their structural couplings. What might be seen as the interlinkages between systems on one level, may be understood as the elements of a system on yet another level. To return to Krönig's (2007) problematic of economization

through "quality management," the change at the operational level of the health system need not be dedicated to an overelaborate concept of a side code. Quality management, it might be said, signals the becoming-efficient of health and the becoming-health-promoting of efficiency. It is a third system—an example of what I will coin a "metrological system" in the next chapter—running on a symbiotic code of quality/nonquality that is structurally coupled to a multiplicity of organizations (hospitals, universities, schools) and function systems (economy, health, education). The economization of health, it might be added, can now be understood as the relative ecological dominance of quality management over health systems and hospitals.

This intervention maximizes the creative flexibility of Luhmannian systems theory. It liberates the theory without violating Luhmann's central principle of autopoiesis and the thesis of function differentiation, which ensures the reproduction of difference in modernity. The alternative to Luhmann's relatively stiff catalogue of received function systems—which feels intuitive because it is hegemonic—should not come in the form of a sociology of openness that liquidates this catalogue into a dedifferentiated flux. Instead, the alternative is a sociology that is open to registering the increasing differentiation and complexification of the social world in light of its relations of ecological dominance, therefore resigning itself to an infinite movement through paradoxes of closure and openness. Of course, this does not in any way spare us from the indeterminacies of social scientific description—if anything, it probably heightens and multiplies them. Krönig, for instance, might insist that the function system of "quality management" is *in fact* simply the contemporary health system. So, how should such a difference of position be resolved? What kind of reasons should be adduced here? Scientific reasons? Political? Aesthetic? What is the nature of the choice at hand? Here we must turn to Luhmann's most intricate and vexing challenge to critical theory—that only science can, and should, count for science.

THERE IS NO ELEVENTH THESIS IN LUHMANN'S SYSTEMS THEORY

For critical social science, theory cannot be separated from practice. This is the original sense in which Marx's critical theory was materialist: Theory is always situated in, and directed at, the historical and the natural world (Marx 1998). Critical theory, therefore, not only aims to understand and describe the social world, but simultaneously seeks to submit it to critique, thus imbuing theory with a practical intent. This holds true not just for Frankfurt School critical theory but also for critical-theory variants in fields such as political economy, sociology, history, queer theory, feminist theory, critical race theory, and

postcolonial studies. As Max Horkheimer (1982, 208) originally wrote in his essay "Traditional and Critical Theory," "the separation of value and research, knowledge and action" expresses a fundamental "alienation" from the world. Even though Luhmann, unlike the positivists to which Horkheimer is referring, would agree that the scientific observer is always already caught up in the observed, this involvement does not lead to some kind of unity between theory and practice, knowledge and action. Science and politics belong to two irreconcilable value spheres, and social science should therefore refrain from quasi-moralist notions such as alienation in establishing this descriptive fact. There is, simply put, no eleventh thesis in Luhmann's systems theory.[16] Does that mean that any design for a critical systems theory is bound to fail? Should social theory only observe in the medium of truth rather than also in that of power, even in the face of the difficulties discussed earlier? In order to answer these questions, let us start by taking a closer look at Luhmann's epistemology.

Luhmann's epistemology of "radical constructivism" understands cognition as a self-referential process: Cognitions cognize cognitions rather than reality. This is a counterintuitive proposition that, once again, invites the charge of solipsism: How is a system of cognition able to know its outside if it is confined to its own inside? Luhmann's response is astonishing. He compares radical constructivism to German idealism and notes that the latter's "problem was: how is cognition possible *in spite of* having no independent access to reality outside of it. Radical constructivism, however, begins with the empirical assertion: cognition is only possible *because* it has no access to the reality external to it" (Luhmann 2006, 242).

In order to observe its environment (reality), the system first needs to differentiate itself from that very environment. In other words, it needs to achieve autopoiesis through operational closure. Subsequently placing more distinctions on the system side, the system builds internal complexity so as to reduce the complexity of its environment to a processable cognition. The systemization of the system's operations into iterative structures—its internal complexity—is what produces knowledge in the observing system. The system thus becomes receptive to its environment, but always on its own terms. This means that, while the system has now produced an energetic openness to its environment, this ecological reality simultaneously retreats forever into the distance. The system's internal distinctions at once disclose and occlude, reveal and obscure, make visible and render invisible—it is this brittle dialectic that affords cognition. Radical constructivism's logical conclusion is therefore neither solipsism nor a denial of the real. For even though knowing can only know knowing itself, it must nevertheless presuppose reality as a necessary yet unobservable

unity. A cognizing system, as Luhmann (2002, 129) writes enigmatically, can see reality "as if out of the corner of its eye."

Systems of cognition and knowledge are no different from other self-observing systems in their constitutive self-referentiality, which means that they too are ensnared in paradoxes. The system's essential incompleteness prevents a total gaze, a view from nowhere. Every observation triggers, as Luhmann (2013, 338) calls it, a "blind spot." This blind spot is the excluded middle of binary observation, the unity of the distinction by which one casts the world into intelligible differences—an eye that cannot see itself seeing. This blind spot can of course be observed by another observer, but not without that observer itself generating yet another blind spot. Society, according to Luhmann (2002), is what takes shape in this kaleidoscopic vision of partial social observers. However, Luhmann continues, early Frankfurt School critical theory's ideology critique remained wedded to a universal vision, abusing society's blind spots as if in a children's game in order to reveal the hidden truths that secretly drive capitalist and libidinal economies: "I see something you don't see!" (Luhmann 2002, 187–96). That critical theory, charges Luhmann, failed to see that its critical categories, too, cast shadows on the social. It instead assumed a first-order "know-it-all attitude" buttressed by "impeccable moral motives" (Luhmann 2013, 327). What is needed, Luhmann maintains, is a "sociological Enlightenment" that is no longer beholden to cheap moralism (Luhmann 1991a, 66–91; Luhmann 1994; see also Baecker 1999).

One might wonder whether the harsh words are entirely fair to authors such as Adorno and Horkheimer, who always struggled with their troubled relation to an objective reason they deemed equally indispensable and inaccessible. Much less did they identify the existence of a universal social observer after even the proletariat had been reified into administered consciousness. Moreover, whatever still remained of their epistemic superiority was quickly abandoned by Jürgen Habermas (1984) and his followers, who grounded critique in democratic institutions open to all speaking subjects. In a more recent turn to social movements, critique has furthermore been reformulated as "reconstructive critique" that draws out a dialectic between observers and participants in order to put their respective limitations into a productive movement (Celikates 2018). In the wider discipline of critical theory without capital letters, meanwhile, the universal standpoint of the proletariat has been given up for a splintered mode of subjectivity that mobilizes the multiplicity of subject positions for "strong objectivity" (Harding 1993); the perspective of the "outsider within" (Collins 1986); or answerable "situated knowledges" (Haraway 1988). These knowledges, besides their situation in material-discursive realities, intersect in socially complex ways along axes of class, race, gender, and sexuality, such that

their resulting uniqueness is not only incongruent with but also threatened by universal claims. No critical theory today, consequently, can posit the existence of a first-order observer without raising strong suspicions of a potentially oppressive voice. Critique cannot afford to be blind to the existence of its own blind spot.

Luhmann's harsh, if not caricatural criticism of early Frankfurt School critical theory therefore no longer seems to apply. In fact, it may be asked whether these standpoint epistemologies do not "out-Luhmann Luhmann" in their emphasis on social locality and fragmentation. Whereas Luhmann scatters the human subject across tightly coupled psychic, organic, and social systems and their respective internal differentiations, he remains silent about the socially relevant ways in which the resulting perspectives are configured and interrelated. Luhmann simply interprets their differentiation and contingency as a sign of their formal equality as well as an indication of the impossibility of epistemic privilege. For critical theory, however, the formal equality of observers is always mediated by their material position in historical relations of power. For example, in Frankfurt School critical theory's foundational essay "Traditional and Critical Theory," Max Horkheimer writes that the observed object is always already "socially preformed" by "the historical character of the perceiving organ" (1982, 200). Likewise, in Donna Haraway's "Situated Knowledges" we read that "vision is *always* a question of the power to see" (1988, 585). The sociological reflexivity of the observer's situation in power relations does not yet require any political motive on the part of the sociologist—it only demands a sensitivity toward phenomena such as power, oppression, and marginalization that throw the social into relief. On such an uneven terrain, not every observer is equally capable of having an effect on the observed. As Cary Wolfe notes, Luhmann here reveals a blind spot of his own: "a blind spot that manifests itself in Luhmann's inability or unwillingness to adequately theorize the discrepancy between the formal equivalence of observers in his epistemology and their real lack of equivalence on the material, social plane" (1998, 76).

In what begins to resemble a reprise of the theme of ecological dominance in the previous sections, Luhmann again draws a false inference—from the formal equality of perspectives to their material equality. From the formal equality of systems, Luhmann infers that none can be dominant; from the formal equality of observers, he concludes that none can be hegemonic. Yet the demise of a universal and totalizing gaze has not led to an absolute leveling of perspectives. At this point then, the parallel lines of these two discussions meet, since falling for the former non sequitur raises the chances of falling for the latter and vice versa. For the observer relatively unaffected by the inequities of capitalist domination, the slanted reality of the social system tends to recede

from view. Yet without the recognition of this slanted reality, it is unclear why the social situation of the observer would matter. Any reflexive social theory, however, must have these feedback loops of power on its radar. It requires that attention be paid to the "semantics"—the cultural reservoir of meaning patterns—of class, race, gender, sexuality, and species that inform the structures of function systems and organizations, and which coevolve "under the shadow of ecological dominance" (Jessop 2008, 13) of capital accumulation.[17] It also calls for "embedded," "embodied," and "embrained" observers that emerge from the complex interplay between organic, social, and psychic systems (Braidotti 2019). The need to grasp the feedback relations that hold between social observers and the social world is nothing but a demand flowing from the radical constructivist position itself: The observer is irrevocably bound up with the observation.

Yet, Luhmann seems overly eager to save sociology from a contamination with power. The antinomies of modern reason lead to a split between the social science and politics. So what, then, is the task of sociology? For Luhmann, the answer is dictated by the operational closure of science and the impossibility of escaping self-reference. The task of sociology is to deliver the best "self-description of society" in the medium of truth (Luhmann 2012, 11). The practical criteria marshaled by critical theory's normative program have no operational purchase on these scientific descriptions. However, for Luhmann, the demand for "scientificity" does not imply a crude positivist quest for *the* true self-description. Rather, it invites the heterogeneity of truth-guided descriptions characteristic of today's "polycontextural or hypercomplex" society (Luhmann 2013, 181–83). This heterogeneity of truth-statements is at once limited and enabled by the operational closure of science. For, even though sociology is bound by a "preference" for truth, the contingency produced by its paradoxes of self-reference prevents the exhaustion of that truth. The structures of science can never force the next observation with pure logical necessity—what counts as truth can always be disputed. In light of this contingency, the scientific system sees itself confronted with an inescapable *choice*—an underdetermined decision to observe in one way rather than another. It must select in the face of complexity, but it is contingent how that selection is made.

The essential question to which the rest of this chapter is dedicated, is how to understand the nature of this choice in light of the possibility of critical systems theory. It is appealing, for instance, to read this choice as political. Since theoretical reasons cannot unequivocally determine the theory, the resulting incompleteness appears to present a chance for the spontaneity of practice. What cannot be resolved in thought, it might be imagined, must be settled by other means. Ernesto Laclau and Chantal Mouffe (2014), for instance, seize upon

this opportunity in *Hegemony and Socialist Strategy*, in which they argue that the abstract indeterminacy of theory reveals itself as the site of "the political." As evinced in his debate with Habermas, Luhmann (in Habermas and Luhmann 1971) condemns such a strategy as a logical confusion of perspectives—as the illegitimate import of politics into the domain of science. The choice forced by scientific indeterminacy belongs only to science, and emerges from a theoretical or logical, rather than political, deficit. However, as William Rasch and Cary Wolfe argue, there are complex affinities between Laclau and Mouffe, and Luhmann. Indeed, in light of Luhmann's functional differentiation of society, Rasch and Wolfe propose, in a distinctly Laclau-Mouffian vein, that "the trope of politics as *critique* be rethought in terms of politics as *conflict*" (2000, 19–20). It is precisely the antinomy between theoretical and practical reason—the differentiation between science and politics—they claim, that secures "the modern condition of possibility for politics" (Rasch and Wolfe 2000, 19). According to Rasch and Wolfe, what Mouffe and Laclau call "antagonism"—the irreducible political conflict expressed in society's contingency—presupposes Luhmann's basic premise of differentiation.

Elsewhere Rasch explains this proposition in more detail. The outdifferentiation of the political system from the premodern authorities of theology and morality, first of all, warrants the autonomy of political reason. The logic of politics becomes incommensurable with the desire for transcendence or the unconditional good; its questions can no longer be legitimately resolved in reference to these or other societal values. In fact, the guiding values from external function systems turn into totalitarian threats to the self-legitimation of the political system: They appear as theocracy (theology), technocracy (technology), financial corruption (economy), nepotism (family), and so on. This irresolvable tension or conflict between social systems is what Rasch calls the "meta-political" (2004, 43). This difference is subsequently reproduced within the political system itself. Like Laclau and Mouffe, Luhmann "tames" or "domesticates" Carl Schmitt's friend/enemy distinction—the logic of the political—through his own government/opposition coding, which structures communications in the political system (Rasch 2000b, 161). In modernity, sovereignty loses its unity and politics "operate[s] with a top that is bifurcated" (Luhmann cited in Rasch 2000b, 161): the sovereign is split. This political bifurcation ensures the continuation of political communications: power can always be disputed. Put differently, the structural indeterminacy of the political system resigns it to endless politics over politics. As Rasch shows, Luhmann therefore theoretically warrants the possibility of political choice in modernity through two radical differentiations: the first internal to the self-referential bifurcated workings of the political system (the political); the second in between the

incommensurable social subsystems (the metapolitical). "Conflict," concludes Rasch, is thus "grounded in conflict—all the way down and all the way up" (2004, 44; see also 2000b, 151–68).

Yet contrary to Rasch and Wolfe's suggestion, Luhmann's conception of the political does not bear "more than a passing resemblance" to Mouffe and Laclau's similarly sounding thesis (Rasch and Wolfe 2000, 21–22; Wolfe 1998, 70).[18] This is because even though the post-Marxist duo also identify the structural indeterminacy of systems as the site of the political, this moment of political choice cannot, for them, be restricted to a specific social perspective. As Mouffe (2005, 16) writes in *On the Political*, "the political belongs to our ontological condition." Alternatively, as phrased slightly differently by Laclau and Mouffe in their coauthored work, the political is *"an ontology of the social"* (2014, xiv). In a distinctly left-Heideggerian manner, they distinguish between ontic politics (day-to-day political communications) and the ontological political (the contingency of communication that cannot be eliminated through ontic politics). The political shows itself in politics yet cannot be reduced to it. This difference between the ontic and the ontological, or politics and the political, they argue, can only be secured if this difference is *itself* a site of the political—what Oliver Marchart has called the "ontopolitical" (2007, 172). Their point is not, as Rasch and Luhmann argue, that *when viewed from* the political system the choice brought up by systemic contingency must be observed as political, but rather that this choice *is* political regardless of the function system. What for Rasch and Luhmann *could* be read as the political, *must* be so read for Mouffe and Laclau.[19]

Which position is to be preferred, and what are their respective implications for critical social science? For starters, there is a tragic Weberian element to Luhmann and Rasch's position. The contingent choice in scientific observation could *in principle* be operationalized as a political observation, but not without threatening the metapolitical difference between science and politics, and thus risking the demise of the political as such. For Luhmann, the perspective of the political is not limited to politics, but it nonetheless should be for the sake of both science and politics. The basic limitation here is that politics cannot invade science *and* hold the fort: "One cannot functionally differentiate society in such a way as to make politics its center without destroying society" (Luhmann 1990b, 33). Thus, the only way to seize upon the power of political operation is to confine it to its own structural sphere and so, tragically, to render it relatively powerless. Rasch, unfortunately, fails to provide any strategy for navigating this paradox. Luhmann, however, employing Weber's liberal strategy, quite happily trades off the potency of the political for what comes down to the value-freedom of science. Yet the dire consequence is a double loss: science cannot

demonstrate the value of its value-freedom, while the political system risks shrinking into mere administration.[20] The latter is exemplary of the spirit of our neoliberal postpolitical age, which Laclau and specifically Mouffe seek to remedy. The political now becomes encased in a bourgeois sphere of politics that cannot fully contain all the political conflicts of capitalist society—for instance those that arise (as the Marxist phrase goes) at the point of production.

Conversely, Mouffe and Laclau's proposal is to resolve the antinomy between theory and practice by affording an ontological primacy to the political. The indeterminacy of science therefore presents a *political* choice: a moment of openness in which theory either contributes to the political "articulation" of a counterhegemonic bloc or becomes complicit—like Luhmann—in the ideological cover-up of conflict (Mouffe and Laclau 2014, 100). However appealing it may seem, Mouffe and Laclau's ontological "pan-politicism" is not without its own difficulties. Luhmann and Rasch might retort that this risks dissolving science into politics, such that politics turns into a colonizing force that endangers the autonomy of both science and politics itself. Mouffe and Laclau fail to appreciate the antinomy or paradox that generates the very political they wish to defend. This critique is echoed by Marxist writers, such as Bob Jessop and Ngai-Ling Sum (2013, 132), who charge that the post-Marxist intervention "reduces the social to politics," and Slavoj Žižek (2002, 271), who holds that it risks emptying the social, and notably the capitalist economy, of all its ontic content (see also Žižek and Daly 2004, 145). The political becomes socially "weightless," unmoored from social structures (McNay 2014, 95).[21]

Therefore, none of the positions outlined above offer solace for a critical systems theory that must have as its aim, paradoxically, *simultaneously* to acknowledge the antinomy of theoretical and practical reason *and* to confront their intimate interconnection so as to empower both. In contrast to Laclau and Mouffe, the political must be understood, not as an ontological condition, but as a specific function of the social that takes shape, as Jessop would have it, "in the shadow of ecological dominance" (2008, 13) of the capitalist economy. Theory, meanwhile, must remain autonomous even though it cannot be fully detached from the political. Thus, in contrast to Luhmann, the power-inflexed nature of observation urges a response from sociology itself. Sociology needs to recognize that the contingency of theoretic observation stages a choice-in-power. It must take responsibility for the fact that every scientific observation is simultaneously a political observation—for example, that value-freedom is itself also a political value. As it stands, the paradoxical theoretical limitation that Luhmann is forced to accept is that science must simultaneously *acknowledge and deny* the effects that politics has on its observations. For even Luhmann would agree that, without theorizing the feedback relations between the

political and the scientific, science cannot adequately theorize its own causes and effects. In order to take these political communications into account, however, self-referential science must operate on the contradictory assumption that only truth, rather than power, matters for science. Politics must therefore be made invisible by science in order to be rendered visible. Or, as Fischer-Lescano refines the point: "Paradoxes are not avoidable, they can only be invisibilised by hegemonic discourses" (2013, 22–23).[22] Hence, Luhmann too, however invisibly and implicitly, must make a political choice.

So, what is the political choice that Luhmann makes? The answer, as Rasch (2004, 46) notes, is an emphatic decision *for* functional differentiation: "Description is our only prescription." As Rasch clarifies elsewhere: "The description of modernity as differentiated needs to be read both as an empirical fact—'differentiation exists'—and as an imperative—"differentiation ought to (continue to) exist" (2000b, 145). Since the scientific and the political systems are conditional on a metapolitical difference between function systems, the injunction "Only describe!" is simultaneously scientific *and* political. It prevents both the denigration of science into political preference and the reduction of politics to scientific expertise. Acknowledging the existing antinomy between theory and practice, then, becomes at once a theoretical and a practical imperative. Society's subsystems now have to contend with one another—like Weber's "warring gods" (2008, 49)—thus limiting their operation to their own spheres. Against the primacy of the political, Luhmann therefore posits *the primacy of the "metapolitical"*—the political differences between social systems become primary (Rasch 2004, 43).

The political system, as a result, has to relinquish its claim to the driving seat of society, as "politics too can only steer itself" (Luhmann 1997, 46). Luhmann polemically compares G8 summits to Native American rain dances: Their structural effects are limited and unpredictable, but they fulfil key social functions (Moeller 2012, 28). The upshot of this structural modesty is that other function systems are "set free" from politics. Agents in the capitalist economy, for instance, can now fully indulge in Milton Friedman's self-referential mantra that "the business of business is business." The economic system, this thinking goes, is only hindered by political protests against human exploitation: "While this appears an intolerable injustice to the worker as a human being, it is difficult to see how a purely economic calculation could be carried out differently, for example, to monitor the cost effectiveness of an investment or the mode of operation of an enterprise" (2013, 244). Not only does Luhmann argue along Hayekian lines that modernity too complex to control from a single source; he adds that the consequent "state failure" or overburdening of the welfare state will also tend to become compounded in the face of ever more side effects

caused by the political compensation of previous side effects (Luhmann 1990b). Luhmann's liberal appeal to a primacy of the metapolitical —the balance of power between function systems—thus ends up, as Cary Wolfe notes, with a "tacit endorsement of liberal capitalist society and 'neoliberal' policies" (1998, 73).

Theory, it becomes clear, has clear practical effects—something that Luhmann himself well recognizes: "Through its own self-description, the system directs what it can notice in the way of inconsistency, limiting it and accordingly intensifying irritabilities against the background of everything that is thus suppressed and disregarded" (2013, 179). The Marxist analysis of class, he continues, has "obscured" the fact of functional differentiation (Luhmann 2013). Yet who is to say that Marxism obscured functional differentiation rather than that sociological functionalism has masked the continued dominance of the capitalist economy? When it comes to such politically charged sociological theses, it is only fair to ask for an explicit deliberation on, and answerability for, the sociologist's own practical norms and intents. The alternative is, as Habermas notes, that "systems theory of the Luhmannian sort transforms this practical postulate into a theoretical one and thus makes its normative content unrecognizable" (1987, 345). Not only is this practically dishonest, but it is also theoretically poor. For unlike Luhmann suggests, the opposite of political answerability is not better or purer theory, but rather a limitation of theoretical reflection on theory's own ecology.

Luhmann's handling of the paradoxes and antinomies of the modern, then, tends to become ideological both in content and effect. What Rasch appears to appreciate as Luhmann's tragic yet productive paradox—"description is our only prescription" (Rasch 2004, 46)—becomes no more than a tautology, where the fact of the liberal status quo becomes a political argument *for* the status quo. As Adorno and Horkheimer might say: "Factuality wins the day . . . thought becomes mere tautology. The more the machinery of thought subjects existence to itself, the more blind its resignation in reproducing existence" (2010, 27). This blindness, of science to its own political ecology, is an essential function of the reproduction of this very blindness. Luhmann operates on a description/prescription distinction that is reentered on the description side of this distinction. As a result, the unity of this distinction becomes a blind spot for Luhmann—a blind spot that critical systems theory seeks to illuminate. Hence, the point here is not that critical theory adopts a practical ethos whereas Luhmann's systems theory does not, but that both have different ways of navigating the paradoxes that exist between theory and practice. What is required for a critical systems theory, then, is a strategy of navigation that confronts the paradoxical

unity of science and politics in a social situation marked by functional differ-
entiation and ecological dominance.

CRITICAL SYSTEMS THEORY AS ECOLOGICAL PRAGMATISM

So far in this discussion of the possibility of critical-theoretic observation, I
hope to have demonstrated three points that follow from Luhmann's radical
constructivism: First of all, in practice, sociology will tend almost inescapably
to mobilize political or pragmatic considerations in its observations, like those
pertaining to existing function systems, due to structural and practical inde-
terminacies. Second, the social situation of observers in power relations not
only affects what becomes visible in observation, but also skews their relative
potential to affect the observed. Scientific observation will therefore always
involve political stakes and effects. Third, scientific description must always
double as political prescription. This Weberian tragedy of science afflicts Luh-
mann in the form of a necessary paradox, namely that the scientific description
of modernity as functionally differentiated must simultaneously affirm this
description as a prescription: Luhmann affirms a primacy of the metapolitical.
Yet this still does not address the crucial question at stake here—to put it bluntly:
Should we care? Luhmann could acknowledge all three points and still consis-
tently maintain the proposition that science should only operate on scientific
criteria, that its indeterminacies are merely logical, and that the choices they
necessitate should only be approached as theoretical.

Critical theory, in whatever form it may take, cannot remain content with
this conclusion. Its claim is that the indeterminacies of science are, at least in
part, practical—that its decisions should be treated as politically loaded. It
contends, moreover, that proceeding on the assumption that science is free
from political values decorates science with an ideological luster, obscuring its
practical content through an appeal to the factual. In other words, critical theory
claims that the *difference in position* between Luhmann and critical theory is
itself, again at least in part, political. This point is clearest in the case of Laclau
and Mouffe, as well as other left-Heideggerian theorists of the political. All
social differences—like those between politics and the political, theory and
practice, science and politics—are the ontological site of the political, or the
"ontopolitical" (Marchart 2007, 172). Luhmann, however, simply maintains that
the difference between the theoretical and the political is not itself political but
rather theoretical. At this point we are in a Lyotardian *differend*, meaning that
these positions are radically incommensurable (Lyotard 1988). They only con-
tinuously reproduce their differences on the higher level of an adjudicating

third term, which must then also be adjudicated, and so on (see Rasch 2000b, 116). We are caught in a fractal deadlock.

Yet it is important to recognize the asymmetry in the positions of Luhmann and Laclau and Mouffe that I noted earlier. Whereas Laclau and Mouffe assign an ontological status to the political, Luhmann does not do the same for the theoretical. His point is not that all indeterminacies *are* logical or theoretical, but rather that they are so only when observed from the scientific system. When observed from the political system, the same indeterminacy is political. Luhmann therefore opposes the ontology of the political with a radical pluralism of observers, which means that his theory can incorporate a Laclau-Mouffian notion of the political while the reverse is not the case. I believe that this sensitivity to difference gives Luhmann the upper hand here. Critical systems theory should therefore also depart from his vision of society as constituted by the differences of social perspectives and their environments. This means that it must also grapple with the Weberian self-referential paradox of science, namely that science cannot prove its philosophical presuppositions scientifically. Hence, science *cannot yet must* untangle itself from political authority. It must, however, refuse Luhmann's strategy of turning a blind eye to this paradox of science and politics—of hiding in self-reference. Another method is required; a mode of navigation that explicates and confronts theory's political ecology without collapsing the modern paradoxes of reason.

Jean-François Lyotard is an illuminating figure in the search for such a strategy. He too detects the Weberian logic of the cannot-yet-must in the legitimation of modern science, but his approach contrasts sharply with that of Luhmann. According to Lyotard (1984), science has always attempted to solve the problem of self-legitimation by taking recourse to ecological legitimation. Scientific knowledge looked to "narrative knowledge" for legitimation, to the stock of myths and metaphysics that science, through its very progress, sadly delegitimates. This consequent dual impossibility of self-legitimation and ecological legitimation is what Lyotard (1984) calls "the postmodern condition." For Luhmann, departing from the same paradox, the ecological legitimation of the autopoietic system of science is a hopeless undertaking: "Function systems can only legitimate themselves. That is, no system can legitimate another" (Luhmann 1990b, 19). The need for legitimation is only an issue for science itself, since the rest of society simply depends on the specialized functions of science— what Luhmann (1989, 19) calls its "performances" (*Leistungen*)—for its very survival. For the health system, for instance, medical science's success in healing patients is all the legitimation it needs. Yet for Lyotard this fact of performance, the existing interdependence of function systems, is what he laments as the "de facto legitimation" of "performativity" (1984, 47). Following

the failure of internal and external legitimation, society has become governed by an immanent nihilist force; a pure logic of efficient means that debases legitimacy into material dependency. In the uneven ecosystem that is capitalism, the power of performance hardens into a veritable blackmail of the capitalist economy and its most performative agents. Legitimation cannot, thinks Lyotard, be relinquished in a society in which capital, knowledge, and power are interlinked (Lyotard 1984).

To fight the reign of performativity, Lyotard attempts to fashion a new mode of ecological legitimation for science. The fracture of modern reason into an archipelago of language games—in Luhmann's terms: function systems—demands the faculty of judgment (see Lambert 2021). Judgment, a political device *par excellence*, represents the capacity for navigating within the archipelago, providing linkages between the heterogeneity of language islands into "little narratives" that do not aim to have the last say (Lyotard 1988). These linkages are *passages* across *"differends"*: the ineluctable differences that exist within the modern social bond, much like the differences between Luhmann's function systems. Precisely because of these *differends*, judgment—like Luhmann's observation—is strained by an inescapable contingency, and hence we must "judge without criteria" (Lyotard and Thébaud 1985, 14). The narratives that are crafted from these indeterminate judgments, according to Lyotard, must therefore be judged on the basis of their performativity (Readings 1991, 58). Yet this is not the performativity of maximum technical efficiency alluded to above, but a *pragmatic criterio*n that judges narratives immanently by their production of effects and resituates performativity in the domain of justice. In the absence of a completely representable truth, justice must be *done* (Readings 1991, 59). Science must carefully navigate its own political environment.

Lyotard represents an example of what Cary Wolfe calls poststructuralist pragmatism, for which he advances Foucault and Deleuze as two major examples. These authors share, as Wolfe puts it, "a commitment to an 'ethics of thought' that places a premium on the production of new concepts by means of the continual confrontation of thought with its own outside" (1998, xix). Deleuze's notion of the "concept," for instance, functions as a means of experimentation across differences (Wolfe 1998, 103–4). Like Lyotard's judgment, philosophy, according to Deleuze, creates concepts from within the multiplicity of power relations and must ultimately be judged by both its effects on philosophy itself *and* on its environment. Philosophy becomes what Emmanuel Renault calls "heteronomous thought" (2017, 16)—a mode of knowing that connects philosophy to the nonphilosophical. This, according to Renault, is the basic modality of Marx's notion of critique as well as that of Frankfurt School critical theory. It is also, Renault proposes, the point at which critique shows

its affinities with pragmatism. Like pragmatism, critical theory in both Frankfurt School and poststructuralist senses, works with an antirepresentationalist and antifoundationalist epistemology, as well as a "relative instrumentalism" (Wolfe 1998, xv). This attitude calls for a ceaseless engagement with its practical situation in an ecology of power and its theoretical epistemological conditions (Wolfe 1998, 140).[23] It therefore demands an ethos of experimentation that recognizes thought will have unpredictable, contingent, and nonlinear effects and therefore requires constant reevaluation. What Luhmann regards as evidence for the impossibility of critical theory, then, critical theory accepts as part of the critical challenge prompted by the historicity of the observed and the historicity of the observer.

The crux of critical theory, I want to propose, therefore lies in its ceaseless confrontation with its environment. It approaches the indeterminacies of the social, not only as theoretical deficits, but also as political points of decision. Yet this is not a confusion of modes of observation, nor an illegitimate imposition of politics onto science or vice versa. Critical theory holds that the choice-in-power that afflicts science is neither, as Luhmann argues, purely theoretical nor, like Laclau and Mouffe hold, purely practical, maintaining instead that the choice is *critical*. Like quality management, critical science must be understood as a third system—an emergent system over and above traditional science and politics in the differentiated social system of capitalist modernity. It is the creative coevolutionary product of both these systems that attempts to think, in the face of its very impossibility, the paradoxical unity of theory and practice as critique. It is the becoming-true of practice and the becoming-practical of truth—a "block of becoming" (Deleuze and Guattari 2014, 10) that can nonetheless never totally achieve this remarkable synthesis due to its own contingency, paradoxes, and blind spots. Critical theory is therefore a speculative-practical wager that assesses social contingencies on the basis of the unique code of critical/ideological. What counts as critical and what as ideological is born out, and takes shape by virtue of, its ecological relations with science and politics. This means that the critical mode of observation is fundamentally pragmatic in the sense that—in the final instance—it judges its success on the effects it has on these systems in its environment. Critical systems theory does not produce truth and justice, but rather *effects* them.

It is important at this point to recognize that critical systems theory is a speculative-practical *wager*. It accepts that to approach the choice posed by society's contingencies as speculative-practical is *itself* a speculative-practical choice. There is no effort to break the fractal deadlock that I noted earlier, for the simple reason that this stalemate cannot be theoretically resolved. Modernity is thoroughly nihilist in Friedrich Jacobi's original sense—a *salto mortale*

cannot be avoided. This also means that one cannot force Luhmann to adopt a critical-theoretic stance on the pain of inconsistency. Traditional science cannot be pressured to transform into critical science, to use a familiar phrase, by the unforced force of the better argument. The former can only be rendered critical through ecological—that is to say, interdisciplinary—confrontation. Here we have reached, then, the fundamental indeterminacy of the modern. What can be argued, however, is that critical systems theory is possible and has certain theoretical and practical advantages over Luhmann's version of traditional systems theory. These advantages flow from a conception of reason that acknowledges reason's constitutive connection to power. Reason must be understood fundamentally as *artifice*—observation is not passive registration, but a creative and productive act. Knowledge requires power, but power in turn presupposes knowledge. This is already an abstract property of Luhmann's radical constructivism yet finds a more materialist expression in the writings of figures like Marx, Adorno and Horkheimer, and Foucault.

The theoretical benefits of critical systems theory derive from its ecological confrontation with science. This translates into an interdisciplinary research program that submits other disciplines to immanent critique, as Marx did with classical political economy, Frankfurt School critical theory did with sociology and psychoanalysis, feminist theory and critical race theory with biology and anthropology, and so on. This ecological confrontation opens up the theoretical field of ideology critique, which critical systems theory directs, both toward itself and toward its traditional scientific environment. When ideology critique is directed toward traditional science, it enriches and refines empirical theory by unmasking inconsistencies and incoherencies, for example by revealing its hidden practical purport, or showing the contradiction between its formal statements and the material realities they describe. Bob Jessop's (2008) demonstration of the ecological dominance of the capitalist economy in the realm of formally equal perspectives is therefore already an expression of critical systems theory; it is an ideology critique of Luhmann's systems theory. When critical systems theory applies self-critique, it interrogates its own historical and material situation within the uneven ecosystem that is capitalist society. It does not shy away, therefore, from the consequences of the coimbrication of knowledge and power for its own observations. To the contrary, it seeks a reflective understanding of the historical genesis, evolution, and deployment of its own thought and judges its merits on both its theoretical adequacy and practical effects. Conversely, the practical gains of critical systems theory spring from its ecological confrontation with politics. It offers critical-theoretic support for those who are engaged in social struggles against inequity, oppression, and alienation by detailing the mechanisms and processes that shape modern society, as well

as its many power asymmetries. It also helps clarify the nature and the stakes of these struggles and reveals the epistemic blockages that hinder them.

Theory and practice, science and politics, nonetheless remain autonomous or autopoietic domains. Critical systems theory does not write up political programs in the format of scientific papers, nor is politics simply the application of correct theory. This would jeopardize the autonomous logics of these systems in a process of dedifferentiation, undermining both the authority of theory and the spontaneity of politics. Instead, the emergence of critical systems theory signals a further complexification and differentiation of both. Even though it takes social struggles as its starting point and the political inflection of perspectives as observationally relevant, it is symbiotically more tightly coupled and deeply interpenetrated with science. It shares many of the scientific system's programs, like the "form" of theory, methodologies, and rules of logic. Because of critical systems theory's avowal of the coimbrication of knowledge and power, it pragmatically judges its own criticality by the effects it has, both in the medium of scientific truth and political power. This is not to say that it operates in both of these media simultaneously, but rather that what is critical, is ecologically legitimated by the systems of science and politics. Critical systems theory is the pragmatic navigation of these ecological relations.

Critical theory is therefore not, as Max Horkheimer already warned, "a storehouse of hypotheses" (1982, 239). Rather, it represents a creative engagement with an equally creative society. As the social system develops, "the theory as a whole is caught up in an evolution" (238). "It constructs," Horkheimer continues, "a developing picture of society as a whole, an existential judgment with a historical dimension" (239). This historical dimension is the creative feedback relation of critical theory with its outside—its ecological confrontation—where history still means something more than the mere passing of time. It means that it, however improbably, seeks to break with the present in the present, to forge a link between the descriptive of the factual and the prescriptive of the not-yet-factual. Where Luhmann simultaneously affirms yet depoliticizes the primacy of the metapolitical difference between subsystems, critical systems theory's ecological pragmatism engages and criticizes the metapolitical of the modern. This is, ultimately, the object of its "existential judgment."

Critical systems theory therefore forms a critical strategy for navigating the metapolitical differences of functionally differentiated society. The impossibility of self-legitimation by science pushes it into an ecological confrontation it cannot yet must navigate. Critical social science is the system that emerges from this ecological confrontation of science with politics, and it attempts to think their paradoxical unity by contingently and pragmatically passing between them and itself. The ecological dominance of the capitalist economy,

meanwhile, slants the terrain on which the ecological navigation of critical theory takes place. It is, moreover, in the interstices of this functionally differentiated yet ecologically dominated social system that the political takes its institutional shape as politics, with parliamentary democracy serving only as its official outlet. The ecological dominance of the capitalist economy limits the reach and potency of politics, but politics cannot be reduced to a function of the economy. The concept of ecological dominance affirms the primacy of the metapolitical *and* the determination of the capitalist economy in the final instance, whose "lonely hour," famously, "never comes" (Althusser 2005, 111–13). Critical systems theory finds itself in this constellation of forces. Its tasks are to clarify and critique the historical forms of the scientific, the political, and the social, as well as their complex and irrevocable interrelations. Critical systems theory, in this sense, is fundamentally a mode of ecological navigation that must be judged by the pragmatic effects it has on its environment—whether it effects truth and whether it effects justice. Even if this is an endless, paradoxical task.

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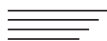
As Dirk Baecker writes, Luhmann's systems theory is "the deconstruction of its central term" (2001, 61). The way in which systems theory deconstructs the system is by displacing its central term even further and, finally, becoming ecological theory. In light of this, the two apparent dedifferentiations proposed by critical theory that threaten Luhmann's functional differentiation can be incorporated into systems theory by walking the razor's edge of ecological deconstruction. First, the dominance of the economy can be thought without revoking differentiation and violating autopoiesis by way of the concept of ecological dominance. In place of a multitude of formally equal subsystems, critical systems theory registers a material imbalance in which capital accumulation comes out on top. The ecological contextualization of function system codes, moreover, allows for a much more creative sociological description of how society's subsystems develop; how new ones emerge; and how they are related to each other in terms of ecological dominance. Second, the apparent dedifferentiation between science and politics, theory and practice, professed by critical theory, also rests on a misunderstanding. Science and politics remain autopoietic spheres, yet they are ecologically mediated by critical systems theory as a third symbiotic system that attempts to think the paradoxical unity of theory and practice in the face of its very impossibility. The wager of critical systems theory is that, despite its improbability, this ecological confrontation with science and politics produces not only more reflexive theory, but also a more just politics.

In both cases, theories of dedifferentiation or sociologies of openness—like those of Sevänen, Münch, and Laclau and Mouffe—are not the solution to the rigidities of Luhmann's systems theory. These blow up the systems framework together with its theoretical virtues, such as its attention to immanence, paradox, difference, and contingency. The result is a view of society as a flux of indistinction that makes it difficult to theorize the autonomy of social units and their relative stability. In chapter 3, I return to the troubles of the sociologies of openness in a critique of the work of Michael Hardt and Antonio Negri. In contrast to this sociology of openness, in chapter 4 I detail how the differentiation of social systems and their paradoxical ecological relations are constitutive of contemporary capitalist modernity with its cybernetic mode of rationalization. First, however, the next chapter is dedicated to the theory of rationalization in Frankfurt School critical theory. On the basis of critical systems theory, I will ask if the technical rationalization of capitalist modernity can be understood through systems theory's paradox of closure and openness and examine how the political emerges from these paradoxes of rationalization.

SPIRALING INTO CONTROL

Paradoxes of Thermodynamic Rationalization

> There is *one* thing of which one can state neither that it is 1 metre long, nor that
> it is not 1 metre long, and that is the standard metre in Paris.
>
> —Ludwig Wittgenstein

For the theorists of the Frankfurt School, rationalization, the narrative of modernization, is as follows: In a motion of closure, the proliferation of technical reason drives out political reason, eclipsing the horizon of alternatives. Once totalized, there waits an "iron cage" (Weber 2005) or a "totally administered society" (Adorno and Horkheimer 2010). It is at this point that, in a paradoxical twist, technical control becomes political domination. This is in essence the logic of instrumental rationalization. Though still abstract, it is easy to see the appeal of this narrative in midcentury times of Taylorist management, monopolist firms, and state planning—never mind the totalitarian regimes of Nazi Germany and the Soviet Union. More than ever, calculation was the medium of politics. Yet even today, in more fluid and market-mediated societies, the tale of rationalization retains a distinct pull. For although now precarity is feared more than totalitarianism, contemporary capitalism has become yet more technicized. Monopolist platforms have closed down on the internet's original horizontalist promise, and the neoliberal market order runs on a vast bureaucracy designed by technocrats. The tale of instrumentalist technology turned political domination should thus still speak to us.

The theory of rationalization is not without its problems, however. Most important, it hinges on an unlikely separation and opposition of technical and political rationality. The result is that the theorists of rationalization, despite all their dialectical nuance and sociological finesse, often left little conceptual room for history and politics in their portrayals of technical reason. In the case

of Weber (2019) and Habermas (1984; 1987), this lack appears as an instrumentalist vision of technology as a neutral means. For Adorno and Horkheimer (2010), conversely, it results from their equation of technology with domination. Portraying technology as an autonomous and one-dimensional force, however, is both empirically and politically problematic. Technology, as science and technology studies (STS) has demonstrated time and again, is political through and through. Denying this fact merely risks shielding technology from social critique. If one assumes politics and technology are mutually exclusive domains, one ends up in a trade-off between justice and efficiency, where the one can only be won at the expense of the other. This limits the bite of a critical theory of rationalization, which should enable us to connect the just to the efficient in a politics of technology—one thinks, for instance, of the need to challenge algorithms, credit ratings, and GDP metrics. Hence, we must ask whether the diagnostic and critical potential of the concept of rationalization can be salvaged without taking on these essentializing views of technology. Can we devise a new theory of bureaucracy fit for the current age?

STEERING THE MACHINE: RATIONALIZATION IN MAX WEBER

Looking out over the "mechanized petrification" that had by the early twentieth century eroded traditional social forms, Max Weber (2005, 124) sought to understand the place of the modern individual in this newfound world. Western modernity, according to Weber (xxix), was uniquely marked by emerging "systematic forms of thought" across various social spheres, including science, law, art, music, architecture, the modern state, and the capitalist economy. These had attained a specific form of rationality or "consistency," a degree of systematization and formalization that allowed for technical mastery (Weber 1946, 324). Hence, Weber thought, Western modernity fundamentally contrasted with other cultures, societies, and religions both in the past and present. For the German sociologist, therefore, the study of modernity should take the form of a historical-sociological investigation into the development of this specifically "Occidental" form of rationality.

To carry out this ambitious project, Weber (2019, 87–88; 101–3) takes "social action," or action oriented toward other subjects, as his starting point. He analyzes social action "ideal-typically," a neo-Kantian strategy that allows the sociologist to stylize the inconsistent or irrational nature of reality into consistent or rational concepts (Weber 2012, 125). Weber distinguishes types of action by their guiding rationality, the two central ones being purposive rationality (*Zweckrationalität*) and value-rationality (*Wertrationalität*). These are mutually exclusive concepts. Whereas purposive rationality refers to the calculus of

optimal means or consequences in actions oriented to an end, value-rational action concerns itself purely with intrinsic ends or unconditional values, and disregards questions of means and/or consequences (Weber 2019, 101–3). Actions, institutions, and systems of thought can, albeit to varying degrees, be "rationalized" according to any rationality type. Indeed, as Weber (2005, xxxix) suggests, "rationalizations of the most varied character have existed in various departments of life and in all areas of culture." In a general sociological sense, then, rationalization refers to an immanent rational consistency that cultural and social phenomena either have achieved or are in the process of achieving, whatever the form of this consistency.

The study of rationalization is what gives Weber's rich and complex oeuvre its "thematic unity" (Tenbruck 1980). Throwing this unity into relief, Wolfgang Schluchter distinguishes three senses or facets of rationalization—alternatively called "rationalism" by Weber. First, there is "scientific-technological rationalism," referring to "the capacity to control the world through calculation," enabled by advances in science and technology (Schluchter 1984, 14). Second, there is a "metaphysical-ethical rationalism" or the "systematization of meaning patterns" (15), for which Weber singles out an urge to "consistency" and theodicy as a main thrust of rationalization in all world religions. Finally, there is rationalization as "practical rationalism" or "the achievement of a methodical way of life" in both the life of individuals, and the development of institutions or organizations (*Verbände*; 15). The intellectual challenge that Weber set himself was to explain the development of the socio-practical type of rationalization by way of technoscientific and ethico-metaphysical rationalization. Or, as Habermas (1984) puts it a touch more economically, to explain Western modernity's societal rationalization by means of cultural rationalization.

Weber's diagnosis of capitalism remains the paradigmatic example of this intellectual strategy. Capitalism, for Weber, represents "the most fateful force in our modern life" (2005, xxxi) and is thus in many ways emblematic of social rationalization. In contrast to Marx's materialist philosophy, Weber interprets the societal rationalization of the capitalist economy in terms of a "spirit of capitalism," which he traces back to the Protestant work ethic. Characteristic of the spirit of modern capitalism, argues Weber, is the rational ethos of constant reinvestment enabled by the disciplined abstinence of material enjoyment. It is the pursuit of continued profit for its own sake. He recognizes this spirit as the secular successor of the Protestant ethic of "inner-worldly asceticism," which prescribes methodically working in a "calling" (*Beruf*; e.g. Weber 1946, 325). Since the individual's chances of salvation are strictly unknowable in the Protestant doctrine of predestination, all the believer could do was direct their attention to earthly matters. Hence, this-worldly working in a calling—"a

systematic rational ordering of the moral life as a whole"—formed the Protestant's total horizon and became an end in itself (Weber 2005, 78–79). Analogously, in the sober spirit of capitalism, the entrepreneur turned to profit-making for its own sake rather than for the end of material enjoyment.

The withdrawal of ultimate ends or salvation behind a worldly horizon is what Weber calls "disenchantment" (2008, 51). Rather than mere secularization, it refers, in the words of Alain Touraine, to "the break with all forms of interpenetration of the sacred and the profane, or of being and phenomena" (1995, 26). Or, as Weber himself suggests in *Science as a Vocation*: "God is hidden, his ways are not our ways, his thoughts not our thoughts" (2008, 38). This fact of disenchantment gives the rational "consistency" of the Protestant ethic and the capitalist spirit a paradoxical twist. On the one hand, working in a "calling" means pursuing work as an end in itself and therefore typifies value-rational action. On the other hand, this end refers to the purposive realm of means and consequences—a realm that excludes action based on intrinsic values. The modern spirit of capitalism with its vocational imperative then, in a strange twist, suspends the question of "other-worldly" ends and directs its attention wholly toward "this-worldly" means. Hence, modern value-oriented action transforms into its exact opposite: purposive or means-oriented action. In disenchanted modernity from which all unconditional ends and values have been expelled, rationalization signals the universalization of an instrumentalist logic—endless purposive reasoning devoid of purpose.

Along these paradoxical lines, Weber interprets the rise of capitalist or "socio-practical" rationalization by way of the "ethico-metaphysical" rationalization of Protestantism (Schluchter 1984). Yet what about "scientific-technological" rationalization? As Weber remarks, "scientific progress is a small part, albeit the most important part, of that process of intellectualization" (which Weber uses synonymously with "rationalization") (2008, 35). The advance of scientific and technological enterprise, moreover, is as much a force of disenchantment as the Protestant ethic is. In fact, scientific rationalization and disenchantment are mutually enhancing forces. On the one hand, as techno-scientific rationalization progresses, magical and mythical knowledge lose their credibility. On the other hand, as disenchantment grows, the faith that the world may be successfully rationalized along worldly scientific principles strengthens. In his famous definition of rationalization, Weber therefore asserts that rationalization "means the knowledge or belief that *if we only wanted* to we *could* learn at any time that there are, in principle, no mysterious unpredictable forces in play, but that all things—in principle—can be *controlled through calculation*. This, however, means the disenchantment of the world" (35). The upshot of this process of disenchantment sparked by technoscientific control is that

previously binding values of enchantment—like those of theology, myth, or morality—now lose their integrating force in modern society. As a result, the social falls into differentiation.

Modernity, according to Weber, fragments into "life orders" and "spheres of value," each with their own "internal and lawful autonomy" (1946, 323; 328): the economic, the political, the aesthetic, the erotic, and the intellectual order. This newly emerging plurality of value-spheres, their corresponding set of institutions, and their own incommensurable ends, such as truth (science), beauty (art), and profit (economy), signals the return of polytheism after the death of God. This loss of universals, Weber argues, can be confronted only through two ideal-typical cultural attitudes, namely "this-worldly asceticism" and "other-worldly mysticism" (325–26). The latter signifies a flight from the world, where the individual takes on a contemplative stance and views him or herself as a vessel of the divine. The former, by contrast, views the individual as a tool of God's work and prescribes an active mastery of the world. Weber nuances this distinction, it must be noted, by adding the possibility of an "inner-worldly mysticism" (326), but he leaves us in the dark with regard to its contents. This, as I argue in the epilogue, forms the cultural attitude of the present. For Weber, however, the uniqueness of Occidental rationalization lies in the becoming consistent of the inner-worldly asceticism that he finds in the value-spheres. This includes, paradigmatically, the Protestant ethic and capitalist spirit in the economic order, but also the value-free pursuit of truth and methodical mastery of technology in the sphere of science (see "Science as a Vocation" in Weber 2008). As the new plurality of life-orders becomes universally governed by purposive reason, modernity differentiates into sameness (see Gane 2002, 44).

Weber is now on his way to capture the "socio-practical" rationalization of Occidental modernity through the rationalization of "ethico-metaphysical" and "technoscientific" practices. How then, in this paradoxical sociocultural situation, must we interpret the logic of the capitalist economy and the bureaucratic state? The modern capitalist economy, answers Weber (2005), is guided by a universalized purposive spirit (ethico-metaphysical) and by techniques of calculability, measurability, and control (technoscientific). It is profit-making for its own sake mixed with new technologies of double-entry bookkeeping and "capital accounting" (*Kapitalrechnung*; Weber 1978, 91). These tools are "the most formally rational means for the orientation of economic action" (Weber 2019, 173). Modern or "rational" capitalism is the universalization of these means, the self-application of purposive reason that enables profit-making for the sake of continued profit-making (see Swedberg 2000). Weber's account of capitalist rationalization is mirrored conceptually by his theory of bureaucratization. "Purely bureaucratic administration," writes Weber, "is the *most formally*

rational way of exercising rule [*Herrschaft*]" (2019, 350). Modern administrations rely upon specialized and formally trained staff organized in hierarchical structures governed by legal rules. It is "rule through *knowledge*," a mode of authority that mobilizes technoscientific control through precision, rigor, and predictability (352).

Weber stresses the intimate relation between bureaucracy and technology, which would become a central tenet of the Frankfurt School. Not only does bureaucratic rule require material infrastructure ("railways, telegraphs, telephones"), but bureaucracy is also *itself* a kind of technology (Weber 2019, 352). Bureaucracy, Weber continues, is "the most formally and technically rational [system]," having reached a "very high degree of *technical* perfection" (350), and ends up dominating us in the same way that commodity production is "dominated by precision machine tools" (352). It is a "technically rational machine" (Weber 1978, 811) or, more precisely, an "animated machine" (Weber 1978, 1402). So, if bureaucracy is technology, then what is technology? According to Weber, the essence of technology is that it is a totally means-oriented or purely purposive rationality. Every action toward an end employs means, and "the means employed to achieve this are its "technology" (Weber 2019, 146). It is no wonder then that "*Zweckrationalität*," literally "purposive rationality," would come to be translated as "instrumental rationality," the rationality of the technical instrument (Weber 1978, 24). Weber, as Keith Tribe (2019, 54) writes, derives this conception of technology from the work of Friedrich Gottl, who links it to the two main maxims of the thermodynamic age: productivity and efficiency. Like modern capitalism then, bureaucracy forms a purposively rationalizing action system that takes its governing logic from technoscience.

Via these analyses of the capitalist economy and bureaucratic organization, Weber examines the consistency of modern, technical, purposive rationality. What is the nature of this consistency? How can it shed light on the precarious situation of the individual in modernity? Since "the bureaucratic apparatus" is fully turned in on itself, reasoning from means to means, Weber diagnoses that it "has compelling and purely material (ideal) interests in its own perpetuation" (2019, 351). In the same way capitalist entrepreneurs secure profit for the sake of further profit, bureaucracies generate rules for the sake of further rules. Emptied of all final and external ends, purposive rationality becomes *formal rationality*. This transformation occurs, as Jürgen Habermas (1984, 171) notices perceptively, when the rationality of purposive action is no longer evaluated in terms of external ends or value-rationality, but when the means are justified in terms of yet more means. Formal rationality is therefore the guiding rationality of a kind of self-referential system of purely means-oriented purposive reason. Since it expels all reference to ultimate ends or unconditioned substance, it

directs its attention only to this self-referential system—that is, to its form. Modern capitalism and bureaucracy, as well as the other rationalized spheres of value, must be understood as such: formal systems of self-referential purposive reason. As these action complexes proliferate throughout modernity, a boundless technical rationality increasingly drives out political values and ends, leading ultimately to Weber's famous "iron cage" (2005, 123). The individual becomes trapped in the *closure* of self-propelling formal reason.

Formal reason thus represents the conceptual limit of instrumental consistency. It is a totalized mode of instrumental reason appearing to supply its own legitimation. Yet on closer inspection, this formal self-legitimation raises suspicions—those already anticipated in the paradoxes of the spirit of capitalism and the Protestant ethic. On the one hand, formal rationality supplies its own ends, namely its formal system of means. Formal rationalization therefore forms the point at which consistency reverts to inconsistency—where the means become ends in themselves and where purposive reason collapses into value-reason. On the other hand, this paradox merely seems to postpone the question of ends in an infinite spiral. While productivity and efficiency abound, their human rationale grows increasingly obscure: Efficiency for what? For whom? Why? Instrumental rationalization, in other words, becomes progressively value-irrational. Here we have yet another paradox of rationalization: "As rationalisation increases, the irrational grows in intensity" (Freund 1969, 25). Weber detects this problematic, for example, in the fact that formally rational bureaucracy must be steered on the basis of external ends: "At the *top* of bureaucratic rule, there is therefore unavoidably an element that is at least not *purely* bureaucratic" (2019, 349). Bureaucratic rule seeks governance from a type of rule that from its formal perspective is wholly irrational, namely "charismatic rule" based on intrinsic values (Weber 2019, 376). Weber, turning vice into virtue, here assumes a heroic role for the bourgeois entrepreneur and the political leader who must stem the tides of instrumental petrification and steer "the machine" (Weber 2008, 180). His cautious hopes, however, cannot conceal that Weber finds himself in a strange position. In the search for rational consistency, the sociologist finds only paradoxes.[1]

These considerations reveal just how complex and multifaceted the concept of rationalization is for Weber. In order to arrive at the paradoxical "sociopractical" rationalization typical of Western modernity, Weber maps out a historical lineage of "ethico-metaphysical" rationalization of world religions to the Protestant work ethic and combines it with an analysis of "technoscientific" rationalization. He sees the question of ends retreat from an increasingly disenchanted world, while the rationality of the technical instrument totalizes the social in all its immanent spheres. A formal rationality directed to mastery

and calculability closes in on itself and exorcises all substance, leaving only value-irrational form. In short, then, rationalization signals a paradox of paradoxes. The first paradox expresses the fact that modern rationalization forms the point at which rational consistency becomes inconsistency, where the means become an end in itself. The second paradox refers to purposive reasoning growing increasingly value-irrational, since purposive reason cannot in principle provide its own ends. The central paradox of rationalization, therefore, is based on an uneasy aggregation of the two: In Occidental rationalization, purposive rationality *cannot yet must* supply its own ultimate values.

For Weber, above all else, the paradox of rationalization signals the tragic fate of the modern individual. In his analysis of the iron-clad closure of modernity, we sense a liberal fin-de-siècle gloom over the slow disappearance of the entrepreneur in the face of bureaucratized and industrialized monopoly capitalism—a situation that will last, Weber speculates, "until the last ton of fossilized coal is burnt" (2005, 123). The complexity and paradoxical nature of the concept of rationalization, however, places a critical ambiguity at the heart of Weber's writings. For authors writing in the tradition of Western Marxism (to whom I shortly turn), eking out a materialist dialectic from this tragic ambiguity would form the basis of their own diagnosis of capitalist modernity and its many social pathologies. Herbert Marcuse, who brings this dialectic to bear on Weber's texts, intimates that his value-freedom unexpectedly turns into critique: "Truth becomes critique and accusation, and accusation becomes the function of true science" (2009, 161). The paradoxical intimacy of instrumental reason and irrational charisma, for Marcuse, signifies both the deadening condition of capitalism *and* an explosive critical potential. On the one hand, somewhat more pessimistically than Weber, Marcuse notes that "the formal reason of the technically perfect administrative apparatus is subordinated to the irrational" (164). where the latter represents either the decisionism of the entrepreneur or the whims of the Führer. On the other hand, it is precisely the intimate relation between the rational and the irrational that suggests an opening: "Technical reason reveals itself as political reason" (169). As Marcuse pushes on, through Weber's hidden dialectic, he therefore finally wonders whether there is not a promising irony in his work: "Does he by any chance mean to say: And this you call 'reason'?" (169).

THE INSTRUMENT ACHIEVES INDEPENDENCE: LUKÁCS AND THE FRANKFURT SCHOOL

The basic Weberian diagnosis of capitalist modernity as an irrational process of instrumental rationalization is shared, barring important differences in

emphases and nuances, by most of the prominent members of the Frankfurt School, such as Max Horkheimer, Theodor Adorno, Herbert Marcuse, and Jürgen Habermas. This Weberian thread running through the Western Marxism of the Frankfurt School was largely inherited from the writings of Georg Lukács, who combined Marx's critique of commodity fetishism with Weber's theory of bureaucratic rationalization to fashion his own critical theory of reification (*Verdinglichung*). As Axel Honneth records, for both Walter Benjamin and Theodor Adorno, "reading the analysis of reification in Lukács's *History and Class Consciousness* was a key intellectual experience" (2009, 56).

For Lukács (1971), capitalism tends to treat human beings as things, since it commodifies them as labor-power and governs them through abstract economic laws. Rationalization—the principle of "what is and *can be calculated*"—serves as the precondition of commodity exchange and, consequently, of reification (Lukács 1971, 88). Through rationalization, Lukács argues, human beings become debased into mechanical parts of a "perfectly closed system" (90). As instrumental reason comes to pervade social life, it welds together the increasingly specialized enterprises of science and technology, bureaucratic administration, capitalist markets, and the Taylorized labor process: "There arises a rational systematization of all statutes regulating life, which represents, or at least tends towards a closed system applicable to all possible and imaginable cases" (96; see also Feenberg 2014, 194). Tying together these two Weberian strands of systemic closure and the universalization of instrumental reason, Lukács arrives at his own paradoxes of rationalization. Notably, Lukács observes that the formally rationalized system places the life-processes that secretly vitalize it beyond its own grasp (104). Similar to Weber, then, Lukács concludes that formal knowledge tends to erode its own basis for legitimacy and intelligibility. Yet what for Weber represented the tragic fate of modernity appears for Lukács as the source of capitalist crises and as a foothold for social critique (Habermas 1984, 357; Jay 1984, 110).

Starting out from these Lukácsian-Marxist principles, Theodor Adorno and Max Horkheimer (2010) finally end up radicalizing a Weberian genealogy of modern thought. As irrationalist administrative power swarmed the globe from the Stalinist dictatorship of the people via German fascism to the command-and-control economy of the United States, Horkheimer and Adorno increasingly felt that the Marxist analysis of market-led capital accumulation alone no longer sufficed. During the 1940s, Adorno and Horkheimer therefore turned to the "critique of instrumental reason" (Benhabib 1994, 67). Instrumental reason's totalitarian impulse provided a template, not just for analyzing totalitarian regimes, but also for what Adorno and Horkheimer, following Friedrich Pollock, called "State Capitalism"—the Fordist phase of capitalism running on increasingly

centralized administration (Dahms 2000). Radicalizing Weber, they argue that the administrative principle of modern capitalism is not merely prefigured by a particular cultural ethos, but rather is inherent to the general logic of enlightenment technoscience and, ultimately, to the deeper philosophical-historical structure of reason itself. In *Dialectic of Enlightenment*, Adorno and Horkheimer swerve along the two polar ends of irrational rationalization in fragmentary and essayistic fashion: "Myth is already enlightenment; and enlightenment reverts to mythology" (2010, xvi). By working through this dialectic, Adorno and Horkheimer seek to "release" the Enlightenment's promise of freedom and technological progress from its dark shadow of domination. The historical problematic of enlightenment, for Adorno and Horkheimer then, runs deeper than both Lukács's reification and Weber's bureaucratization. At stake is now the domination of outer and inner nature as such.

Enlightenment reason, Adorno and Horkheimer argue, combines two principles: Identity and instrumental control. Modern thought is ruled by "the principle of equivalence," which "makes the dissimilar comparable by reducing it to abstract quantities" (2010, 17, 7). Epitomized by the explosion of mathematical numbers and formulae, technoscience degrades thought into mere tautology and smashes difference into similarity. Adorno and Horkheimer therefore aim their critique at what they term "identity logic," a violent relation between concept and thing or name and object. Identity thinking subsumes the thing under the concept and thus, as Adorno (2004, 146) writes, "depreciates a thing to a mere sample of its kind or species." The proliferation of identities, Adorno and Horkheimer stress, pushes modernity to new heights in terms of control, allowing for better calculability, manipulability, and mastery. Equivalence and control go together. As enlightenment progresses, moreover, identitarian reason increasingly encloses its objects into the *system* identified by Lukács, a pyramid of identities crowned by a unifying principle: "[The Enlightenment's] ideal is the system from which all and everything follows" (2010, 7). Such, they hold, is the ultimate ambition of Leibniz's *mathesis universalis* and Bacon's *una scientia universalis*, which couples instrumental mastery with a restless expansionism: "Enlightenment is totalitarian" (6).

Power and domination thus flow from identity logic. Yet, equally and crucially, identitarian knowledge itself already requires force. Identity is fundamentally the result of *artifice* or cunning. Force thus presupposes knowledge, but knowledge already requires force. It is in this dialectical sense that Adorno and Horkheimer state of enlightenment knowledge that "technology is the essence of this knowledge" (2010, 4). Echoing Weber, enlightenment rationality is the logic of the instrument. Yet while such enlightenment logic may expel premodern forms of magic and myth, it nevertheless retains constitutive traces of

mythology. Like myth, instrumental reason is born of the desire to conquer fear and to thwart the inevitability of fate. Most important, however, the dialectic of myth and enlightenment manifests itself in the tragic irony that mastery cannot itself be mastered. Born of the desire for subjective mastery, enlightenment control *itself* becomes the dominating subject over the individual. "Artifice," Adorno and Horkheimer therefore write in their analysis of the proto-bourgeois figure of Odysseus, "is the means by which the adventuring self loses itself in order to preserve itself" (2010, 48–49). Odysseus is only able to escape the cyclops by deforming its own name into the similarly sounding "Udeis" or "Nobody." Through "the artifice of the name"—*the* capsular formulation enlightenment thought—Odysseus's "self-assertion . . . is self-denial" (67–68). It is an allegory for enlightenment reverting to mythic irrationality, or for the fact that the domination of outer nature always simultaneously induces the domination of the self's inner nature.

The Weberian paradox of irrational rationalization therefore sits at the heart of Adorno and Horkheimer's *Dialectic of Enlightenment*. Instrumental reason expels all differences and ends, therefore hollowing out the historical potential of reason. In addition, "reason itself," Adorno and Horkheimer assert more sociologically, "has become the mere instrument of the all-inclusive economic apparatus" (2010, 30). In what Adorno and Horkheimer called "an administered society" (*die verwaltete Welt*) (x), or what Horkheimer (1982, 7) referred to as a "totally managed world," reason becomes the servant of control. Bureaucratic domination merges with the manipulation of consciousness by the culture industry to produce an almost inescapable, closed world that echoes Weber's original iron cage and Lukács's reified society (see Honneth 1993, 93). Yet, paradoxically, through the totalization of instrumental rationality, the social totality becomes irrational. Adorno and Horkheimer specify that reason becomes a calculating tool, a "general tool, useful for the manufacture of all other tools." However, the goals to which these tools should be applied, they continue, move "beyond all calculation" (Adorno and Horkheimer 2010, 30). The totalization of calculation finally leads to incalculability. It is a familiar Weberian paradox, which Adorno and Horkheimer describe elsewhere as "the enthronement of the means as an end" (54). For the authors, these means/ends reversals—this dialectic—is already present in the cunning of reason as such and today achieves special historical pertinence in the subordination of human needs to endless capital accumulation. "The instrument," as Adorno and Horkheimer conclude, "achieves independence" (37).

Adorno and Horkheimer's dialectic thus adheres to central Weberian themes. Yet what for Weber signaled a tragic aporia of modern life contains a critical potential for Adorno and Horkheimer. The paradoxes of instrumental

rationalization are understood as contradictions that carry the potential for a dialectical self-transformation of reason. Enlightenment may revert to mythology, but one should not forget that myth is already enlightenment (see Benhabib 1994, 79). Frankfurt School critical theory sets itself the task of developing a sociological critique of instrumental reason, restoring reason to "its proper place as the arbiter of ends, not merely means" (Jay 1976, 63). It suggests a Weberian project that offers a value-rational critique of purposive rationality, phrased by Max Horkheimer (2018) as an "objective rational" critique of "subjective reason" and by Jürgen Habermas (1984, 363) as a communicative critique of purposive reason. For Weber and Adorno and Horkheimer, however, the setting of unconditional ends had been rendered suspicious by disenchantment. It had been revealed as untenable metaphysics. For Adorno and Horkheimer, therefore, there was no escaping the uneasy dialectic between means and ends, technics and politics, facts and values. It raised the question whether Frankfurt School critical theory could deliver the goods when it comes to alternatives.

According to Adorno and Horkheimer's successor, Jürgen Habermas, it indeed could not. If critical theory was to have any teeth, it required a way to reason about unconditional ends under the horizon of disenchantment. For Habermas (1984, 273, 344), the "aporetic course" of his Frankfurt predecessors resulted from their Weberianism, which had prevented them from identifying the communicative rationalization of "the lifeworld" alongside the purposive rationalization of "the system" (Habermas 1984, 251; 1987). Whereas the system was made up of actions oriented to instrumental efficacy, simplified by the demands of money in the economy and power in bureaucracy, the lifeworld offered a communicative reservoir for reaching mutual understanding (Habermas 1984, 297). Importantly, every communicative action implicitly raises three "validity claims," which can be rationally assessed by the hearer in terms of objective truth, normative rightness, and subjective sincerity (Habermas 1987, 120). It was along these validity claims that the ends put forward in discourse could be rationally assessed. Modernity was thus rationalized along dual lines. The project of modernity now consisted in subordinating the means to the ends, or in "anchoring" the system in the lifeworld. Habermas (1984, 198; 219) claims to detect this logic of "anchoring" in Weber's theory of rationalization and thus charges Weber with a "central contradiction" (253). Weber, he argues, recognized the value-rational anchoring of purposive reason, but failed to conceptualize value-rationalization. Solving this issue, cast in terms of an earthly communicative rationalization, would save critique.

Yet it is unclear whether Habermas's communicative reason escapes metaphysical enchantment, as indeed his postmodern antagonists quickly charged (Lyotard 1984; Rorty 1988). It is telling, however, that the same accusation has

not been leveled against Habermas's conception of purposive reason, which contains an equally dubious instrumentalist ontology. Worse yet, Lyotard himself took over a version of Weberian instrumental reason in his notion of "performativity." Like Weber, Habermas understands instrumental action as the application of "technical rules of action" governed by the principle of "efficiency" (1984, 285; see also Habermas 1989, 91–92). In an earlier essay entitled "Technology and Science as 'Ideology'," Habermas takes inspiration from Arnold Gehlen when he notes that there exists an "immanent connection" between purposive-rational action and technology. "Technological development," Habermas concludes, "thus follows a logic that corresponds to the structure of purposive-rational action" (1989, 87). The system of purposive action, consequently, is a form of "norm-free sociality" (Habermas 1987, 307). This becomes the basis of reification, Habermas (1987, 183) continues, once the system's instrumental reason is "technicizing" or "colonizing" the goal-setting political activities of the lifeworld, like when campaign dollars encroach on democratic will-formation. Habermas thus offers a dualist vision of society, consisting of a transhistorical technical reason that must be "anchored" in or "steered" by external ends determined in communicative action. In so doing, he veers from his Weberian-Marxist predecessors in a fundamental way. Habermas fails to see the potential for immanent critique in Weber's theory of rationalization, because he mistakes Weber's paradox of rationalization for a contradiction. For Weber, the tragedy of modernity is not that instrumental reason has lost its anchor in the realm of values, but that value-reason only finds expression in modernity as a perversion of instrumental reason. In rationalization, it must be remembered, the means become ends in themselves.[2]

For Adorno and Horkheimer, similarly, substantive reason does not provide an external standard of critique, but instead reflects reason's potential for self-correction (see Feenberg 2014, 165). Their immanent mode of critique therefore escalates the Weberian ambiguities of irrational rationalization into a revolutionary dialectic. It follows the immanent procedure of Marx (and Engels 2008), who argued that the capitalist forces of production produce a formal freedom and material wealth that remains blocked by the capitalist relations of production. Capitalism's totalization therefore requires its very abolition, much like Weber's universalization of purposive reason itself reverts into value-rationality. Adorno offers a version of this critique in *Negative Dialectics* on the barter principle. On the one hand, Adorno writes that "the [barter] principle imposes on the whole world an obligation to become identical, to become total" (2004, 146–47). Yet on the other hand, to totalize the immanent normative promise of free and just barter, Adorno continues, would mean to abolish its function in realizing surplus-value: "Its realization alone would transcend barter" (147). It

is a great example of Adorno's winning formulation that "nonidentity is the secret *telos* of identification" (149). Putting into motion the intimate dialectic between consistency and inconsistency, or totality and contradiction, then, the method of Frankfurt School critical theory is to totalize historical systems to the point of collapse, while carrying their normative potential beyond them. It is this critical motif that Honneth calls "inner-worldly transcendence" (*inner-weltliche Transzendenz*) (2007, 64).[3] Modernity's paradoxes must not be resolved but turned emancipatory.

For Adorno and Horkheimer, then, the rationalization of society combines two essential elements, namely the dominating power of instrumental reason and the totalitarian impulse of identity logic. Rationalization represents a violent mix of technology and systemic closure. Inspired by Lukács's writings on reification, the early Frankfurt School explodes the ambiguities of Weber's antinomy between purposive and value-rationality. Whereas Weber found that the paradoxes of irrational rationalization added a tragic edge to these universal categories, Adorno and Horkheimer channeled them into their potentially emancipatory dialectic. Ironically, however, as time progressed, the Marxist duo's hopes for radical transformation tended to fade into a mood closer to Weber's original pessimism. Writers such as Walter Benjamin (2007) and Herbert Marcuse, by contrast, did manage to keep the emancipatory flame burning by canvassing the democratic potential of technology. Marcuse, who saw novel revolutionary prospects in the New Left, nonetheless shared Adorno and Horkheimer's basic diagnosis of rationalization: "[Society's] sweeping rationality, which propels efficiency and growth, is itself irrational" (2002, xliv). Despite their despair, however, Adorno and Horkheimer's dialectic does offer a radical *politics of consistency*—a mode of critique governed by a perverse principle of transformation that is activated when a system is driven to the point of total consistency. As with Weber's writings, there remains an incendiary ambiguity in Adorno and Horkheimer's diagnosis of the totally rationalized world—one that always glimpses the inconsistency of consistency.

METROLOGY: SYSTEMS OF EQUIVALENCE

From the writings of Max Weber to those of the Frankfurt School there emerges a conceptual core of rationalization that comprises three features. First, rationalization involves the rise of *instrumental reason*: a specifically technical logic aiming for the optimal efficiency of means in the pursuit of the mastery of pregiven ends. Second, instrumental reason drives out all alternative and emancipatory types of logic—value-reason, objective reason, communicative reason, and so on—and therefore tends to produce a formal self-referential logic

in a process of *closure*. Third, the totalization or becoming consistent of instru-mental reason through closure runs up against its own limits and turns into its obverse through *paradox*. Rationalization, in a single formula, then, denotes technical reason driving out political reason from society, paradoxically turning into a form of political domination itself. Elegant as this formula may be, how-ever, the concept of rationalization is marked by a fatal flaw: it depends on an unlikely separation between politics and technology that makes it possible to imagine capitalist modernity as the bare reign of technical efficiency. For Adorno and Horkheimer, technical rationality is inherently domineering, whereas for Weber and Habermas, technology is a neutral means that can be connected to various ends. Both varieties of "instrumental reason," however, project an unchangeable logic onto technology that reduces it to either domi-nation or efficiency (Feenberg 2001, 151). Technology offers little emancipatory promise. The depoliticizing logic of rationalization, it seems then, is already inscribed in its blunt conception of technical reason.

Yet decades of research in science and technology studies have rendered exactly this conception of technology suspicious, suggesting a more complex, layered, and close relation between technology and politics. It raises the ques-tion whether the speculative propositions of the old theorists of rationalization hold up to scrutiny today, and, by implication, whether the theory of rational-ization remains tenable at all. We can examine these questions from the entry point offered by the distinctly technical form of communication known as measurement. Measurement is itself a technoscientific practice and forms the object of the specialized science of "metrology." Studying the techniques, instruments, and practices of measuring, metrology concerns itself with issues such as determining how objects and processes are classified, what practices and methods are involved in measurement, how measurement instruments are selected and calibrated, and how heterogeneous objects are commensurated through common measures and standards (Cooper 2015, 1787). What implica-tions do the insights of STS and "metrology studies" have for the theory of rationalization? Can it be saved? Could it be improved?

In the essay "Give Me a Laboratory and I Will Raise the World," Bruno Latour (1983) first uses the term "metrology" in the context of science and technology studies. Metrology, for Latour, represents the vast technoscientific infrastructure that allows for the circulation of scientific facts, like train tracks enable trains to move (Latour 1987, 251). This metrological infrastructure, however, tends to disappear from sight as it locks firmly into place, like the light by which one sees: "People think that the universality of science is a given, because they forget to take into account the size of the 'métrologie'" (Latour 1983, 167). Physical constants, for instance, appear universal, but require

continuous technoscientific efforts and capital investments of up to 6 percent of the GNP of the United States to actually make them constant and maintain their consistency and accuracy (Latour 1987, 251). This metrological system is a great commensurating machine, producing identities between the elements that circulate along it and flattening differences by gathering heterogeneous units under a common metric. This machine should be seen, first and foremost, as a social technology (Porter 1995). It allows scientists from the world over to communicate their results to one another, it enables buyers and sellers in markets to compare commodities and ensures that TV sets that are produced in California also work in New York (O'Connell 1993). Metrological commensuration, in other words, transforms qualities into quantities, difference into similarity, heterogeneity into homogeneity and, as a result, produces comparability, calculability, and communicability (Espeland and Stevens 1998, 316). Horkheimer and Adorno's (2010, 17) "principle of equivalence" is thus fundamentally a principle of communicability.

In addition to standardization, producing equivalence takes place through the practice of *naming*: classification, taxonomy, and/or categorization. These practices signify the establishment of homogeneous categories under which heteronomous elements are gathered and commensurated. In *Sorting Things Out*, Geoffrey Bowker and Susan Leigh Star (2000) characterize classification systems as totalizing constructions that aim to segment the world on the basis of an organizing principle. For James Scott (1998, 80), these processes of classification belong to the basic operation of "simplification" that has historically animated the "high-modernist" "project of legibility" by means of which administrative agencies—most notably states and commercial enterprises—exercise control. Such projects create "synoptic facts" through which populations, territories, flows of resources, and so on can be easily read, assessed, compared, predicted, and calculated. Similarly to Scott, James Beniger's (1986, 15) impressive cybernetic history of "the control revolution" also takes simplification or the reduction of complexity as the defining characteristic of rationalization: "Rationalization might be defined as the destruction or ignoring of information in order to facilitate its processing." Metrologies, like standardized forms and homogenous time zones, preprocess information so that more of it can be effectively used. Beniger (1986) therefore distinguishes "rationalization" as the preprocessing of information and "bureaucratization" as its processing.

The reduction of complexity, simplification, or preprocessing often proceeds by transforming qualities into quantities. The elements of these quantities—the countable quanta—are not simply discovered but must be actively constructed as part of this process of simplification. States quickly discovered that counting

people in a census requires the construction of "a people," including the institutionalization of surnames to achieve unambiguous identification (Scott 1998, 65). As Michael Power specifies, the practice of counting and quantification requires "technical instruments to 'translate' phenomena into standardizable and measurable quanta" (2004, 767–68). Since such quanta circulate in a homogeneous space governed by standardized criteria, they allow for easy comparability, communicability, and controllability. Crucially, moreover, they can now be mathematically manipulated at a second (higher) order. Power dubs this "second-order measurement" (771), measurements that do not refer to the world directly but to the "further aggregation of numbers and the further creation, via statistical and mathematical operations, of ratios and indices" (see on rankings and ratings, Esposito and Stark 2019). In this "measurement of measurement," the operations of the metrological system draw on previous operations rather than on first-order input—it signals the reflexivity that transforms the operations of metrological *instruments* into a metrological *system*. Power further notes that these second-order measurements tend to become increasingly disconnected from the first-order measurement to which they appear to refer, creating a kind of "hyper-reality of calculation" (772). Systems of measurement become less concerned with directly representing their environments and more with connecting future measurements to their internal systemic metrological structures.

Metrological systems therefore require elements that need to be, if not homogeneous, at least *interconvertible*. Indeed, this increasing interconvertibility lies at the very heart of the transition from premodern to modern metrology (Porter 1995, 23). Anthropological units of measurement such as feet and ells (the latter based on the length of a human arm) were not inherently worse or less useful than arbitrary intrinsic standards such as the kilogram or the meter. Their major shortcoming was their inability to be converted into other metrologies. As Witold Kula illustrates: "In Ethiopia, the ell was equal to two spans plus two digits, and in Latvia, as late as the seventeenth century, 16 feet equaled 7½ ells" (1986, 25). Metrologies must therefore not only commensurate their elements, but also cross-commensurate them with other metrologies. According to Bowker and Star, this is exactly what has happened throughout modernity: "In the past 100 years, people in all lines of work have jointly constructed an incredible, interlocking set of categories, standards, and means for interoperating infrastructural technologies" (2000, 319). Metrological systems coevolve along a multiplicity of what Weber calls "spheres of value" (1946, 323), or what Luhmann (2012) refers to as "function systems." Statistics, for instance, provided an essential tool for modern states that sought to control their populations and territories, yet these changes in the political system also sparked a new branch

of mathematics in the scientific system. Science and statecraft thus relied on metrological interconvertibility.

This first cursory glance at the elements of metrology as they are represented in contemporary science and technology studies vindicates a core tenet of Frankfurt School critical theory. The rationalization of modernity works fundamentally on a principle of equivalence—a mode of "identitarian" thought that commensurates the concrete multiplicity of the social, the political, and the natural. Metrologies, through standardization, classification, and commensuration, make the world communicable. Moreover, this process of communicability is marked by a principle of expansion that is tied to the history of political control. This dual force of identification and expansion is what constitutes the logic of *closure* of rationalization. The metrological system is marked by an ethos of absorption and exhaustion, which either exorcizes the heterogenous or turns it into homogeneity. Rationalization thus gives rise to social pathologies of closure, notably the "loss of meaning" and the "loss of freedom" (e.g., Habermas 1984, 350) which, for the theorists of rationalization, loom large in modernity's "iron cage" (Weber 2005), "totally administered society" (Adorno and Horkheimer 2010), or "one-dimensional society" (Marcuse 2002). Nevertheless, this initial glance at science and technology studies also intimates the limits of the Frankfurt School narrative, since the evidence points to a radically different conception of systematicity (or indeed, the system itself) than that offered by the Frankfurt School. The system of metrology is not a totalizing pyramid governed a principle of subsumption, but functions more like Niklas Luhmann's cybernetic conception of second-order systems.

Luhmann's (2012; 2013) social theory, as I laid out in more detail in chapter 1, views society as a communication system. Specific to this second-wave cybernetics or second-order systems theory is the notion of *autopoiesis*, which describes the self-production and self-reproduction of systems (Luhmann 2012, 32). The system, according to Luhmann, produces itself by distinguishing itself from an environment and by drawing further distinctions on the system side of this distinction, creating an endless mise en abyme of system/environment distinctions. The dazzling result of this basic figure is a paradoxical system of self-referential distinctions (or "operations" or "communications") that spiral into "operational closure." This means that the system's operations forfeit direct reference to their environment in favor of connecting to previous systemic operations (49). Operational closure is the name for this "recursivity," or operations referring to operations. This means that the system's environment can never directly operate on the system; it can only "perturb" the system as "complexity," a surplus of possibilities from which the system must "select" by reducing this environmental complexity (80). Because of the system's

operational closure, it can select only on the basis of former operations, which are fed back into the present in a recursive loop (51). These guiding operations sediment into structures if they are repeated through time, such that they generate relatively stable expectations for future operations (Luhmann 2009, 145). They become "selection schemata" for the "connectivity" (*Anschlussfähigkeit*) of present and future operations to past ones (Luhmann 2012, 50).

The modern social system, Luhmann suggests, has seen the outdifferenti-ation of a wealth of self-referential "function systems" (2013, 65), such as art, law, politics, science, religion, medicine, and so on. Yet, despite their self-referentiality, these operationally closed systems remain open to their envi-ronment. As the founding cybernetic paradox holds, the system gains "structural openness" *because* of its "operational closure." The system's internal complexity (closure) allows it to reduce the complexity of its environment (openness). The system now becomes connected to its environment through "structural couplings"—or shared structures—upon which various systems operate on their own self-referential terms. Legal constitutions, for example, form just such a structural coupling for politics and law, in which politics observes the constitution as a limit to power while lawyers can assess its legality (Luhmann 2013, 112). Such structural couplings ensure the mutual adaptability of operationally closed systems and set them onto a path of "coevo-lution." The dynamic interplay between Luhmann's system and environment, as Dirk Baecker (2001, 63) notes, thus always proceeds through a dual, inher-ently non-linear, causal logic—an "indeterminate causality" that runs between incommensurable systems and the "circular causality" that animates them.

The components of metrological rationalization discussed thus far suggest a systemic logic of commensuration that fits Luhmann's conception of the system. First, the "simplification" (Scott 1998) or "preprocessing" (Beniger 1986) inherent in metrological identification indicates a profound affinity with the system's basic operation of complexity reduction. Second, as the case of the production of quanta reveals, metrological systems produce their own objects rather than finding them "ready-made" in their environments. Third, as Power's second-order measurements show, metrologies produce a "hyper-reality of calculation" (2004, 772) that differentiates and complexifies through the estab-lishment of indices and ratios. The interconvertibility between various metrics further enshrines their ongoing self-reference. Fourth, the logic of intercon-vertibility puts the metrological system onto a path of coevolution across a host of organizations and function systems, such as the economy, politics, science, and law. Finally, the leitmotiv of metrological systems is to produce and pro-mote that principal property of Luhmann's social system: communicability. Hence, while many of these components of metrological rationalization

vindicate the theorists of rationalization in their diagnosis of the "identifying" and expansionist thrust of technical reason, metrological systems do not manifest the kind of unity, identity, and totality that Adorno and Horkheimer (2010, 7) attribute to the perfect pyramid that is the enlightenment system. Like Luhmann's paradoxical second-order systems, metrological systems, at most, display a logic of nontotalizing totalization—a movement that is interrupted at various points. It raises a promising question: Can the logic of closure that is distinctive of instrumental rationalization be understood as "operational closure" in the Luhmannian sense?

BECOME COMMUNICABLE . . . OR ELSE!

Horkheimer and Adorno's "principle of equivalence" (2010, 17) belongs to the core of metrology and is the guiding force in the creation of what Alain Desrosières calls "spaces of equivalence" (1998, 10). This term should be taken quite literally. It refers, for instance, to the tabular grids that allowed for the easy comparability of numbers and to the territorial space of the state (Foucault 2005, 82; Desrosières 1998, 21). During the unification of France, the abolition of the diversity of provinces in favor of equally sized departments went hand in hand with the drawing of cadastral maps and the establishment of a universal metric—the meter (Kula 1986). Through this metrology, the territory was made "legible," in Scott's (1998, 45) sense: It became amenable to centralized control by insuring measurability, visibility, and communicability. In addition to "the territory," the French state also sought to make its population legible by holding the modern periodic census (Porter 1986, 17). This required not simply the registration of a preexisting people, but also its very production by constructing the category of citizenship and assigning people surnames. The construction of the citizenry also cut a swathe through the old estate-based categories of prerevolutionary France. The statistical enterprise presupposed a certain equality among its objects: "It makes no sense to count people if their common personhood is not seen as somehow more significant than their differences" (Porter 1986, 24). Through the metrological commensuration of its territory and population, the French state engaged in a project that was at once political and technical: a "politico-cognitive construction of a space of common measurement to the scale of the One and Indivisible Nation," thereby constructing the attributes of the very nation it was measuring (Desrosières 1998, 33).

It presents a first clue toward the self-productive, autopoietic nature of bureaucratic rationalization. Rather than technical reason driving out political considerations, the French project of creating spaces of equivalence presented a highly choreographed meeting of metrology and statecraft. Here, the express

political aim of creating a citizenry of equals dovetailed with the implicit equalizing effects of statistics (Scott 1998, 32). Positive recursive loops took hold between politics and technology, with the result that the claims and potency of both were mutually reinforcing. The statistical or metrological creation of a citizenry of formal equals reinforced the applicability of those very statistics, in turn cementing the notion of a modern citizenry. Thus, according to Theodor Porter, "the statistical enterprise was, to a degree, self-vindicating" (1995, 37). All future administrative vocabulary now needed to be integrated into the existing metrology and therefore had to refer to previous structures and operations in order to operate effectively. This demonstrates that the metrology shows the beginnings of operational closure—the recursive reference of operations to previous operations. Therefore, the creation of spaces of equivalence, in both its literal and figurative senses, already points to the autopoietic or self-productive nature of metrological systems.

"Indeed," Theodore Porter writes, "the concept of society was itself in part a statistical construct" (1995, 37). The regularities of crime and suicide that were unearthed in statistical research went above and beyond the motivations of individuals and so became attributed to an impersonal entity called "society" (see Hacking 1990, 131–32; Porter 1986, 52). As Desrosières (1998, 236) writes: "the aim of statistical work is to make a priori separate things hold together, thus lending reality and consistency to larger, more complex objects." This metrological production of society is, for an important part, responsible for the shift in the meaning of "society" from its premodern sense as a form of association among human beings, to its modern sense as a set of impersonal regularities and mechanisms (Williams 1983, 291–95). Yet since civil society was closely tied to statecraft, it was not obvious to nineteenth-century social scientists that it constituted an autonomous domain rather than a "governmental technology" (Foucault 2008, 296). Only in the functionalism of Émile Durkheim in France and later in that of Talcott Parsons in the United States do we start to find the notion that society is a self-organizing whole, evolving through "organic solidarity" or "system integration" respectively (Wagner 2000). Stressing the significance of metrology in the production of modern society does not, it must be noted, minimize the role that the emerging material mechanisms themselves—notably the capitalist market—played in the formation of society. It is crucial, however, to recognize that these mechanisms cannot be separated from the metrological conditions in which they were realized. For example, the modern capitalist market required the commensuration of local trading practices into national and international markets that in turn presupposed common units for circulating commodities (Kula 1986; Velkar 2014).

This process of commensuration also produced labor-power as a quantifiable and controllable unit. Not only did this require the mastery and measurement of time, but also the disciplining and training of human beings into diligent workers (Thompson 1967). As Foucault writes in his critique of "homo faber": "The time and life of man are not *labor* by nature; they are pleasure, discontinuity, festivity, rest, need, moments, chance, violence, and so on" (2015, 232). The notion of labor-power arose from the technoscientific imaginary of thermodynamics, which served to measure the outputs of human beings analogously to the output of the heat engines that energized industrial capitalism. As steam engines transform carbon into motion, Anson Rabinbach (1990) observes, "the human motor" digests nutrients to do work. Labor came to be seen not as a spiritual operation on nature but as a natural conversion of energy. Karl Marx's critique of political economy, as Amy Wendling shows, also operated within this "energeticist model" (2009, 62) of labor-power. It harmonizes with Foucault's (2015, 188) observation that the main "illegalism" or transgression of nineteenth-century workers was "no longer one of *depredation*, but of *dissipation*." The technopolitics of worker control in the nineteenth and the first half of the twentieth century focused on the themes of energy dissipation—laziness, efficiency, fatigue, ergonomics, productivity, waste, and so on—culminating in Frederick Taylor's "scientific management," which treated the workshop as a combustion engine that needed to be optimized in order to convert the energy from a day's labor-power into a maximum "foot-pounds" of work (see Daggett 2019, 89–90).

The emergence of "the economy" tells a similar story. Keith Tribe (2015) demonstrates that the production of "the economy" as an object originates with the development of a metric for the national economy. He traces the idea of a "national dividend," the annual flow of goods and services, from the writings of Marshall in 1890 to its elaboration in Pigou's welfare economics in 1907 to its ultimate development into a national accounting framework in the 1941 budget of Great Britain. Timothy Mitchell corroborates this account: "the economy is a recent product of socio-technical practice, including the practice of academic economics" (2006, 1116). He points to Keynes's breakthrough in using the circulation of money as the basis for an aggregate "national income" (Mitchell 2005, 135). Notions like "national income" and "national accounting" gained momentum against a broader background of macroeconomic modeling pioneered by Dutch engineer-economist Jan Tinbergen (Van den Bogaard 1999, 303). Thus, Mitchell concludes that "metrologies create and stabilize objects; the economy is a very large instance of such an object, with rival attempts to define it and to design tools for its measurement and calculation" (2006, 1119). STS scholars such as Callon (1998) and Mitchell (2005, 141), therefore, deny the

Polanyian thesis that "the economy" has become "disembedded" from society. Instead, they speak of the "embeddedness of economic markets in economics," where economics stands not only for social science but also for related metrological practices and knowledges such as accounting and marketing.[4]

These observations suggest a complex and close relation between the constitution of the economic metrology and the economic system—a dynamic that requires some further clarification. First of all, science and technology studies show that economic metrology produces its own objects and is therefore fundamentally *self-productive*. Since this metrology is systematized into a *metrological system*, it must be understood as an autopoietic function system of society that is again subdivided into smaller autopoietic subsystems of more specific metrologies. This does require interpreting Luhmann's theory of functionally differentiated society in the more creative and liberal fashion set out in chapter 1. It means breaking with Luhmann's relatively intransigent list of existing function systems, instead emphasizing the emergence of wholly new systems from their coevolving structural couplings. In full Luhmannian jargon, we may specify the following. The technical communications of the metrological system, on the one hand, paradoxically refer to their outside—namely to the economy—by way of self-referential measurements. The economy, as the circulation of payments, on the other hand, operates on these measurements as borrowed media or structural couplings. Financial accreditation indexes, for instance, structure what payments can be made. The closure of this metrological system is what allows the economic system to develop its own autopoiesis and to strengthen its position in the power asymmetries between modernity's function systems. The metrological system and economic system therefore symbiotically coevolve in a generalized "relation of simultaneous enhancement" (Drepper 2005, 189). As both systems rationalize their self-referential operations in a process of closure, they tend to expand their relative "ecological dominance" in the ecosystem of society (Jessop 2008).

The central message from the literature from science and technology studies considered so far is that metrological systems have self-productive qualities. Metrological systems produce their own objects, in the form of their own elements and structures (Luhmann 2012, 32). This defining feature of autopoiesis signals that the metrological system's operations produce its future operations. Yet next to this basic logic of *self-production*, metrological systems also demonstrate *self-performance*. By this I mean that metrological systems increase the relevance and viability of their measurements across society by pressuring other systems in their environments to operate on their structures. The notion of performativity has received ample attention in the social sciences and the humanities since the 1960s and 1970s. In the branch of science and technology

studies that investigates the social sciences in general and economics in particular, the notion of performativity has been deployed by actor-network theorists such as Michel Callon (1998; 2007) and Donald MacKenzie (2006).[5]

For Callon "performation" means "that economics, in the broad sense of the term, performs, shapes and formats the economy, rather than observing how it functions" (1998, 2). The economy may not be created in a single stroke, but rather is the result of a political agonism between rival technoscientific statements, economic players, and metrological infrastructures. Hence, the economy is a metrological performance enacted by the political "struggle between sociotechnical *agencements*," pointing to both human and nonhuman actors in this struggle (Callon 2007, 332). Callon (1998; 2007) highlights the fact that technological development is thoroughly social and political. Crucially, Callon adds, the criteria for success (or failure) are not simply given in the environment of the system. There are no transcendent criteria of technical efficiency, some timeless calculus of optimal means that governs the development of capitalist modernity. Instead, Callon points to the autopoietic qualities of a metrological system that sets up its own systemic structures and coauthors the environment in which it thrives: "It is not the environment that decides and selects the statements that will survive; it is the statements that determine the environments required for their survival" (Callon 2007, 332). This relation to the environment is what I mean to capture with the notion of self-performance, meaning, in short, the system's capacity to force the kind of ecological complexity that increase its chances of success.

How this works in practice is illustrated by Donald MacKenzie's famous case study of the Black-Scholes-Morton model in option pricing. According to MacKenzie (2006, 17), this financial model exhibits what he calls "Barnesian" performativity: it made the economic reality it purported to describe truer as a result of its description. The environment into which the Black-Scholes-Merton model was introduced in 1973 was not exactly like the smooth, abstract mathematical space of the model itself. The "open outcry exchange" took place in a trading pit with "shouting, gesticulating, sweating, jostling bodies" that was structured by spatial hierarchies and trading factions (MacKenzie 2006, 177). Perhaps as a result, the correspondence between the model and the actual price patterns was initially fairly poor. Over time, however, this changed for the better as coinventor Fischer Black started selling paper sheets to mediate between the mathematics of the model and the scrum of the trading pit. Traders could now relatively easily calculate whether prices were, according to the model, too low or too high, and place their bets accordingly. As a result, the market practitioners tended to "arbitrage away" the discrepancies in the market prices that the model identified. The market thus tended toward correspondence

with the model. As MacKenzie concludes, with some minor qualifications: "The 'practice' that the Black-Scholes-Merton model sustained helped to create a reality in which the model was indeed 'substantially confirmed'" (166). The metrology of the financial model had reshaped the trading pit and so had created an environment in which it could survive, expand, and succeed; it had effected an environment in which its numbers could circulate.

The metrological system thus demands communicability from its environment—a demand Lyotard (1984, xxiv) calls "performativity": to "be operational (that is, commensurable) or disappear." Yet since systems cannot operate on their environment, they have to pressure them into commensuration in indirect ways. In contrast to their own self-production, systems can only *effect* ecological influence. Self-performance thus means navigating the incommensurable differences that exist between them, engaging in what William Rasch (2004, 43) calls the "metapolitical": the struggle for reproduction in an ecosystem of incommensurable social systems. As discussed in chapter 1, the modern ecosystem of social systems is marked by what Bob Jessop (2002, 25) calls "ecological dominance" of the capitalist economy, which possesses "the structural and/or strategic capacity of a given system in a self-organizing ecology of systems to imprint its developmental logic on other systems." Jessop names a system's capacity to "redesign the environment" (2008, 11) as one of the crucial criteria for ecological dominance. Self-performance therefore forms a crucial weapon in the metapolitical struggle for ecological dominance. This weapon becomes especially relevant in the case of metrological systems that are tightly coupled to the ecologically dominant function system of the economy, such as GDP, cost-benefit analysis, and efficiency. These economic metrologies, as Frankfurt School critical theory diagnosed, tend to interperform in an ecologically dominant constellation of pervasive social forces—a constellation Jessop terms a "historical bloc" (13). The recognition of this relief in societal power relations is crucial for a critical systems theory that wishes to steer clear of the risks of actor-network theory, in which (the evolution of) sociotechnical systems can turn out too flat and power-free (Jasanoff and Kim 2015, 16–17; Star 1990).

The metapolitical struggle for ecological dominance finally leads from the metrological system's self-performance to its *self-reinforcement*: its measurements enhance its own validity by way of an initial process of positive feedback loops. One such powerful self-reinforcing loop is that which reinstates the past in the present and the future, the functioning principle of feedback technologies such as focus groups, polling, and questionnaires. Adorno criticized these positivist techniques for their rationalizing and ideological effects. "Empirical social research," Adorno writes, "wrongly takes the epiphenomenon—what the world has made of us—for the object itself" (1976, 74). These metrological techniques

are ideological because they fail to see their own role in the production of that which is measured, thus silently reproducing the status quo. In our own post-political democracies, politics risks becoming trapped in an eternal present marked by what Mark Fisher called the "political sterility" of "capitalist realism" (2009, 7).

Metrological systems such as those that rely on feedback technologies are caught in a positive feedback loop with the environment in which they are situated. They become self-reinforcing: the system pressures its environment into commensuration, thus strengthening its potential for further commensuration. This is no social constructivist statement. Metrological systems are tightly coupled to physical systems, as evidenced by metrological materials—for example, standardized lab mice and purified chemical reagents (Porter 1995, 16). Or, as James Beniger has shown, "the Control Revolution" that marked the rationalization of early industrial modernity came into its own through self-amplifying loops between flows of matter/energy and flows of information. Electricity grids and bureaucracies were mutually supportive, giving rise to an autopoietic loop of specialized clerks. Control depended on integration within this loop. The great breakthrough of the steamship, Beniger explains, was not that it cut the journey across the Atlantic from three months to ten days, but that the *consistency* of the journey allowed for its integration into the "planning, scheduling and coordination of material flows" (Beniger 1986, 292). The crux of modernization, this anecdote suggests, is therefore not the exponential acceleration of social life (*pace* Rosa 2013) but rather the thickening of metrological systems—their self-reinforcing closure.

The self-referential closure of metrological systems means that they are, to an extent, "self-vindicating"—they become "closed system[s]" that are "essentially irrefutable" (Hacking 1992, 30). Their heterogenous elements (theories, apparatuses, objects, and subjects) are mutually constitutive and have become mutually reinforcing. For example, as Porter (1995, 43–44) observes: "If psychological tests predict school grades, this is in part because quite similar tests are used in schools to evaluate students." Metrological systems coevolve in paradoxical and complex ways with their environments over time and therefore attain ecological stability and institutional inertia. For new metrological structures to work, they need to be embedded in existing systems that have themselves become immobile (Bowker and Star 2000, 35–38). The reliance of new infrastructures on those already existing only adds to this immobility: if you change one, you must also change the other. As Luhmann suggests: "Every change to a subsystem is also a change to the environment of other subsystems" (2013, 4). This can put systems in a state of path-dependency, which, in the most severe cases, ends in technoscientific lock-ins (Perkins 2003). In the past century,

for instance, gasoline cars spun into place within an ecology of assembly lines and sprawling suburbs (Kirsch 2000). Due to a lack of infrastructural connectivity, electric vehicles instead appeared as "unrealistic" and inefficient, finally signaling the sociopolitical inertia of "carbon lock-in" (Unruh 2000).

The interconvertibility or intercommunicability of various metrological systems thus adds to the slow evolution of a complex and textured ecosystem that tends to become increasingly inert. According to Bowker and Star, this metrological inertia also gives rise to its naturalization and invisibilization: "As classification systems get ever more deeply embedded into working infrastructures, they risk getting black boxed and thence made both potent and invisible" (2000, 325). The metrology appears natural because it is cornered in, interlocked into other structures that make it seem unchangeable. Further metrological integration consequently appears as the only rational, realistic, or efficient option, granting it the sterilizing logic of ideology that can fool even the most prominent critical theorists. The self-reinforcing nature of metrological systems therefore tends to reproduce and exacerbate existing power asymmetries, for example, when racial inequalities are reproduced through algorithmic policing (O'Neil 2016). Yet equally, if science and technology studies show us one thing, it is that technical interlockings are the result of social and political struggles and that they are permeated with political values that have sedimented from these struggles. What becomes clear at this point is that, unlike the Frankfurt School tended to assert, the depoliticization of modern social organization is due, not to the fact that a valueless instrumental reason has become the sole governing value but rather because the closure of metrological systems as such shapes and limits the political options deemed possible and instrumentally viable.

For now, and by way of an interim summary, it may be said that the three logics of metrological self-reference—self-production, self-performance, and self-reinforcement—together constitute the general *logic of closure* that the Frankfurt School identified as the core movement of rationalization. Metrological systems reduce the complexity of their environments by creating internal spaces of equivalence, at once drawing in all that is different from its environment into their logic of equivalence and driving out all that cannot be connected to its operations. As Marcuse writes: "one-dimensionality" means that actions and ideas that do not fit the system "are either repelled or reduced to terms of this universe" (2002, 14). The self-referential closure of metrological systems is a particular kind of closure—one that Luhmann terms "operational closure" (2012, 49). It means that metrological systems become second-order systems: they establish feedback connectivity to existing systemic constructions, rather than in maintaining a one-to-one correspondence with their environment. It

is precisely through this process of operational closure that the system can remain indifferent to parts of its environment, signaling the reduction of complexity or simplification involved in bureaucratic techniques of classification, standardization, and commensuration (Luhmann 2012, 34). This metrological process of complexity reduction produces all the key features of an autopoietic system: the homogeneous elements that the system requires for its sustained reproduction (e.g., quanta, metrics, and units); the programmed communication between these elements (e.g., methods of connectivity, and procedures of calibration); and successful boundary maintenance (the difference between what is and what is not communicable in the system's metrology).

Metrological systems therefore conform to the definition of autopoiesis: they produce their own operations and structures (Luhmann 2012, 32). Furthermore, in the uneven ecosystem of functionally differentiated society, these metrological systems are highly successful at pressuring the systems in their environment to become commensurate with their structures, thus boosting the chances of their reproduction and the performativity of their own operations. The self-amplifying feedback loops through which metrological systems enact their ecological viability reveals a motion that runs from self-production via self-performance to self-reinforcement. In cybernetics, such self-amplifying, runaway loops are traditionally associated with revolution and rupture, whereas "negative" feedback loops are usually seen to produce order, homeostasis, and regularity. The metrological systems that form the sociotechnical basis for the complexity reduction characteristic of rationalizing modernity, however, produce runaway loops in precisely the opposite direction—that of petrification, solidification, and stabilization. Like a reverse explosion, these metrological systems cascade ever more firmly into place, forming "historically irreversible complexity" that then, completing the dialectic, is retained through negative feedback loops (Luhmann 1989, 41). Hence, the process of rationalization first and foremost denotes a historical situation in which social systems are spiraling *into* control.

PARADOXES OF CLOSURE AND OPENNESS: THERMODYNAMIC RATIONALIZATION

The self-amplifying loops of metrological systems rationalize the social by pressuring it into commensurability, controllability, and communicability. This movement parallels the classical logic of closure that theorists of rationalization, from Weber to Habermas, identified as lying at the heart of modernization, a logic that they feared would end in the totally closed system of the "iron cage" (Weber 2005) or a "totally administered society" (Adorno and Horkheimer 2010).

Yet the triple logic of "operational closure" identified in the previous section works in more paradoxical ways, since cybernetic systems are always *open because they are closed*. It is what Cary Wolfe refers to as the principle of "openness from closure" (2010, xxi).[6] Far from debilitating the system, paradoxes put cybernetic systems into motion. The operational closure of the metrological system, for instance, reduces the complexity of its social environment, but as a result also opens up the possibility of communicating about it and sustaining structural couplings with it. Yet the principle of openness from closure, I want to suggest, should be complemented with its obverse: the principle of closure from openness. Not only does Luhmann show how structural openness results from operational closure; he also demonstrates how this closure emerges from openness—that is, from the contingency, difference, and incommunicability smoldering at the innermost core of the system. This means that systems theory enables an understanding of the social processes of petrification, solidification, sterilization identified by what I have called sociologies of closure *by way of the* fluidity, liquidity, and difference stressed by the sociologies of openness. The system's spiraling into closure produces its openness to its environment, and yet this system's closure emerges from its very openness.

In order to draw out these paradoxes and to specify the logic of rationalization, we must first return to the concept of rationalization as formulated by Weber and the Frankfurt School and assemble the three basic elements. First, it describes the rise of a *technical logic*, such as instrumental reason or the calculus of optimally efficient means. Second, it refers to a *logic of closure* through which the social exorcises the incommunicable, the inefficient, and the political. Third, it mobilizes a *concept of paradox*, a logic through which the closure of instrumental reason reverts back to value-reason and through which the means become ends in themselves. The problem with this conception of rationalization, as I noted earlier, is that it risks conceptualizing technical reason as an ahistorical and apolitical logic of efficiency. Technology *as such* is either equated with "identifying" domination (Horkheimer and Adorno), or with the neutral logic of means selection (Weber and Habermas). Combining the research from science and technology studies and the conceptual premises of systems theory gathered so far, it is now possible to disassemble and reassemble these elements of rationalization so as to alleviate this central problem while leaving its core conceptual structure intact. This means that the core proposition of the Frankfurt School—that capitalist modernity spins into a *closed* totality—can be retained while acknowledging that this logic of closure *paradoxically* produces a *historically and politically open* expression of technical reason.

This point can be split up into two conceptual strands. First of all, the logic of closure forms the basic operational motion of social systems, and it is from

this immanent logic that the *historical* expression of instrumental reason emerges. Second, the closure of technical reason does not merely drive out political reason, but simultaneously and paradoxically opens it structurally to *the political*.

The Historical Expression of Instrumental Reason

Starting off with the first strand, operational closure is the basic logic of social systems, through which they immanently produce their own elements and structures. Operational closure builds the systemic complexity through which the system paradoxically reduces the complexity of its environment. This means that the logic of closure is analytically distinct from instrumental reason as an internal structure (or systemic complexity), even if that structure is the means by which the system engages in operational closure. The young Luhmann (1972; 2016), in his critique of Weberian sociology, argues precisely this point. Purposive reason, he suggests, emerges from the more basic logic of complexity reduction, while purposive reason is itself a tool for subsequent complexity reduction. Sharing the aim of Jürgen Habermas, Luhmann even hypothesizes that this offers "an exit from the unsatisfactory equation of instrumentality with rationality" (2016, 16). He therefore severs the strict identity between the systemic logic of closure and the technical logic of efficiency. In fact, operational closure now produces efficiency.

The metric of efficiency in particular has always compelled the imagination of the theorists of rationalization, functioning almost as a synonym for instrumental reason. As Max Horkheimer writes in the "The End of Reason," instrumental reason "can be summarized as the optimum adaptation of means to ends, thinking as an energy-saving operation" (1978, 28). Instrumental reason is nihilist reason—rationality stripped of all ends and values. As such, it is a transhistorical logic of self-preservation: "As close as the bond between reason and efficiency is here revealed to be, in reality so has it always been" (28). Yet if efficiency is a historical effect of metrological closure, then Horkheimer's conclusion proves far too pessimistic.

Indeed, scholarship has shown, efficiency has a history like anything else. It evolved with the rise of thermodynamics over the course of the nineteenth century, coming to be defined as the optimal ratio between input of energy and output of work (Alexander 2008). It counts as one of the twin thermodynamic virtues: the maximization of work (productivity) and the minimization of waste (efficiency). Opposite these virtues stood the vice of entropy, the leakage of energy into unproductive waste. In the case of steam engines, this translated into the challenge of controlling the inside of the engine with technoscientific

precision. The turbulent engine chamber needed to be smoothed out into a space of equivalence made legible by energy units. Yet the limits of this chamber also dictated, as Cara New Daggett observes, the "limits of control: that which is bounded is known, made visible, and vulnerable to governance. That which escapes the boundaries must be evacuated, policed, made invisible" (2019, 8). Like instrumental reason, thermodynamic reason forms a technical logic aimed at controlling productivity and efficiency while pushing their ends into the purview of irrational decisionism. Apply steam efficiently—but to what?

Weber's Protestant work ethic must also be placed within this context: "The energetic model of work meant that work was not primarily judged according to whether it served life (human, capitalist, earthly, or otherwise), but according to productivity and efficiency" (Daggett 2019, 98). The Protestantism that interested Weber, Daggett writes, was developed by the Scottish Presbyterians in the nineteenth century into a "geo-theology" of efficient and productive work with an eye to "perfect managerial control" (54, 82). Efficiency became the techno-moral cornerstone of a generalized "energeticist" episteme that sought to put the world to work for profit. Not only did it serve as the measure of success for modernity's driving technology—the steam engine—it soon also commensurated nature and human labor-power through the biopolitical discourses of social hygienics, ergonomics, and the science of work (Rabinbach 1990; Wendling 2009). Fatigue, play, and laziness became figures of entropic decay. "Economic and physical ideas," as Porter writes, "grew up together" (1995, 55). Whereas thermodynamics was concerned with "balancing energy accounts," proto-economists came to see work as the expenditure and transformation of energy (55). As Philip Mirowski (1989) has shown, early neoclassical economics analyzed capitalist markets according to their allocative efficiency in the face of the conservation of utility. The workplace, meanwhile, became likened to a steam chamber in which the efficiency of energy use was measured in terms of "foot-pounds" of work—a vision culminating in Taylorist "scientific management" (Daggett 2019). The national economy, too, under Keynesianism was to be planned according to the optimally efficient deployment of all its productive forces—alternately cooling and heating the economy to generate motion. It was at the peak of this thermodynamic episteme that the members of the Frankfurt School published their critique of instrumental rationalization.

Yet the rise of thermodynamic reason was in no way an automatic, technical process, as if guided by the universal beat of efficiency. The thermodynamic metrological system instead built tight structural couplings to central physical and technical systems (such as steam engines and large-scale industry) and to the ecologically dominant capitalist economy, nestling itself within a "historical

bloc" of social systems" (Jessop 2008, 13). The rise of the steam engine itself presents a helpful analogy for the ascent of thermodynamic reason as such. The steam engine, as Andreas Malm (2016) has documented, won out over water-wheels, not in virtue of the superior efficiency of its mechanical makeup but due to its suitability to labor control and emerging capitalist social relations. In the wake of the steam engine's success, the heat science of thermodynamics coevolved with a bloc of dominant social systems that appear, in Habermas's terms, to "colonize" the social whole by pressuring it into communicability with its metrics of energy efficiency and productivity. Technical efficiency, for instance, became a model for economic efficiency, which began guiding business operations in the economy. The political system, meanwhile, became forced to govern on the basis of the efficiency of the economy in order to ensure continued revenue for state expenditure. Efficiency thus emerged from the *self-productive closure* of the metrological system under the shadow of the dominant capitalist economy. Once established, this system *self-performed* across a host of ecological systems by universalizing its criterion of efficiency. Gaining wider applicability and dominance, thermodynamic reason thus *self-reinforced* into ideological security. The thermodynamic metrology closed in on itself. This complex logic of closure, which constitutes rationalization, explains how its contingent energeticist expression could be felt by Adorno and Horkheimer as the deep, perennial logic of enlightenment.

Rather than form the essence of rationalization as such, thermodynamic reason solidified into a historically specific *mode of rationalization*—a generalized strategy for navigating the social paradoxes of closure and openness. Such a strategy is what Foucault might call an "art of government" (2008, 2; 2009, 108–9). While this strategy manifests itself in the logic of metrological closure that I detailed in the previous section, the notion of a *strategy* of navigation serves to highlight that rationalization's logic of closure is not simply an automatic technical process, but itself a historical operation. The thermodynamic mode of rationalization, I suggest, is realized in its *strategy of suppression*; it suppresses openness and celebrates closure. As part of modern metrology more generally, thermodynamic reason is aimed at consistency, commensurability, and equivalence. The steam chamber of the social must be made perfectly legible. Yet the figure of paradox threatens this elusive legibility and consistency, signaling the looming danger of entropy. The ideal of a perfectly closed system becomes inscribed in the need to curb the leakage of energy. Openness forms a rupture in the space of equivalence, a breach to the system's outside, to the unknown, to the irrational. As Adorno and Horkheimer note: "Nothing at all may remain outside, because the mere idea of outsideness is the very source of fear" (2010, 16). Thermodynamic rationalization therefore aims at total closure.

Yet, paradoxically, this logic of closure always operates through structural openness—for instance, when the metrological system self-performs by pressuring systems in its environment into commensuration. The closure of the metrological system therefore already requires an openness to its ecology. It gives the strategy of suppression a paradoxical quality. While the metrological system desires total closure, it can only strive to attain it through openness. It is the principle of closure through openness in action.

The logic of closure thus in fact expresses a modern strategy for regulating the underlying paradox of closure and openness. This paradox gets obscured by the strategy of suppression itself, giving the impression—as stressed by the sociologies of closure—that the essence of rationalization is a logic of totalizing closure. Yet however much closure is the crux of thermodynamic rationalization, it can never be totalized. Rationalization's closure always already relies on openness; its consistency requires paradox; and its goal of communicability presupposes the incommunicable. Closure, in other words, is not an essence but a historical process, one consisting of two looped moments. The closure of metrological systems is itself a product of a historically contingent strategy; and this strategy, or instrumental reason, is the result of metrological closure. In thermodynamic rationalization, instrumental reason appears as thermodynamic reason or efficiency. Put simply, then, efficiency demands closure, and closure produces efficiency. This is the circular logic of thermodynamic rationalization that gives it its air of inevitability, that presents closure as the directionality of history and efficiency as its indestructible motor. Thermodynamic rationalization itself now appears as the fated winner of history due to its superior efficiency, even though this very criterion is historically contingent. We are thus back to the Weberian self-reference of instrumental reason: Efficiency for what? Efficiency, but why? Or as Marcuse noted: "Technical reason reveals itself as political reason" (2009, 169).

The Political Openness of Technical Closure

The position of the thermodynamic metrology within the wider ecosystem of modernity's function systems is what, with Rasch (2004, 43), I have called its "metapolitical" situation in the previous chapter. Yet thermodynamic reason is also more directly situated within a political ecology. The operational closure of the metrological system paradoxically opens it to the structures of the political system, and the operational closure of the political system enables this system to operate on the structures of the metrological system. The metrological and the political therefore represent two radically different autopoietic logics, which are nevertheless tightly coupled through paradoxical and

nonlinear coevolutionary feedback patterns. This means that the distinction between the metrological and the political must neither be collapsed nor reified. Yet whereas Weber and the Frankfurt School have risked reifying them, theories of dedifferentiation such as actor-network theory often tend to collapse them into integrative notions, such as "sociotechnical *agencements*" (Callon 2007, 319).

The critical systems theory of rationalization must instead embrace the inescapability of the following chiasmus: What passes as politics is in fact mere technicality; what passes as technicality is in fact political! While both sides of the chiasmus can make one look like a witty social critic, they also appear to be mutually exclusive. Yet critical systems theory should not attempt, in the words of Timothy Morton, to "flatten out the inherent twist in a chiasmus, to make the twist into a pure circle" (2016, 57). Instead, it should try to think through the paradoxical entanglement of politics and technology, in order to reach the point at which the latter veers back into the former and vice versa (see also Thygesen 2012). In this way, critical systems theory stays true to the original Weberian paradox of rationalization: Instrumental reason reverts into political reason the moment it is totalized.

To grasp the logic of rationalization, it is necessary to think the paradoxical unity of metrology and politics in the face of their very differentiation. Overemphasizing their differentiation, as Weber and Habermas are apt to do, tends to suggest, as Porter (1995, 89–90) has put it, "that quantitative professionals pursue rigor and objectivity except so far as political pressures force them to compromise their ideals." Yet this, he continues, "is exactly wrong. Objectivity derives its impetus, and also its shape and meaning, from cultural, including political, contexts." Weber and Habermas forget to consider the formative political ecology of technology. As Callon suggests, "it is not values which serve as a bastion to the infinite extension of calculation" (1998, 38). The Black-Scholes-Merton model, for instance, legitimated previously illegal practices of derivatives trading as efficient pricing rather than gambling (MacKenzie 2006, 158). Conversely, it is impossible to simply bypass free discourse by pointing to instrumental calculations in a space of "norm-free reality" (Habermas 1987, 327). Instead, as Luhmann's paradoxes make intelligible, the closure of both the metrological system and the political system opens them up to nonlinear mutual influence and coevolutionary development. This means that the contingencies of the metrological system can be seized as the site of the political, ensuring that agents can always politically contest and negotiate different metrological options. These negotiations, in turn, determine the shape and content of the metrological operations that structure future politics (see Rose 1991). The metrological therefore shapes the political, which in turn formats

the metrological. The bare contingency of "the political" is brought to life through its paradoxical loopings with metrological "politics."

Thus, contrary to what Weber and Habermas suggest, technologies are not simply neutral instruments wielded by dominant social powers to serve their political ends, but rather are imbued with power relations at every level. Furthermore, in contrast to what Horkheimer and Adorno (2010) intimate, technical or metrological reason is not merely an expression of domination, a will to power, since appeals to "objective" metrology are as often a way to limit, as they are a way to expand, power. Indeed, as Wendy Espeland and Mitchell Stevens (1998, 316) note, the mobilization and extension of metrological procedures may serve the expansion of democracy, the limitation of discretion, or even the seclusion of weak authority. On this point Porter (1995, 90) agrees: What he calls "mechanical objectivity" is a crucial political instrument in limiting discretion and keeping unwanted authority at bay. Metrology, bound by its clear rules, elements, and procedures, instead tends to lay down an "impartial" or "objective" playing field for political agonism. These empirical reflections grant a textured and complex view of how the political informs the technical and vice versa.

The paradoxical reconnection of technical and political reason opens up a new field of critique. Since the critical systems theory of rationalization separates the logic of closure from the historical logics of instrumental reason, it retains the sociological potential to diagnose the alienation and heteronomy associated with the closure of capitalist modernity, while simultaneously presenting the possibility of critiquing capitalist closure on the basis of efficiency and instrumentality. Instead of exchanging capitalist efficiency for social justice, critical systems theory therefore opens up the prospect of a two-tiered *politics of efficiency*, which aims at the becoming-efficient of justice and the becoming-just of efficiency. The struggle against ecological pollution serves as an example of this type of politics. At the first tier, this involves a *systemic metrological politics* that engages in a struggle over the production of methods, practices, and metrics of measurement. Current "green capitalist" solutions, for instance, rely on a vast metrology that makes carbon emissions exchangeable on markets and that create a space of equivalence for "offsets." Not only are these vital sites of political struggle, but the "stakes" of these metrological systems may also be challenged.[7] It may be more important to aim for directive "effectiveness" in reducing greenhouse gases than for allocative efficiency of resources (Durand 2021). At the second tier, the politics of efficiency involves an *ecological pragmatism* or a politics of self-performance that aims at changing the environment in which efficiency takes shape. Since efficiency is not a timeless measure of success, designing the ecology of efficiency becomes crucial. In the case of climate

action, for instance, this requires a planned program of constructing energy infrastructures within which green and just efforts can even appear as "efficient" and "realistic" (Buller 2022, 66–67). The politics of efficiency, in a word, challenges what counts as efficient.

This critical systems theory of rationalization therefore integrates an explanatory diagnostic of social closure with the critical impulse of a politics of efficiency. This means, on the one hand, resolving the paralyzing trade-off between technical means and political ends, or between efficiency and justice. On the other hand, it means furnishing Luhmann's traditional systems theory with a critical edge. As I argued in the previous chapter, Luhmann renounces the critical navigation of "metapolitical" differences between social subsystems in favor of a limited search for society's best self-description in terms of truth. Critical systems theory, by contrast, constantly maneuvers society's metapolitical differences by an ecological confrontation that aims at effecting justice and truth. In the politics of efficiency, it pilots the paradoxical coimbrication of the metrological and the political as a mode of immanent critique. This means that it takes the historical measures of efficiency and productivity as it finds them and subverts their significance by wrestling them from their current social situation marked by the ecological dominance of the capitalist economy. In other words, critical systems theory aims to disconnect the technical values of efficiency and productivity from the economic code of capital valorization in favor of a political program of justice. This immanent subversion follows from critical systems theory's appreciation Adorno and Horkheimer's original strategy of "inner-worldly transcendence." Yet it seeks to rid their paradoxical diagnosis of its last reifying tendencies. Rather than either collapse or separate the political and the technical, critical systems theory incites the political ecology of technology with the aim of bringing them into an unstable, paradoxical unity.
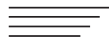
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For the theorists of rationalization, from Weber to the Frankfurt School, rationalization designated an amalgam of three elements: the logic of closure; the logic of technology; and the logic of paradox. They interpreted the rise of instrumental reason as an expanding and identifying force that finally fueled the total closure of modernity. Paradoxically, however, the totalization of this technical nihilist force brought forward its polar opposite: political domination. Yet despite inserting this dialectical motif, the theorists of rationalization did tend to reify the concept of instrumental reason by underplaying its political and historical character. Instrumental reason either became pure means-selection, a "technology" of efficiency irrespective of ends (Weber and

Habermas), or inherently oriented at domination, a technology of control (Adorno and Horkheimer). It leads to a conception of technology that either places it beyond the pale of value-based critique, trapping the critic in a trade-off between efficiency and justice, or that turns technology into a helpless case, trapping the critic in enlightenment perennialism.

To remedy this tendency while preserving their core intuition regarding the closure of the modern, I have sought to first disassemble and thence reassemble these elements of rationalization in light of empirical materials from STS research and concepts of systems theory. The logic of closure proves to be inherent to the core components of modern metrological systems, such as categorization, standardization, and commensuration. The metrological system expands its logic of closure, and thereby its strategy of closure, throughout its social ecology by way of three self-referential and self-amplifying motions: self-production, self-performance, and self-reinforcement. This does not lead, however, to the total closure of the social system. As both STS research and the conceptual apparatus of Luhmann's systems theory show, the system's closure paradoxically depends on its very openness—it rests on its contingency, difference, and incommunicability. Inversely, the openness of the metrological system is produced by the system's logic of closure. The result is that technical or metrological reason is not simply a nihilist force of closure, but that the closure of the metrological system itself produces technical reason as a historical force *and* opens it up to its political ecology. This discloses the possibility of a politics of efficiency as a mode of immanent critique while retaining the social diagnostics of the closure of capitalist modernity.

Rationalization as a process of closure reveals itself as a historical mode of rationalization, a strategy of government by which systems navigate their paradoxes of closure and openness. The thermodynamic mode of rationalization is realized in the attempt of the metrological system to suppress its own life-giving paradoxes in favor of total closure, absolute communicability, and perfect control—even if it can in fact only achieve this paradoxically through openness and incommunicability. What the theorists of rationalization described as the instrumental rationalization characteristic of the Occident or enlightenment is therefore rather the historical mode of thermodynamic rationalization. This is not to say that their descriptions of instrumental reason can simply be reduced to thermodynamic reason, but rather that their conception of instrumental reason has been thoroughly influenced by the contemporary historical dominance of thermodynamic rationalization in the first half of the twentieth century. The final takeaway from these considerations is that this thermodynamic mode of rationalization is historically contingent and might therefore change over time. As I will argue in chapter 4, this is in fact what has

happened over the second half of the twentieth century, as thermodynamic rationalization ran up against its own limits and was ultimately succeeded by a new, cybernetic mode of rationalization. This change perhaps explains why the concept of rationalization has fallen out of vogue over the course of this transition, even though Weber's original concept was open-ended enough to capture multiple historical variations. Yet, before I turn to cybernetic rationalization, the next chapter will be dedicated to a popular sociological suggestion: that the age of social closure has made way for an era of social openness.

3

THE VITALIST ALTERNATIVE

Sympoietic Multitudes

> The [imperial] machine is self validating, autopoietic—that is, systemic.
>
> —Michael Hardt and Antonio Negri

Whatever the diagnostic success of the theorists of rationalization and their stress on the closure of modernity, contemporary society no longer seems to fully fit their descriptions. Since the 1970s, social theorists have variously claimed that capitalist modernity has shifted from reflective to reflexive (Beck 1997); organized to disorganized (Lash and Urry 1987); solid to liquid (Bauman 2012); disciplinary to control-based (Deleuze 1992); and from imperialism to "Empire" (Hardt and Negri 2001). Their interventions might be summarized as follows: The closure of rationalization and its logic of total measurability, communicability, and control has been superseded by a new situation marked by social openness. They have a point. At the state level, command and control-style planning has yielded to the celebration of the market's unpredictable price mechanism. Meanwhile, stable jobs have been abandoned for flexible projects; the fixity of the gold standard has been released in favor of infinitely leveraged speculation; and life itself has become yet another entrepreneurial activity. Today one fears precarity rather than totalitarianism. The result, so the story goes, is that the specialized units of "functionally differentiated" modernity have dissolved into a dedifferentiated network of horizontal relations. What was once bounded, is now unbounded; what were units are now relations; what was closed is now open. It is the basic claim of what I call sociologies of openness.

The ultimate goal for these sociologies is to conceptualize what might be called the agency of the environment. Whereas older Promethean visions saw the environment as the playground of an instrumentalist subject, developments

in science and society have spurred on writers to take seriously the environment's capacity for influence. Especially the advent of the Anthropocene has made it undeniable, the thought goes, that the environment has agency, too. This theoretical desideratum extends from social theory to "theory" as such, as (new) materialist theories have sought to level the distinction between the social and the material (e.g., Latour, 1993; for examples see Malm 2019, 159). In this context, the theory of autopoiesis—of which critical systems theory is an example—is often thought to be insufficient to grasp such an openness to environmental agency, since it emphasizes the self-production of closed systems. Against these autopoietic units, prominent scholars such as Donna Haraway (2016a) and Mark Hansen (2009) cite the openness of "sympoiesis" and "system-environment-hybrids" (SEHs), respectively. These concepts serve to highlight cooperation across the boundaries of system *and* environment.

Haraway and Hansen's conceptual strategy is shared by Michael Hardt and Negri's work on "Empire," which I consider to be the strongest expression of the sociology of openness. As a totally open space, "Empire" describes the contemporary formation of capitalism in which all previously existing boundaries—such as those between work and leisure, production and reproduction, necessary and surplus labor time—have finally collapsed. The "multitude"—Hardt and Negri's name for the collective laboring subject—operates in the flux left behind by the dissolution of these old metrological categories. The multitude's labor, Hardt and Negri therefore claim, is both "outside of" and "beyond measure" (2001, 357). Hardt and Negri's combined emphasis on "dedifferentiation"—the aforementioned dissolution of social categories and sectors—and the role of the immeasurable in contemporary capitalism makes their work a powerful example of the sociologies of openness and a promising theoretic approach by which to grasp the workings of today's mode of rationalization.

This chapter explores the viability of theories of openness from Haraway, Hansen, and Hardt and Negri. It ultimately defends the theory of autopoiesis as a better option for theorizing the agency of the environment. Although the aims that these theories pursue are sympathetic, their monist philosophies cannot ultimately deliver what they promise. As I will argue, Haraway and Hansen misunderstand the theory of autopoiesis, and their alternatives lack the capacity to grasp the ecological agency they aim to describe. This is due to a kind of theoretic ethos of dissolution—an emphasis on relationality and an antipathy against boundaries—that ultimately causes them to dissolve the environment into the system. Without the distinction between system and environment, it is unclear what the agency of the environment could still mean. Hardt and Negri's work suffers from precisely the same flaw, ultimately dissolving the multitude into Empire. This makes their intriguing attempt to

theorize the multitude as the active ecology from which capital "extracts" value, at best, an inconsistent endeavor. What these theorists aim for can best be achieved with the theory of autopoiesis: only on the basis of this theory's stress on distinction, paradox, and ecology can the agency of the environment be theorized, and thus Hardt and Negri's powerful extractivist image of contemporary capitalism consistently thought. Modifying Luhmann's systems theory, I argue that cybernetic communication systems require an incommunicable environment that they *cannot yet must* accept in order to operate. While showing the limits of the sociologies of openness, this paradoxical logic finally opens up the possibility of studying social openness and ecological agency in contemporary rationalization.

CRITIQUES OF AUTOPOIESIS: SYMPOIESIS AND SYSTEM-ENVIRONMENT-HYBRIDS

If, in today's social world, the environments of the many social systems that occupy it have any meaningful role to play, then these environments must have some form of agency (see Hörl 2017). Yet the theory of autopoiesis, at least superficially, seems to offer little help in this regard. The environment is the product of the system, which is in turn a self-productive unit with sharp boundaries. Systems are self-referential loops of operations referring to previous operations, making them "operationally closed" (Luhmann 2012, 49). The environment, at most, "irritates" the system in the form of indistinct complexity that only becomes meaningful "information" after the system has reduced it by way of its own operations. From this perspective, then, there appears to be little room for the openness of the system to the agency of the environment. The theory of autopoiesis, consequently, is not without its challengers.

Donna Haraway, for instance, claims that "nothing makes itself; nothing is really autopoietic or self-organizing" (2016b, 58). She instead proposes the concept of "sympoiesis" to refer to "collectively-producing systems that do not have self-defined spatial or temporal boundaries" (33). These sympoietic systems must be understood as "holobionts," which are "symbiotic assemblages" that do not give rise to "units" with sharp boundaries, but rather to "symbionts"— provisional "knots" in these intra-acting assemblages (60). What might at first sight look like self-production is thus in reality coproduction. Haraway supports these abstract reflections with the empirical work on "symbiogenesis" done by the evolutionary biologist Lynn Margulis. Inspired by these symbiogenetic processes that take place across cells, Haraway seeks to discard the strict distinctions between system and environment in an attempt to think the agency of the environment in the genesis of systems. Systems for Haraway, then, are

not self-productive units but rather the fragile result of the internal, symbiotic differentiations of the holobiont.

Confusingly, however, three pages after denying the existence of autopoiesis, Haraway claims that autopoietic systems do in fact exist but merely stand in a "generative friction" with sympoietic systems (2016b, 61). By this she appears to mean that autopoietic systems are an empirical reality but are never *truly* self-productive. In the final instance, systems are always coproductive with their environments; autopoiesis is always "enfolded" by sympoiesis (58). At first sight, this proposition does indeed appear to be at odds with the theory of autopoiesis, since the latter holds that it is the system that produces both itself and its environment: the system produces itself by distinguishing itself from its environment. The consequence of this strange self-positing logic is that there is no universal environment, no encompassing "holobiont" within which there exist symbiotic systems—only specific environments *for* specific systems. Whatever environment one observes is therefore always a matter of perspective. It will depend on what system is observing. It is why the inventors of the concept of autopoiesis, biologists Humberto Maturana and Francisco Varela (1987, 26), underline the importance of their adage that "everything said is said by someone." The crucial question that remains is one that should be familiar to Haraway (1988): Where is this someone situated?

Once one realizes this, it becomes clear that the cocreative capacities of an environment with respect to any system can already be observed with the theory of autopoiesis. Two autopoietic systems involved in symbiotic cooperation—what Haraway might call sympoiesis—can still be observed by an outside observer, like a biologist peering through a microscope in the case of biological systems. This biologist will perceive the "indeterminate causality" that runs from one system to another (Baecker 2001, 63–64). Haraway's explanandum, ecological agency, can thus already be accounted for by the theory of autopoeisis. The only qualification that this theory adds, however, is to say that from the perspective of the autopoietic systems under the microscope, the "irritations" they receive from this indeterminate causality can only be observed in terms of the "circular causality" of their own operational circuit. Similarly, the biologist observes the symbiotic constellation in her environment in terms of her own circular operations. The point is that "the environment" that coproduces the system is different depending on the perspective. Haraway simply confuses these various environments with an environment as such.[1]

The confusion is not without consequences. It is precisely the ineradicable difference between observers that safeguards the theory of autopoiesis from, to put it somewhat dramatically, ecological totalitarianism. It is this difference that enables an understanding of the symbiosis and symbiogenesis of various

autopoietic systems without collapsing them into the unifying perspective of the holobiont. The theory of autopoiesis, to put it in a nutshell, allows an observer to observe both "sympoiesis" and "autopoiesis," but never both *at once* (Luhmann 2012, 105). In the words of Luhmann, "An observer . . . has a double possibility of describing a system both from within ("understanding" his self-description) and from without, and thus of adopting both an internal and an external standpoint. Of course, he cannot do both at the same time, for he has to use the internal/external distinction" (105).

Haraway, by contrast, does attempt to grasp the two logics of sympoiesis and autopoiesis in a single vision. The irony is that precisely as a result of this, she loses the possibility of observing either of them, since she undermines the distinction that enables the observation. Autopoiesis hinges on a boundary that her theory of sympoiesis denies. The result is that there are now no systems or environments left to engage in sympoiesis, because the environment that is the holobiont has now become everything there is. A sympoietic system can thus never observe an autopoietic system, but an autopoietic system *can* observe a sympoietic one. According to the theory of autopoiesis, "sympoietic" systems can simply be observed as structural couplings between autopoietic systems; they can be observed as symbiotic rather than sympoietic systems. The agency of the environment, therefore, is protected rather than made inaccessible by autopoietic systems theory. Even Lynn Margulis, it might be noted, considered Gaia to be an autopoietic system (Clarke and Gilbert 2022).

Another attempt to grant agency to the environment in the context of auto-poietic systems comes from media scholar Mark Hansen (2009). In contrast to Haraway, Hansen is ostensibly looking for a middle ground between authors that emphasize the closure of units (Maturana and Luhmann) and authors that stress the openness and permeability of such units (Hayles and Guattari). He fears that the latter authors' emphasis on openness risks losing the merits of closure altogether, leading to a state of indistinction and dedifferentiation—as I believe happens in the case of Haraway. Equally, however, Hansen contends that the theory of autopoietic units is fatally lacking in interpretive power with regard to two prominent contemporary phenomena. First of all, Hansen agrees with Latour that contemporary social reality is no longer neatly divided into autonomous social spheres but has become a messy "melting pot," such that "any effort to reduce it through selection by systems . . . cannot ignore the agency that is wielded by the environment" (Hansen 2009, 114). Second, and relatedly, this environment is permeated with technology and so its agency is overwhelmingly technical. In order to account for these two complexes of phenomena, Hansen suggests that next to autopoietic systems there exist "system-environment hybrids" (SEHS)—organizational forms that "realize

their autonomy at a higher level of inclusiveness—which is to say *through a constitutive relation with alterity*" (2009, 115). As with Haraway, in this case, coproduction trumps self-production.

While Hansen's attempt "to move . . . beyond the polarization of open and closed systems" (2009, 114) is certainly sympathetic, his critique of autopoietic systems, like Haraway's, rests on a misunderstanding of Luhmann's systems theory. His first point reiterates a familiar criticism that has been voiced by numerous social theorists in the reception of Luhmann's thought. A notable critique is offered by Richard Münch (1990), who maintains that Luhmann's stress on autopoietic closure cannot account for the messiness and porosity of the modern social system. In chapter 1 I argued at length that the image of strictly separate social spheres does not represent Luhmann's systems theory. As Uwe Schimank (1996, 165) summarizes, there is "no next to each other, but multiple crisscrossing of perspectives."[2] The trick is that, even though the operations of autopoietic function systems belong to their respective closed circuits, such operations derive their meaning from a multiplicity of environmental contexts, such as structures, programs, organizations, interactions and, I would add, sociotechnical metrological systems (see chapter 2). This means that autopoietic systems can borrow structures and programs as "performances" of other operationally closed systems to which they are structurally coupled. Operationally, then, functionally differentiated modernity is partitioned into strict units. Structurally and empirically, however, modern society is a messy network of porous systems. As Luhmann remarks: "The world is just not constituted so that events generally fit within the framework of one function alone" (1989, 49). Remarks like these are difficult to square with Luhmann's alleged "desire for purity" (Hansen 2009, 114).

This also holds with regard to Hansen's second point regarding the increasing technicity of the environment in which we live—the "technosphere." In the previous chapter, I showed how technical autopoietic systems can be said to affect modernity's central function systems within a Luhmannian systems theory. However, according to Hansen (2009), what is needed is a new theory to study technical systems that are neither autopoietic nor allopoietic, and that engage in a type of closure that is not purely operational. While the conceptual ramifications of this remain unclear, Hansen is clear that, concretely speaking, he thinks of distributed cognition in "complex computational infrastructures," such as those enabling credit card payments and monitoring stock markets (Hansen 2009, 117). These differ from autopoietic metrological systems in that they are input/output devices that are therefore not informationally closed. According to Hansen, such systems have some direct agency over the operations of the systems to which they are coupled. In the theory of autopoiesis, by

contrast, the environment can only "trigger" informational events in the system by way of "irritations" that can only be operationalized by the system on its own terms. Affirming the autonomy of the environment, however, Hansen maintains that the alterity of the technical environment is such that it resists the system's reduction of complexity and thus "cannot be reduced to mere perturbations" (115). The question is: If the agency of the environment is not a matter of perturbations, then what exactly is it?

The alternative is that this agency must be understood as an operation rather than as an irritation. Yet this cannot be the case, since even Hansen acknowledges the operational closure of society and therefore claims that "this force of alterity" does not "directly enter in the operation of (some) systems" (2009, 115). A few pages later, however, he contradicts this and tells us that his system-environment-hybrids engage in "cognitive operations" and produce "selections" (i.e., operations; 117–18). He adds that such operations are "selections that take place *across* the system-environment divide" (118). This, however, merely rephrases the question of how these ecological operations can be part of the operationally closed system without violating their closure. Ultimately, Hansen fails to make good on his own desideratum of envisioning an active environment that produces neither operations nor perturbations and, relatedly, of conceptualizing systems that are neither autopoietic nor allopoietic. This is far from coincidental, because these are simply the only options one has if one chooses to preserve the operational closure of systems. Systems are either autopoietic or they are heteropoietic. They are operationally closed, or they are operationally open—there simply is no third way.

The problem with Haraway and Hansen is that they confuse this initial distinction between autopoiesis or heteropoiesis for a dilemma: *either* one affirms autopoiesis and thus the agency of the system, *or* one affirms heteropoiesis and thus the agency of the environment. Wanting both autopoiesis and the agency of the environment, Haraway and Hansen seek to wrestle themselves from this unsurpassable dilemma to no avail, all the while failing to consider that the dilemma itself might be fundamentally false. It is true that, for the theory of autopoiesis, there is no middle road between autopoiesis and heteropoiesis. A system is either autopoietic or it is not, the signal is on or off, 1 or 0. The fact that systems are either self-produced or other-produced therefore leaves no third option: *tertium non datur*. What Hansen and Haraway miss, however, is the paradox that precisely this binary exclusion produces the ecological "*tertium*" in the form of the programs and structures that give the system its sense (Luhmann 1989, 99). This is simply a reformulation of second-order cybernetics' founding paradox of openness from closure: The system is open to the structures in its environment because its operations swerve in a closed

loop around its code. One therefore starts with the digital principle of "tertium non datur." For that is how one gets the "tertium." One does not start with the "tertium"—whether in terms of "sympoiesis" or "SEHs"—because then one loses the basic difference between system and environment that generates, animates, and sustains it. In other words, it is precisely the system's autopoiesis that enables the agency of the environment. The middle road exists, but there are no shortcuts.

The basic way of formulating Luhmann's position is through the Batesonian formula that only differences make a difference (Bateson 1972, 381). Unities—whether system-environment-hybrids (Hansen 2009), holobionts (Haraway 2016a), planes of immanence (Deleuze and Guattari 2014), or intra-active flows (Barad 2007)—do not produce or contain differentiation. There is no relation that precedes the relata; only other relata precede the relata. We are firmly in the sphere of what Friedrich Hölderlin (1972) calls the *"Urtheil"*: the "primordial distinction" that at once calls forth the unity of this distinction and eclipses it. The original unity of unity and distinction recedes as the result of the distinction that produced them. Yet, crucially, so does the original distinction between unity and distinction. This is because this original distinction can only be observed by making yet another distinction, which is what introduces the "second-order" character of Luhmann's cybernetics. It is thus difference itself that differentiates. Only this principle prevents a final reification of the holobiont or the SEH into a unity that produces difference, which is a logical conclusion both Haraway and Hansen explicitly try to avoid. This is why one needs to stick to the autopoietic principle that the system produces its environment, because an observing system is nothing other than a distinction making distinctions.

For Donna Haraway and Mark Hansen, by contrast, the relation precedes the relata. Relationality is key, since relata are for them ultimately incompatible with the agency of the environment—whether that environment is organic, technical, or social. These authors are therefore suspicious of units, distinctions, and borders: they are potential barriers to ecological activities. Above all, they hold that the self-production that is central to Maturana and Varela's and Luhmann's theory of autopoiesis must give way to the coproduction of system and environment in sympoietic holobionts or system-environment-hybrids. While I sympathize with the aim of theorizing the openness of the system and the agency of the environment, Haraway and Hansen ultimately make a critical mistake. They fail to appreciate the existing possibilities of conceptualizing ecological agency within the theory of autopoiesis and so, ironically, lose the possibility of coherently theorizing the agency of the environment because they dissolve the system into its environment.[3] Systems and environments

become derivatives of a unitary flow of becoming—a pure relationality embodied either in the hybrid, or the holobiont. Haraway and Hansen therefore display what I would like to call an ethos of dissolution: a philosophic disposition to liquify all units and distinctions in favor of a monist principle of relationality, flow, and excess. The theory of autopoiesis instead recognizes that distinction is needed to conceptualize both system and environment, and it continues to guarantee their differential interaction through the principle of paradox. This discussion has wider ramifications for contemporary social theory, in which there also exists a tendency toward an ontology of dedifferentiated flows in order to conceptualize ecological agency in contemporary capitalism. The postworkerist Marxism of Michael Hardt and Antonio Negri, to whom I now turn, is emblematic in this regard.

AGAINST MEASURE: HARDT AND NEGRI'S MULTITUDE

Michael Hardt and Antonio Negri's work over recent decades, most notably their four-part series *Empire* (2001), *Multitude* (2004), *Commonwealth* (2009), and *Assembly* (2017), represents one of the most prominent iterations of Italian autonomist Marxism as well as one of the most incisive descriptions of contemporary capitalism as such. Hardt and Negri (2001, 290) depict today's global capitalism—in their terms, "Empire"—as the hegemonic rise of "immaterial labor."[4] The old society of material mass commodities had given way to a world of brands, signs, and services, all of which required a new type of work to create and sustain. Ours is the era of the content manager, the advertiser, and the marketing agent. The rise of immaterial labor is thus how Hardt and Negri phrase the deindustrialization of the Global North since the late 1970s—a process that includes the expanding service sector, the increasing importance of cognitive and affective skills, the flexibilization of work time, the rise of information technologies, and the precarization of work (Pitts 2018a, 4). Yet shockingly, Hardt and Negri contend that this new form of labor is radically *immeasurable*: it is both "outside of" and "beyond" measure (2001, 357). With this statement, Hardt and Negri declare the old laments of rationalization for dead. What is distinctive about contemporary capitalism, according to them, is not the closure of measurement and control, but the openness characteristic of an immeasurable world.

What leads Hardt and Negri to claim that today's hegemonic form of labor is fundamentally immeasurable? Their answer may be split up along historical and ontological axes. First of all, the historical rise of immaterial labor radically changes the game of capitalist rationalization. Immaterial labor is cooperative, creative, and unpredictable in nature, making it impossible to pin down its

value in neat slices of time. The "general intellect," the emergent collective of immaterial laborers, operates in a space that more resembles a restless rhizome than a static grid (Hardt and Negri 2001, 364). Immaterial labor, in more concrete terms, brings forth the breakdown of the nine-to-five work regimen, in which worked hours could be easily converted into corresponding output. Instead, immaterial labor proceeds arrhythmically, split between hours of procrastination and bursts of productivity. What's more, the line between work time and leisure time also begins to blur. An idea for work might come in the shower, Hardt and Negri (2004, 110–11) quip.

In its most basic sense, the hegemony of immaterial labor means that the boundaries between life and work begin to fade: Economic "production becomes indistinguishable from [social] reproduction" (Hardt and Negri 2001, 385). Immaterial labor is displaced from the workplace, or rather, the workplace is displaced onto the whole social field: "Society became a factory" (284). These displacements engender what Hardt and Negri (2009, 133) refer to as the "feminization of work," where domestic reproductive labor moves out of the margins to form the paradigmatic example of immaterial production in general (Marazzi 2007; for critiques see Adkins 2009 and Federici 2006). This total dissolution of the boundaries between production and reproduction, between life and work, is what Hardt and Negri call "biopolitical production" (2001, 24)—an arrangement of power specific to Empire in which the production of life takes center stage (see Read 2001).

The foundering of measure in contemporary capitalism thus results from the historical dissolution of previously existing boundaries. Nothing can be measured without units. Hardt and Negri's stress on dissolution as the difference engine of capitalism is strongly indebted to the writings of Gilles Deleuze and Félix Guattari. Their Empire series, in fact, may well be read as fleshing out the few pages that Deleuze (1992) dedicated to the notion of "societies of control," which is, in turn, a reworking of Foucault's postdisciplinary forms of biopolitical governmentality in "enterprise society" (Lambert 2020, 92). In these pages Deleuze (1992) declares the collapse of the discrete, striated, enclosed spaces of discipline (the prison, the school, the factory, and so on) and their supersession by the smooth, modulating, and open spaces of "control" in which all disciplinary boundaries are finally liquidated. For Hardt and Negri, the hegemony of immaterial labor under Empire is the primary, but certainly not the only example of this shift into liquidity (see also Bauman 2012). Another example of dissolution is the breakdown of the Bretton Woods system in 1971 and its replacement by monetarism, which liquidates all ties to real production and to a stable monetary metrology as such (Hardt and Negri 2004, 155; 2017, 185). Related to this is the dissolution of the space of "imperialism"—in which

the nation-state functioned as a discrete spatial unit—into the smooth trans-national plane of spatially immeasurable "Empire" (Cooper 2011, 134; Hardt and Negri 2001, 356). Labor and capital under Empire know no boundaries, operating instead across an open and smooth space.

Yet smooth spaces are difficult to measure. It is why Hardt and Negri (2004, 145; 2009, 314–15) ultimately put forward an argument against Marx's labor theory and its corollary "law of value"—the thesis that value is determined and measured by socially necessary labor time. Immaterial or biopolitical labor, they claim, simply does not allow for these kinds of measurements. Pitting Marx against Marx, Hardt and Negri hold that Marx himself, in his "Fragment on Machines" from the *Grundrisse*, prophesied that capitalism would undermine its own law of value at some fateful point in the future (Caffentzis 2011, 103). Hardt and Negri now claim that "what Marx saw as the future is our era" (2001, 364). This can be gleaned, they argue, from the fact that society has reached the point of "real subsumption of labor under capital" (Hardt and Negri 2001, 25; see also Hardt and Negri 2009, 142). It means that capital has become truly global. It now totally structures, "commands," or "controls" living labor—even life itself—through the wage-relation and the measure of exchange-value. In this situation, Negri argues, socially necessary labor and use-value no longer provide "natural" yardsticks (1999, 82), since there is no longer an outside to exchange-value: all has been subsumed under capital's artifice. The implication is that the measurement of value is, as Hardt and Negri suggest, "defined on the basis of always contingent and purely conventional elements" (2001, 355). They take this fact to signal the end of Marx's theory of value and, as a result, as proof that Marxism's calculus of exploitation should be resigned to the dust-bin of history.

Yet the immeasurability of contemporary labor has much, much deeper roots. Next to a historical argument, Hardt and Negri also put forward an ontological argument. According to them, the immeasurability of the value produced by immaterial labor flows from the metaphysical constitution of "the multitude"—Hardt and Negri's (2004) name for the global collective subject of cooperative immaterial laborers. Inspired by Spinoza's *multitudo*, the multitude forms an ontological *causa sui*—a spontaneous vital and creative force of pure positivity. It represents an ontological excess that *precedes* measurability (Negri 1991, 219). The multitude, Negri thus asserts, "has nothing to do with use-value, because it is not a measure but a power"—that is, the "power to act" (1999, 79, 85). The multitude is pure potentiality, chopped up into measurable units by capital only after it has actualized itself in work. This puts an ontological spin on the primary tenet of Italian workerism, namely that capital must always follow labor's lead. The point is expressed in Mario Tronti's (2019) sociological

"inversion of perspective," through which he sought to provide a counterweight to the Italian Communist Party's orthodox Marxist emphasis on capitalism's objective laws of motion (see also Cleaver 1992). Trontian workerism instead calls attention to labor's autonomy, with workers" political struggles forming the driving force behind the evolution of capitalism (Mecchia and Henninger 2007). Ontologizing this Trontian inversion of perspective, Hardt and Negri (2001) establish the multitude's metaphysical priority over capital. Capital now appears as a radically reactive agent, a parasitic power that follows the multitude wherever it goes and that attempts to tie its creative potentialities in its corset of value. "Resistance," Hardt and Negri summarize, "is actually prior to power" (2001, 360).

Hardt and Negri, in sum, advance both historical and ontological arguments to bolster their claim about the immeasurability of immaterial labor. Their claims toward a generalized "crisis of measurability" (Marazzi 2008, 43), however, have been subject to persuasive criticisms. First of all, as Frederick Pitts (2018b, 7–8) has suggested, Hardt and Negri misunderstand Marx's labor theory of value, or at least fail to consider the strongest contemporary interpretations of it—notably those offered by scholars who been gathered under the rubric of the "New Reading of Marx," such as Moishe Postone (1993) and Michael Heinrich (2012). This new reading deflates Marx's theory of value and, like Hardt and Negri, relinquishes all reference to a "natural" standard of labor. It thus treats notions such as "necessary labor" and "surplus labor" as mediated by the realm of exchange-value. Within this earthly realm a Marxist theory of measurement is still wholly feasible. Thus, Heinrich (2012) could be taken to show that the lack of a metaphysical standard does not undermine the possibility of measurement *as such*.

Hardt and Negri's confusion stems from their mistaken belief that changing metrological regimes of "concrete labor," work as it is actually performed, imply parallel consequences for the notion of "abstract labor," work as a social unit of comparison. For abstract labor, however, it is irrelevant whether concrete immaterial labor is tied to the clock hours of the factory floor or proceeds in unpredictable fits and starts. As Micheal Heinrich argues, as long as there is an "act of exchange," it is wholly irrelevant whether commodities are material or immaterial. It is not the concrete properties of the commodity, but only the "social form" (i.e., the exchange) of the commodity that determines its value (Heinrich 2012, 44). Abstract labor, in contrast to concrete labor, was never performed anyway—not in pre-Fordism, Fordism or, indeed, post-Fordism.[5] In contrast to concrete labor, abstract labor is always already immaterial or abstract: it is a function of the system of exchange. At most, then, Hardt and Negri can uphold their thesis on the crisis of measurability as an empirical

argument about the inaptitude of Fordist metrologies of clock time when it comes to measuring immaterial labor (see Rosenkrantz 2011, 160). What has broken down, in this case, is not so much the possibility of abstract labor's measurement, but the homology between Fordist metrologies and the newly emerging forms of concrete labor (see Adkins 2009, 334). In order to measure today's "immaterial" form of concrete labor, time-based metrologies are increasingly superseded by financialized metrologies of asset appreciation (Hardt and Negri 2009, 157; on stocks as second-order symbols, see Marazzi 2007, 28; see also Fumagalli 2011, 9).

This brings us to a second objection to Hardt and Negri's supposed crisis of measurability, namely that it is empirically invalid. The intensification and expansion of uncodifiable forms of labor has not led to the withering away of measurement. Indeed, the possibility of empirically measuring "socially necessary labor time" has always been debatable (Rosenkrantz 2011, 160). Likewise, pre-1971 specie-backed monetary systems were, like any metrological system, equally liable to contingency and convention as the complex instruments of contemporary finance (Caffentzis 2011, 117). Moreover, Hardt and Negri's crisis of measurability risks forgetting that precarious and casual labor was already very much the rule in pre-Fordist times, when Marx was filling the pages with the law of value. Finally, there is no empirical evidence that the various strategies and techniques for evaluating intangible assets have disappeared. Quite to the contrary, conclude DeAngelis and Harvie (2009) in their case study of higher education: the measurement of immaterial labor is a crucial aspect of New Public Management. Indeed, as Steven Toms adds, "it is equally plausible to argue that a shift to affective and immaterial labour involves increased control through measurable outputs against targets" (2008, 433). The past decades have also seen an explosion of new credit rating metrologies at all levels: private businesses, governments, households, and individuals (Feher 2018). These observations suggest that the rationalization of metrological systems has not so much disappeared as that it has changed form with the collapse of Fordism. Recognizing this point, as will soon become clear, is crucial to understanding the conceptual flaws of Hardt and Negri's approach to the immeasurable and, consequently, to understanding the logic of neoliberal capitalism.

The criticisms of Hardt and Negri surveyed above suggest that the duo overstate the extent to which the immeasurability of the multitude's work has made Marx's law of value obsolete. Yet there is a risk for some of their critics to lose what I take to be the vital insight of Hardt and Negri's social theory, namely that the measurability of value depends on an immeasurable source of value. In their case, capital, as a system of valuation and valorization, depends on a laboring multitude that is strictly invaluable. Appreciating the constitutive

function of an outside to metrological systems is crucial for understanding rationalization, since it is impossible to grasp the production of surplus value or capital growth in the face of the exchange of equivalents (see Marazzi 2007, 20; Marx 1976, 258–69). As Lyotard writes: "If one supposes [capitalism to be] a closed system of energies, capital would not be able to grow at all" (1993, 221). Anticipating the following chapter, the challenge is to theorize the immeasurable as the environment of metrological systems that aporetically animates these systems. This is why the theme of ecological agency is essential to understanding the paradoxical logic of capital, which simultaneously drives out and thrives on the immeasurable. Understanding contemporary rationalization requires a confrontation with the outside to the official capitalist economy on the basis of a thoroughly paradoxical logic.

THE ETHOS OF DISSOLUTION

In Hardt and Negri's oeuvre there is a clear desire to think through environmental agency by way of paradox. Theorizing the paradoxical nature of capitalism arguably constitutes the crux of their social philosophy and political economy. For example, as they write in their introduction to *Commonwealth*: "Contemporary forms of capitalist production and accumulation in fact, despite their continuing drive to privatize resources and wealth, paradoxically make possible and even require expansions of the common" (Hardt and Negri 2009, ix). Yet confusingly, this core thesis on the paradoxical nature of capitalism follows an opening in which they state that contemporary capitalism is "a world that has no 'outside'" (vii). It is here that our problems begin. Lacking an outside to capitalist accumulation, it is difficult to understand how capitalism is supposed to siphon off value from an extracapitalist "common"—a term Hardt and Negri (2004, xv) use to refer to openly accessible and democratically produced goods and services.[6] The inconsistency proves telling. It points to an instability that explodes Hardt and Negri's philosophical monism and carries broader relevance for contemporary accounts of capitalism that share Hardt and Negri's ethos of dissolution.

Hardt and Negri's account of contemporary capitalism is full of references to its paradoxical logic. They observe this logic, for instance, in the double binds that capital faces in post-Fordist knowledge production: "Empire recognizes and profits from the fact that in cooperation bodies produce more and in community bodies enjoy more, but it has to obstruct and control this cooperative autonomy so as not to be destroyed by it" (Hardt and Negri 2001, 392).[7] Similarly, private knowledge production depends on the production of open science and free collaboration, to which privatization constitutes an outright threat (Hardt

and Negri 2009, 145). Biopolitical production, moreover, requires labor to organize its own time autonomously, but it also demands the kind of flexibilization and precarization that takes away labor's control over time (147). Empire requires collaboration without solidarity, disruption without revolution, and transgression without sabotage. Contemporary capitalism thus develops through the paradoxical interplay of two countervailing tendencies—one deterritorializing, the other again territorializing. It invokes and then revokes the workers' autonomy on which it feeds. The paradoxality of Empire, around which the whole of Hardt and Negri's work revolves, can therefore be summed up in postworkerist Paolo Virno's (2004, 110) term "communism of capital" (see also Beverungen, Murtola, and Schwartz 2013).

The strange phrase points to the fact that, as McKenzie Wark suggests, "it takes an awful lot of communism to keep forms of private property, exploitation and accumulation afloat" (2017, 51). Whereas Fordism depended on a kind of "socialism of capital," namely on state planning and waves of socialization, post-Fordism hinges on the autonomous cooperative creativity of the multitude or the "general intellect" (Virno 2004, 106). The multitude, Hardt and Negri argue, is caught up in a kind of feedback loop of "the common": the fund of collectively produced and consumed elements of social life (2004, xv; 2009, 123; 2017, 98). The common, Hardt and Negri explain, is both "ground or presupposition" and "the result" of the multitude's fundamental power to act (2009, 123)—a dialectic that unfolds in "an expanding spiral relationship" (Hardt and Negri 2004, xv). The common fruits of the multitude's labor represent "Commonwealth," Hardt and Negri's term for a communism that is always already present in the autonomous activities of the multitude. It is "a kind of spontaneous and elementary communism" upon which capital preys and depends (Hardt and Negri 2001, 294). Commonwealth is thus not so much a classless utopia as it is an immanent condition that already exists in the present, albeit imperfectly and corruptly. Exploitation in the era of immaterial labor, Hardt and Negri argue, is no longer predominantly the expropriation of surplus value via the exploitation of wage labor, but the private capture of an immeasurable Commonwealth that is produced in common and as common by the multitude (2009, 113, 150). "Exploitation," Hardt and Negri (2001, 385) conclude, "is the expropriation of cooperation." This, in essence, is the communism of capital.

Following Yann Moulier Boutang (2011) in *Cognitive Capitalism*, Hardt and Negri maintain that exploitation—or rather, expropriation—now runs through the capture of "externalities," that is, the social value created outside the official capitalist production process (2004, 147; 2009, 141). Externalities, to put it in Luhmannian terms, represent the ecological, indistinct, immeasurable environment of the capitalist economy's official metrological systems. Contrary to

the received wisdom of neoclassical economics, these externalities are not signs of "market failure," but instead form the unofficial conditions of market success. This becomes clear in the example of "gentrification" (Hardt and Negri 2009, 155–56). Social urban wealth, Hardt and Negri explain, is initially produced by poor artists, students, and locals who move in and freely produce an intellectual and cultural dynamism, a common form of wealth that finally solidifies in rising housing prices. As a result, the original producers of this wealth are forced out by high rents and real estate prices, thus stalling the productive process that allowed such assets to boom in the first place. Capital is therefore burdened by a paradoxical motive to simultaneously create and stimulate the common *and* to fetter and destroy it through private capture (Hardt and Negri 2009). Capital can capture the value of production only *because* production proceeds autonomously and externally. In other words, capitalism is capitalist precisely because it relies on a protocommunist outside that it *cannot yet must* accept as part of its own logic.

Yet, silently and fatefully, Hardt and Negri slide from paradox into smoothness as their Spinozist monism slowly manifests. As stated earlier, the multitude finds itself in an expanding loop with "the common." The multitude produces the common on the basis of the common in an "expanding spiral relationship" (Hardt and Negri 2004, xv). In an anti-essentialist gesture, Hardt and Negri assure us that this does not mean that the multitude serves as a metaphysical foundation, a pure commonality, that grounds the common. "The common we share, in fact," Hardt and Negri write, "is not so much discovered as it is produced" (xv). The multitude is fully enveloped in the productive loop of commoning rather than forming its unmoved mover. Yet it must still be asked: If the multitude produces the common, then what produces the multitude? Hardt and Negri's answer is that the multitude produces itself. Indeed, Negri's basic innovation in reading Spinoza, as Michael Goddard (2011, 190) notes, is Negri's conception of the multitude as "a biopolitical self-organizing force of innovation and creation" that does not require (or tolerate) any external agency. In Hardt and Negri's (2003, 312) terms, the multitude is the sole "constituent power": a pure source of "creative positivity" (Hardt and Negri 2001, 61) that is the ontological source of both itself and its historical antagonist, the "constituted power" that is capital, sovereignty, and Empire. In this sense, then, the multitude represents the power to act: the material and immanent capacity for self-production and self-organization.

These notions of self-organization and self-production may remind one of the principles of the theory of autopoiesis. Yet, despite appearances, Hardt and Negri's conception of the multitude's self-production refers to a radically different form of self-production than autopoietic self-production. Whereas

autopoietic self-production develops through duality or distinction, Hardt and Negri's self-producing vital force—the multitude—is radically monist and affirmative. This means that the multitude is not a historical agent that unfolds through the duality between the common that it produces and the common by means of which it produces, but that it denotes the active process of commoning itself. Rather than be split between two poles of the common connected by a loop, the multitude *is* this loop. It is a principle of pure relationality and potentiality, a "power to act," a form of "deterritorialized autonomy" (Hardt and Negri 2001, 344). It is only after the multitude acts, or *loops*, that the poles of the common are brought into being. Put in a Baradite phrase, then, the multitude must be understood as the relation that preexists the relata.[8]

Now, the parallels between Haraway and Hansen on the one hand, and Hardt and Negri on the other, begin to come into focus. The multitude is the practical expression of what Haraway calls "sympoiesis," a principle of biological and/or biopolitical production that operates immanently across boundaries. As previously discussed, for Haraway, sympoiesis refers to "collectively-producing systems that do not have self-defined spatial or temporal boundaries" (2016b, 33). Likewise, for Hardt and Negri, the immanent space in which their cooperative subject operates is "defined as the absence of every external limit from the trajectories of the action of the multitude" (2001, 373). The multitude's collaborative potentiality, like Haraway's sympoiesis, does not have self-defined spatial or temporal boundaries since it acts on a radical axis of immeasurability and deterritorialization. The historical rise of immaterial biopolitical labor in the fully "smooth space" of Empire heralds the multitude's successful dissolution of spatial, social, and temporal boundaries and thus the advent of sociopolitical immanence. Under Empire, one might say, the multitude forces capital to join it in becoming a single Harawayian "holobiont."

This monist impulse is not limited to theoretic description but extends into the realm of practical precepts. Since capital is now rendered a purely derivative, parasitic force, the nature of class struggle is also significantly altered. In their autonomist vision, the anticapitalist struggle against exploitation and class domination should take the form of an "exodus" in which the autonomous communist core of post-Fordist wage labor retreats from the parasitic formation that is capital (Hardt and Negri 2009, 152). Even today, Hardt and Negri (2009, 311) assure us, capitalism still produces its own gravediggers. For whereas capital always requires labor for its own reproduction and growth, labor has an unmitigated interest in cutting itself loose from this unfavorable symbiosis. The multitude must unburden itself from the fetters of capital, which merely capture and curb its creative, cooperative, and affective excess. "Communism," as Negri writes with Weberian overtones, "is the negation of all measure, the affirmation

of the most exasperated plurality—creativity" (1999, 33). Hardt and Negri's ethos of dissolution therefore, it is now revealed, is more than a theoretical device for understanding contemporary capitalism; it functions as the practical ethos for the multitude's great historic project. This project is above all one of dissolution, in which this collective agent—following a deleuzoguattarian aesthetic—flows like lava down a volcano, liquifying everything in its path, struggling to remain mobile in the face of the petrifying forces of measurement and capital. The multitude, in short, is on a historic trajectory of indistinction, leading finally to the erasure of measure. Post-Fordism is simply the latest "progress report."

The multitude, above all then, embodies the emancipatory potential inherent in the vitalist force of *sympoiesis*. Yet, as we saw with Haraway, her own ethos of dissolution led to a liquefaction of the environment into the system. Theorizing the holobiont as a single encompassing environment for the immanent forces of sympoiesis left her with what I termed ecological totalitarianism—or, amounting to the same thing, no environment at all. Haraway's dissolutionism makes it difficult for her to systematically think of an outside to the system, and by implication to think through the paradoxical relations that exist between such an outside and an inside. Hardt and Negri, as we will see, sharing Haraway's ethos of dissolution, run into the same problem. It leads to fundamental inconsistencies and contradictions in their theorization of contemporary capitalism and the struggles that take place within it. This bars us from theorizing the paradoxical relations that couple the capitalist system to its various environments or externalities. Yet theorizing these relations as the logic of contemporary rationalization is not only the aim of this study, but also that of Hardt and Negri themselves.

EMPIRE OF UNDECIDABLES

Hardt and Negri's ethos of dissolution may be traced back to their ontological monism, which sees the multitude as the singular power to act. "The deterritorializing power of the multitude," Hardt and Negri write, "is the productive force that sustains Empire" (2001, 61). The post-Fordist formation of Empire represents the historical end result of the ontological pressures of the multitude, forcing capital to battle increasingly on the multitude's home terrain of total immanence. This is where Hardt and Negri ontologize Mario Tronti's (2019) sociological reversal of perspective, which designates the multitude as the decisive historical actor. This ontological shift is not without risks, however. For starters, it is not empirically obvious whether the labor conditions of post-Fordism have resulted from the social agitations of the multitude rather than

from a power grab by capital in the face of stagnating accumulation in the capitalist core in the 1960s and 1970s. Should the rise of precarious labor, formulated more sharply, not be considered an example of downright "class war from above," rendering Hardt and Negri's redeeming narrative of the multitude's rise "nothing less than *ideology*" (Palmer 2014, 44)? Moreover, does this narrative not overestimate the multitude's potential for self-organization and self-fashioning in the face of its globally and locally warring factions, trying to eke out a living on this desolate "planet of slums" (Davis 2006, 201; Laclau 2004, 26)? Questions such as these suggest that, in ontologizing Tronti's sociological reversal of perspective, Hardt and Negri predecide historical and empirical questions concerning the development of capitalism in ontological terms.

Yet the postworkerist duo explicitly eschew the type of ontology that builds in a metaphysically coercive strain of teleology: "There are no final ends or teleological goals written in history" (Hardt and Negri 2004, 221). History and ontology here appear to be pulling in opposite methodological directions: the one pointing at a timeless tension between "Empire" and the "multitude," the other situating that tension in a distinct temporal setting. Hardt and Negri address this problem by distinguishing between a historical and an ontological multitude—in Spinozist jargon, a multitude of actuality versus one of possibility. Whereas the latter creates an "absolute freedom" by acting in the eternity of the perpetual present, the former signals the political project required to constitute the multitude in the image of its absolute aspirations. The distinction, Hardt and Negri hurry to add, is merely analytic: the two dimensions of the multitude cannot ultimately be separated. The historical multitude, for instance, only recognizes itself in its political project on the basis of its ontological potential. "The multitude, then, when we put these two together," Hardt and Negri write, "has a strange double temporality: always-already and not-yet" (2004, 222). By joining these two faces of the multitude, Hardt and Negri explicitly refuse the false dilemma between history and ontology, and keep their eyes fixed on both at once. In this way they infuse their materialism with just enough historical contingency to steer clear of the philosophic vice of grand teleology. As Kam Shapiro suggests: "It is here, in the space between the potential and the actual . . . that Hardt and Negri interject the teleological strain of their materialism" (2004, 294).

Some tricky questions remain, however. It is difficult to comprehend how this Spinozist monism, which collapses yet separates the historical and the ontological, does not simply end up muddying the two. There are, after all, still two countervailing tendencies in this Spinozism: historical and ontological. Does the arrival of Empire and post-Fordism represent the liberation of the ontological by the historical? This fits well with Hardt and Negri's Bataillean

picture, which imagines the multitude as a vital force of excess that blooms through history like a flower slowly bursting through asphalt. However, this narrative is denied by Hardt and Negri's insistence on the priority of history—their Marxian methodological principle that theory should always follow social reality (Hardt and Negri 2004, 140). So, what then is history? Is it a contingent organization of materials that informs empirical sociology, or a passive receptacle for the play of the ontological powers singled out by the Spinozists? If this question is rejected as a false dilemma, then one might ask: Is the fact that historical Empire is the exact mirror image of the ontological multitude merely a momentous coincidence?

The question is never resolved. Rather than predecide the question of what entity or force constitutes the motor of history, Hardt and Negri's confusion of the ontological and the historical makes it *undecidable* who or what the prime mover in capitalism actually is, a confusion that extends over both dimensions. Ontologically speaking, the difference between Empire and the multitude—between post-Fordism and the labor force it subsumes—remains unclear. Hardt and Negri stress that only the multitude functions as a principle of ontological creativity and positivity; it represents the world's sole productive force and constituent power. The multitude is, to recall, the productive power that animates the feedback loop of "the common"—the subject that produces the common in common on the basis of the common. In this sense, the multitude represents the relation (the loop) that precedes the relata (the common), forming the practical expression of what Haraway calls sympoiesis. The multitude's antagonist—Empire—appears as the petrifying force of measure and capture, but nonetheless "Empire itself is not a positive reality" (Hardt and Negri 2001, 361). It is merely a "parasite," an "apparatus of capture that lives only off the ontological vitality of the multitude" (2001, 62; 2019, 83). Capital is thus not so much a freestanding counterforce to labor as it is a historical aberration of the multitude itself—"the failure to realise our own power" as Benjamin Noys (2010, 112) phrases it.

Nevertheless, Hardt and Negri portray capital under post-Fordism and Empire as a force that operates fully on the plane of immanence as a result of *its own* deterritorializing thrust: "Capital tends toward a smooth space defined by uncoded flows, flexibility, continual modulation, and tendential equalization" (Hardt and Negri 2001, 327). Hardt and Negri follow Deleuze and Guattari's (1983; 2014) description of capitalism as a process of progressively decoding and deterritorializing flows, who in turn take their cue from Marx and Engels's famous line that under capitalism "all that is solid melts into air" (2008, 38). As a powerful example of a sociology of openness, throughout their oeuvre, Hardt and Negri emphasize the constitutive role of social openness in the logic of

capitalism. While the old capitalist logic of "sovereignty" was imbued with a transcendent logic, Empire functions through what they call—again in reference to Deleuze and Guattari—an immanent "axiomatics" (Hardt and Negri 2001, 327). "The primary characteristic of such an axiomatic," Hardt and Negri continue, "is that relations are prior to their terms" (327). Yet this means, importantly, that Empire has the exact same conceptual structure as the sympoietic multitude: They both signify the relation that precedes the relata. There is no conceptual reason, then, why capital cannot act as a "constituent power" that drives history and negates all measure under post-Fordist Empire. Empire and the multitude are, ontologically speaking, indistinguishable.

Further adding to the confusion, Hardt and Negri argue that this ontological indistinguishability between Empire and the multitude is itself the product of historical development. Post-Keynesian capital, they maintain, functions in a permanent state of crisis: Its modus operandi is the exploitation of disequilibrium and the unruly forces it discharges (e.g., Hardt and Negri 2017, 290). As a result, it becomes increasingly difficult to grasp whether a crisis came "from above" or "from below"—indeed, whether such crises form a ruse of capital or an act of resistance from the multitude, whether they result from rebellion or recuperation (Cooper 2011, 135). Even the boundary between capital and labor itself, Hardt and Negri suggest, starts to collapse with the advent of Empire. The rise of immaterial or biopolitical labor implies that the means of production are increasingly internalized in the affective, cooperative, and communicative skills of living labor (Hardt and Negri 2001, 30). The main productive force under post-Fordism becomes the "human capital" of the "entrepreneur of himself" (Foucault 2008), meaning that even labor-power turns into another form of capital. It concurs with the broader disintegration of the distinction between "dead labor" and "living labor"—or the "hybridization of humans and machines" (Hardt and Negri 2001, 367)—as cybernetic machines and imaginaries take over the work place (Hardt and Negri 2017, 110).[9] Under post-Fordist production, then, it becomes increasingly unclear who is who and what is what. Capital preys on the confusion.

Ultimately, Hardt and Negri's ethos of dissolution leads to a state of total indistinction between capital and labor, or Empire and the multitude, in both ontological and historical terms. Ontologically speaking, they are both forces of pure relationality on the plane of immanence. Historically speaking, it is radically uncertain on which empirical force one should pin crises and developments. Thus, in spite of the distinct flavor of teleology that runs through Hardt and Negri's work, the main problem is not that they predecide on empirical and historical questions by way of metaphysics, but that these questions have now finally become entirely undecidable. In an ironic twist, therefore,

little to nothing remains of the original Trontian reversal of perspective. Even more important, these conclusions invite a tough line of questioning on their core thesis that, today, exploitation takes the form of the capture of "external-ities." For to what outside are Hardt and Negri referring when they talk about externalities? External to what? External how? Hardt and Negri appear to suggest that the value produced by the multitude is "outside the direct produc-tive process" (2004, 147). Yet this suggestion depends on the distinction between economic production and social reproduction that they argue has broken down under Empire. This is, in fact, the exact same distinction, the dissolution of which, according to them, proves the unviability of Marx's quantitative notion of exploitation under post-Fordism. Swapping "externality" for "surplus labor time," however, does not magically bring this distinction back to life.

This unhelpful state of indistinction and undecidability is no coincidence. It follows from the overpowering thrust of the ethos of dissolution that saturates their monist ontology. After having dissolved all boundaries in both ontological and historical terms, the indistinct soup of multitude and Empire, communism and capitalism, inside and outside, no longer allows for a theoretic arrangement that is able to bring these notions into paradoxical contact. As with Haraway and Hansen, the desire to theorize an environment that has agency vis-à-vis the system reverts into a total loss of ecology. The immeasurability of the environment of capital—the multitude—results for Hardt and Negri, not from the fact that it forms the environment *for metrological capital*, but from the ontological nature of this all-encompassing environment *as such*. It is everything and therefore, simultaneously, nothing. In consequence, Hardt and Negri's main thesis that contemporary capitalism forms a system that saps value from the "externalities" produced by a protocommunist multitude—the communism of capital—takes on an entirely incoherent profile. After the dissolution of all distinctions—production/reproduction, production/consumption, biopower/biopolitics, multitude/Empire, labor/capital—all outsides have disappeared. Capital, one can only conclude, does not extract value from externalities for the simple reason that, in this vision, there are no externalities. There is only a foggy excess.

THE PERFORMATIVITY OF THE INCOMMUNICABLE, OR WITTGENSTEIN'S MYSTICAL

To think through Hardt and Negri's core proposition—namely, the commu-nism of capital—we require a thorough appreciation of ecology and paradox. This means that we must shed the general distrust of boundaries, units, and distinctions that has become quite fashionable in contemporary continental

philosophy and social theory. Rather than mystify an excessive relationality that precedes and produces all relata, we need to embrace Bateson's (1972) cybernetic principle that only difference makes a difference, and only other relata precede the relata. There is no originary source of self-production, a vital excess that produces all production. There is only an interminable sequence of the production of production. This is indeed the strange trick of Luhmann's second-order systems theory: the system's self-production is, in a certain sense, not self-production at all. The system's original self-production cannot ultimately be retrieved in the mists of production. Instead, the system's self-reference always already refers to another order, because the system requires a second point of production to refer to its original self-production. The system's self-reference is therefore not unproblematically self-referential, since the order of this "self" changes constantly in the process of self-reference. Even the system's "foundational" self-reference is thus steeped in paradox: it produces itself through its other, yet it generates its other through self-reference. Rather than flow from an absolute wellspring of relationality, positivity, and excess, Luhmann's self-productive system really is, to its very core, difference, paradox, and ecology.

To respect the agency of ecology rather than to dissolve them into the system, one must thus first accept the principle of autopoiesis. This means conceding that there exist distinctions between systems and their environments, such as those between work and leisure time, and that these environments cannot operate directly on the system. These distinctions, however, produce the openness required to think through the self-deconstruction of the system and its paradoxical couplings to its environment. Any social theory that wants to conceptualize ecological agency should track these paradoxical couplings by studying the cross-differentiation and complexification of these relations rather than contend that they have dedifferentiated into indistinction. One way of doing so is by highlighting the structural openness of the system about which Luhmann is so adamant. We might call this the *official openness* of the system: the structures or "performances" that a system self-consciously borrows from its environment for its own operations. For example, the economic system may borrow labor contracts from the juridical system to structure its own payment operations. These performances are a type of communicable complexity; they are differences that are integrated into modernity's metrological chains. There is, however, also an *unofficial openness* to the environment, which is sadly disregarded by Luhmann. Getting this second type of openness into focus can help us better grasp Haraway's and Hansen's projects, namely the problematic of how, in Hansen's terms, "the environment matters, above all, *as a source of alterity* for a system" (2009, 130).

In order to grasp the unofficial openness of the system to its environment, we need only to shift the emphasis in Luhmann's second-order systems theory in a subtle yet crucial way. According to Luhmann (1989, 37), any self-referential system must of logical necessity run either into tautology (e.g., the true is true) or paradox (e.g., it cannot be shown to be true that the true is true). These logical conundrums cannot be evaded, but rather they provide the motive force for the system's operation. The founding paradox of any system is "unfolded" through time by turning this paradox into a binary distinction (e.g., true/false). The system can now operate by oscillating between the two values of the distinction ("the form"), while the unity of this distinction ("the medium") is presupposed (albeit never observed). This unity is in fact the observer itself, and it becomes the blind spot of the observation, the eye that cannot see itself seeing. By temporally unfolding paradoxes through distinctions, the system produces visibility because it makes its founding paradox invisible (Luhmann 2012, 211).

This internal unfolding of a function system's paradox, according to Luhmann, creates a situation in which "function systems can only legitimate themselves. That is, no system can legitimate another" (1990b, 19). In chapter 1, I argued that this stress on the internal unfolding of paradox with regard to the self-legitimation (i.e., self-reference) of function systems blinds Luhmann to the ways in which external function systems legitimate them from the outside. Rather than function through official openness and by way of Luhmann's "performances," these legitimizations function by way of an unofficial openness and generate what Lyotard (1984) calls "performativity." We find the paradigmatic expression of this ecological legitimation in Lyotard's *The Postmodern Condition*. There Lyotard also starts with the problematic of self-reference, namely the self-legitimation of modern science. In accordance with Luhmann and Weber, Lyotard tracks down the founding paradox of science: science cannot prove the proof (Lyotard 1984, 29; compare Weber 2008, 40). That is to say, science cannot prove the truth of the truth/falsity distinction. Over and above observing how science unfolds this paradox on the inside, however, Lyotard notices that science reaches outside for its legitimation, namely to "narrative knowledge." Yet the problem is that, for science, narrative knowledge does not count as knowledge at all: they are only fables, fairytales, and myths. The system thus finds itself in yet another paradox: It needs recourse to an environment it *cannot yet must* accept for it to function at all. Lyotard therefore describes a process that is homologous to Weber's original paradox of rationalization, which sees modern purposive rationality struggling to supply its own ends.

The postmodern condition demands a coming to terms with this ineluctable paradox afflicting modernity's function systems. In the absence of a commensurating metanarrative, the postmodern condition comprises a patchwork of incommensurable systems that are both paradoxically related to their internal workings *and* to their external environments. Accepting this postmodern condition while rejecting the label, Luhmann (1990a) stresses the self-legitimation and internal unfolding of function systems. To account for the reliance of function systems on their environments, he mobilizes the concept of "structural couplings" and the way in which systems borrow communications from their environments by internalizing them as "performances." Medical practitioners, for instance, use medical science, but they care only about their healing capacities rather than their truth. In this way, the system is closed at the level of its binary code (e.g., healing/not-healing) and open with respect to ecological programs (medical science; Luhmann 1989, 40). What disappears in Luhmann's account of system-environment dynamics, however, is Lyotard's paradoxical ecological legitimation of the system. In other words, what recedes from view is the way in which the system depends on its environment not only by transforming its environment into *communicability*, but also precisely by respecting the *incommunicability* of its environment. Systems theory should thus not only deconstruct its central notion of the system but also fundamentally turn to its ecological situation in what has been called a "general ecology" by studying the ways in which systems produce, require, and harness the incommunicable performativity of their environments (Hörl 2017).[10] It is this performativity of ecological incommunicability that the motif of the cannot-yet-must articulates.

In his *Tractatus Logico-Philosophicus*, Ludwig Wittgenstein (1999) presents a phenomenal articulation of this motif. In this work Wittgenstein sets out to trace the logical limits of sense. What may sensibly be said, according to the young logician, are propositions about states of affairs in the world. Yet the propositions of logic that state *this* are themselves not about states of affairs, but about the rules that regulate propositions. The paradox Wittgenstein runs into, therefore, is that in stating the limits of the sayable he exceeds those very limits. By telling us these limits, he in actuality *shows* us what cannot be told, but only shown. It is here that we find the famous image of the ladder one has to throw away once one has climbed up it (Wittgenstein 1999, §6.54). Cast in Luhmannian terms, we might say that Wittgenstein sets up an environment of showing that the system of saying *cannot yet must* accept in order for it to make sense at all. In a letter to Ludwig von Ficker, Wittgenstein (cited in Rasch 2000a, 80) therefore writes that the *Tractatus* "consists of two parts: the one that is presented here plus all that I have *not* written. And it is precisely this second

part that is the important one." The unwritten half of the *Tractatus* forms the absolute ecological condition of the written half (see Rasch 2000a, 73–98, for a brilliant discussion). It is the incommunicable that conditions the communicable in an aporetic fashion. Wittgenstein (1999, §6.522) calls this ecological condition the mystical: "There is indeed the inexpressible. This *shows* itself; it is the mystical."

While Wittgenstein's mysticism has been poorly received by the Vienna circle and later analytic philosophy as an idiosyncratic quirk, it forms part of a larger tradition of continental mysticism that has always been a galvanizing aspect of the wider *Aufklärung*, running back through Schopenhauer, Kierke-gaard, and the aforementioned Hölderlin (see Josephson-Storm 2017; Nieli 1987). "Ineffability," the fact that the mystical "defies expression," as William James (2002, 295) writes in his classic study of religious experiences, belongs to the core of mysticism. Thinking back to Hölderlin (1972), for instance, the mystical refers to the intuition of Being (*Seyn*)—a wholly indistinct unity—in the face of the divisions of discursive rationality that operates within the sphere of judgment/sundering (*Urtheil*), or the space of distinctions that is sustained by Being. Luhmann himself did acknowledge his affinity with the negative theol-ogy of Nicholas de Cusa, identifying with the devil as the originator of a first distinction between himself and God (Rossbach 2004, 48; see also Rossbach 1996). In Luhmann's writings (2006, 252), "Seyn" or God surfaces as the more secular "world" or "reality," an indistinct ecological realm beyond all distinc-tions that must be presupposed but that can never be observed. Like Wittgen-stein's mystical, "world" forms an unmarked horizon that conditions all that is marked. Yet for Luhmann, we are irredeemably stuck with the fallen, trapped in the irreversible differentiations of modernity. The mystical, the absolute oneness of the world, is a mere logical fantasy, a vanishing point that never materializes (see Clarke 2022 for a discussion). This, however, significantly underplays the role that the mystical plays in cybernetic rationalization. In the same manner in which Horkheimer and Adorno's contemporaries failed to recognize the inspiriting myth of enlightenment, Luhmann misses the role of the mystical in the workings of cybernetic modernity.

With my critique of Luhmann for failing to appreciate the mystical in cap-italist modernity, I do not mean to argue for a Hölderlinian return to Being as an indistinct whole. Nor do I wish to endorse a single Wittgensteinian ecology of inexpressibility. Rather, I want to call for a study of the *many ways* in which the mystical is provoked, produced, and valorized within the everyday material rationalization of capitalist modernity in the cybernetic episteme. This means that the mystical, or the incommunicable, is not some *focus imaginarius* to which rationalization, with its totalizing aspirations, always asymptotically tends.

Indeed, this conceptualization of the mystical has been left behind with the demise of the thermodynamic episteme and its desire for total control. Nor is the mystical, as in the materialism of Haraway and Hardt and Negri, a vitalist force of indistinction that progressively eats up all division and measure. The mystical is not the soul of the world, whether embodied in life or labor. Rather, in the cybernetic age, the mystical refers to the multiplicity of ecological conditions produced by systemic distinctions that form the paradoxical logic of the "here and now"—the material sociotechnical and metrological systems that shape contemporary modernity. In our age, Wittgenstein's mystical is thus brought to earth and pluralized. It is not a single environment that includes all that cannot be said, but a plurality of environments for a plurality of systems.

In order to see how this new relation to the mystical functions concretely and materially in cybernetic rationalization, it is necessary to shift the focus from the written half of rationalization—its official, communicable account, or that which appears on the books—to its unwritten half. It means charting the role of the incommunicable, the immeasurable, and the unpredictable in neoliberal governmentality and the post-Fordist production process. This project thus necessitates a study of the ways in which the capitalist economy and its tightly coupled metrological systems continuously set up a multiplicity of environments in order to profit from them in a manner that cannot be measured, that is strictly "off the books," and that is instead mystical. Bringing together the systemic logics of closure and openness in their paradoxical and ecological relations, the following chapter investigates how metrological systems *thrive on* the incommunicability (openness) they incessantly *drive out* into their environments (closure). Rather than trace a simple supersession of epistemes, the openness that is valorized in the cybernetic episteme thus hinges on the closure of the thermodynamic episteme. The cybernetic episteme, as will become clear in the next chapter, is a radicalization of the thermodynamic episteme. It is nothing more nor less than the becoming-ecological of the thermodynamic age.
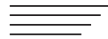
Theorizing the openness of systems to their environments remains an indispensable desideratum for any social theory that seeks to address the transformation of capitalist modernity that occurred from the 1970s onward. This transformation comprises, among others, the global neoliberal breakthrough in political economy, the rise of the post-Fordist production process, the financialization of large swaths of the social, and the digitization of infrastructure through cybernetic technologies. However, understanding this transformation in terms of a decisive shift from rationalization as the increasing closure of

systems toward a mode of rationalization that instead tends progressively toward openness risks losing the distinctions and paradoxes that were produced by the closure of systems and that enabled their very openness to their environments in the first place.

This is the basic flaw of the materialist theories of Haraway, Hansen, and Hardt and Negri, who start off with an overriding concern for the openness of the system—whether that be a biological unit, an informational circuit, or capitalist production—to the agency of its environment. It moves them to opt for a form of vitalist relationality that precedes all relata, because relata—or units, distinctions, boundaries, and so on—are above all seen as barriers to the agency of the environment. It gives their work an ethos of dissolution, which means that the environment tends to become dissolved into the system (whether a holobiont, an SEH, or the multitude) or, amounting to the same thing, the system dissolves into its environment. As boundaries between inside and outside collapse, closure thus gives way to openness. Yet the question then becomes: To what is this system still open? Or, in the case of Hardt and Negri, where are their "externalities" to be found? The perspective of pure relationality does not offer us the situated observations required to answer these questions.

For that we require a theory that does not move from the relation to the relata, but from the relata to the relation. The theory of autopoiesis is such a theory. It is a theory of self-production working with an endless sequence of distinctions that are paradoxically coupled to their self-produced ecologies at every turn. The closure of systems thus opens them up to the agency of their environments in both official and unofficial ways, in both a communicable and an incommunicable sense. While Luhmann failed to identify this latter sense of openness, it is the performativity of an incommunicable ecology that signals the pivotal role of what Wittgenstein calls the mystical in the functioning of systems. Identifying this openness opens up the possibility of interrogating the various ways in which the mystical is produced, stimulated, and harnessed by the system in a way that it cannot yet must accept. Such an interrogation will lead us to the material logic of the current mode of rationalization that animates the cybernetic episteme, of which the recent transformation of capitalist modernity forms a notable part (chapter 4) and of which the rise of conspiracy theorizing is the irrational expression (epilogue).

CYBERNETIC RATIONALIZATION

Valorizing the Incommunicable

> From the perspective of the system, the environment acts randomly on the
> system; but this very randomness is indispensable for the emergence of order,
> and the more complex order becomes, the more this is the case.
>
> —Niklas Luhmann

How much easier would it be to study evolution if it took place at a faster pace?
In the early 1990s, the question absorbed researcher Thomas Ray at the Santa
Fe Institute. Entertaining no hope for an answer from carbon-based lifeforms,
Ray turned to silicon-based life instead. He began writing code for a software
program that established a few simple parameters regulating reproduction,
mutation, and death. To the surprise of many, he jumpstarted the evolution of
a complex ecosystem of digital organisms, sprawling with even parasites and
hyperparasites (Hayles 1999). Artificial life was born. To display the marvel of
this software program called "Tierra," the institute released an educational
video starring Ray some years after.[1] The video has a quaint and distinctly 1990s
feel, a kind of retro-futuristic quality, as Ray talks over clunky computer-
generated animations of double helixes overlain with purple and yellow letters.
Evolution, Ray narrates in the clip, is fundamentally uncontrollable. The only
thing that can be controlled are its conditions. Hence, while evolution might
not be reducible to a code, it can be sparked by it. Such was the main tenet of
the video, deftly captured in its title, "Simple Rules . . . Complex Behavior." The
significance of this slogan goes far beyond this video, however, revealing a
cybernetic logic that is emblematic of rationalization today.

   The formula "Simple Rules, Complex Behavior" expresses a paradox: a
system of communicable rules provokes an incommunicable ecology. This
incommunicability is what Ludwig Wittgenstein (1999, §6.522), who was

tracing a similar paradox, called "the mystical": the ecological condition of everything that can be expressed, yet which cannot itself be expressed. Technoscientific programs such as Tierra might therefore, as I noted in chapter 3, be understood as a type of mystical materialism: they provoke and work with the mystical rather than try to eradicate and subdue it. In such programs the mystical takes on a more material, plural, and profane guise than in Wittgenstein's early work. They are part of a wider cultural fascination with the incommunicable, originating in the countercultural infatuation with information and surfacing in the political economy of flexibility, creativity, and uncertainty that has dominated social life since around the 1970s. It is no coincidence, it might be noted, that it was Citibank that funded the Santa Fe Institute's artificial life research (Parikka 2016, 228). Capitalism has become enchanted by a thousand mystical ecologies. Rather than threats to control, they are now seen as invaluable sources of surprise, new environments for capital's ever-growing need for surplus-value extraction. Contemporary rationalization is no longer based on Max Weber's (2005) famous "inner-worldly asceticism" of Protestantism, the cultural attitude that strives for perfect control and communicability of humanity's worldly environment, but on what might be called an inner-worldly mysticism: the desire to put the system's incommunicable ecology to work.

As Ray's Tierra program reveals, the new mystical extractivism is closely tied to cybernetics, the study of communication and control systems. I am far from the first to notice the historical influence of cybernetics on contemporary capitalism. Early engagements include Jean-François Lyotard's *The Postmodern Condition* (1984), Donna Haraway's "Cyborg Manifesto" (2016a), and Gilles Deleuze's "Postscript on Societies of Control" (1992), the last of which also forms the source of inspiration for many influential contemporary postworkerist authors such as Hardt and Negri (2001), and Tiziana Terranova (2004). From Manuel Castells's *The Rise of the Network Society* (2010), via Nick Dyer-Witheford's *Cyber-Marx* (1999), to Tiqqun's *Cybernetic Hypothesis* (2020), it would be impossible to engage with all the literature that has noted in some way the influence of cybernetics on contemporary capitalism. I do, however, want to push back against a general tendency that emerges, namely, to theorize the cybernetization of capitalism as the advance of a logic of dissolution that leads to a state of total openness. Rather than a simple supersession of the closed systems of thermodynamic rationalization by today's liquid and open networks, the current cybernetic mode of rationalization can be understood only by analyzing its animating paradoxes—those of closure and openness.

ECOLOGICAL STRIKE IN FORDISM:
THE COLLAPSE OF THERMODYNAMIC RATIONALIZATION

All systems are faced with an unfathomable ecology—an outside that they cannot yet must accept for their own reproduction. The ideal of a perfectly closed system has thus always been a pipe dream. The numerous examples collected in Lydia Kallipoliti's (2018) *The Architecture of Closed Worlds* serve to testify this fact. We have also seen this to be the case with metrological systems in a previous chapter. Even statistics, which seeks to eliminate a reliance on subjective discretion through its more "objective" operations, fundamentally depends on an ecology of trust. Paradoxically, systems of numbers only succeed in replacing trust once they themselves become a "technology of trust" (Porter 1995). Full closure from their environment is thus not only impossible, but even dangerous to the reproduction of systems. What I called thermodynamic rationalization in chapter 2, therefore, suffers from *ecological neglect*, a failure to take into account the environment on which systems imperceptibly depend. It is the major flaw in the mode of rationalization that Max Weber and the Frankfurt School originally sought to describe and that climaxed in the social formation that has come to be known as Fordism.

The concept of Fordism was originally coined by Antonio Gramsci and later popularized by the Regulation School (Boyer and Saillard 2005). It refers to a social contract of sorts, a compromise between capital and labor that reconciles, in the definition of Michel Aglietta (1998, 57), the "rapid increases in productivity with the growth of real income and with stability in its distribution" (see also Boyer 2005, 232). As Bob Jessop and Ngai-Ling Sum (2006, 59–65) specify, Fordism includes a strict technical and social division of labor (Taylorism), a "growth regime" that depends upon a virtuous circle of mass production and mass consumption (Fordism in the narrow sense), and a "mode of regulation" consisting of Keynesian demand management and interventionism (Keynesianism). Fordism might thus for the sake of simplicity be thought of as the combination of Taylorism, Fordism in the narrow sense, and Keynesianism. When one thinks of rationalization, one tends to think of Fordist rationalization. Indeed, it was the Fordist integration of large-scale firms and state administration into mixed economies that provided the political-economic backdrop to the early Frankfurt School's critique of instrumental rationalization—even though, following Friedrich Pollock, they called it "state capitalism" rather than Fordism (Dahms 2000). Fordism's command and control hierarchies were seen as the logical outgrowth of modern metrological technologies of communicability—such as standardization, classification, and commensuration—identified by Max Weber,

as well as the concentration and centralization of capital foreseen by Karl Marx (1976, 762–870).

This Fordist mode of rationalization may be called thermodynamic, since its technoscientific imaginary is thoroughly informed by the science of heat and fire. In thermodynamic rationalization, the technoscientific object is observed as a closed system—a heat engine that must be meticulously controlled with the aim of transforming energy into work with minimal waste. Productivity and efficiency were seen as the two virtues that governed steam engines, human labor-power and nonhuman natures alike (Daggett 2019, 5). Taylorist "scientific management," for instance, views the shop floor as a combustion engine that must be centrally designed, controlled, and systematized in order to attain perfect efficiency, or the optimum use of energy (measured in "foot-pounds") from a day's labor-power (Braverman 1974; Daggett 2019, 89–90). Taylorism institutes a rigorous division of labor in the production process, separating low-skilled executive tasks from high-skilled design and control. The design of this work process abstracts from artisanal knowledges by, as Frederick Taylor (cited in Braverman 1974, 112) writes, "classifying, tabulating, and reducing this knowledge to rules, laws and formulae." The resulting metrologies then detail the work tasks in "scientific" descriptions, breaking them up into small, repetitive motions that turn workers into lifeless robots (Scott 1998, 337). The Taylorist work philosophy thus explicitly attempts to ban informal rules and workers' knowledge in order to control the escape of energy from the shop floor. Shovelers in a Taylorized factory, for instance, are commanded by supervisors to replace their "natural" shoveling styles with those styles calculated for efficiency through the "science of shovelling" (Beniger 1986, 295). In this sense, Taylorism epitomizes rationalization as closure: a ruthless process that tends toward absolute control and optimal efficiency.

Taylorism's rational division of labor creates, to quote Foucault (1984a, 85) on a similar topic, a "universe of rules, which is by no means designed to temper violence, but rather to satisfy it." Recalling the fate of statistics, instrumental reason does not just drive out politics, but it also becomes one: it turns into a force of domination. Technics reverts to politics reverts to technics, and so on. What happens to our understanding of rationalization if we try to unravel this paradox?

Cornelius Castoriadis provides some preliminary answers. Pushing back against Lukácsian visions of near total reification—the debasement of human relations into thing-like metrologies—Castoriadis (2005, 16) states that "reification, the essential tendency of capitalism, can never be wholly realized." Taken on its own, this is not yet a wholesale rejection of thermodynamic thought, but only a qualification of it. It still takes the mystical—the incommunicable—as

an impassable region at the edges of reification, a *focus imaginarius* that may never be reached but that can at least be approximated. The logic of totalization, however unsuccessful, remains intact. In an ecological gesture, however, Castoriadis takes it one step further. "Society," he writes, "must live with a double reality, distinguishing between an official version and a reality which are irreducibly opposed to one another" (Castoriadis 2005, 95). Rationalization or reification works through these two realities, the official and unofficial, written and unwritten, inside and outside. The latter terms must now no longer be thought of as passive receptacles for instrumental reason, but rather as active potentialities in the strangeness of capitalist reification. "Capitalism," as Castoriadis (2005, 16) illustrates paradoxically, "can function only by continually drawing upon the genuinely *human* activity of those subject to it, while at the same time trying to level and dehumanize them as much as possible."[2] He thus arrives at an expression of a mode of rationalization without totality; a mode that functions fundamentally through paradox and incommunicable ecology (Castoriadis 2005).

In the context of Taylorist management, it is clear that this is not an idealist proposition but rather a statement that reflects a materialist logic taken straight from the shop floor. As Castoriadis (2005, 16) specifies: "A factory in which the workers were really and totally mere cogs in the machine, blindly executing the orders of management, would come to a stop in a quarter of an hour." Rather than describe some hypothetical situation here, Castoriadis details what is alternately called a white strike, a work-to-rule strike or a ca'canny, in which workers follow the rules and regulations to the letter such that they end up undermining their spirits. Parisian cab drivers, for instance, sometimes protest the municipality by meticulously following the regulations of the *Code Routier*, thus bringing traffic to a screeching halt (Scott 1998, 256). Similarly, during the Russian February revolution of 1917, the Cossacks devoutly obeyed the order not to move their position, allowing the protesters to crawl under their horses and storm Saint Petersburg's exposed center (Miéville 2018, 45). These examples illustrate how rationalized systems secretly rely on unarticulated outsides (tacit knowledge, improvisation, or unregistered overtime) that they officially try to suppress or drive out. The white strike demonstrates the extent to which rationalized metrological systems depend on activity that is strictly off the books.

The white strike brings this central paradox of rationalization to light because it follows its own paradoxical logic. In an important sense, the white strike is not a strike at all, because those apparently "on strike" are in fact still carrying out their jobs. Indeed, the point is that they carry them out *perfectly*. Rather than a strategy of refusal, then, the white strike refers to a situation of total obedience. It carries the process of rationalization to the nightmarish

endpoint of its own dreams of universality. Total obedience, it turns out, forms the logical point at which obedience veers back into sabotage, a reversal that is at once subversive. As Timothy Morton (2013, 200) succinctly states, it shows that "to kill or destroy is to reduce something to consistency." The white strike is immanent critique in action, a ruthless politics of consistency. It is disobedience *because* it is obedience; it transcends by totalizing. What the white strike demonstrates is that a system of rules only ever functions against an outside of unruliness or even rule-breaking, even if the system officially strives to eliminate this outside. The white strike must thus be understood as a general refusal of the system's outside; it is an *ecological strike* that lays bare the inconsistency of the system's desire for consistency.

Castoriadis's critique of ideology reveals the paradox that rules always require unruliness: a hidden humanization drives Taylorist dehumanization. He is backed up by James C. Scott, who argues that Taylorism's totalizing impulse eventually secured its demise. "The utopian dream of Taylorism," he writes, was ultimately "unrealizable" (Scott 1998, 337). Like all the "highmodernist" schemes of social engineering that Scott details in *Seeing Like a State*, from top-down city planning to scientific forestry, Taylorism's weak spot was its fatal neglect of its environment. In the analogous case of the monocropping of scientific forestry, this environmental neglect was most literal, as the practice slowly destroyed the wider ecosystem on which the planted crops turned out to depend for their very life. Translated to Taylorism, its ecosystem is teeming with unofficial knowledges, implicit practices, and the improvisations of workers, all of which were regarded as inefficiencies that needed to be "weeded out." It made these high-modernist schemes inherently unsustainable. Echoing Castoriadis, Scott summarizes how "formal order . . . is always and to some considerable degree parasitic on informal processes, which the formal scheme does not recognize, without which it could not exist, and which it alone cannot create or maintain" (1998, 310). In contradistinction to the official rationalized knowledge of social engineering, Scott identifies the existence of "*mētis*," or the wide variety of implicit knowledges, informal processes, and unregistered motions that rationalization ceaselessly strives to design out, yet on which the system nevertheless thrives. It forms the unwritten half of rationalization on which the written half hinges. The fatal element of thermodynamic rationalization was the instability generated by its logic of totalization—its blindness to paradox and ecology that made it vulnerable to ecological strike.

Indeed, strikes there certainly were, although they were not necessarily limited to the white variety. Over the years, Fordism came under pressure from various angles, with the critique of Taylorism peaking in the student and worker revolts of 1968. Writers from the Trontian postworkerist tradition have stressed

the political role of labor in the transformations of capitalism—including the collapse of Fordism in the 1970s—as a correction to histories that focus on the autonomous laws of capital and the forces of production (Virno and Hardt 1996). While the question of what exactly led to the demise of Fordism remains open and contested, it is generally thought to have been spurred on by a mix of deepening labor protest, the stagflation crisis in the 1970s, the internationalization of production, and counterinflationary strategies that interrupted the Fordist social contract (Jessop and Sum 2006, 126). Not wishing to resolve this debate here, I merely want to highlight how a societal critique of the environmental neglect of thermodynamic rationalization contributed to the breakdown of Fordism and thermodynamic rationalization.

The point is best made by Luc Boltanski and Ève Chiapello in *The New Spirit of Capitalism* (2007), in which they chronicle the decisive role of the worker revolts of 1968 in the transition to the post-Fordist "spirit of capitalism." Building on Weber's original phrase, Boltanski and Chiapello use the notion to refer to historically varying ideological justifications of capitalism. During these times, the Fordist spirit of capitalism became the target of a dual critique, distinguished by the French duo as "social critique" and "artistic critique." Rooted in in different "sources of indignation," these critiques spoke to the injustices of exploitation and inequality, and of alienation and inauthenticity respectively (37–38). Over and above matters of redistribution, protestors turned against the drudgery of work and demanded autonomy and self-management, or nothing short of the "unbounded liberation of human creativity" (170). Rather than in revolution, however, the agitation ended in a new, "post-Fordist" phase of capitalism. How did this happen? According to Boltanski and Chiapello, the cunning of capital in the aftermath of May 1968 was that it played off artistic critique against social critique. Capital sacrificed the social demand for security while artistic "autonomy" became the watchword of the new spirit of capitalism and new forms of capitalist exploitation (191). The bohemian values of artistic critique now found a new home at the heart of post-Fordist exploitation.

The post-Fordist or "third spirit of capitalism" mobilized an entirely new imaginary to entice those working within it. The "network" became the central image of the new "projective city," in which projects are the dominant formations in the spider webs of the social. Those who prosper in this "city" are flexible, agile, and eager to learn. Rather than display the virtue of *efficiency* that was central to the "industrial city," these agents must live by a generalized ethos of "connectionism": the extension of the network to the benefit of all (Boltanski and Chiapello 2007). Yet not only "spiritually," but also materially, Boltanski and Chiapello (325) show, the artistic critique of the May movement came to be "recuperated and exploited by capitalism." In contrast to the rigid

hierarchies of Taylorism, flexibility became the dominant new maxim. In what Boltanski and Chiapello call "external flexibility" (218), organizations became increasingly "lean" in order to successfully "surf" the waves of market signals in the sea of radical uncertainty. Through processes such as subcontracting and outsourcing, there emerged a "modular production network" of organizations controlled by decentralized market forces rather than by hierarchic command (Sturgeon 2002). "Internally," or within firms, a similar transformation occurred. While employment conditions were casualized and flexibilized, the work process itself also changed, now resembling a distributive network of postindustrial laborers engaged in multitasking, continuous learning, and communicating. Taylorism thus made way for "Toyotism" or "Kaizen," which placed a premium on self-control, self-monitoring, and self-improvement (Boltanski and Chiapello 2007, 246). Hence, Boltanski and Chiapello convincingly show how the artistic critique of capitalism was separated from social critique and enlisted by capital both in spirit and as a material force in order to ensure its continued accumulation.

Boltanski and Chiapello thus present a history of societal critique of thermodynamic rationalization in the May movement. This critique centers on the ecological neglect of this mode of rationalization, surfacing in the call for the liberation of the "artistic" outside suppressed by Taylorism. When we recall Castoriadis's and Scott's considerations on the necessity of this outside for the system's functioning, it becomes clear that the coopting of artistic critique by capital was always already a conceptual possibility. Both in spirit and in the flesh, the capitalist work process underwent a radical transformation from the 1970s onward. As we will see, capital attempted to take the weakness of thermodynamic rationalization and turn it into its strength. Ecological neglect needed to become ecological valorization. This radical transformation is not just politico-economic but also pertains to a wider reorganization of knowledge and power: its mode of rationalization. Capitalism transitions from a logic of industrial efficiency to networked connectionism, from the thermodynamic rationalization of Fordism to the cybernetic rationalization of post-Fordism.

"BE SPONTANEOUS!": PARADOXES OF POST-TAYLORISM

Post-Fordism goes by many names. In management schools, it was long known as the "New Economy," while other sociological labels often emphasize its knowledge-based character. They range from "information society" (Castells 2010), "postmodernity" (Harvey 1989), "postindustrial society" (Bell 1999), "cognitive capitalism" (Boutang 2011), and "Empire" (Hardt and Negri 2001) to the now popular "neoliberal capitalism." In the same way that Fordism could

be subdivided into smaller parts, post-Fordism may be said to refer to the symbiosis of post-Taylorism, post-Fordism in a narrow sense, and neoliberalism. Post-Taylorism signifies the incorporation of the postmodern values of creativity, autonomy, and uniqueness into the labor process. Post-Fordism in the narrow sense refers to a new social contract that could be said to have taken shape in the capitalist "core," namely the promise of "human capital" development in the sphere of production and the availability of infinite credit to sustain consumption (Streeck 2014). Neoliberalism, finally, represents a collection of political-economic strategies for the legal and political institution of market competition. As the various names for post-Fordism suggest, this stylized subdivision is hotly contested. Not wishing to end the discussion, I merely want to note that this rough and ready specification of post-Fordism does give a sufficient sense of where to look for the workings of cybernetic rationalization. There is an abstract logic of rationalization that permeates these three elements of post-Fordism. It is the valorization of the incommunicable by systems of communication.

While Fordism was fascinated by the science of heat and fire, post-Fordism takes inspiration from the mechanical computation of numbers. From the 1960s onwards, the work process came to rely increasingly on cybernetic technoscience, referring to a new mode of knowing centered on the logic of feedback and control. Information and communication technologies (ICT) flooded the workplace, from reprogrammable robots via "gamified" interfaces to artificial intelligence (Dyer-Witheford 2015, 33). Not only did cybernetic technologies enter farms, factories, and offices, but companies themselves were also imagined to be giant information processors. From the 1950s and 1960s onward, management theories increasingly borrowed themes and concepts from new sciences such as complexity theory and systems theory. Organizations were redefined as cybernetic systems in which workers and machines were included as equals within a powerful self-organizing feedback loop aimed at adaptation to a turbulent business environment (e.g., Beer 1959; Skyttner 2001; for a more general discussion, see Dyer-Witheford 2015; Franklin 2015; McKenzie 2001, 69–73; Williams 2015). Boltanski and Chiapello (2007, 139–40) themselves also draw upon three main nonmanagement sources of inspiration for "the connectionist imagination" that characterizes the third spirit of capitalism: communication; complexity; and disorder, chaos, and self-organization. Likewise, Nigel Thrift (2005) mobilizes a substantial body of literature to show how managing complexity and information has become paramount to management in "soft capitalism." Most recently, business has become infatuated with machine learning and AI as the next big engines of "disruption." If Fordism was all about energy, post-Fordism is about information.

Labor organization followed cybernetic technologies into this new regime of communication. The rise of post-Fordist production saw the relative expansion of the tertiary sector in the capitalist core—a sector that produces mainly "immaterial" commodities through cognitive, creative, communicative, or affective labor. Such communicative labor is what Hardt and Negri call, following Lazzarato (1996), "immaterial labor" (2001, 290). It refers to the kind of work done by those who Robin Murray (in Gilbert and Goffey 2015, 194) splits into the categories of "cultural producers" (marketeers, designers, content managers) and "systems managers" (financiers, lawyers, accountants). In this tertiary sector, the Taylorist style of management quickly runs up against its own limits, since service work relies heavily on the ecological potential of what Scott (1998) called *"mētis"*—uncodifiable skills and practices. The work process hinges on the creative potential of autonomous workers—a potential that is nullified once it is codified into strict rules. As Hegel already recognized, one cannot force autonomy. Service work has to come from below rather than from above, and this poses a critical question for capital concerning the work process: How to govern that which cannot be governed (Stäheli 2011, 272)? How to control the uncontrollable? Or more comprehensively, how can the ecological potential that was at stake in "artistic critique" be put to work?

One might recognize in such questions the guiding problem of the work of Michel Foucault, for whom power always operates through freedom. Foucault's central question, as Gregg Lambert (2020, 21) has noted, was always the following: "If power originates in a manner that is in some ways 'irreducible to rationalization,' then how does one go about the business of rationalizing it?" The pertinence of this question is heightened in the cybernetic age, since cybernetics—with its "ontology of unknowability" (Pickering 2010, 23)—fundamentally concerns itself with how control systems might navigate the uncontrollable. How, this science asks, do systems of communication pilot the incommunicable? Perhaps it is no coincidence that Foucault (2009, 108–9; 2008, 2) chose the term "governmentality" for this art or *technē* of navigation, "governor" being cognate with the Greek *kubernētēs* (steersman), after which Norbert Wiener (1985) named cybernetics. Beyond the superficial similarities, Foucault's notion has much in common with cybernetics' objective of governing the paradoxes that follow from its self-referential feedback loops. Liberal governmentality—like the disciplinary dispositifs with which it is bound up—operates through a paradoxical principle of self-limitation. It produces the freedom that simultaneously threatens it (Foucault 2008, 64). While according to Foucault (2008) this has been the central challenge of government since the seventeenth or eighteenth century, it demands new answers in the post-Fordist workplace. It is no longer enough to separate power and freedom into distinct regions (that is, into

execution and design functions), but power must now also enter into the realm of freedom and vice versa (Foucault 2008). Today, therefore, the question of government becomes explicitly cybernetic: How to rationalize that which cannot be rationalized?

To see how capital has tackled the question, it is crucial to note a change in the means of production. As Robin Murray observes, the "means of production have been internalised within labour and cannot be entirely appropriated *from* labour" (in Gilbert and Andrew 2015, 194–95; see also Boltanski and Chiapello 2007, 151–56). This is, first, a reformulation of the point that the worker's autonomy now forms part of the production process and can therefore no longer be excluded from the labor process as it was under thermodynamic rationalization. Second, it suggests a collapse of the distinction between capital and labor as commonly conceived. This suggestion comes from "human capital" theory, which was first put forward by economists Theodore Schultz and Gary Becker in the 1970s. "Human capital," Gary Becker writes, "is important because productivity in modern economies is based on the creation, dissemination, and utilization of knowledge" (cited in Bröckling 2011, 256–57). The worker's knowledge, passions, skills—their whole personality—should be seen as a "human resource," a form of capital that requires investment and that yields a return in the form of a wage. As Foucault succinctly states, human capital theory turns the worker into "a sort of enterprise for himself" or "an entrepreneur of himself"—a new type of "*homo oeconomicus*" who is "eminently governable" (Foucault 2008, 225–26, 270).

Since Becker's theory operates on a set of measurable assumptions, the behavior of *homo economicus* can be calculated, communicated, and therefore controlled. Yet the nature of this control is radically different from thermodynamic control. To demonstrate the difference, Ulrich Bröckling (2011, 250, 257–58, 262) contrasts human capital theory with its unofficial forerunner: Rudolf Goldscheid's "rational administration of 'organic capital'" or *Menschenökonomie*. Whereas Goldscheid's form of administration aims to intervene directly in the choices of agents through rational administration, human capital theory merely attempts to govern their behavior by controlling incentives and promoting competition. Human capital theory does not directly steer the action of agents but instead manipulates—as it later came to be known in the psychology of "nudging"—the agent's "choice architecture" so as to stimulate them into making better decisions (Thaler 2008). In other words, human capital theory no longer totalizes a sphere of perfect communicability, but instead institutes a framework of communicability in order to unleash the productivity of an incommunicable resource, namely, human personality.

This in essence is how this new entrepreneurial subject is governed. The paradox of freedom and power is not suppressed by capital, but rather, exploited. This is no coincidence, speculate Boltanski and Chiapello when discussing the "liberated firm" that has "self-organized teams working in a network": "'Controlling the uncontrollable' is not something with an infinite number of solutions: in fact, the only solution is for people to *control themselves*" (2007, 80). Control must be devolved to the freely operating agents on the ground. Post-Taylorist management thus relinquishes the dream of total control and instead limits itself to controlling the context of autonomous action. It designs and constructs this context through newly invented metrological techniques such as brainstorming, mind-mapping, and clustering, as well as human resources methods such as total quality management (TQM) and 360-degree feedback (Bröckling 2016). These technologies stimulate the creativity of the worker, kindling the productive power of their whole personality. The new logic of government also extends from the official workplace to the entire "social factory," mobilizing both waged and unwaged work (Cleaver 2000, 70). Digital platforms, for instance, incite "prosumers" to build creative content within parameters set by corporate designers (Williams 2015, 12). Platforms engage in parametric control, or what Terranova (2004, 108, 20) calls "soft control." It refers to the conduct of human action, "the virtual (that which is beyond measure)," by carefully designing enabling and constraining conditions. "Creativity," as Ulrich Bröckling summarizes the operation, "is not produced, it is enabled" (2016, 109).

Post-Taylorist management thus departs significantly from the "common sense" of the thermodynamic age. In fact, it looks like no less than a complete reversal of Taylorism. "The total and entirely repressive domination of the worker's personality," as André Gorz observes, "was to be replaced by the total mobilization of that personality" (1999, 30). Whereas under Fordism workers were ordered to treat the workplace merely as a site for the deployment of raw labor-power, they are now invited to treat it as a space of artistic investment. The "worker's soul," as Maurizio Lazzarato writes, "[needs to] become part of the factory" (1996, 133; see also Berardi 2009). Firms therefore needed a type of employee that could take up the invitation. Economic production required a preceding production of subjectivity. In order to capture this production of subjectivity—capital's shaping of creative, autonomous, cooperative, and entrepreneurial personalities—postworkerist writers like Michael Hardt and Antonio Negri (2001), and Maurizio Lazzarato (2002) take up Foucault's concept of "biopower." Whereas Foucault (1984b, 264) originally coined it to describe "the entry of life into history" more generally, the postworkerist philosophers

instead primarily use it to frame the production and reproduction of living labor under post-Fordism.

The Italian Marxists nonetheless aim to retain the paradoxical structure of Foucault's original concept. For Foucault (e.g., 2008, 64), biopower refers to a mode of government. It is part of a wider constellation of techniques and dispositifs gathered under the rubric of liberal "governmentality"—a paradoxical mode of power that, as mentioned above, operates through freedom (see Lazzarato 2002, 100). Biopower is exercised not through sheer domination but by appealing to an individual's capacity for autonomous action and thought. In the case of post-Fordist biopower, this means that capital stimulates the creative and autonomous abilities of workers for the purpose of surplus value production. However shrewd and refined this method of control may seem, its paradoxical logic puts capital in a vulnerable position. Capital can only shape the personalities of living labor by inducing a personal autonomy that contradicts, resists, and potentially refuses such shaping. The capitalist wants cooperation without solidarity, disruption without revolution, affective investment without material ownership. This is why the postworkerists make a distinction that is absent from—or, rather, implicit in—Foucault's writings, namely between biopower and biopolitics. Whereas the former designates the collection of governmental techniques and strategies employed by capital and sovereignty, the latter denotes the resulting ethico-political space in which labor moves (Lazzarato 2002, 110; e.g., Hardt and Negri 2009, 57). This ethico-political space—the autonomy and personality of workers—is both a potential site of resistance *and* the force that sustains biopower. This is where Foucault's governmental paradox of power through freedom comes fully to the fore: biopower works only through biopolitics.

Post-Fordist labor, in other words, operates in a paradoxical situation of "autonomy within heteronomy": autonomy is simulated within the strict confines of the logic of surplus value production (Gorz 1999, 39). Stressing the same point, Maurizio Lazzarato writes that the demands for authenticity, "far from eliminating the antagonism between hierarchy and cooperation, between autonomy and command, actually reposes the antagonism at a higher level. . . . One *has* to express oneself, one *has to* speak, communicate, cooperate, and so forth" (1996, 134). Thus, the first level of the work process—*how* to speak, cooperate, and so on—is left to the biopolitical self-organization of workers. Yet this first order of biopolitical self-control is *incited* and *provoked* by capitalist biopower on a second level—*that* they must speak, cooperate, and so on. Crucially then, post-Taylorist control is directed at the level of the second order rather than the first. Biopower is a form of second-order control: the control of control. Foucault

calls this the "conduct of conduct" or an "action upon an action" (2008, 186): it structures the possible field of action rather than steering such action directly (Bröckling 2016, 8). In Luhmannian terms, the second-order nature of biopower means that the distinction between biopower and biopolitics is reentered into the biopower side of the distinction. As control now becomes a second-order process, it also becomes fundamentally self-referential: Control controls control. And since control becomes self-referential it inevitably runs into paradoxes, of which the liar's paradox ("This sentence is a lie") serves as the paradigmatic example. The art of governmentality as the conduct of conduct, then, essentially refers to the navigation of these paradoxes, most notably the dual paradox of freedom through power and power through freedom.

However complex this post-Taylorist logic may be, it finally crystallizes in a strikingly simple formula: "Be creative!" or "Be spontaneous!" (Bröckling 2016, 114; Lazzarato 2017, 175; McRobbie 2016). This is the solitary rule that replaces the entire system of minutiae that constituted Taylorist scientific management. The dynamism of this chant—"Be spontaneous!"—derives from its paradoxical appeal: One follows the rule by breaking it and one breaks the rule by following it. If the worker acts spontaneously, they are merely following the rule; if the worker chooses to obey the rule, then that means they are ignoring all the rules. "Be spontaneous" is thus a rule that calls for its own transgression, a "liminal-norm" as Jon McKenzie has called it: "The valorization of liminal transgression or resistance itself becomes normative" (2001, 50). The rule liberates its outside; it invites all that is not included in the rule itself. In this sense, the adage forms the mirror image of thermodynamic rationalization. Instead of suppressing metrological systems' paradoxical openness to their environments, this uniquely simple piece of metrology mobilizes and exploits its own ecology. Worker improvisation, creativity, and personality, along with all the further potentialities the system could never predict, can be made productive by introducing a jolt of controlled rebellion. It is a daring strategy of recuperation.

The strategy marks the transition from thermodynamic to cybernetic rationalization. Managers now began to reimagine organizations as cybernetic machines rather than steam engines. Workers were thus no longer thought to produce equivalents in terms of energy units, but rather create differences or information (Wark 2004). The total measurability of labor-power (Wendling 2009) gave way to the immeasurability of "invention-power" (Boutang 2011). Whereas under Taylorism the worker's spontaneity and personality were viewed as potential sources of energy leakage, post-Taylorist management understands these very same factors as immeasurable and uncontrollable sources of information. It therefore shifts attention from the system's struggle

against entropy to the stimulation and capture of negative entropy in the system's environment.[3] This negative entropy, or ecological complexity, is now viewed as a reservoir of "positive externalities" on which cognitive capitalism runs. "Political economy," Boutang underscores, "has no choice but to deal with this relation it has to its own outside" (2011, 55). Whereas under Taylorism ecological complexity was first and foremost deemed a threat to the system's communicability and efficiency, post-Taylorism seeks to harness the productive potential of this ecological incommunicability. It valorizes invention-power as a form of ecological production.

The strategy thus resembles that of Thomas Ray at the Santa Fe Institute when he attempted to simulate artificial life. Governing laboring life and artificial life are perhaps more closely related than one might assume. Post-Taylorist production first establishes "simple rules"—human resource management and platform infrastructures—in order to generate the "complex behavior" of creative, cooperative, and entrepreneurial workers. The system therefore becomes second-order: it institutes the controllable parameters that unleash the uncontrollable order that secretly animates this system. It means that cybernetic rationalization no longer attempts to crush its paradoxes into perfect closure, but rather expressly navigates and valorizes the basic cybernetic paradox of closure and openness. Yet this openness does not only refer to what I referred to as the "official openness" of the system in the previous chapter—that is, its capacity to operationalize its outside on the inside. It does not simply mean reducing ecological incommunicability to systemic communicability. Rather, it entails an "unofficial openness," through which the system provokes and respects the very incommunicability of its outside as a source of surplus value that imperceptibly energizes the system. In the same way that statistics require trust and management demands workers' autonomy, communication systems need an incommunicable environment. What is distinctive in the case of cybernetic rationalization is that systems now accept and exploit the basic paradox of rationalization, namely that the system needs recourse to an environment it cannot yet must accept.

The transition from thermodynamic to cybernetic rationalization is fundamentally realized in this change in strategy toward the motif of the cannot-yet-must. This motif follows logically from the principle of self-reference and has thus always already afflicted the metrological closure of thermodynamic rationalization. Even for Weber (2005), as I detailed in chapter 2, the tragic logic of occidental rationalization was expressed in the fact that purposive reason cannot yet must supply its own ends. In this sense, cybernetic rationalization must be understood not as a supersession, but as a radicalization of thermodynamic rationalization. The basic paradoxical logic of rationalization remains

intact but is now expressly exploited rather than suppressed. This sense of "strategy" may take on several manifestations, for example, in the Regulation School's "mode of regulation" (Boyer and Saillard 2005), Boltanski and Chiapello's (2007) "spirit of capitalism," and Foucault's (2008) "governmentality." All of these concepts serve to differentiate historically changing modes of dealing with the lasting paradoxes of capitalist modernity, if not its unruly contradictions, antagonisms, and crises. They allow one to conceptualize, not just the material logic of post-Fordist capitalism—which, after all, exhibits many similarities to pre-Fordism and Fordism—but also its strategic organization of power and knowledge, technology and culture, closure and openness, what I call its mode of rationalization.

The transition from the white strike to the equally paradoxical imperative to be spontaneous thus signals the transformation of the mode of rationalization that occurred in the 1970s: the shift from the thermodynamic to the cybernetic mode. Capital's response to the artistic critique of the 1960s and 1970s was to incorporate its core values of authenticity, autonomy, and creativity into the production process. Capital stopped viewing this unwritten half of rationalization as something that was yet to be rationalized by its written half, and instead started appreciating how the unwritten half in fact constituted, as Wittgenstein (cited in Rasch 2000a, 80) remarked concerning his *Tractatus*, the most important half. In recognizing this ecology of rationalization, capital sought to overcome its ecological neglect and thus its vulnerability to ecological strike—the refusal of the outside. Instead, the outside needed to be put to work! Hence the post-Fordist slogan "Be spontaneous!"—an adage that seeks to liberate the system's uncontrollable outside, a rule that demands to be broken. Therefore, while the white strike showed Fordism that perfect obedience inevitably becomes disobedience, post-Fordism responded by turning disobedience into perfect obedience. It is a highly stylized way of saying that post-Fordist capital is no longer gripped by the pipe dream of perfect closure, but instead attempts, however imperfectly and precariously, to exploit society's paradoxes of closure and openness. Its metrological systems no longer try to totalize measurability but instead attempt to capitalize on the ecological potential of the immeasurable. Stressing both the continuity of paradox and the discontinuity in the strategic relation toward it, the cybernetic mode of rationalization is nothing more or less than the becoming-ecological of the thermodynamic mode.

NEOLIBERAL MYSTICISM

The cybernetic mode of rationalization accepts and exploits its animating paradox of closure and openness. In the production process, metrological systems

provoke their immeasurable environments in an attempt to valorize the mystical, whether such environments are the invention-power of workers, off-the-clock collaboration, or networks of free digital labor. Turning to the meso- and macroeconomic levels, it is possible to discover a similar motif of rationalization: the exploitation of paradox and the valorization of mystical ecologies. Recently, the study of this political-economic level has coalesced under the rubric of neoliberalism. Neoliberalism was first sketched as a "thought collective," or a network of scholars, journalists, and political and corporate leaders who were associated with the Mont Pelerin Society since 1947 (Mirowski and Plehwe 2009). Yet studies have since shown the messy and uneven development of "really existing" neoliberalism from a great variety of theoretical angles (Cahill et al. 2018). Neoliberalism or neoliberal capitalism, like post-Fordism more broadly, is best understood through the basic paradoxical logic of cybernetic rationalization.

Unexpectedly, the posthumous publication of Foucault's 1978–1979 lectures at the Collège de France in 2008 offered a prescient analysis of neoliberalism. Foucault's (2008) history of neoliberalism grasps the concept as what might be called a new mode of rationalization. For Foucault, neoliberalism refers to an epistemic shift, a transformation in the technoscientific organization of power and knowledge. More precisely, Foucault understands neoliberalism as a transformation in the liberal art of governing, or "governmentality." Liberal governmentality springs from the constitutive problem of self-limitation: the state must produce freedom through a power that forms a potential threat to this freedom (Foucault 2008, 64). The inverse of this paradox is the basic logic of biopolitics that I interrogated earlier: power operates through freedom. The art of liberal governmentality thus signifies the navigation of this dual paradox of biopolitics: freedom through power, power through freedom. Neoliberalism represents a shift in the nature of this navigation, a family of new and affiliated responses to the question of how to govern and how to self-limit. Analogous to governing the work place, the economy must be managed, not by assigning freedom and power (i.e., market and state) their separate jurisdictions, but by bringing them into productive contact.

For both the liberal and neoliberal mode of governmentality, the market operates as the arbiter of what counts as good governance. "The market," as Foucault puts it, "constitutes a site of veridiction" (2008, 31). For liberal governmentality, the state or the sovereign must ultimately govern for the market. Neoliberalism adds to this that the state must not only govern *for* the market but also *according to* the logic of the market: "The problem of neoliberalism is rather how the overall exercise of political power can be modeled on the principles of a market economy" (Foucault 2008, 131). As states and public sectors

are redesigned to emulate market principles, their mode of governmentality approaches subjects as market actors and entrepreneurial selves. *Homo economicus*, as Wendy Brown (2015) argues, comes to replace *homo politicus*. Governing "according to" the market explains why, as William Davies sums up, "neoliberalism is typically less concerned with expanding markets per se, than in expanding the reach of *market-based principles and techniques of evaluation*" (2017, 23). Importantly, moreover, the shift from "governing for" the market to "governing according to" the market also implies a shift from first-order to second-order government. Neoliberal governmentality does not intervene into the first order of market action, but rather limits itself to governing the second-order parameters that generate and order it. This is, *in nuce*, the way in which neoliberal governmentality navigates the dual paradox of power and freedom: government creates market freedom through parametric control.

Neoliberals have always explicitly distinguished neoliberalism from classical liberalism. Foucault (2008) names three central features of neoliberalism in comparison to classical, laissez-faire liberalism. First, the primary principle of the market is no longer thought of as the exchange of equivalents, but as competition between unequals (Foucault 2008, 118–19).[4] Competition, rather than exchange, comes to be seen as the driving force of the price mechanism. Second, and crucially, neoliberals view market competition not as a natural given but as an object of artifice or government. Markets do not arise spontaneously but must be created, stimulated, and even simulated. This brings us to the third and final feature of neoliberalism, which is that the state and the economy are no longer confined to their respective and mutually exclusive domains. Instead, bringing together these three features, neoliberalism acknowledges that the state must produce, provoke, and sustain market competition (Foucault 2008).

Emerging from the context of late nineteenth- and early twentieth-century monopoly capitalism, neoliberals recognized that unbounded competition tended to produce its opposite: widespread cartels, hierarchical businesses, and market monopolies. Fighting paradox with paradox, neoliberalism proposes that monopoly must break monopoly (Foucault 2008, 134). The state must free the market. Underlining the historical messiness of neoliberalism, this paradox of monopoly proves too narrow a definition. Even Friedrich Hayek, one of the main founders of neoliberalism, excludes a discussion of monopoly from his major work *The Constitution of Liberty*, "after careful consideration mainly because it seemed not to possess the importance commonly attached to it" (2011, 381). Neoliberalism instead should be understood as an approach to capitalist rationalization that seeks to *stimulate and simulate* market principles. Paradox forms an animating principle of this approach, since statist or interstatist power serves to generate market freedom, a point often captured in the phrase "strong

state, free economy" (e.g., Bonefeld 2017). As Jamie Peck observes: "Neoliberalism's curse . . . has been that it can live neither with, nor without, the state" (2010, 65). For neoliberalism therefore, the state is both a curse and a blessing, both poison and medicine. Neoliberal rationalization revolves around this point of undecidability. Rather than aiming to eradicate the paradoxes of freedom and power, market and government, it seeks to navigate them. It is why neoliberalism belongs to the cybernetic mode of rationalization.

Besides classical liberalism, neoliberalism has also always defined itself in opposition to economic planning. Like Frankfurt School critical theory's critique of instrumental reason, neoliberalism is a response to the petrifying logic of thermodynamic rationalization. Neoliberals associate this primarily with socialist planning, state interventionism, and expert rationalism: the road to serfdom is paved with calculation and control. Unlike Frankfurt School critical theory, however, they regard capitalist markets as sites of resistance against such rationalization: markets are mechanisms that ensure the decentralization of power. Calculation must be brought within the confines of the market order precisely to dissipate the calculating power of unlimited government. In the "socialist calculation debate" of the early twentieth century, neoliberals Ludwig Von Mises and Friedrich Hayek argued that the decentralized price mechanism represents a much more efficient calculator than any central planner ever could be (Mirowski and Nik-Khah 2017). Centralized calculation must falter, according to Hayek (1945), since all the relevant economic information is scattered across countless market actors in patchy and contradictory snippets. The price mechanism must be understood as a kind of calculating machine that organizes these snippets. Or, as he puts it in "The Use of Knowledge in Society," the market is "a mechanism for communicating information" (Hayek 1945, 526).

Already in the 1920s then, Mises and especially Hayek gradually come to think of the economy as an unrepresentable, incommunicable, unknowable object (Slobodian 2018, 55–90). They marshal market mysticism to break the calculating grip of thermodynamic reason. Hayek's linking of this mysticism to cybernetic information technology in the 1940s appears to be mostly coincidental.[5] From his 1952 work *The Sensory Order* onward, however, Hayek starts to explicitly base himself on cybernetics and systems theory (Lewis 2016; Oliva 2015; Rosser 2015). Under the influence of Ilya Prigogine, Garett Hardin, and Ludwig von Bertalanffy, he comes to view the market as a radically complex, emergent self-organizing system. By the 1970s, Hayek writes in the preface to the one-volume edition of *Law, Legislation and Liberty* that "it was largely the growth of cybernetics and the related subjects of information and system theory which persuaded" him to use phrases like "self-organizing structures" instead of "spontaneous order," "information" instead of "knowledge," and "system"

rather than "order" (2013, xxi).[6] For Hayek, then, markets are self-organizing, complex cybernetic systems energized by competition in which price signals function as the central feedback mechanism.

For Hayek, this mystical market system must be protected by the rule of law. As Foucault succinctly states: "The economy is a game and the legal institution which frames the economy should be thought of as the rules of the game" (2008, 173). It is what Quinn Slobodian has dubbed "cybernetic legalism" (2018, 224). Since economics must remain a modest discipline in the face of its sublime object, Hayek's focus shifts instead to the *constitution of the economy* in a double sense: its creation through the rule of law. This shift is not unique to Hayek. Indeed, in his 1937 work "An Inquiry into the Principles of the Good Society," Walter Lippmann—himself influenced by Mises and Hayek—already undertook a similar shift, which would have a formative influence on the development of both neoliberalism and ordoliberalism (Slobodian 2018, 76–81). In Hayek's economic constitutionalism, the spontaneous and mystical order of the economy—what he terms "catallaxy"—must be instituted or constituted through rules of conduct enshrined in law: the enforcement of contracts, the protection of property, and the guaranteeing of market entrance (2011, 338). These rules of conduct—in the form of morals, traditions, and habits—are themselves also, for the most part, a *"nomos"* or spontaneous order that evolves as a self-organizing system. Hayek's major innovation is to ground the mystical order of catallaxy in the mystical order of morality. This does not mean, however, that there is no place for deliberative design at all. The task of judges is both to articulate existing moral rules into law and to design new laws, so as to make the whole legal order more consistent and coherent (Hayek 2011; 2013).[7]

It is this last step that distinguishes Hayek from classical liberals: a well-ordered catallaxy requires constant experimentation with its parameters, that is to say, its constitution (e.g., Hayek 2011, 340). As Miguel Vatter writes: "The paradox here is that Hayek's 'evolutionary' understanding of *catallaxy* requires a new activism on the part of the judicial power" (2018, 378). For Hayek, the market order or catallaxy must be run like the Artificial Life simulation at the Sante Fe Institute. Through a second-order mode of government, the "simple rules," the parameters, or the constitution of the market system must be carefully designed and controlled so that it spawns the "complex behavior" of that uncontrollable catallaxy. Unlike thermodynamic rationalization, this is not a first-order form of interventionism: "The task of the lawgiver is not to set up a particular order but merely to create conditions in which an orderly arrangement can establish and ever renew itself" (Hayek 2011, 230). Hayek, under the influence of cybernetic theory, likens this to a physical form—that of the crystal: "We can never produce a crystal or a complex organic compound by placing

the individual atoms in such a position that they will form the lattice of a crystal or the system based on benzol rings which make up an organic compound. But we can create the conditions in which they will arrange themselves in such a manner" (Hayek 2013, 38; see also 2011, 230).

The rule of law, together with a host of metrological and financial arrangements (Hayek 2011, 332), must be understood as a communicable system that produces an incommunicable complexity. In what amounts to a cybernetic seance, the government or the state must incite the mystical qualities of the market. Since, as we learn from Foucault (2008, 32), the market functions as the site of veridiction, the statist system is legitimate to the extent that it succeeds in inciting the mystical. This is how, from the perspective of the state, the market order *ecologically legitimates* the state, much like James Scott's *mētis* aporetically powers formal organization. Conversely, from the perspective of the market as a system, the state appears as an outside that is neither efficient nor legitimate yet nonetheless serves as a guarantor for its own efficient and legitimate operations. The state, in other words, forms an outside that the market *cannot yet must* accept. Neoliberalism differs from classical liberalism in that it embraces these paradoxes and attempts to make them productive. In contrast to thermodynamic rationalization, the cybernetic mode of rationalization is not primarily directed at the maximization of efficiency but builds a more principled case for the production and harnessing of incommunicable order.

Of course, one cannot extrapolate from Hayek's writings to neoliberalism as such. Yet Hayek's cybernetic mysticism has much wider ramifications. As Mirowski and Nik-Khah (2017) show, there is a larger story to tell about the influence of cybernetics on contemporary "market design" (see also Mirowski 2002). In a somewhat tortuous historiography, they detail how the self-professed market socialists in the Cowles Commission of the 1940s grappled with Hayek's challenge of an incommunicable market order and the implications of information theory for economics (see Morozov 2019). It led to the prominent stream of "mechanism design" or "market design," which aimed to do exactly what its name suggests. These design practices grew from a combination of viewing the market as a giant information processor, the need for regulators in the 1960s to improve markets, and the rising power of the neoliberal "thought collective" of the Mont Pelerin Society (Mirowski and Nik-Khah 2017, 145–47). If the market was an information processor, then economists should design its algorithm. Markets became computers: problem-solving technologies for governments. Governments could, for instance, combat pollution through emissions trading or improve the quality and efficiency of universities by inciting competition between them and their scientific personnel (De Angelis and Harvie 2009). A

private company such as Uber uses markets in the same way: It designs a market mechanism for quasi-entrepreneurs as a source of ecological complexity (Mezzadra and Neilson 2019, 83; Srnicek 2017). Neoliberal governmentality, in this sense, not only *stimulates* but also *simulates* markets. For Mirowski and Nik-Khah (2017, 240), it shows the paradoxical function of the economist who simultaneously operates on the basis of an "artificial ignorance"—that the market knows best—*and* from the "god's-eye knowledge" of market design. It expresses the paradox of cybernetic rationalization: communicable simple rules generate an incommunicable complexity of behavior.

Rather than profess a crude universalization of market principles then, neoliberalism has always been fascinated by the environment: it accepts that the capitalist market requires a scandalous outside. As a result, neoliberalism is not guided by an ethos of dissolution but by a mission to valorize a multiplicity of paradoxes between inside and outside. From the perspective of the market order, the state is the paramount example of such an outside. The German tradition of ordoliberalism, led by thinkers like Eucken, Böhm, Müller-Armack, Röpke, and Rüstow, adds civil society to this duality. Catholic economist Wilhelm Röpke, president of the Mont Pelerin Society from 1961 to 1962, stood as a founding exponent of the German postwar "social market economy" (*soziale Marktwirtschaft*). Much more than the Austrian and Anglo-American neoliberals, these German ordoliberals note the corrosive societal and moral effects of market mechanisms and interpersonal competition. In a Polanyian vein, they assert that capitalist markets tend to undermine the social conditions required for their own reproduction. The market order must, therefore, be protected, instituted, and ordered (*Ordnungspolitik*) through an ecological triangulation with both state and society. To secure this fragile market order, the state must not only craft economic policy, but also a "policy of society" (*Gesellschaftspolitik*) that produces the requisite "social environment" (*soziale Umwelt*) for market competition (Dardot and Laval 2013, 79).

Attention to this ecological thought with respect to traditional social mores also offers a lens through which to study the historical symbiosis between neoliberal and conservative powers in the emergence of really existing neoliberalism. In *Family Values*, Melinda Cooper (2017) demonstrates how in the case of the United States such a symbiosis has proved crucial in rolling back social democratic welfare programs by appealing to private family responsibility. Where the state withdrew, families had to step in. "In a somewhat paradoxical fashion," she observes, "private family responsibility would become the guiding principle of social policy" (313). Historically and politically, this paradox entails, as she concludes, that "neoliberalism and social conservatism are thus tethered together by a working relationship that is at once necessary and disavowed"

(63). In light of Cooper's research, it becomes clear once more that social repro-
duction has not been wholly dissolved into economic production, but that the
former is still required precisely as an outside to sustain the latter as an inside.
This insight is also crucial to theorizing neoliberal capitalism's most recent
mutations, which suggest that the neoliberal market order is compatible with
illiberal and authoritarian governments, or regressive social codes (Hendrikse
2021; Davies and Gane 2021). This should come as no surprise once one recog-
nizes the paradoxical nature of neoliberal capitalism, notably that the closure
of political systems is precisely what produces the openness of capitalist mar-
kets. Technocracy and populism—or "undemocratic liberalism" and "illiberal
democracy," as Cas Mudde (2021) has called it—are two separate roads that both
lead to market universalism (Brown 2019).

Neoliberalism's paradoxical quality makes it a flexible and deceptive his-
torical force. After the 2008 financial crash, public opinion soon declared
neoliberalism dead. Bailouts of systemic banks specifically had supposedly
violated the neoliberal market logic, requiring the state to step in and sort
things out. Yet, as Martijn Konings (2018, 113) has shown, bailouts are no
stranger to neoliberal finance but belong to the time-honored tradition known
at the Federal Reserve as the "mop-up after" strategy. The neoliberal financial
system explicitly mobilizes the self-referential paradoxes spawned by the
infinite leveraging of leverage. The exception simply serves to extend the rule,
giving the system a swift reboot at the threat of terminal crisis (Konings 2018).
Today, in lieu of real economic policy, the bailout has become the crude instru-
ment of choice for continuing business as usual, from the banking crisis to the
Covid crisis to the energy crisis. Even "bailouts for the people" serve to extend
the life of neoliberal capitalism rather than to end it. It is what Gareth Fearn
(2022) has called "ransom capitalism": pay up so the status quo can live another
day. During the Covid crisis, too, it seemed as if neoliberalism had finally given
out, with spectacular fiscal and monetary responses being rolled out that were
"once advocated by radical Keynesians" (Tooze 2021, 12–13). Yet whereas the
means may have been Keynesian, the end goal was decidedly neoliberal: price
stability in the turbulent financial markets (Tooze 2021, 149–50). Neoliberalism
lives by dying.

The bailout resembles that other central policy instrument of the pandemic
years: the lockdown. In contrast to Asian and Oceanic countries, North Amer-
ican and European states were hesitant to engage in social interventionism in
their pandemic response, a clear neoliberal reflex. The Western pandemic
response, one might say, was rationalized cybernetically, limited to second-
order tweaking and averse to first-order interventionism. Cybernetic techniques
were mobilized to map and model "disease ecologies," yielding the curves that

desperately needed flattening (see Bratton 2021). Using real-time feedback from hospitals and test centers, states began tweaking the "simple rules" that gave rise to the "complex behavior" of the population and, by implication, the virus. These simple rules consisted in appeals to individual responsibility, such as social distancing, masking, and limiting gatherings. "The rest," as the Dutch health minister would often exclaim helplessly, "is behavior," as if pointing to some mystical limit of government action. At most, the population's behavior could serve as the input for another round of tweaking the rules. Yet the policy of constant optimization gelled badly with the logarithmic crisis resulting from viral network effects. Regularly, therefore, governments had to take out their policy bazooka: the lockdown. Again, it is seductive to see this as the retreat of neoliberalism and the return of the interventionist state, with governments going so far as locking people up in their own homes. Yet paradoxically, the lockdown signaled precisely the absence of interventionist policy.[8] The lockdown operated according to a similar logic as the bailout, as an exception to the status quo so that it may continue.

Without wanting to claim to have given an exhaustive overview of neoliberalism scholarship, it should be clear that neoliberalism and neoliberal capitalism share an abstract thought motif with cybernetic technoscience and post-Fordism in a wider sense. There is a clear parallel, for instance, between the logic of bailouts and lockdowns, on the one hand, and the post-Fordist adage to "Be spontaneous!" on the other. Both call for exceptions that affirm the rule, exploiting the paradoxes of the social. Neoliberalism thus sits firmly within the cybernetic episteme. Political economy is no longer characterized by an ethos of totalization sanctified by a metric of systemic efficiency, but shifts its gaze to a multiplicity of outsides, which it seeks to valorize by exploiting the paradoxical relations that exist between them and the market system. First-order interventionism is superseded by second-order governmentality, while total control is relinquished for parametric control. Neoliberalism does not entail the universalization of market openness through the elimination of thermodynamic metrological closure. Rather, it seeks to produce the openness of markets precisely *by way of* metrological closure. This amounts, as William Davies aptly suggests, to challenging "Deleuze's assumption that 'control societies' are *succeeding* 'disciplinary societies,' and suggest[ing] instead that the former are sucking the energy and power from the latter, but nevertheless depend on them" (2015, 54; see also Lambert 2020, 72). As part of cybernetic rationalization, then, neoliberalism seeks to control communicable parameters in order to provoke an ecological incommunicability it cannot fully command. Neoliberalism must be thought of as part of a wider shift to cybernetic rationalization—a radical transformation in knowledge and control. It refers to the

deployment of cybernetic technoscience and its accompanying material-discursive systems of which, as Davies (2015, 51) again perceptively observes, "the price system is the preeminent example, but no more than that."

VALORIZING THE INCOMMUNICABLE: CAPITALISM AND ECOLOGY

The cybernetic mode of rationalization must be understood as a radically paradoxical process. No longer is it thrust forward by a totalitarian spirit or an ambition for perfect closure. This is not to say that the tendency toward communicability, exchangeability, and calculability is alien to our times and that the spiraling into control of metrological systems belongs to a (now past) solidified phase of modernity. The systemic calculation is now deployed primarily to incite its Other: an incalculable, incommunicable, mystical environment that nevertheless forms the lifeblood of the system. Cybernetic rationalization exists by exploiting this paradoxical movement, by *driving out* the incommunicables that systems of communication silently *thrive on*. The process is embodied in the various "dispositifs" that aim to valorize the paradoxical relation of the cannot-yet-must. It is now time to spell out how this process of valorization works in more abstract detail. How must this paradoxical play between inside and outsides be understood exactly? How is this mode of rationalization constitutive of the process of capital accumulation? What is the place of capitalism and the capitalist economy in all this?

The cybernetic rationalization of the capitalist economy breaks with the thermodynamic mode of rationalization and its attitude toward totalization and perfect closure. Thermodynamic rationalization, as detailed in chapter 2, is centered on what Luhmann calls operational closure. The system seeks to reduce the complexity of its environment by translating perturbations from the environment into communicable self-referential operations. This basic principle of self-reference or operational closure means that the external can only be communicated as internal: The system paradoxically includes its outside as inside. The system, in this sense, seeks to totalize its sphere of communicability by selectively internalizing its environment. In the case of the economic system, this operational closure takes place under the banner of commodification and the subsumption of social life under metrics of exchangeability, value, and efficiency. When observed from a perspective that sees both system and environment, moreover, dominant rationalizing metrological systems can be seen to exert pressure on their environments, to become commensurable with them through an expansion of structural couplings. Through this self-referential logic of expansion, metrological systems *spiral*

into control by way of self-production, self-performance, and self-reinforcement. The commensurating expansionism of metrological systems forms the logic of closure that is characteristic of capitalist modernity. It was foundational to the original critique of instrumental reason by the Frankfurt School and remains essential to understanding technocratic reason, bureaucratic thickening, and market expansion in our own time.

When viewed through a Luhmannian lens, however, the closure or totalization of metrological rationality is irremediably paradoxical. For Luhmann, the system's totalization through operational closure denotes a form of nontotalizing totalization. The system, first of all, generates a kind of internal openness, contingency, or radical difference due to the "reentry" of its distinctions: "The system becomes incalculable for itself" (Luhmann 2012, 19; see Clarke 2008, chapter 3, for a discussion). Second, the system's operational closure produces a structural openness to its environment: its internal communicability makes it receptive to surprises from its incommunicable environment. As Luhmann (1995b, 26) puts it: "Only complexity can reduce complexity." This is what I have called the official openness of the system, where the system achieves the ability to operate on structures in its environment—what Luhmann (1995b, 213) calls "performances" or structural couplings. This is an official form of openness, since these structures are integrated into the operations of the system; the operations refer to the environment qua system. Finally, and crucially, the system achieves an unofficial openness to its environment, a form of ecological thought that is underdeveloped in Luhmann's writings. In this case, the system is dependent on the environment qua environment. This is what is expressed in the motif of the cannot-yet-must: The system relies on an ecological complexity that it cannot acknowledge as communicable, yet that it needs for its own communications to make sense. Unofficial openness thus inverts official openness: The system employs ecological pressure, not by transforming ecological complexity into communicability, but precisely by respecting its very incommunicability. It is this third type of openness that forms the key to unlocking the secret of cybernetic rationalization.

The system is unofficially open to its environment in the same way that the written half of Wittgenstein's *Tractatus* is open to its unwritten half—the most important half, as Wittgenstein enigmatically claimed. The environment of the capitalist economy and its metrological systems forms the unwritten half of capitalist rationalization. This environment is what Wittgenstein called "the mystical" (1999, §6.522): that which cannot be said but which shows itself. The mystical, in essence, forms the ecological condition of the system; the outside that animates the inside. Yet, unlike in the case of Wittgenstein, the mystical in cybernetic rationalization does not denote a single ecology, but

rather a plurality of ecologies. One of these mystical ecologies, for instance, was described by Lyotard in *The Postmodern Condition* (1984). He observed that narrative knowledge paradoxically conditioned the knowledge of modern science. The self-referential system of *science*, he argued, requires recourse to an environment of *narrative knowledge* for its own legitimation. Yet from the perspective of science, Lyotard writes, "narratives are myths, fables, legends" (1984, 27). Science thus cannot yet must accept narrative as a legitimate form of knowledge. By driving out nonscientific forms of knowledge, science paradoxically delegitimates its own legitimation. Science provokes its own ecological strike. Likewise, in the sphere of social organization, the same modern ethos sought to exorcise the mystical in its quest for "scientific management" and total metrological control, thus undermining the unmanageable *mētis* (Scott 1998) or *"human* activity" (Castoriadis 2005) that secretly put it into motion. In the thermodynamic mode of rationalization, modernity's vital subsystems struggle to obscure and smooth out their animating paradoxes in an effort to achieve total communicability and optimize efficiency. These systems all attempt to subsume their respective mystical regions with an ethos of closure.

As Lyotard writes in *The Postmodern Condition*, an early report on cybernetic capitalism or "computerized societies," postmodern science (modern science's successor) found a new response to this crisis of ecological legitimation. In contrast to its precursor, postmodern science no longer attempts to smooth out its self-referential and ecological paradoxes with the aim of total efficiency and control. Formulating the basic principle of cybernetic rationalization, Lyotard claims that postmodern science instead accepts these paradoxes and attempts to make them productive. In contrast to thermodynamics, suggests Lyotard, postmodern science "has little affinity with the quest for performativity," that is, with the "positivist 'philosophy' of efficiency" (54).[9] As Lyotard explains: "[Postmodern science] is producing not the known, but the unknown. And it suggests a model of legitimation that has nothing to do with maximized performance, but has as its basis difference understood as paralogy" (60). Postmodern science legitimates itself by generating new ideas that were previously inexpressible (65), or far more precisely, by holding out a space for the inexpressible, which he later came to call bearing witness to "the differend" (Lyotard 1988). Accepting and putting to work its self-referential and ecological paradoxes, postmodern science thus incites and exploits the mystical.

Yet in 1979 Lyotard considered the most recent mutations of capitalism to be antagonistic to this scientific advance. As science and society were becoming increasingly computerized, capital remained bound to the old technoscience of fire and heat, thus threatening cybernetic incommunicability with the

totalitarian terror of communicability. Strangely, Lyotard points to Luhmann's systems theory as a quintessential model for this antiscientific and "terrorist" technocracy: "It is its [narratives of legitimation] absence for which the ideology of the 'system,' with its pretensions to totality, tries to compensate and which it expresses in the cynicism of its criterion of performance [i.e., efficiency]" (1984, 65). Not only did Lyotard miss the fact that by that point Luhmann had already exchanged the thermodynamic input/output model for an irreducibly paradoxical and thus very postmodern system/environment schema, but he also failed to recognize at the time—though one can hardly fault him for that—that the capitalist economic system was in the process of jointly shaping the mode of rationalization he recognized as paralogical science. Be that as it may, Lyotard's report does give us an early description of the cybernetic mode of rationalization by detailing how, after running into the self-referential paradox of the cannot-yet-must, science adapted by accepting and valorizing this paradox rather than by struggling against it.

Ironically, using Luhmannian systems theory, we can now spell out how capitalist mysticism has become an integral part of cybernetic rationalization. In modernity, as discussed in chapters 1 and 2, the capitalist economy has acquired what Bob Jessop (2002, 25) calls "ecological dominance" with respect to the rest of the social ecosystem, a notion that signals "the structural and/or strategic capacity of a given system in a self-organizing ecology of systems to imprint its developmental logic on other systems." This capitalist economy, moreover, is tightly coupled to ecologically dominant metrological systems that mobilize notions such as GDP, efficiency, and credit ratings. Without violating the operational closure of other function systems, then, the capitalist economy and its metrologies can expand power by pressuring systems in their environment into commensuration through structural couplings. These structural couplings represent the official openness generated by the system's metrological closure. Crucial to cybernetic rationalization, however, is also the way in which the capitalist economy is able to provoke and govern an ecological incommensurability to which it is unofficially open, and which secretly animates it. Ecological dominance, then, also refers to the capitalist economy's capacity to provoke or incite this environmental complexity. Capitalism is the name for the social system in which the capitalist economy is ecologically dominant in the dual sense of being able to simultaneously pressure its environment into communicability *and* into incommunicability. Thus, cybernetic rationalization refers to the strategic relation to this paradoxical duality of capitalism that accepts, governs, and valorizes it.

To see how cybernetic rationalization functions within capitalism, it is first necessary to appreciate the paradoxical and dual extractive logic of capitalism

in systems theoretical terms. First, value is an emergent property of the capitalist economy, as are labor-power and capital. All three are historical elements of the capitalist economic system and are produced through the logic of autopoiesis or, synonymously, operational closure. As the metrology of value spirals into control in the process of capitalist modernization, the capitalist economy assumes an ecologically dominant and self-expansive movement. This self-expansion is not merely coincidental but is inscribed into the code of the capitalist economy itself. The economy does not run, as Luhmann (1996) suggests, on a logic of equivalence or the code of payment/nonpayment. This is to mistake the market, or what Marx calls the sphere of circulation, for the capitalist economy. Rather, the economy operates on the code of valorization/nonvalorization, where valorization refers to the generation of nonequivalence, namely the production of surplus value (Marx 1976, 302). Within this context, Luhmann (1996) suggests, money functions as a symbolically generalized medium to operate on the code—a universal equivalent of sorts. This installs a "preference" for the positive value—in this case, for valorization: "The positive value functions as a preference, and hence as a symbol for connectivity, *and at the same time, it functions as legitimation for the use of the code itself*" (Luhmann 2012, 219). Valorization in the capitalist economy thus becomes its own self-referential purpose or, as Marx writes, "the circulation of money as capital is an end in itself [*Selbstzweck*], for the valorization of value takes place only within this constantly renewed movement. The movement of capital is therefore limitless [*maßlos*]" (1976, 253).

Capital must be understood as the unity of the binary code on which the capitalist economy turns. As Luhmann explains, "the unity of the whole is not outside or above the parts but is identical and not identical with the sum of them at the same time" (1989, 134). Signaling the immanent and differential logic of the system, capital is the paradoxical unity of difference. The only unity of capital is difference, but its difference is an emergent property of its unity. Capital therefore is not identical to the recursive distinctions of the capitalist economy. Capital, as Marx writes, is "constantly changing from one form into the other, without becoming lost in this movement" (1976, 255). As a result, Marx continues, capital is simply "value in process" or value in motion. Capital, as the paradox of unity and difference, is "unfolded" in the process of valorization, which means that capital differentiates through time and through various economic operations (e.g., money, commodities, raw materials). For instance, money is only capital when it is observed through the valorization/nonvalorization distinction—that is, when it is advanced to make more money. Since this valorization process occurs within the self-referential limits of the operationally closed system, capital's "valorization is therefore self-valorization" (255).

This gives capital, Marx writes, an "occult ability" (255)—a mystical capacity that allows it to add value to itself. Yet here we get a taste of Marx's bitter satire. The "occult ability" is an ideological illusion that must be dispelled. The trick is to explain where surplus value really comes from. It cannot come from the exchange of equivalents in the market, reasons Marx, since we need to explain nonequivalence and growth. The same point holds for metrological systems, with their principles of equivalence and communicability, that rationalize into increasing closure. Surplus value as nonequivalence must thus be produced beyond the reach of these metrological systems, somewhere in their environments. Consequently, Marx leads us down into the "hidden abode of production" (279): the ecological region of production. To dissipate the faux-mystical qualities of capital accumulation, we need to shift our gaze to the environment from which the self-valorization of capital secretly draws its energy. What is mystical to the system should not remain mystical to us. The production of value and surplus value in the economic system can only function on the basis of an *invaluable* environment that it cannot yet must accept for its very functioning. For Marx, this invaluable environment is the concrete human worker who must sell their labor-power for a wage. Labor-power, writes Marx, is "a commodity whose use-value possesses the peculiar property of being a source of value" (270). By internalizing the human capacity to create value through work as "labor-power," the capitalist system can draw surplus value from its human environment. This is the exploitation of waged labor, which secretly animates the "occult ability" of seemingly self-valorizing capital.

This ecological interpretation of surplus value production has the potential to lead beyond Marx's quasi-humanist focus on official wage labor. If the economic system draws its lifeblood from its ecology, we should try to look, as Nancy Fraser has phrased it, for "an abode behind the abode" (in Fraser and Jaeggi 2018, 30). Racialized and gendered forms of unwaged labor, as well as the public sector and nonhuman natures, form hidden realms of extraction and "expropriation." "Capitalist economies," as Fraser states paradoxically, "constantly siphon value from those realms while simultaneously denying that those realms have any value" (154). This ecofeminist impulse, which goes back to Rosa Luxemburg (2003), has also been taken up by Jason Moore, who similarly theorizes the ecological relations in which the official elements of capitalism are enmeshed. His innovation is captured in the following paradoxical expression: "Value does not work unless most *work* is not valued" (Moore 2015, 54). Moore argues that the official system of capitalist paid labor secretly relies on an unofficial environment of unpaid work/energy: "The historical condition of socially necessary labor-time is socially necessary unpaid work" (69). The *exploitation* of waged labor thus vitally depends on an outside of ecological

appropriation. Capitalism's law of value, in other words, depends upon what Moore calls the "law of Cheap Nature," where a myriad of unpaid substances—namely uncommodified labor, food, energy, and raw materials—are funneled into the official process of exploitation without paying for their full worth. This entire dynamic of exploitation and appropriation yields what Moore calls the "world-ecological surplus" (95)—or more simply: "ecological surplus." This is "the ratio of the systemwide mass of capital to the systemwide appropriation of unpaid work/energy" (95).

The size of this ecological surplus, then, depends on the measure of success with which the capitalist economy is able to generate surplus value from its paradoxical system-environment dynamics—both official and unofficial. Yet the "production" of surplus value takes place at an irreducibly paradoxical site. Since value is a self-referential metric of the capitalist economy, what is to be appropriated as surplus value from its environment is not yet value. Hence, as Moore phrases it, "the value *form* and the value *relation* are nonidentical" (2015, 65). The value relation encompasses the wider system-environment dynamics that condition the value-form of the economic system, however imperceptibly from the perspective of the system. Doing some philosophy from the margins, Moore therefore remarks in a footnote that "the condition for quantification within the commodity system (units of labor-time) is a world of unpaid work that cannot be quantified" (95). The environment forms an immeasurable, incommunicable, mystical realm that aporetically enables and conditions the measurability, communicability, and calculability of value.[10]

Viewing this play of economic value and ecological wealth from a third perspective reveals a strange dynamic between an operationally closed system, the economy, that does not sustain a one-to-one correspondence with its environment. Abstract labor will never have a perfect correspondence to concrete labor, and the accumulation of capital is nonlinearly connected to the accumulation of energy. There is therefore not a single metrology with which one can totally commensurate the value that is located within the economy with the *sources of value* that are located outside this metrology, whether in terms of labor units, calories, or foot-pounds of work. When one asks where surplus value comes from, the answer must always contain the qualification that value and the source of value remain *incommensurable* since they are separated by a double complexity differential. Their relation is, in systems theoretic terms, doubly contingent.

So, rounding up, how does capital extract value from its various ecologies? For starters, the source of value lies in the economy's environment. This source of value, however, must first be "produced." The system is involved in what Moore calls "environment-making" (2015, 64): the "production" of ecological

complexity. Such environment-making involves, first of all, practices in the environment of the economy that are to some extent independent from capital and that can even work in normative registers that are antithetical to capitalist valorization, like care labor or informal organization. Yet in cybernetic rationalization, the system itself also strategically engages in such environment-making. However, "environment-making," it must be noted, is strictly speaking a misnomer, since the system cannot operate on its environment and thus cannot directly make, produce, or indeed create it. Instead, the system *incites*, *seduces*, or *provokes* the ecological complexity to which it is unofficially open. It does this by instituting internal, simple, and calculable metrological rules, such as human resource techniques, social media algorithms, or economic constitutions. This is how the logic of closure that continues to proliferate today aims to incite an ecological complexity to which it is paradoxically open in a dual sense—officially (through which it reduces and realizes it), and unofficially (through which it produces and incites it). As Moore summarizes: "Modernity is a therefore mighty control project. It effects all manner of quantifying and categorising procedures oriented towards identifying, securing, and regulating historical natures in service of accumulation. Counterintuitively, these procedures are not primarily aimed at directly commodifying natures. They are aimed at appropriating unpaid work/energy. Commodification can and does occur. But it must be kept in check, and if accumulation is to revive, must serve the 'greater good' of appropriation" (95).

Under cybernetic rationalization, this paradoxical control project has become official policy. The capitalist economy now expressly spirals through its animating paradoxes of closure and openness. Through operational closure, the economy self-produces its logic of value, valuation, and valorization. To strengthen its position in the wider social ecosystem, the capitalist economy symbiotically couples itself to metrological systems and starts to spin further into closure and control. This is the old motion of Weberian thermodynamic rationalization that we can still recognize in our own time in the form of bureaucratization, commodification, and platformization. They form the motions of closure through which the system becomes officially open to its environment: an increasing share of the social can now be processed in its internal accounting of value. Under cybernetic rationalization, however, closure is now at the same time expressly enlisted to generate an unofficial openness: to provoke an ecological complexity that forms the invaluable source of surplus value and so aporetically animates the official system. This openness is in turn followed by a motion of closure producing official openness, through which the system reduces and valorizes this ecological complexity, realizing it as surplus value. This swirling cybernetic logic of closure and openness,

measurability and immeasurability, or expressibility and the mystical, typifies the dominant cultural strategy of the present. It is what, in loose reference to Max Weber, might be called *inner-worldly mysticism*. What for Weber (1946, 326) represented a logical possibility without historical referent is now the dominant mode of our time. It is a materialist brand of mysticism that brings the incommunicable down to earth and puts it to work. It is the cultural attitude of cybernetic rationalization.

Through the countervailing tendencies of closure and openness, then, the capitalist economy is caught between a drive for the infinite expansion of communication and the need to sustain and provoke a mystical environment. It is stuck between the desire for internalization through official openness and the necessity of externalization through unofficial openness, torn by the dual pressures of its principle of equivalence and its principle of valorization. The closure of the system is required for both forms of openness, for both its potential for communicability and incommunicability. The system's motion is the unfolding of these paradoxes of openness and closure. While riddled with crisis-tendencies and, ultimately, the potential for self-destruction, this paradoxical motion at the same time pushes the system onward without measure (*Maßlos*). While this paradox has always animated the capitalist economy, even in the thermodynamic episteme, the system under cybernetic rationalization has adapted its strategic relation to it. In contrast to its thermodynamic predecessor, the system now accepts and valorizes its constitutive paradoxes of closure and openness—those of simple rules and complex behavior. This is, finally, how the agents of capital today exploit an environment that the capitalist economy cannot yet must accept. It is how capital provokes and valorizes the mystical.

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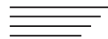
Biopower has gone digital. Governing life, Thomas Ray found at the Santa Fe Institute, means programming, monitoring, and recalibrating a bundle of zeros and ones. The rest is up to . . . what exactly? Out of nowhere, through mystical yet material forces, evolution takes shape. There emerges a complexity that cannot be reduced to simplicity, but that can nonetheless be provoked by it. Governing life, suggested Ray, means governing a cybernetic machine. The government of life always happens one step removed from it, in the same way Luhmann's system can only ever observe itself observing. Governing living labor is no different. The calculus of human capital, the calls for spontaneity and transgression, platform algorithms, *Gesellschaftspolitik*, and economic jurisprudence are all examples of simple rules that aim to summon a rift that these rules can never hope to cross into complex behavior. The agents of the

system—capital, management, sovereignty—have recognized that the uncontrollable on the other side of this mystical rift, far from being merely a threat to total control, is also its superlative. Cybernetic rationalization in the capitalist social system therefore operates on the basis of this rift, this power-inflexed complexity differential.

Autopoietic systems are digital systems. They are either operationally closed or not; self-referential or not. Yet precisely because they are self-referential, they can refer to another: they are open because they are closed. Accepting the digital binary thus means moving beyond it. A totally closed system does not exist, nor does a totally open one. The system is paradoxical on all sides, both with regard to the system itself (the paradox of self-reference) and with regard to its environment (the paradox of the cannot-yet-must). The question is how the system manages or governs such paradoxes. Under thermodynamic rationalization, systems attempt to ignore, suppress, or even eliminate them. The dream of perfect closure on the inside leads to a neglect of its openness to the outside. It is one of the explanations for why Fordism ultimately proved to be so fragile: it strove to degrade the environment on which it depended. Under cybernetic rationalization, systems attempt to learn from this mistake. It seeks to stimulate and simulate a mystical outside through the process of closure. It becomes acutely aware of its constitutive paradoxes and harnesses, exploits, and valorizes them. A new strategy of exploitation supersedes the old strategy of suppression.

Under cybernetic rationalization, the ecologically dominant capitalist economy thus finds itself in a double bind that it desperately tries to put to work. It strives simultaneously to draw its environment into its sphere of communicability *and* to provoke and respect its very incommunicability. The capitalist economic system simultaneously needs to measure and stabilize value, to provoke an immeasurable source of surplus value, and then to realize it as such. Its endless self-expansion is therefore also predicated on a principle of self-limitation. The system paradoxically spirals into control in order to spiral out of control as it works to valorize the paradoxes of closure and openness, simple rules, and complex behavior, the material and the mystical. In order to navigate these paradoxes successfully, capital in the age of cybernetic rationalization abides by the words of Thomas Ray himself: "What my work is about is creating the environment for evolution—the artist—to work in."

EPILOGUE

Cybernetic Irrationalization

The essential figure of modernity is not the straight line but the circle. James Watt's coal-powered steam engine, which brought in the age of industrialized capitalism, for instance, was first used to drain the coal mines, allowing access to more coal with which to power the engine (Stoekl 2007, xiv). It is an innocuous yet telling example, since similar figures abound in other central facets of modern organization and thought. According to Immanuel Kant (2012), enlightenment could develop only if reason were capable of *self-legislation*—if it could function as its own tribunal. The circular imperative was matched in the practical sphere by the call for the *self-determination* of the people, a new political collective that would establish itself through its own autonomy. Furthermore, in the domain of political economy, Karl Marx (1976) had shown that the basic motion of capitalist accumulation resided in the fateful *self-valorization* of capital. As a final example of circularity, the sociologist Max Weber (2005) observed that what most typifies modern societies is the *self-application* of purposive rationality in "Occidental rationalization," with which he meant the calculation of the optimally efficient means for the sake of yet more efficient means. It is this final mode of circularity that has been the topic of this study.

Circles are deceptive figures. Rather than represent eternity and sameness, they draw one into the unruly abyss of self-reference—where the monsters of undecidability, unpredictability, and paradox lurk. As the paradigmatic example of the liar's paradox ("This sentence is a lie") shows, self-reference can trap the unwary in a precarious loop. In this case, if the sentence lies, it is in fact true; if it is true, however, it lies. Similar miseries afflict the modern circles noted above. In the case of Kant's project of critique, the hope for the self-legislation of reason immediately spawned the dark prospect of its failure. It led his contemporary Friedrich Jacobi to warn of "nihilism," instead embracing the paradox that the founding of reason required an irrational leap of faith. It sparked

a controversy over the authority of reason of which the aftershocks are felt to this day (Beiser 1998). In modern democracies, analogously, the principle of the people's self-rule has to contend with the uneasy fact that the people must remain absent. The people, in Ernesto Laclau's (2005) formulation, are an "empty signifier": a point of contestation rather than substance. Likewise, the self-accumulation of capital is fraught with the many contradictions and antagonisms Marx and his followers have detailed, anticipating the fabled day of capitalism's collapse (Marx and Engels 2008). Weber (2005), too, displayed great sensitivity to the paradoxes that sprang from modernity's circularity. As purposive reason, the logic of optimal means became totalized throughout society, Weber saw that it reverted into its very opposite: value-rationality or the logic of setting ends. The means had become ends in themselves. It signaled, for Weber, the madness that accompanies the modern—the tragic irrationality of rationalization.

With this epilogue I would like to leave the reader with some reflections on how cybernetic rationalization has given rise to current forms of irrationalization. I am thinking here of the renewed surge in radical-right politics, the growing prominence of conspiracy theories in public discourse, and the resulting insurrections of which the storming of the German Reichstag and the U.S. Capitol are the most dramatic and violent examples. How is it possible that in the Age of Information we find liberal, holistic antivaxxers marching alongside neo-Nazi commandos in antigovernment rallies, high on large doses of mis- and disinformation? Why, to put it differently, do our cybernetic "societies of control" often seem so crazily out of control? To answer these questions, this epilogue will develop the concept of "inner-worldly mysticism" as the cultural attitude of cybernetic rationalization. Inner-worldly mysticism is to cybernetic rationalization what inner-worldly asceticism was to capitalism for Weber and what myth was to Enlightenment for Adorno and Horkheimer. The key to understanding this connection is realizing that cyberneticians and mystics both celebrate the incommunicable as the source of ultimate truth. Today's irrationalists must be understood as inner-worldly mystics, historically and philosophical indebted to cybernetic venerations of the ineffable. Specifically, radical-right conspiracists represent an alternative way of navigating society's paradoxes of closure and openness, mobilizing the incommunicable in a distorted way. The current social irrationalisms are therefore the corollary of cybernetic rationalization, representing a simultaneous movement of irrationalization that shows how modernity's circles can turn destructive as much as they can be made productive.

To set the stage for this venture into inner-worldly mysticism, it is helpful to recap the most important results of this study. This study has been an attempt

to think through a particular paradox of modern society: that of closure and openness. Closure here refers to what has been the point of focus in the theories of rationalization from Weber to the Frankfurt School, namely modern society's ominous slide into consistency. Epitomized by modern technoscience—by its formulas, instruments, and standards—closure denotes the totalization of equivalence, measurability, and control into a self-referential system. Openness, by contrast, represents the countervailing tendency toward fluidity, flexibility, and open-endedness that is so distinctive of the current age. Today a dominant tendency in social theory is to proclaim that modernity has moved from closure to openness and that the solid units of the old have given way to today's liquid networks and their permeable boundaries. Yet both closure and openness can be found together in contemporary society: bureaucracy and markets are mutually dependent, monopoly platforms accommodate digital networks, and liquid speculation presupposes state bailouts. How are we to make sense of this on a conceptual level? If closure has not been superseded by openness, then how are closure and openness structurally related in capitalist modernity both past and present? How can we approach them as paradoxically related, such that openness precipitates closure and closure generates openness? These are the kinds of questions this study has attempted to answer via a critical examination of the concept of rationalization.

The radical sociology of Niklas Luhmann has proven to be a potent tool in studying rationalization. His cybernetic theory of autopoietic systems rests on a fundamental paradox of closure and openness, meaning that for Luhmann, social systems are structurally open to their environments precisely because they are self-referentially closed. It is as simple as it is perplexing. Yet, turning to Luhmann for a critical theoretic inquiry is far from self-evident, since the relations between Luhmann and the Frankfurt School have been at best always a little tepid, at worst perhaps even bellicose (see Brunkhorst 2018). For Luhmann, Frankfurt School critical theory's project of modernity was a moralist venture that has no place in differentiated modernity. Conversely, for Habermas (in Habermas and Luhmann 1971), Luhmann's systems theory was simply a mouthpiece of positivist technique, even if Habermas did ultimately integrate a version of it into his own social theory. In the end, as explored in chapter 1, their disagreement boiled down to the thorny issue of social differentiation versus dedifferentiation. According to Luhmann, Marxist critical theory's stress on the primacy of the capitalist economy failed to appreciate the "functional differentiation" of modernity. In addition, he mocked critical theory itself as the confusion of two incommensurable perspectives: science and politics. Defending critical theory against these challenges, I outlined a critical systems theory centered around the concepts of "ecological dominance" and "ecological

pragmatism." The former offers a way of conceptualizing the relative dominance of the economy in the wider ecosystem of subsystems, while the latter presents a mode of critique that functions via the confrontation of thought with its outside. This yields a theory that attempts to think the paradoxical unity of theory and practice in a functionally differentiated society marked by the ecological dominance of the capitalist economy.

On the basis of this critical systems theoretic approach, I interrogated the concept of rationalization. The concept of rationalization, originally devised by Weber, was developed into the basis of social critique by Georg Lukács and the Frankfurt School. Although there are important differences in emphasis between various writers, rationalization has a conceptual core of three basic elements: a logic of closure, a logic of technology, and a logic of paradox. Putting these elements together, one ends up with a narrative that chronicles the development of modernity. Modernity is enveloped in a process of *closure* in which a *technical mode of reasoning* drives out political modes of reasoning. The exact terms vary with each author, but the core argument remains comparable. For Weber, for instance, "purposive rationality" exorcizes "value-rationality," while for Horkheimer "subjective reason" expels "objective reason," and for Habermas "functionalist reason" colonizes practices structured by "communicative reason." Anticipating the completion of this harrowing dynamic, these theorists finally offer a dystopian image of totally closed modernity: an iron cage, a totally administered society, or a one-dimensional world. Yet, then, just as the story seems to have drawn to a close, comes the volta. At the moment that technical rationality has totalized itself throughout modern society, it *paradoxically* reverts into a political force. Determining the means has become an end in itself; value-freedom has become the supreme value; and technical efficiency becomes political domination. It is this strange yet powerful movement that the concept of rationalization brings to the fore.

The societies in which these theories of rationalization emerged, differed qualitatively to those of today. They were designed in times of what the Frankfurt School called state capitalism and that is now often referred to as Fordism, an era of capitalism that was marked by economic planning and Taylorism (Dahms 2000). It is in this context that Adorno and Horkheimer indict the "principle of equivalence" (2010, 17), which terrorizes the social into commensuration. As technologies of standardization, classification, and calculation spread throughout modernity, the Frankfurt duo saw that their elements tended to form a closed self-referential system. It was a system in which the imperative to *become communicable* reigned supreme. In chapter 2 I redescribed this vision in Luhmannian terms as the "operational closure" of measurement systems. These "metrological" systems are caught up in a triple self-amplifying motion

of self-production, self-performance, and self-reinforcement. Drawing out Luhmann's paradoxes, however, it is the closure of these technical systems that opens them up to their historical and political ecologies. Highlighting this openness remedies the Frankfurt's School's tendency to reify technical reason into transhistorical form, either as "neutral means" (Weber and Habermas) or as "pure domination" (Adorno and Horkheimer). First, instrumental reason's openness to politics enables a *politics of efficiency* that allows agents to contest what counts as efficiency. Second, instrumental rationalization can now be historicized as what I refer to as thermodynamic rationalization. The thermodynamic mode of rationalization is marked by its *strategy of suppression*: systems suppress paradox and openness because they treat them as points of leakage—as inefficiencies. This strategy gives an impression of totalizing closure to what is, in effect, a mode of governing a paradoxical logic of closure and openness.

This deals a first blow to the popular narrative that capitalist modernity has moved from a logic of social closure to one of complete openness. The closure of instrumental rationalization always already involved social openness. The inverse, however, also holds true: contemporary rationalization does not liquify the closed units of the thermodynamic age into an open space of flows. In chapter 3 I argued this point by highlighting the inconsistencies of Michael Hardt and Antonio Negri's postworkerism. Their account forms the most powerful expression of the sociologies of openness due to its relentless emphasis on both the liquefaction of closed units and the constitutive role of immeasurability. Following Gilles Deleuze's (1992) impulse of the famous *Postscript*, Hardt and Negri trace the collapse of all existing boundaries under "Empire." The multitude's "immaterial" labor blurs the distinctions between economic production and social reproduction, work time and leisure time, human and machine, and many more. With the foundering of these divisions, Hardt and Negri hold that the central Marxist distinction between necessary and surplus labor also breaks down. Necessary as the distinction is for determining the value of labor under capitalism, the duo concludes that immaterial labor becomes *immeasurable*, indicating a complete reversal of the Fordist rationalization of metrological systems. Provocative as their thesis of immeasurable labor may be, Hardt and Negri ultimately run up against the limits of their theoretical resources. Their key thesis—that capital forms a parasite that extracts value from the productive outside that is the multitude—proves to be irreconcilable with their monism, which does not allow for any outsides. To consistently think through Hardt and Negri's paradoxical analysis of contemporary capitalism, one needs a theory that operates on principles of distinction, paradox, and ecology. The theory of autopoiesis is such a theory.

Luhmann's theory of autopoietic systems provides an immanent vantage point on contemporary capitalism. For, whereas the Fordist age of Weber and the Frankfurt School imagined economies and workplaces to operate like steam chambers, today these are envisioned as communication systems or information processors. The current mode of rationalization must therefore be understood as cybernetic rationalization. As discussed in chapter 4, the logic of cybernetic rationalization follows the slogan of the Santa Fe Institute's 1990s artificial life program "Tierra": "Simple Rules, Complex Behavior." The software program simulated and governed life by instituting a few measurable parameters, its "simple rules," in order to spawn an immeasurable ecology, its "complex behavior." It redirects control from intervention to continuous tweaking. The same logic can be observed in the post-Fordist production process. As Hardt and Negri incisively observed, post-Fordist management seeks to exploit an immeasurable resource: human personality. What they miss, however, is that this resource is immeasurable not due to the metaphysical qualities of human creativity, but because it forms an incommunicable region ("complex behavior") that is provoked by very communicable rules of production ("simple rules"). The logic of personality management is condensed in the paradoxical imperative to "Be spontaneous!"—a simple rule that demands to be broken in unpredictable ways. Neoliberal political economy works along analogous lines. Neoliberals encourage states not to retreat but to step in and set the "simple rules" of the market so as to incite the "complex behavior" of competitive strife. This is, in essence, how the closure of the system of communicable rules opens up an environment that is fundamentally incommunicable. Cybernetic rationalization therefore denotes a strategy that seeks to valorize social openness by exploiting this paradoxical motif. It means that the thermodynamic *strategy of suppression* is superseded by the cybernetic *strategy of exploitation*.

What is unique to cybernetic capitalism is therefore not so much the ubiquity of communication, but rather its incessant struggle to put *the incommunicable* to work. In reference to the early work of Ludwig Wittgenstein (1999), I have called the incommunicable ecology on which communication systems secretly turn *the mystical*. This is not to mystify the workings of capitalism, but rather to show that the mystical is at work in our societies today as a material, plural, and partly secular force. What characterizes the cybernetic mode of rationalization is therefore above all a form of materialist mysticism in which the inexpressibility associated with mystical experience plays an immanent and earthly social function. Today the mystical can be found and made productive in a plethora of phenomena, such as networked production, the price mechanism, and entrepreneurial activity. Cybernetic rationalization therefore mobilizes a novel cultural attitude—a disposition that Max Weber (1946, 326) already

noticed as a logical possibility, yet for which he could not find a historical referent: *inner-worldly mysticism*. It is an attitude of submission and resignation based on a fascination with the incommunicable, but without involving a flight from the world. Showing the depths of the cybernetic episteme, the phrase unites authors such as Friedrich Hayek, and Hardt and Negri, who disagree over who (or what) truly embodies information. For Hayek, one must submit to the incalculability of the market, whereas for Hardt and Negri, one must cherish the immeasurability of the multitude. Hence, whereas instrumental reason's lust for control carried the traces of "asceticism" (Weber) or "myth" (Adorno and Horkheimer), the "weird ontology" of cybernetic anticontrol suggests a mystical residue. It is the key to grasping today's irrationalisms.

CYBERNETICIANS, MYSTICS, AND CONSPIRACISTS

The mysticism at the heart of cybernetic rationalization is not a mere philosophical designation but refers to distinct sociological phenomena. This historical connection between cybernetic imaginaries and mystical experiences has previously been traced by scholars of media and of religion, most excellently so in the work of Erik Davis. In his 2019 *High Weirdness*, Davis details the "paradoxical coming-together" (2019, 14) of the sacred and the profane through a close reading of three extraordinary experiences relayed by Philip K. Dick, Terence and Dennis McKenna, and Robert Anton Wilson. These "seventies psychonauts," argues Davis, are emblematic of the wider "consciousness culture" of 1970s California that took shape within a media ecology of deviant knowledges and budding information technologies.

Spiritual experiences such as those traced by Davis form the hallmark of mystical thought, providing clues to an ultimate reunion with God. They lift the distinction between God and the self, between spirit and matter, between eternity and time. Since this sensed unity is beyond all distinctions, it delivers a confrontation with the "ineffable," as William James (2002, 295) famously put it in his 1902 *Varieties of Religious Experience*. In identifying religious experience as the core of mysticism, James wrestled this form of religiosity from the Christian mystical tradition and reframed it as a universal human capacity. Mystical insight became a blank canvas for painters from a variety of traditions. Terence and Dennis McKenna, as Davis (2019, 89–173) beautifully details, for instance, elicited their mystical experience by eating psychedelic mushrooms in a Colombian forest. The McKennas viewed their botanic psychedelics as technologies for accessing the Real. They were cybernetic alchemists, drawing equally from hermetic gnosis, Neoplatonism, and Renaissance magic and declaring new information technologies the harbinger of a "mysticism of

electric culture" (Terence McKenna in Davis 2019, 98). In seventies counter-culture, Davis shows, cyberculture meets inner-worldly mysticism.

The point of contact between cyberneticians, hippies, and mystics was also the topic of Davis's earlier *TechGnosis*, in which he draws up the "secret history of the mystical impulses that continue to spark and sustain the Western world's obsession with technology, and especially with its technologies of communication" (2004, 5). Gnosticism names the ancient folklore that imagines the world as having been split in two, into the cosmic and the divine. Human beings find themselves in the fallen order of the cosmos, yet not without retaining a spark of the divine that can be rekindled through mystical "Gnosis": the incommunicable knowledge of a lost unity. For Davis, this spiritual trope is all over cyberculture. He narrates "how the spiritual counterculture of the 1960s created a liberatory and even magical relationship to media and technology" (10). In the eyes of the modern technomystic, information represents lightweight, free-flowing spirit, while matter bears a cosmic filthiness. Examples of techgnostics abound. Computer scientist Edward Fredkin, for instance, imagined the universe to be a giant computer, prompting a "digital pantheism . . . that consist of simple elements and basic rules, but which eventually breed into complex cybernetic ecologies" (151). The so-called Extropy-movement, meanwhile, sought to harness the cybernetic forces of self-organization to thwart entropy in an everlasting life (147).

Even though a quick glance at a twenty-year-old internet café should cure one of the fantasy of uploading one's mind to a mainframe in order to float through the eons, the gnostic dream lives on in the varieties of transhumanism and "longtermism" popular in Silicon Valley today. Exponents of the latest Artificial Intelligence hype, for example, speak of the nearing advent of super-human intelligence as "creating God," who will perform "miracles" and unleash "magic" (Marche 2022). In awe of the ineffable, one particular author submits that the "unfathomability" of AI "poses a spiritual conundrum," and then hurries to add that "it also poses a philosophical and legal one" (Marche 2022). According to the commentator, EU regulations that contain transparency requirements for machine-learning algorithms are fundamentally at odds with the incommunicability that this technology engages. The author approvingly cites ex-Google CEO Eric Schmidt: "The EU's plan 'requires that the system would be able to explain itself. But machine-learning systems cannot fully explain how they make their decisions'" (Marche 2022). The ineffability of Artificial Intelligence can only be governed by the ineffability of the market. Only gods can legislate gods. The market is, after all, itself an artificial intelligence of sorts, a vast computer running real-time simulations of expected value. Confronted with such divine forces, one can only adopt an attitude of

submission (Whyte 2019). Or if one does feel the need to act, one can become their missionary and carry the Promethean flame across new frontiers. As Elon Musk's business mantra goes, technology serves "to extend the light of consciousness" (Musk cited in Siddiqui 2022).

This cybergnostic mood shows the continuing relevance of what, by 1989, cyberculture magazine *Mondo 2000* dubbed the "New Edge": a portmanteau for Silicon Valley's "edgy" nerds and "New Age" hippies, self-consciously straddling the line between religion and reason, spirituality and tech, cybernetics and mysticism (Zandbergen 2011, 25). Fred Turner (2006) has detailed its origins with countercultural hippies settling in communes erected in geodesic domes on the Bay Area hills and reading Norbert Wiener's *Human Use of Human Beings* under the soft glow of their night lights. For settlement tips, tricks, and tools, these "New Communalists" turned to Stewart Brand's *Whole Earth Catalog*. The *Catalog* was a do-it-yourself guide for "hippy bricoleurs" hacking their way into the new age (Davis 2019, 80–81). "It was sort of like Google in paperback form," as a communard by the name of Steve Jobs (cited in Turner 2019) put it. The later Silicon Valley, however, argues Turner, did not emerge from a capitalist cooptation of leftist hippie ideals, even if New Left anti-institutionalism did provide popular support for the coming neoliberal order (Gerstle 2022; see Boltanski and Chiapello 2007 for the European context). The New Communalists came from the counterculture, but they were a distinct group from the New Left. Both groups shared a suspicion of "the System" with its military command-and-control style rationalization. Yet whereas the New Left sought political mobilization, the New Communalists dreamed of outsourcing social organization to information machines and putting their freed-up energies into cultivating the spiritual depths of consciousness. Their vision was one of an eclectic world of decentralized cybernetic flows mixed with Brandite network entrepreneurialism and psychedelic occultism (see also Barbrook and Cameron 2015).

Scholars of religion have traced the general resurgence of esotericism, occultism, and mysticism back to 1950s Californian counterculture (Hanegraaff 2013, 43), later collected under the heading of New Age (Hanegraaff 1996). According to the New Age, humanity was facing a "paradigm shift," a coming spiritual awakening in the "Age of Aquarius." It belongs to what scholar of religion Christopher Partridge (2004) has termed the "reenchantment of the West," the simultaneous movement of secularization and sacralization that emerged in the postwar world. While churches were being vacated, Western societies saw the rise of what Partridge calls "occulture" (70): an umbrella term for popular yet "deviant" modes of thought and practice associated with spirituality and New Age—from astral projections, healing crystals, and feng shui

to UFOs, Kabbalah, and Druidism. These new diffuse religions are thoroughly postmodern, as they are marked by epistemological individualism, eclecticism ("supermarket spirituality"), an orientation to happiness, and the mystical belief in the divination of the self (32). The world of occulture is one of "spiritual bricoleurs," the original home of DIY culture (85). Since these new religions place a premium on self-sacralization, they are especially conducive to a mystical orientation in which individual experiences take center stage. Furthermore, as Partridge writes, the aim of individual liberation *within* the world as opposed to an ideal of liberation *from* the world makes these new religions distinctly "world-affirming" rather than world-rejecting (28). These new religions thus form the social context for a new cultural attitude of inner-worldly mysticism.

Davis's and Turner's hippie cyberneticians form part of this larger generation of spiritualists that left churches in a quest for occult, esoteric, and psychedelic wisdom. Placing a premium on unmediated insight, these spiritualists tend to pit such mystical epistemology against revelation and faith on the one hand, and discursive scientific reason on the other (Hanegraaff 2013, 87). Over and above the communicated and the communicable, mystics celebrate the incommunicable. This does not mean, however, that "systems mysticism" rejects all science outright (Davis 2019, 406). It instead views what Lyotard (1984) called "postmodern science" as further proof of the inner-worldly reality of their Gnostic intuitions (Hanegraaff 1996, 62). The new sciences, cybernetics prominently among them, refuted many of the old Newtonian and commonsense assumptions about the world. These sciences then found their way to the New Age through works by David Bohm and Karl Pribram on the holographic paradigm, by Ilya Prigogine and Erich Jantsch's on the self-organizing universe, and the literary genre of "parallelism," which notes an affinity with Eastern religion and new physics, exemplified by Fritjof Capra's *Tao of Physics* (Hanegraaff 1996, 62–76). On top of this, mystics also display a fascination with the weird world of quantum mechanics, whose "spooky action at a distance" and flagrant contradictions seem to defy all rationalistic logic (Davis 2019, 69–72). Postnormal and paranormal science could shake hands.

Inner-worldly mysticism and cybernetic rationalization thus share an epistemological commitment to the incommunicable as well as a fascination with the new sciences of communication. What is more, they also share a mode of organization. The rise of new religions may be understood as the "disorganization" of religion, keeping with wider social trends toward flexibility, fluidity, and openness (Lash and Urry 1987). Since the 1970s churches have faced issues in securing membership as much as labor unions, political parties, and journalistic outlets have. New religions' focus on individual extraordinary

experiences challenges the priority of church institutions, orthodoxies, and dogmas. Being ineffable, mystical experiences are hard to codify. It is why earlier scholars such as Ernst Troeltsch (1931) and Colin Campbell (2002), on whom Partridge (2004) builds, stressed the distinct social organization, or rather dis-organization, of mystical religion. Mystics reject the Weberian rationalization of churches and sects in favor of more individualist, charisma-driven, fleeting "cults" (Troeltsch 1931). For Campbell (2002), the ephemeral and individualist characteristic of cults means that they rise and fall like the waves of a more or less constant "cultic milieu," a turbulent ocean of deviant knowledges of which mysticism forms the paradigmatic example. As Partridge writes, the new religions are organized in "amorphous networks" made up of fairs, festivals, and internet fora (2004, 66). Mystical cults, in other words, are not rationalized in the classic Weberian sense. They are rationalized cybernetically, drawing on the ecological forces of the cultic milieu.[1]

Yet for Davis the mystical moment of cyberculture already marked a darker period of the counterculture. After the bustling decade of the 1960s, led by youth who rejected the middle-class lifestyles of their parents in hopes of political and spiritual transformation, a gloomier decade of stagflation, oil shocks, and deepening foreign wars set in. An uglier face of reenchantment started to show itself. By 1969, the optimistic forces of the "Fists" and the "Heads," the New Left activists of Berkeley and psychedelic hippies from the Haight, had already slumped in power. At this point most countercultural leaders were either in court or in jail, and Charles Manson had "bloodied the Aquarian dream in the minds of the silent majority" (Davis 2019, 47). As the 1970s progressed, much remaining talk of spiritual transformation received a particular Cold War inflection. Under the threat of atomic war and Communist espionage, those busying themselves with spiritual transformation became preoccupied with "brainwashing." For many, the discovery of Project MKUltra proved their worst fears, as the CIA was found to use drugs on unwitting citizens for purposes of mind control, ultra size. The assassination of high-profile figures such as Martin Luther King and John F. Kennedy and the outing of illegal FBI programs aimed at neutralizing "subversive" organizations such as the Black Panther Party and student protest movements fostered further paranoia. To top it all off, the 1974 Watergate scandal had revealed a coverup reaching all the way up to the highest office in the United States (Davis 2019, 49).

The spiritualism of the counterculture and the fears of communist threats thus formed the breeding ground, not just for mystical visions, but, as Richard Hofstadter (1964) captured the McCarthyist mood, for a "paranoid style of politics" altogether. Whether pathological or not, these years saw the emergence of a "culture of conspiracy" that blended with the rise of new religions (Knight

2000). Were conspiracy theories in the 1950s still the domain of right-wing fanatics, Peter Knight (2000, 33) recounts, "by the end of the 1960s it became the identifying style and posture of significant numbers of those in tune with the New Left and the counterculture." The West had entered a time of speculation on fake moon landings, secret societies, and UFO visits, still reflected in popular culture by books such as *The Da Vinci Code* and Netflix series such as *Stranger Things*. They are signs of mass mediatized "occulture," bringing deviant knowledges to a wide audience. To capture the confluence of conspiracism and spirituality, Michael Barkun has argued that Campbell's notion of the "cultic milieu" must be extended to include what he terms "improvisational millennialism," a bricolage-style hashing of conspiracist knowledges (Barkun 2003, 18).

The mystical is thus more than a philosophical concept with which to grasp cybernetic rationalization. The mystical element of cybernetics was also never wholly secular. Rather, the cultural attitude of inner-worldly mysticism shares a historical lineage with Californian cyberculture, neoliberal entrepreneurialism, and conspiracy culture. The concept of cybernetic rationalization, I would like to add, helps explain why inner-worldly mysticism could emerge in parallel to it. The reason is that they share a basic philosophical creed: one must mobilize the incommunicable truth that is at the core of the cybernetic universe, the market order, and the human mind. Not only does this shed light on the coemergence of mysticism and cybernetics, but their philosophical kinship will also allow us to interpret current forms of conspiracist radicalism, illuminating the strange loop between social rationalities *and* irrationalities. It enables a rethinking of online Telegram groups fuming about sinister plans from the World Economic Forum, European *Querdenker* protesting harmless vaccines, and QAnon-shamans storming the U.S. Capitol. These movements are all examples of "conspirituality": the strange fusion of the male-dominated, conservative conspiracy scene and the more female-led and liberal holistic milieu (Ward and Voas 2011). The genealogy above already forms the start of an explanation of this phenomenon. Seemingly contradictory worlds, their shared history in postwar "occulture" indicates, as Asprem and Dyrendal (2015, 376) have noted, a "common origin of elements that have only later (and only partially) been separated from each other." These social irrationalisms—conspirituality and radical-right activism—can be understood as distorted ways of navigating society's paradoxes of closure and openness. They represent the particular mode of irrationalization that comes with cybernetic rationalization, turning its circles into violent spirals.

PARADOXES OF CONSPIRITUALITY: CONFRONTING THE MYSTICAL

The standard response in public discourse to today's paranoiac irrationalisms remains essentially Wienerian: conspiracists lack proper information. Norbert Wiener, the founder of cybernetics, popularized the new science in his 1950 book *Human Use of Human Beings* with an existentialist appeal to information (Wiener 1989). According to him, this force had the unique power to thwart entropy, the deterioration of energy into waste. Organisms, computers, and societies are all "islands of decreasing entropy" that run on information—it is the lifeblood of any healthy system (Wiener 1989, 40). Yet information, Wiener warns, is prone to corruption in the form of secrecy and commodification. Therefore, efforts must be made to ensure that information remains free. Wiener's message crucially influenced later Silicon Valley venerations of information, notably those of libertarians connecting the freedom of information with digital democracy and networked entrepreneurialism (Barbrook and Cameron 2015). It led John Barlow (1996), for instance, to famously declare the "Independence of Cyberspace." The celebration of information thus taps into an older reservoir of liberal discourse on free discourse as the bedrock for rational deliberation between free individuals. It is here that a popular explanation for irrational conspiracism emerges: The conspiracy theorist has been poisoned by mis- or disinformation. One can see such discourse in action today by media putting out fact checks to prevent the public from buying into toxic conspiracy theories. However, the problem with pointing to a lack of information in explaining conspiracist tendencies is that the average conspiracy theorist spends hours "doing their own research" as a form of engaged citizenship. More important, the Wienerian explanation makes it all the more miraculous that conspiracy culture should come to fruition in the Age of Information of all times.

For less superficial explanations, one needs to look at the social circumstances in which these irrationalisms arise. Here we enter the home terrain of Marxist analysis. Fredric Jameson (1988, 356), for instance, offers a classic account of conspiracy theorists as the "poor person's cognitive mapping in the postmodern age." Those who imagine a Jewish cabal behind the scenes are in some distorted and limited sense trying to grasp the "total logic of late capital." The Jamesonian approach allows for a "symptomatic reading" of conspiracy theories that is sometimes useful, yet which does carry the risk of reading one's own critique of capitalism into unsavory delusions. Jameson's remarks are, however, not too far removed from those made by Theodor Adorno when he wrote that

"occultism is the metaphysics of the dopes" (1974b, 9). It is an apt description for the feel-good ontologies of Oneness and Authenticity that one may encounter in self-help books and on motivational posters. The occultist, for Adorno, is the ultimate positivist cum business person, turning spirit into cheap ghosts: "their mysticism is the *enfant terrible* of Hegel's mystical element" (12). It goes to show that for the early Frankfurt School the irrational was never a lofty Hegelian concept but a sign for the base and absurd cultural expressions of capitalism. Critical theory is the study of these absurdities.

Adorno himself turned to a close reading of the *Los Angeles Times* astrology column. Readers of this column, according to Adorno, are duped by what is essentially an extension of the culture industry's ideological apparatus, which is itself an extension of the capitalist economy. "Irrationality," Adorno argues in this context, "is not necessarily a force operating outside the range of rationality," but may also exist as "rational self preservation 'run amuck'" (1974b, 13). The irrational is not the opposite of the rational, but a perversion of it that occurs when the rational is led to its logical end point. This, Adorno suggests, is what happens in the astrology column, through which the reader seeks control and independence in a totally rationalized world. Yet here the compulsions of the capitalist power motive are reimagined as astral magic: stars substitute states and firms. Astrology thus serves as an "ideology for dependence" (83), reconciling the reader to their fixed social situation through occult appeals while circumscribing their field of action to a small sphere of independence granted by their star signs. This produces social conformity in the reader, but more important, also resolves an inherent tension of the state capitalist ideology that calls at once for a rugged individualism and social fatalism. Through the tensions in the astrology column, therefore, speak the contradictions of society.

The bald head of the exiled Adorno glistened under the Californian sun some twenty years before counterculture took hold, and even longer before the neoliberal counterrevolution set in. Adorno's analysis is premised on the state capitalist thesis, which holds that the "power motive" superseded Marx's old "profit motive" as cartels and states turned to central planning and "processes of social control are no longer those of an anonymous market" (Adorno 1974b, 82). When Adorno concludes that "irrationality is in itself the outgrowth of the principle of rationalization" (86), he thus speaks of the instrumental, or what I have called thermodynamic rationalization. The contents of Adorno's analysis are therefore no longer immediately applicable to today's social context. The form of his analysis, however, is still well worth the trouble. This views social irrationalisms not so much as repressed critiques of capital but as paradoxical byproducts of the material circumstances and cultural conditions of

capitalism. The concept of rationalization already captures this complex dynamic of reason and unreason, economy and culture, enlightenment and myth. In what follows, I want to hazard the thesis that today's social irrationalisms must be understood as the outgrowth of cybernetic rationalization. Like this mode of rationalization itself, these irrationalisms are paradoxical phenomena. In line with Adorno's analysis of astrology, therefore, they contain contradictions that reflect the contradictions of society writ large. Yet whereas for Adorno and Horkheimer instrumental rationalization produced fascist mythmakers, today's cybernetic reason must be understood as giving rise to innerworldly mystics.

It is tempting to view conspiracy theorists as mythical thinkers stuck in the thermodynamic age. These theorists posit an agent of total control behind society's messy interactions. In Barkun's famous definition, conspiracy theorists adhere to three principles: "Nothing happens by accident; nothing is what it seems; everything is connected" (2003, 3–4). Surely one would have to think that "the System" was never dismantled by the neoliberal intervention, mistaking the agile meshworks of post-Fordism for centers of command and control. Conspiracy thinkers thus present a puzzle for interpreters of today's hypernetworked society. Networks and conspiracies, after all, are fundamentally at odds with one another. A network is opaque on all sides: no single node surveys the whole. The courier does not know who smuggles the goods over the border, the coordinator does not know who collects the money, and so on. A conspiracy, by contrast, is opaque to its outside but transparent on its inside. Eavesdroppers are strictly disallowed but the conspirators know who is in the room with them. Equally, however, the association of networks with conspiracies is not entirely new. Before networks became all the rage in computerized culture, the term "network" had a distinctly negative connotation when used in social contexts. It was reserved for secret organizations such as terrorist networks, human trafficking networks, or resistance networks (Boltanski and Chiapello 2007, 104). Speaking of a "network" prompted images of the Mafia and the freemasonry. Despite appearances, therefore, it should perhaps not surprise that conspiracist culture should bloom in a world christened as the "network society" (Castells 2010).

Conspiracy theory traces historical events back to a controlling agent or agency within the network. During the Covid crisis, for instance, conspiracy thinkers portrayed Bill Gates as a "puppet master" who planned the pandemic in order to get rich off of selling vaccines and to gain control over the world's population by injecting them with microchips (Knight and Birchall 2023). These outlandish theories often stem from real concerns. It was Bill Gates and the Gates Foundation, for instance, that pushed Oxford-based vaccine developers

to enter into an exclusive licensing deal with the for-profit company AstraZenica instead of offering their vaccine to the world for free (Tooze 2021, 245–46). Likewise, the fear of microchips can be traced back to immunization tracing techniques developed by Rice University scientists at the request of the Gates Foundation (Knight and Birchall 2023, 9). The invocation of Gates might be read symptomatically as a stand-in for the global technocrats and plutocrats celebrated by neoliberalism. With Jameson, we could say that it is no coincidence that the World Economic Forum has become the object of the "Great Reset" superconspiracy theory when neoliberals have explicitly sought to curb national democracies through bureaucratic institutions such as the IMF, the World Bank, and the European Economic and Monetary Union (Slobodian 2018). Through the technocratic closure of these institutions, cybernetic rationalization provokes market openness. In light of this, conspiracy theorists may be understood as asking who controls the "code" that causes their loss of sovereignty. Such paranoia is thus not necessarily a throwback to old Weberian sentiments, unless one really believed the world to have become *totally* disorganized, liquified, and deinstitutionalized.

In fact, current conspiracy theorizing carries over the anti-institutionalist sentiments of neoliberalism into its own distinct epistemologies of suspicion. For despite neoliberalism's glorification of market engineering, it is decidedly anti-institutionalist when it comes to the public sector and its knowledge-producing agencies, materializing in waves of privatization, budget cuts, and marketization (Davis 2015; Bailey and Freedman 2011). These interventions have the effect of delegitimating state provisioning and public knowledge. More than any other factor, dwindling trust in traditional epistemic authorities—legacy media, universities, medical practitioners, and state agencies—is rocket fuel for conspiracy theories (Infodemic 2020). Inhabiting this neoliberal moment, conspiracists turn away from institutionalized knowledge and turn toward two hyperindividualist methodologies: "Doing your own research" and tapping into mystical self-knowledge. These are the two main epistemic modes of "conspirituality," that strange blend of Google detectives and New Age influencers. Strangely, these methodologies contradict each other, with one demanding an endless search for facts and the other propagating a final flash of insight. Yet, as will become clear, contemporary conspiracism paradoxically unites these modes of knowing by confronting the ultimate incommunicability of truth. In the case of fact finding, the conspiracist faces incommunicability through an infinity of mediations, whereas in the case of mystical intuition, they do so through the absence of mediation.

The first epistemology concerns the conspiracist's critical call to "do your own research!" Such research by no means offers a straight line to truth but

zigzags through what may justly be termed postmodern forms of narrative. This makes sense historically, as Peter Knight (2000) has argued, since conspiracy culture came into its own from the 1960s onward, when paranoiac sensibilities fused with late-capitalist cynicism. Conspiracy theories are themselves therefore less a set of propositions or a linear narrative than a "flow" that leads the seeker across traditional and social media, such as TV, internet, and podcasts, and across platforms, such as YouTube, Facebook, and Parler (Knight and Birchall 2023, 129). In line with postmodern literature, moreover, conspiracy theories are often eclectic, modular, and distributed stories. The modularity of conspiracy theorizing is most evident in what Barkun (2003) refers to as "super-conspiracies," which integrate bits and pieces from other conspiracy theories into an overarching narrative. Barkun offers the example of the New World Order (NWO) conspiracy theory that was popular in the 1990s and that has recently mutated into the Great Reset superconspiracy. As one theorist of historical work observes, the facts and details of the theory ("historical research") allow for an endless play of signifiers, but the narrative arc ("historical writing") remains more or less the same (Van Veldhuizen 2022).

To illustrate how "doing your own research" might look like in practice, Peter Knight and Clare Birchall offer an example of nonlinear storytelling. A comment under a Facebook post on 5G technology—variously alleged to be a tool for mind control, a source of radiation, and a transmitter of Covid—is punctuated with hyperlinks, each directing the reader to separate, often contradictory elements "that weave their own conspiracy web." Rather than see them as lazy writing, Knight and Birchall propose to view such posts as the "hyperlinked version of that classic trope of conspiracy and detective fiction: the "crazy board" filled with . . . snippets of evidence, and lines of string to connect them" (129–30). Such wild goose chases have alternatively been referred to as "conspiracy without the theory," blasts of information lacking any real attempt at justification or coherence (Muirhead and Rosenblum 2019, 19). According to Muirhead and Rosenblum, these antitheories do not attempt to put forward a truth-claim of their own but merely seek to undermine the epistemic commonalities foundational to liberal democracy. They are, in the words of former Trump ideologue Steve Bannon, "flooding the zone with shit" (Lewis 2018).

Nihilist, cynical, or ironic sensibilities have long been detected in contemporary conspiracy theorizing (Nagle 2017; Beran 2019). For while it appears as though increasing and worrying numbers of people have fallen victim to conspiracist fanaticism, research shows that most people are willing to indulge more than they are willing to believe (Birchall and Knight 2023; Smallpage et al. 2020). In the prominent QAnon conspiracy theory that emerged during

Trump's rule, for example, the line between irony and fanaticism is not always easy to draw. This "superconspiracy" first sprang up on the "deep vernacular web," located at the fringes of the platform economy and made up of anonymous image boards such as 4chan, 8chan, and 8kun (De Zeeuw and Tutors 2020). A mysterious intelligence operative known as Q began posting clues ("drops") hinting at the existence of a "globalist," Satanic pedophile plot (Rothschild 2021). Cybernetic collectivities on these anonymous fora would spin these "breadcrumbs" left by Q into a grand epic which has Trump and the QAnons rise up against the "deep state." Being a sort of crowdsourced scavenger hunt, QAnon might be understood as a cultish craze of "conspiracy fictioning," a blurring of fact and fiction that brings together ironic subcultures and radical-right fanatics (De Zeeuw and Gekker 2023). QAnon therefore unites all the postmodern sensibilities involved in "doing your own research," such as nonlinearity, eclecticism, and irony. What these have in common is that they are all ways of confronting the incommunicability at the heart of conspiracy theory's endless play of signifiers. In the words of Mark Fenster: "Driven by a circular, inexhaustible desire for more information to prove a conspiracy's existence, this active, endless interpretive practice never arrives at a final, determinate answer—the conspiracy always remains identifiable but elusive and never entirely knowable" (2008, 13).

Conspirituality's second main epistemic mode, mystical insight, faces the incommunicable not through endless mediation but precisely through a lack of mediation. The experience of the mystical reveals a truth that is beyond the distinctions that make communication intelligible. This epistemic mode traditionally belongs to the largely feminine New Age holism. Using lofty phrases of unity and abundance, the holistic milieu places a premium on consciousness of invisible energies and preaches spiritual transformation as the basis for political change (Barkun 2003, 19). Aiming to unlock a looming eternal consciousness within quotidian experience, New Age seekers turn to channeling, alternative healing, and meditation and broadcast them through lifestyle Instagram channels (Hanegraaff 2013, 104). In the wellness circles in which they often circulate, seekers focus on the body, aiming for purity, beauty, and happiness (LeClerc 2022). This kind of holism may surface as conspiracism in the form of the call to trust one's "natural immune system" rather than vaccines. On the Instagram channel of "holistic nutritionist" Kassia Fiedor (2020; 2022), for example, one finds a collage of plant-based recipes, conspiracist calls to foster "our peace within" against the "bullshit that is spoon fed to us on a daily basis," and the suggestion to take *Forsythia suspensa* fruit as an antiviral for Covid (see Breland 2020). On the Instagram page of Dutch supermodel turned conspiracist Doutzen Kroes (2020; 2022), meanwhile, one comes across posts that remind

her followers that they are not "separate from oneness" and that call for "transforming states of consciousness from one dimension to another." To underscore the need for a spiritual awakening, she offers a picture of the rebirth of a caterpillar into a butterfly. Such holistic appeals to spiritual union through health and happiness are clear examples of inner-worldly mysticism combined with conspiracist messaging.

In "conspirituality," the movements of alt health and alt right come together. This strange marriage between conspiracists and spiritualists goes back to 1960s counterculture, appeared on the web in the mid-1990s, and had a boom after the 9/11 attacks in 2001 (Voas and Ward 2011). Today's readers will most likely know conspirituality from anti-lockdown protests and antivaxx rallies. Since the Covid-pandemic, the antivaxx movement, populated by more liberal and female esoterics, has formed a curious alliance with the masculinist, radical-right QAnon movement. On the Instagram channels of what have been called "QAmom" influencers, cute baby photos, birthday cake designs, and nursery decorating tips appear alongside distress calls about a "global elite pedophile ring" (Dickson 2020; Bloom and Moskalenko 2021). Their unassuming hashtag #SaveTheChildren has turned out to be a neat way of dodging the big platforms' recent attempts at content moderation. Others have labeled this female version of QAnon "Pastel QAnon," referring to its particular aesthetic, which "softens QAnon's propaganda grounded in Chan culture" and that "creates new recruitment and radicalization pipelines into female dominated ecosystems" (Argentino 2021).

Yet conspirituality works both ways: conspiracizing spirituality and spiritualizing conspiracism. This new installment of conspirituality does not merely mean that antivaxx moms are conscripted into QAnon, but also that radical-right conspiracism becomes suffused with mystical claims. In some way, an appeal to intuitive truth has long figured in conspiratorial frames about "tenured radicals," "cultural Marxists," or "postmodernists" covering up with "political correctness" what people know to be true in their heart of hearts (Hartman 2005). Yet in recent years, alt-right conspiracy theorists have become infatuated with a coming spiritual transformation: "The Great Awakening." The trope of a "Great Awakening" has been prominent in the QAnon conspiracy movement since its inception on 4chan's Politically Incorrect board in October 2017. On Reddit, the r/greatawakening board became a popular place for Q-related discussions, amassing seventy thousand subscribers before being banned in September 2018 (Ohlheiser 2021). One year later, a book written by twelve insiders called *QAnon: An Invitation to the Great Awakening* topped the Amazon bestseller list (Tiffany 2019). The moniker "The Great Awakening" contains a millenarian appeal to a spiritual and political transformation,

recalling eighteenth- and nineteenth-century evangelical upheavals yet now finding an inner-worldly expression as a "presidential eschatology" (Lambert 1999; Bond and Neville-Shepard 2022). Conspiracy thinkers speak of "waking up" from consensus reality as a transformative gnostic experience. Similarly, many among the alt-right talk about being "red-pilled," referencing Neo's moment of waking up in the film *The Matrix.* "Changing your mind about a conspiracy theory," as Peter Knight and Clare Birchall write, "is therefore not simply a matter of revising your opinion about a set of disputed facts in the light of new evidence. It might mean unravelling your sense of who you are and how the world works" (2023, 17–18).

Fusing the two main epistemologies, today's conspiracists constantly cycle through DIY research and glimpses of epistemic clarity, each one eliciting more of the other. Once the seeker has awoken to the truth of vaccine microchips, they might dive into YouTube clips on Area 51, only to arrive at a spiritual self-help book on Amazon, each round buttressed by mystical intuition. It is how conspiracists spiral through a productive paradox of endless mediations and unmediated clarity, of ironic play and radical fanaticism, conspiracism and spiritualism. Odd as this spiral may seem, their paradoxical epistemology belongs to a longer tradition of what scholar of religion Colin Campbell has called "the cultic milieu," a cultural Petri dish of deviant knowledges of which mysticism forms the paradigmatic example. The cultic milieu, Campbell writes, is unified by "a common ideology of seekership" that contrasts with the dualism of believers and nonbelievers characteristic of churches and sects. Truth is not handed down through dogmas, institutions, or orthodoxy but requires a quest from the individual. The seeker must prepare themselves to gain access to the "esoteric commodity" that is spiritual insight and that retroactively vindicates the endless pursuit (Campbell 2002, 15). It is why conspiracists must do their *own* research rather than being presented with a premade explanation. Only then can individuals open themselves up to the experience of incommunicable truth.

This paradoxical epistemology echoes the cybernetic management of workers' mystical potential. In post-Fordism, as discussed in chapter 4, firms institute a work environment that elicits the immeasurable "invention-power" of the cognitive worker (Boutang 2011). Relatedly, in conspiracism, the DIY narratives provoke the ecstatic experiences of the seeker. This link between cybernetic management and inner-worldly mysticism materializes in the self-help book. Self-help books have a long history in religious and spiritual manuals but truly ballooned from the precarious 1970s onward. This phase of self-improvement literature belongs to the age of "the belabored self" (McGee 2005, 11–12), "Me Inc." (Bröckling 2016) or the "entrepreneur of the self" (Foucault 2008). Yet,

tellingly, these self-help books also matured together with cyberculture and New Ageism, with the *Whole Earth Catalog* sitting at their joints (Davis 2019). Other examples include bestsellers by Anthony Robbins, Stephen R. Covey, and Maxell Maltz that gave a cybernetic sheen to esoteric notions of mindpower (McGee 2005, 59). If the mind was a computer, then it could be reprogrammed to achieve maximum performance—an idea central to the unproven "neuro-linguistic programming." These are the irrationalist counterparts of post-Fordist attempts to mobilize "the social brain" (Marx 1973, 694). The self-help book is the cultural object that connects young urban "creatives," online entrepreneurs, and conspiritual mystics. It is, in light of this, no coincidence that Canadian psychologist Jordan Peterson (2018), star of the "manosphere," republished his insights as *12 Rules for Life*, stirring Jungian mysticism and social Darwinism into a distinct self-help brew.

Yet conspiracy theory is indebted to cybernetic rationalization not only for its cultic epistemology but also for its mode of sociality. The cultic milieu takes its name from its primary mode of organization: the cult. In contrast to churches and sects, cults are "loosely organized, ephemeral, and espouse . . . a deviant system of belief and practice" (Campbell 2002, 12). They are therefore eminently suitable organizations for the distributed, networked, and market-mediated sociability of the cybernetically rationalized age. Cults are the spiritualist counterpart to the fleeting networks of workers that inhabit post-Fordism's "projective city" (Boltanski and Chiapello 2007). No longer primarily integrated by vertical institutions such as churches and firms, cults and project-workers move "lean," "agile" or "just-in-time" through their respective milieus. Driven by supply and demand, they enter into new temporary formations with other elements from their ecologies. This disorganization of production is a sign of a larger process of neoliberal disorganization that outsources politics to a law-oriented rule of experts on the one hand and to a market-based "consumer democracy" on the other (Olsen 2019). It has led to the erosion of civil society, reflected in the steady decline in voter turnout, party membership, and union activism since the 1980s (Jäger 2023; Mair 2013; Brown 2015). This forms the "postpolitical" background for our current populist moment (Mouffe 2005). As the old party and union organizations crumbled, politicians now clamped onto new techniques of media training, impact analysis, and opinion polling to construct "the people." Cybernetic rationalization emptied out politics of its "ontic" content, and what remained was the "ontological" core of the we/they distinction—the crux of "populist reason" (Laclau 2005).

Populism goes hand in glove with conspiracy theorizing (see Knight and Birchall, 2023, 32–35). The populist opposition between the people and the elite, Us and Them, insiders and outsiders fits neatly on top of the Manichean division

between good and evil touted by conspiracists. It is thus no coincidence that conspiracy theories are currently enlisted by radical-right politicians such as Donald Trump, Jair Bolsonaro, and Viktor Orbán and far-right conspiracy entrepreneurs such as Infowars's Alex Jones and former Fox News host Carl Tucker. Do-it-yourself fact finding frequently leads one down the road of "alternative facts." These facts and the explanatory frameworks within they are placed often contain strong anti-Semitic undertones, especially when they point the finger at "globalist" elites, secret "cabals," or bankers such as George Soros and the Rothschilds. Though such preoccupations have historically also been found on the Left, the weaponization of antisemitic tropes and conspiracy thinking belongs more acutely to the present arsenal of the radical Right in the West. It is epitomized by Trump's four-year presidency, beginning with the "birther" conspiracy campaign that questioned Obama's American citizenship and ending with the "Stop the Steal" rally.

The rally was the prelude to the violent storming of the U.S. Capitol on January 6, 2021. In Europe, the events were matched by a siege on the German Reichstag building by conspiracist *Querdenker* ("diagonal thinkers") on August 29, 2020.[2] In light of the preceding analysis, we should see the groups involved in these attacks as cultic or mystical formations rather than as the return of the fascist masses enraptured by myths. For what appeared on the steps of the Capitol and at the doors of the Reichstag were not the old fascist formations marching in lockstep and in uniform, but a motley crew of small entrepreneurs, far-right conspiracists, and holistic antivaxxers. United only by a felt loss of sovereignty and a sense of having awoken from a cosmos of lies, these were the conspiritualists in action. They were mystical swarms rather than mythic masses. This is not to say that myth-based fascist factions do not exist within these radical coalitions, since they do, often enamored with pan-Aryan paganism (see Goodrick-Clarke 2002). Yet rather than be evidence for the return of Adorno and Horkheimer's myth, it speaks to the tremendous syncretism of the cultic milieu (Campbell 2002). At most, the Capitol stormers were a "microfascist" network of loosely connected "groupuscules" (Bratich 2022), mobilizing a kaleidoscopic plenitude of desire: "a cancerous body rather than a totalitarian organism" (Deleuze and Guattari 2014, 215). They were mystical collectivities that anticipated their inner-worldly liberation, swerving around the Capitol's courtyard while scanning their smartphones for Trump's latest tweets.

All things considered, therefore, the current wave of right-wing social irrationalism must be seen as the outgrowth of cybernetic rationalization and its cultural attitude of inner-worldly mysticism. Cyberneticians and mystics share a fascination with the incommunicable, alternatively identified as the distinctive property of information machines, markets, or the human mind. It is the result

of these groups growing up together in a sociological and historical sense. The rise to dominance of neoliberalism and its cybernetic style of governance surfed the waves of Californian counterculture and entered history alongside the upsurge in new mystical religions. What started out for the New Communards as a politics of cybernetic machines and an ethic of spiritual transformation now increasingly manifests as web-based and swarmlike coalitions that crown postmodern cynicism with mystical certitude. Forty years of neoliberal political economy, moreover, have laid the material foundations for today's social irrationalisms. Its destruction of civil society organizations and substitution of democracy for technocracy, its erosion of welfare state provisions and cutbacks for public knowledge-producing institutions, its contribution to historic levels of inequality and the decline of the middle class have bred sentiments of paranoia, resentment, and animosity as well as a desire for consolidation among a vulnerable lower middle class fearing to fall into the guzzling pit of precarity widening below them.

Conspiracy theories proliferate in these conditions. Far from harmless and fun, they are now increasingly weaponized by radical-right movements and populist politicians. Yet today's radical-right irrationalisms cannot be primarily understood as a return of fascist mythos. They cannot be grasped as a strange relic of Weberian rationalization, with its exponents seeking to reintroduce total closure and instrumentalist control. Nor can these fanaticist forces easily be understood as social openness run amok. Rather, they represent an irrationalist attempt to navigate the paradoxes of closure and openness central to cybernetic rationalization. In this mode of rationalization, to recall one last time, the closure of technocratic rules provokes the openness of flexible markets; and the closure of the work environment incites the openness of the worker's creativity. In the hunt for the conspiracy, the seeker constructs their own narrative closure in order to trigger the openness of mystical insight, constantly spiraling through these two epistemic moments of infinite mediation and true immediacy. These individualist epistemologies, moreover, are reflected in the cultic formations in which conspiracists are organized, swarming leanly through the open sociality of the cybernetic age while searching frantically for "the code." It is in this sense that contemporary conspiracism forms an irrationalist outgrowth of cybernetic rationalization and its cultural attitude of innerworldly mysticism, seeking liberation within the world by honoring the ineffable in a mix of postmodern bricolage and gnostic insight.

It leaves us with the two dominant politics of the cybernetically rationalized age: neoliberalism and radical-right mysticism. The rationality of neoliberal governance that unleashes the incommunicable power of the market through a communicable set of rules is met with an irrational outgrowth of cults that

seek to reveal the ultimate communicability of society with an appeal to the incommunicable power of mystical mind. It is a scene of cybernetics and cultism, science and séances, markets and mystics. These are the forces that in recent years have gripped society in a destructive spiral of rationalization and irrationalization, empowering each other with every new election cycle. The pressing question remains: Who will break it?

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NOTES

INTRODUCTION: ABSTRACT ECOLOGIES

1. The quotation by Habermas is my own translation of "die Hochform eines techno-kratischen Bewusstseins." Throughout the book my translations will be accompanied by the original German in the notes.

1. CRITICAL SYSTEMS THEORY

1. The resemblance between cybernetics and poststructuralism is not entirely coin-cidental, since cybernetics has had a major influence on it, notably through Claude Lévi-Strauss (see Lafontaine 2007 and Geoghegan 2023).

2. See Amstutz and Fischer-Lescano (2013); Demirovic (2001); Moeller and Winning (2017); Möller and Siri (2016); and Scherr (2015).

3. In an earlier design for a critical systems theory, Andreas Fischer-Lescano (2013, 15) notes two more affinities between Luhmann and (especially Adornian) critical theory, namely their emphasis on the structural dynamics of society, and a strategy of justice that combines contingency and transcendence.

4. Personal translation of "die Hochform eines technokratischen Bewusstseins."

5. Critical theory is here meant in a general sense that is not limited to Frankfurt School–style theory and includes any social or cultural theory that aims at a diagnosis and critique of capitalist modernity.

6. Translation of "selbstsubstitutiver Ordnung." Functional primacy is a term orig-inally used by Talcott Parsons (see Schimank 2005, 396).

7. Translation of "unveränderlich und sakrosankt."

8. To avoid confusion, "digital" is here used as synonymous with "binary" and does not refer to computer code.

9. Luhmann furthermore adds the category of "interaction" (1995b, 405), which refers to the face-to-face encounter of partners of communication.

10. Translation of "Treffräume für Funktionssysteme."

11. Translation of "Dem biologischen Dominanzbegriff."

12. Translation of "In diesem Kampf um die gesellschaftliche Grenzziehung . . . ist Luhmanns Theorie der funktionalen Differenzierung autopoietischer Systeme ein Kampfinstrument unter anderen."

13. I am indebted to Steffen Roth for his conversations, which helped me develop the argument in this chapter.

14. Luhmann's systems theory, Moritz Klenk argues, is marked by a *"Bezugsproblem"* (2016, 32), a problem of reference, since the observer is always already involved with the observed. The mantra that science should simply offer better empirical descriptions, according to him, must therefore always come up short. It invites questions such as: "Better than what? Better for whom? Better—but how?" (33).

15. Translation of "Es geht nicht bloß um eine—auch noch so stark ausgeprägte— Umweltbeziehung zur Wirtschaft, sondern um eine Veränderung auf operativer Ebene des Systems selbst."

16. "Eleventh thesis" refers to Karl Marx's famous eleventh thesis on Feuerbach: "The philosophers have only *interpreted* the world in various ways; the point is to *change* it" (1998, 571; see Luhmann 1994, 129).

17. An example of such an account is Cedric Robinson's (2000) "racial capitalism," which theorizes the intimate coimbrication of racialization, noncapitalist modes of work, and capital accumulation. Another great example is Stuart Hall's (2019) writings on race in societies "structured in dominance," which bears striking similarities to Jessop's notion of "ecological dominance," albeit it Althusserian rather than Luhmannian vocabulary.

18. See also Kim: "Despite the obvious resemblance systems theory's epistemological radicalism bears to recent theoretical movements toward difference, contingency and paradox, it then will have to be concluded that its connection, as is, with postfoundational political thought is a rather tenuous one" (2015, 372).

19. The crux of this disagreement is that, for Luhmann, his radical constructivism is not based on an ontological structure of the world, but on the findings of cybernetic research. It is, as he says in the passage on radical constructivism quoted above, an "empirical assertion" (Luhmann 2006, 242).

20. To this corresponds Weber's (2008) original dual tragedy of science and politics as a vocation. The value-freedom of science is paid for by the impossibility of its legitimation; the political power of charisma is traded off against the professionalization and bureaucratization of politics.

21. Cary Wolfe (1998, 149) expresses similar reservations about Laclau and Mouffe's position on the primacy of capitalism.

22. Translation of "Paradoxien sind nicht hintergehbar, sie können von hegemonialen Diskursen nur invisibilisiert werden."

23. Wolfe (1998) notes that traditional pragmatism, like that of Rorty and Varela, tends to neglect these two tasks and therefore succumbs to a quietist humanism—a nondescript ethics of less cruelty or universal love—that Foucault and Deleuze attempt to overcome with their materialist philosophies.

2. SPIRALING INTO CONTROL

1. Even the sociologist himself cannot escape the perversions of rationalization. Weber therefore mocked the type of enlightenment positivism that seeks to erase this melancholy of science and that appeals to what he dubbed the "charisma of reason" (Whimster and Lash 2007, 10; see also Roth 2007, 83; Weber 1978, 1209). Weber here thus already anticipated Adorno and Horkheimer's (2010) myth of enlightenment.

2. For the exact same argument spelled out in a Marxist rather than a Weberian context, see Postone (1993, 238–42). Habermas misses the perversion of reason and the emancipatory potential this carries: "It [*The Theory of Communicative Action*] attempts to apprehend a twofold social reality by bringing together two approaches that essentially are one-sided" (Postone 1993, 251).

3. I altered the translation of Honneth's "innerweltliche Transzendenz" from "intramundane transcendence" to "inner-worldly transcendence" to retain the connection to Weber's inner-worldly asceticism. For a contemporary return to immanent critique, see Fraser and Jaeggi (2018) and Jaeggi (2018).

4. See also Mitchell: "The economy was made in the twentieth century, and not by its disembedding. It was embedded in the expertise and calculations of twentieth-century economics" (2005, 141).

5. See for the performativity of economics and economic metrology, Boldyrev and Svetlova 2016; MacKenzie et al. 2007; Muniesa 2014. For an overview of performativity in organizational and management theory, see Gond et al. 2016.

6. Wolfe (2010) argues that this principle is the second-wave successor to what Heinz von Foerster originally called the "order-from-noise principle," illustrated by Von Foerster with the patterns that emerge from jiggling a box of magnetic cubes (see Clarke 2009, 48).

7. I take this concept of "stakes" from Lyotard, who raises the notion in the context of challenging what counts as "performative" (1988, 138). "When Cézanne picks up his paint-brush," Lyotard explains, "what is at stake in painting is put into question; when Schoenberg sits down at his piano, what is at stake in music. . . . Not only are new strategies for 'winning' tried out, but the nature of the 'success' is questioned" (139).

3. THE VITALIST ALTERNATIVE

1. See also Levi Bryant's excellent discussion on this issue: "Luhmann observes that we 'must distinguish between the *environment* of a system and *systems in the environment* of this system'" (2011, 143).

2. "Kein Nebeneinander, sondern multiple Überschneidungen von Perspektiven."

3. Bruno Latour is blunter about his dissolutionism: "Properly speaking, for Lovelock, and even more clearly for Lynn Margulis, there is no longer any environment to which one might adapt. Since all living agents follow their own intentions all along, modifying their neighbors as much as possible, there is no way to distinguish between the environment to which the organism is adapting and the point at which its own action begins" (2017, 100).

4. This hegemony does not mean that immaterial labor has become the dominant form of labor in the world economy in a quantitative sense. "What it means," suggest Hardt and Negri, "is that the qualities and characteristics of immaterial production are tending to transform the other forms of labor and indeed society as a whole" (2004, 65). Just as agriculture was industrialized after the hegemony of industrial labor, now manufacturing and industry are shaped by the techniques, methods, and products of immaterial labor.

5. See Camfield: "Furthermore, the blurring of the line between work time and non-work time as this is experienced by workers is not relevant to the production of value. Value is not produced by concrete labour, in its temporality" (2007, 46).

6. Hardt and Negri's notion of the "common" (2004, xv) refers not so much to the precapitalist commons but to the philosophic idea of goods and services that are produced and consumed in common.

7. Or, alternatively, as they put it in *Commonwealth*: "The more [capital] is forced to pursue valorization through knowledge production, the more that knowledge escapes its control" (Hardt and Negri 2009, 268).

8. See, for example, Karen Barad: "Relata do not preexist relations" (2007, 334).

9. See Lazzarato (2014) on machinic enslavement. He is more cynical than Hardt and Negri about this posthuman constellation.

10. Erich Hörl (2017, 6) asserts that Luhmann's systems theory "even turns out, I would suggest, to be the first condensation of a form of rationality that has turned or is becoming ecological." However, adds Hörl, only after Luhmann's heydays in the "third phase" of the development of a "culture of control," starting around 2000, does "environmental agency" become the main point of focus (2017, 10).

4. CYBERNETIC RATIONALIZATION

1. The video *Project Tierra* is available at https://www.youtube.com/watch?v=W15rRGVD0QI.

2. See also the very similar phrase in his *Political and Social Writings Volume 2*: "The capitalist system can only maintain itself by continually trying to reduce wage earners to the level of pure executants—and it functions only to the extent that it never succeeds in so reducing them. Capitalism is constantly obliged to solicit the participation of wage earners in the production process and yet it also tends to render this participation impossible" (Castoriadis 1988, 259).

3. As a result, efficiency, the measure of entropy, ceases to be the hegemonic metric under post-Fordism, even if it remains vital. Transitioning between epistemes initially involved a process of redescription: The valorization of workers' self-control also reduced the "control costs" of the "hierarchical *cadres*" and thus improved efficiency (Bolanski and Chiapello 2007, 81). "X-efficiency" is especially exemplary here as a notion that acknowledges that maximizing worker output does not primarily depend on rationalizing organizational hierarchies, but rather on flexibly harnessing the information of

decentralized market signals (Coriat 1992, 128). In the same way that Claude Shannon's connection of information and entropy built a bridge between cybernetics and thermodynamics in engineering (Terranova 2004, 30), so "X-efficiency" ties together cybernetic and thermodynamic imaginaries in management economics.

4. This is already a strong hint that the aim of total exchangeability or commensurability has been relinquished by making inequality or difference a basic point of departure for neoliberalism.

5. Hayek gained his understanding of spontaneous order and adaptive evolution mostly from the philosophers of the Scottish Enlightenment, notably from Adam Ferguson (Whyte 2019). Perhaps what is at work here is what in the *Order of Things* Foucault calls the "*positive unconscious* of knowledge: a level that eludes the consciousness of the scientist and yet is part of scientific discourse" (2005, xi–xii).

6. This is admittedly a strange quote, since the book is full of references to "spontaneous order" and "knowledge."

7. It must be noted that Hayek is not entirely consistent on how deliberate this process of design is. At some important points he does stress that "some of the rules of law (but never all, even of these), will be the product of deliberate design" (Hayek 2013, 44). He calls this "the thin layer of rules, deliberately adopted or modified to serve known purposes" (492). Yet at other points he writes that this is merely a process of "discovery": "The former [the *nomos* or law of liberty] are *discovered* either in the sense that they merely articulate already observed practices or in the sense that they are found to be required complements of the already established rules if the order which rests on them is to operate smoothly and efficiently" (116–17). Judges are merely the person through which the spontaneous order speaks: "The efforts of the judge are thus part of that process of adaptation" (113). They are not "a creator of a new order but a servant endeavouring to maintain and improve the functioning of an existing order" (113). In this sense, jurisprudence and the law-making of judges run parallel to competition, which is equally a "discovery procedure," but for the realm of catallaxy rather than the realm of morality (277).

8. It goes to show that biopolitics functions in more twisted ways than through crude domination and surveillance.

9. See Lyotard: "The idea of performance implies a highly stable system because it is based on the principle of a relation, which is in theory always calculable, between heat and work, hot source and cold source, input and output. This idea comes from thermodynamics" (1984, 55).

10. Granted, this conclusion does require reading Moore through a critical systems theoretic lens that emphasizes the need for distinction over monism. Moore himself wavers inconsistently between a stress on the dissolution of the boundaries between nature and society in what he calls "*oikeios*" on the one hand and a refusal to "collapse distinctions" in light of "the danger of Green holism" (2015, 4) on the other. Approaching Moore's world-ecological thought in systems theoretical terms is, I believe, the best way to answer his central research question: "How is nature's work/energy transformed into value?" (Moore 2015, 13; see also Malm 2019).

EPILOGUE: CYBERNETIC IRRATIONALIZATION

1. Partridge veers from his predecessors in preferring to call the new religions "occult" rather than "mystical" (2004, 67). This, however, misses a crucial congruence with cybernetic rationalization: its fascination with the incommunicable.

2. Both insurgencies are examples of what William Callison and Quinn Slobodian (2021) have dubbed "diagonalism," a translation of the German *querdenken*. Diagonalism captures both the fact that the *Querdenker* are forming diagonal coalitions and the connotation of "thinking outside the box."

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