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# INTRODUCTION
# The Logistics of Media

MEDIA AND LOGISTICS ARE GLOBAL OPERATING SYSTEMS. They set conditions for the circulation of information and culture. They activate inventories of materials and networks of infrastructure. They coordinate interfaces between bodies, objects, and environments. Deployed in ongoing projects of capitalization and exploitation, often in the name of global connection, consumption, and security, they affect the day-to-day lives of people around the world. And they are inextricably entangled with one another. Even the text of this book has been enclosed in packets, transmitted, and reassembled innumerable times—a process guided by logistical principles. The materials that constitute it, whether printed on paper or housed in Amazon's cloud storage, were transmitted via trucks, containers, pallets, and hands, their movement likely managed using logistical software. Logistics—the organization and coordination of resources to manufacture and distribute global commodities—depends not only on software and data infrastructures but on a mass of screens, communications devices, and paperwork.

*Assembly Codes* is the first collection to critically interrogate the specific points of contact, dependence, and friction between media and logistics. We argue that the fundamental interconnections between these two systems are essential not only to understanding both of their operations but to the contemporary circulation of culture on a global scale. To describe the dynamics of media today—its production and industries, its vast infrastructures, its material forms, and its global movements—a basic conception of the supply

chain and the science of coordinating techniques is necessary. For the operations of global logistics, a focus on media, whether in the circulation of internet traffic or on the devices that coordinate their commands, reveals crucial links, choke points, and dependencies. Media and logistics are interoperable systems, and the activities of one hinge on the smooth operation of the other.

This collection builds on an exciting field of logistical study that has emerged over the past several decades. In geography, sociology, cultural studies, anthropology, science and technology studies, and history, among other fields, scholars have documented how logistics has been instrumental to warfare and capitalism, as well as to their attendant imperial projects. The idea of logistics was first articulated in the study of warfare, where its theorization elevated it to the same prominence as that of strategy and tactics, but recent work has focused on its adaptation into commerce, especially the impact of the logistics revolution in the early 1960s that cemented logistical operations as a cornerstone of neoliberal economics and politics.[1] In economics, Peter Drucker famously declared logistics the "last dark continent" for commerce left to conquer, and scholars have documented this transition from the more constrained study of "physical distribution management" to the recognition of logistics as "the most encompassing term that describes the management of firms' acquiring and distributing activities over space."[2] Collectively, this work reveals that, as the science of moving goods, people, and information as efficiently as possible to meet the global demands of capital, logistics has been the engineer of the mid-twentieth century. In the subsequent drama of globalization, in which factories have moved to the Global South to exploit cheap labor, and goods are shipped back to the Global North for consumption, logistics has been the star.

In critical logistics studies—a field that coalesced from these inquiries to describe the conditions of logistics, the abstract structures of the supply chain, and their impact on modern life—media is ever-present, even if often in the background.[3] In *The Deadly Life of Logistics*, Deborah Cowen explains that with the expansion of global supply chains, commodities are not produced in conventional geography, but "across logistics space."[4] Logistics space is mediated in a multitude of ways: through process maps, enterprise resource planning software, worker surveillance, the capture of biometric data, and satellite tracking. Logistics, Sandro Mezzadra and Brett Neilson argue, fundamentally "involves the algorithmic coordination of productive processes in space and time."[5] Analyzing these algorithmic architectures, Ned Rossiter calls for a logistical media theory that grasps these technologies'

primary function: "to extract value by optimizing the efficiency of living labor and supply chain operations."[6] These accounts recognize that media are integral to the conceptualization and spread of logistics. Supply chains are defined as much by their communications networks and media technologies as they are by their containers and pallets.

As logistics has become a topic in media and communications studies, scholars have expanded beyond the domain of supply chain management to address its broader conceptualization as a set of coordinating techniques. Paul Virilio's "logistics of perception" places cinematic sounds and images alongside accounts of weapons, people, and materials.[7] Media scholars, including Ned Rossiter, John Durham Peters, and Judd Case, argue that the study of "logistical media" does not simply involve analysis of the visual and computational dimensions of Walmart's or Amazon's operations but a recognition of media's capacity to process data, coordinate movement, and more widely orient sociality.[8] Logistical media, Peters writes, are the media of "orientation," devices of cognitive, social, and political organization and control. They are clocks, maps, and calendars; positioning technologies such as radar; managerial forms such as lists; and commercial codes such as stamps. Due to their ability to organize storage and transmission, and their capacity to locate, arrange, and distribute, all media possess this logistical dimension. Media, in other words, are not simply conduits through which global logistics emerges but exist "prior to and from the grid" through which such operations can be constituted.[9] They are not logistics' black box. They are the instructions for its assembly.

*Assembly Codes* enters into this conversation about the techniques of global logistics and the operative logics of media with three specific interventions. First, it describes what we call the *logistical imagination*. Logistical technologies have always been accompanied by new ways of seeing and listening, reading and knowing, thinking and moving—which have themselves catalyzed crucial shifts in our modes of communication. To unpack the logistical imagination is to trace the representational and imaginative modes of logistical activity, as well as the aesthetic and performative practices that have emerged to grapple with logistical transformations. Second, the essays here illustrate what we call *logistical instruments*: the extensive array of media techniques, technologies, and forms that are essential to the operation of global logistics. The collection's essays demonstrate that media's operative logics—their logistical capacity to orient, arrange, and sort—are deeply connected to the ways in which they have been instrumentalized in histories of militarism, commerce, and empire. As a result, the media

technologies that hold these projects together necessarily advance the trajectories of capitalism, settler colonialism, and biopolitical management. Logistics invests these linked projects with their own seemingly organic and inevitable sense of life, what Cowen describes as an abstract vitalism, at the expense of the human lives of laborers and migrants, and several of our essays touch on these stakes.[10] Finally, the essays reveal how the industrial processes of traditional media production—from cinema to sound recording—are being reshaped as *supply chain media* by logistical technologies and practices. While the processes of sourcing and assembly have always had a substantial effect on how media is produced, distributed, and consumed, contemporary media are being crafted in relation to what Anna Tsing has named "supply chain capitalism."[11] The elements of supply chain capitalism that Tsing documents—actual precarity, collaboration, nonscalability, and translation—are central concerns many of our essays also take up.[12]

While these interventions build across the collection, we have organized *Assembly Codes* into sections that foreground these three ways of rethinking media: as sites of logistical imagination, as instruments of logistical operations, and as products of global supply chains. In the remainder of the introduction, we chart the stakes, contexts, and future directions of these avenues of inquiry, as well as the ties between individual essays and our shared interventions. The authors assembled draw together a diverse set of objects as well as a range of theoretical and conceptual orientations: Black and Indigenous studies, German media theory and sound studies, and the analysis of media industries and production cultures. Their essays foreground the contiguity of production and distribution, the messy relationship between base and superstructure, and most importantly, the continuities between contemporary and historical forms of logistical mediation. They expose the way economic, political, and social power consolidates in and through logistical operations and acts of assembly. Through their careful analyses, the book reveals how contemporary mediation is haunted by its logistical substructures, from the slave ship to the supply chain.

## The Logistical Imagination

How did the imagination of the world change once it expanded to include logistical ways of thinking? When did thoughts of logistical operations begin to hold sway over the details of daily lives? How can one represent the expansive system of global logistics? To answer these questions is to unpack the logistical imagination: the new ways of seeing and imagining the world

brought about by logistics and the new forms of mediation, philosophy, politics, and aesthetics that have emerged to confront it. To analyze the logistical imagination is to understand what it means to see like a supply chain, to comprehend the conditions that make one feel like cargo, or to explore logistics' racialized and gendered aesthetics. It is to document how the subject of Western individualism is, fundamentally, a logistical one, and to interrogate how the historical emergence of logistics in commerce and warfare reshaped everyday life for workers, consumers, and citizens. It is also, we suggest, to imagine how the vast contours of logistical systems elide the faults and friction of their diverse and often divergent operations.[13] To do so involves charting how these underlying instabilities, where "capital hits the ground," may elicit new political potentials and subjective possibilities.[14]

Critiques of capitalism often construe logistics as something simultaneously monumental and microscopic. It is always present but nowhere to be seen. Increasingly automated and algorithmic, it is, like capital itself, an inhuman, unknowable thing.[15] Its representations in texts, photographs, and films are almost always defined by the enormous structures erected in pursuit of global trade. Capable of transporting more than ten thousand containers per trip, megaships, for example, are vessels so massive that they are unable to sail through the expanded Panama Canal locks, their decks unreachable by most North American cranes.[16] The mind-boggling scale of these technologies and of the systems that manage their movements are defined by the dark dreams of the "logistical sublime," where global trade flows are ever more precisely patterned in a nightmare of unending rationalization.[17] Researchers have described how logistics is inextricable from other global phenomena, including the conditions of late capitalism and the politics of neoliberalism. Jasper Bernes has argued that "the totality of the logistics system belongs to capital," and as such, it remains cognitively and materially impregnable by traditional revolutionary means.[18]

While the logistical sublime is the dominant form of the logistical imagination, mobilized by capitalists and critics alike, it is not the only representational possibility. As a means of opening up the analysis of the logistical imagination, the authors in *Assembly Codes* delve into the many ways that humans have engaged with and envisioned logistics. A study of these cases reveals that the logistical imagination is always refractive, embodied in the particular moments and media of their production. This is true when workers slow down or speed up to control the fluctuation of logistical time and speed; when protestors blockade ports to limit the movement of materials across logistical space; and when undocumented migrants and fugitive

slaves seize opportunities to travel outside the well-ordered regimes of logistical control. But it is also true when middle-class people use location-based apps to hook up, request a car to the airport, or arrange for a next-day delivery in a single click. The logistical imagination not only drives forces of oppression, it ignites resistance and lubricates banal normativity. Our aim is to understand the specific differences that these representations, aesthetic practices, and modes of thinking make to larger logistical projects.

We are motivated by the recognition that new imaginations can catalyze systemic shifts. Indeed, the contemporary concern with logistics—which has culminated in academia in fields such as critical logistics studies—was sparked by the dissemination of new logistical imaginations and representations. It was in part through media coverage of the impacts of globalization, including its supply chains, workers' rights, and environmental impact, that middle-class people in the Global North began to grapple with logistics. The anti-sweatshop campaigns of the 1990s that stemmed from Nike's disastrous "sweatshop summer" gave rise to a new discourse of ethical consumerism, one that expanded to encompass concerns for human rights and worker welfare, the ethical treatment of animals, environmental contamination, and global climate change.[19] Recent conceptions of corporate social responsibility, the connection between local sourcing and consumption, and assessment methodologies like carbon footprinting all bring to light the journeys commodities make as, driven by logistics, they are assembled and distributed around the world. At the same time, the meteoric rise of private carriers like FedEx, UPS, and DHL made delivery trucks and logistical laborers familiar figures, so much so that the 2000 film *Castaway* could reimagine *Robinson Crusoe* as a narrative about a FedEx logistician stranded on a desert island in the crash of a cargo plane. It is precisely because of logistics' extraordinary scale and apparent unknowability that media play such a critical role in shaping our knowledge of these systems and afford the potential for collective forms of resistance.

An attention to forms of mediation reveals the language and iconography of logistics as a potential site for intervention. Marc Levinson's *The Box* (2006) and Alexander Klose's *The Container Principle* (2009), for example, both figure the container as the emblem of globalization and the originary sign of modern logistics.[20] Carried by cranes between ship holds and truck beds, this intermodal innovation accelerated shipping times, ending the era of arduous and time-consuming break-bulk unloading, and the work of longshoremen who labored on the docks. By the turn of the century, the box was ubiquitous both in distribution, where the TEU, or twenty-foot equivalent

unit, had become the standard object of operational consideration, and in the public imagination, as developers repurposed it for the architecture of everything from modular housing to shopping malls. Sites like Box Park in London, Tolchok near Odessa, and Common Ground in Seoul reveal a logistical imagination at play, one that places global transportation in a local context of commodity display and retail consumption. The shipping container not only infiltrated the visual and architectural landscape, it was remediated in films (such as Allan Sekula's 2010 *The Forgotten Space*), art installations (such as Gabby Miller's 2015 *Turquoise Wake*), and podcasts (such as Alexis Madrigal's 2017 *Containers*). Alberto Toscano and Jeff Kinkle identify a "poetics of containerization," noting the form's mesmerizing power as an icon of capitalist abstraction, especially to visual artists.[21] Engaging with this form, activists, workers, and scholars have attempted to transform its meaning and leverage the logistical imagination in pursuit of progressive political causes.

Analysis of the logistical imagination is not limited to this most recent moment or to late capitalism. Even in the eighteenth century, Adam Smith found modern man the product of an impossibly global network, one where "all the different parts of his dress and household furniture, the coarse linen shirt which he wears next his skin, the shoes which cover his feet, the bed which he lies on, and all the different parts which compose it, the kitchen-grate at which he prepares his victuals, the coals which he makes use of for that purpose, dug from the bowels of the earth, and brought to him perhaps by a long sea and a long land carriage."[22] During this period, the first overtly political imagination of the supply chain circulated when antislavery activists refused to sweeten their tea with "blood sugar" harvested by slave labor and advocated for more space and ventilation on slave ships. The Atlantic focus of this section indicates the centrality of historical logistics to Black studies, especially its engagement with the Middle Passage, a foundational moment at which ethics and logistics clash.

Such imaginations of supply only multiplied as technologies of acceleration such as the railroad, telegraph, and steamship inaugurated the dromological culture of the nineteenth century, speeding the flow of goods, people, and information throughout the world. Instead of UPS trucks, symbols of earlier logistical imaginations included sights such as the "traveling post offices" of Britain's modernized postal system, where workers sorted mail on moving trains to deliver up to five times a day.[23] As a predecessor of the Amazon interface, the twentieth-century circulation of the Sears mail-order catalog in the United States created a consumer culture based

on delivery to far-flung outposts. Even military matters were open to acts of logistical reimagination and critique. In the mid-nineteenth century, the Crimean War was widely criticized for the logistical failings that left its soldiers shoeless and starving.[24]

The essays in the first section of this book delve into historical cases and origin points for the logistical imaginations of today's global trade and supply. They make use of a range of interpretive methods that unpack the ways of seeing, hearing, and sensing that result from logistical operation. Stefano Harney and Fred Moten, offering a deconstruction from the perspective of Black studies, reinterpret the Lockean individual as the simultaneous proprietor and inhabitant of the body-as-container, arguing for a fundamentally logistical understanding of mediation and the relationship between mind and body. Materializing this argument in an analysis of a document responsible for the operationality of modern trade, Susan Zieger follows the history of the bill of lading to demonstrate how the form necessitates an imagination of trade as a process of textual and visual revision, improvisation, and interpretation. Examining Alfred Charles Sam's Pan-African vision for African American remigration, Ebony Coletu broadens the scope of these arguments to consider how logistical plans and identities involve complex reimaginings of settler colonialism. Finally, Shannon Mattern interrogates the soundscapes of the logistical world, from antennae beeps to the shouts of the stevedores, to demonstrate how sounding technologies regiment logistical operations. Together, these essays document how logistics brought about new forms of subjectivity, along with new forms of paperwork, reading, images, and sonic surrounds, as they offer directions for reimagining logistical operations.

## Logistical Instruments

The communication historian Harold Innis argued for the critical relationship between logistical operation and the history of media technologies, finding in even the mundane materiality of clay tablets an ancient logistical imperative. Since moisture was necessary, Innis wrote, and "since the tablet dried quickly," it was important "to write with speed and accuracy." In this "economy of effort" and corresponding "reduction in the number of strokes," he found an explanation for how the "remnants of pictorial writing" were exchanged for the logistical efficiency of cuneiform. Observing similar sensibilities in everything from Phoenician script to the "problem of producing quantities of letters with speed," Innis offered a foundational history of

mediation defined in terms of logistical capacities like speed and mobility—one that would be influential to the work of media theorists such as Marshall McLuhan and James Carey.[25] Some mediums, Innis explained, were "heavy and durable." The aqueducts and granaries of the ancient world carved out geographies, creating points of orientation persisting in time. Others were, by contrast, "light and easily transported."[26] Papyrus scrolls, the orders Napoleon issued to his troops, and inventories of slave ships are of this latter sort. These media functioned as a kind of "immutable mobile," Bruno Latour would later suggest, permitting movement of abstract assemblies across geographic constraints by allowing others to order their contents. These mobile forms made more durable infrastructures "soft," accessible to new forms of logistical control.[27]

In the history of communication there have been a multitude of forms that accomplished this sort of logistical remediation: maps, lists, orders, and plans; bills of lading, assembly, and exchange; parts lists and production orders; requisitions and receipts. The logistical software that governs the supply chain, including SAP's enterprise resource planning system, is only the most recent form of this operative control.[28] Logistical media studies involves reconciling how these forms have materialized from a particular set of cultural techniques, generalizing the logic that Innis finds in the construction of cuneiform to not only media objects, but the "operative chains that precede the media concepts they generate."[29] Analyzing logistical instruments is then not merely a question of following technologies such as the container, but—as Klose has suggested—techniques like *containment*.[30] The essays in this collection document the new logistical capacities of correspondingly new media, but they also remind us that "old media," like the printed form, telegraph, and telephone, once introduced "new" mechanisms for coordinating and controlling the distribution of goods, materials, and bodies.

To study *logistical instruments* and the cultural techniques they encode, we argue, requires attention to the ways that operative control is interwoven with trade, militarism, and imperial projects. Logistics, in name if not in practice, finds its origins on the battlefield, in its canonization amid the aftermath of the Napoleonic Wars. Recognition of its instrumental importance came when Napoleon's general Antoine-Henri Jomini divided modern warfare into the art of strategy, tactics, and a "third art," which described the moving, housing, and supplying of soldiers. His name for it suggested the Greek for calculation and accounting, but it came from the Middle French word *logis*, "to lodge," and derived, he explained, "from the title of the *major*

*général des logis*."[31] Over the course of the nineteenth century, an attention to preparation meant that the foraging of resources—the pillaging, looting, and seizing of housing and provisions from the local inhabitants of a region—was replaced by a centralized effort to furnish an army's needs for food, water, heat, fodder, and weapons. The careful control of supply lines both increased the importance of communication and produced the need for more detailed documentation.[32] As Martin van Creveld argues, "essentially nonmilitary" techniques and technologies like "transport, roads, and maps; timekeepers, standards, trumpets, and the ability to write . . . did as much to shape warfare . . . as did any number of weapons and arms."[33] Modern warfare was not only more dependent on the distribution of supplies, but supply itself had become a means of war. This was nowhere better demonstrated than in the British delivery of smallpox-infected blankets to the Delaware Indians at the height of the French and Indian War.[34]

As a means for the distribution of domination, logistics not only supplied armies, but it reshaped geographies to render them smooth surfaces of supply. In doing so, it produced new territories of logistical space essential to projects of colonization. The age of exploration was indebted not only to new technologies such as the carrack and the astrolabe or to new media such as tables of solar declination and astronomical charts but to correspondingly new techniques of navigation. It was through "documents, devices and drilled people," John Law argues, both navigators and a vessel made "mobile [and] durable," that the Portuguese were able to operate "at a distance" and enact their revolutionary form of "long distance control."[35] Logistical media are pervasive in the history of slavery, as suited to transporting the wealth of distant lands as human bodies bound in servitude along the Middle Passage—the moment Fred Moten and Stefano Harney recognize as the birthplace of modern logistics. As Simone Browne notes, as a means of "accounting for a particular ship's cargo," even instruments like the branding iron functioned as a logistical technology. They too served to "mark out a point," to track and constrain black bodies, limiting their movement in space and time. As these technologies reduced the operation of slavery to geometric units, the ship's hold became a grid where a kind of "stowing process" could be drawn.[36] As Frank Wilderson writes, "something happened to us in the hold."[37] Harney and Moten find in this *logisticality* the other side to Law's "drilled people."[38]

In the twentieth and twenty-first centuries, logistical techniques became increasingly essential to warfare, neocolonial projects, and new systems of racial oppression. The logistical operations of ships and maps were deployed across media forms. Religious texts were distributed as a means of

colonial control. Leaflets were air-dropped to inhabitants of war zones, and new forms of propaganda were carried over airwaves beyond the confines of conventional borders. The media theorist Paul Virilio suggests the critical relationship of "logistics" not only to martial but to mediative measures. Reflecting on World War II, Virilio observes the kind of coordination at work in Joseph Goebbels sending "fifty thousand fascist propaganda records to gramophone-owning households," as he forced theaters to show "ideologically loaded shorts" and raised the price of radio sets to prevent intrusion from broadcasts abroad. After the war, Virilio explains, this same sense of logistical mediation was evident in everything from the control of markets to the dominance of Hollywood—a development attributable, in part, to the enactment of logistical techniques in the new "supply system" the United States pioneered.[39]

"The battlefield has always been a field of perception," Virilio argues, with war and cinema both a "logistics of perception."[40] But this was true only because the techniques that underlay modern warfare were founded on a mediative logistics of mobility and distribution. Virilio's very idea of modernity, Benjamin Bratton writes, "is logistical," the world a "dromocratic" government of "differential motility" always "harnessing and mobilizing, incarcerating and accelerating things and people." This theorization is fitting for not just "a world in motion" but one run on the motor of logistical instrumentality. The world is a crystalline landscape of competing forces of surveillance, fortification, and movement, with everything from architecture to computation comprising logistical media. As these new media technologies "consolidate territory into logistical fields," Bratton argues that they instantiate new regimes governed by "abstracted calculation over omni-directional spaces and surfaces." The result is a new order of operation that structures the vast spaces of "open oceans" and "shared spreadsheets" alike.[41]

It is this wide-ranging remit that enabled logistics to span the global reach of capitalist production. In documenting this process, Sergio Bologna argues that logistics, as the "the art of optimizing flows," necessitates a universalizing understanding. It demands not only the knowledge of "how to make food, medicines, weapons, materials, fuel and correspondence reach an army in movement," but "where to stock them, in what quantities." Above all, "it must know how to transport all of this stuff and in what quantity so that it is sufficient . . . and how to do this for land, sea and air."[42] Through the expansion of global capitalism, territories and populations have been increasingly subject to the instrumental logics of these techniques. Logistical media have been deployed to accelerate and impede the movement of peoples and

to enable the documentation and monitoring of workers, migrants, tourists, and local inhabitants. Since, as Mezzadra and Neilson write, the aim of logistics is to coordinate this movement "in the interests of communication, transport, and economic efficiencies," it is not surprising that practices of logistical surveillance are "central to the instances of bordering, connecting, and stretching of heterogeneous spaces."[43] From their origins in the codification of paper passports in the nineteenth century, these practices have multiplied and intensified as governmentality has multiplied "borderscapes."[44]

Mobilized under promises of flexibility and efficiency, logistical techniques offer new methods of movement just as they do new methods for reifying established structures of power. Radio-frequency identification (RFID) tags, which are ubiquitous forms of management along the supply chain, are now implanted in the hands of Swedish citizens hoping to smooth the transition from home to office, opening the doors of the gym or paying for train tickets with a wave.[45] Through a logistics of the self, they feed data back to digital corporations for future use in advertising. Beyond these more obvious manifestations in supply chain management, surveillance, and self-tracking, logistical techniques are pervasive in the myriad algorithms for coordinating connections over time and space, the stockpiling of vast repositories of data, and the spread of fibrous networks around the globe. They not only control the mobility of humans and nonhumans, or identify people, goods, and services, they also problematize privacy rights, the nature of consent, and institutionalized racial and gender discrimination.

In their examination of logistical techniques and their inherent instrumentality, the essays in this section consider operations ranging from automation to surveillance, working to reveal how ideas of optimization, efficiency, and interoperability are entangled with the multitude of technologies and media forms—from the canoe to the camera—that have produced them. Liam Cole Young begins by demonstrating how logistical media such as canoes, compasses, and paperwork shaped the circulation of fur and cod in Canada, "canceling" out the indigenous formations of logistical practice and organization that had preceded them. Matthew Hockenberry historicizes the idea of efficiency in US manufacturing and the shift in meaning it underwent after the popularization of the telephone. The result was an auditory understanding of efficiency that, he argues, altered the future of communication and production alike. Finally, Ned Rossiter proposes a logistical media theory capable of attending to the geopolitics surrounding technologies of automation. Taking as examples several customer management platforms, he describes the geocultural encoding that exists at the heart of

corporate operations. Examining media's fundamental logistical capacity, these contributors show, can reveal unseen forms of power and the production of difference within the very mechanisms of mediation.

## Supply Chain Media

Understanding the logistical imagination requires an attention to logistics' representational and conceptual patterns. Studying logistical instruments involves tracking the forms of power latent in its techniques. Our third area of inquiry, the analysis of media's supply chain, focuses on the manufacture and distribution of media objects themselves. This includes an attention to their raw materials, locations of manufacture, and networks of distribution. Significantly, it necessitates an understanding of the ongoing forms of coordination and management that tie resources, production, and distribution together. Why, for example, does the revival of old sound formats depend on negotiations with mail carriers? How are efficiencies in cinematic production achieved through the geographically specific conditioning of bodies and labor? In what ways does sourcing—and the winding paths of media's supply—reflect geopolitical conflicts? How do the resulting media objects affectively relay their racialized processes of manufacturing?

Answering such questions, and tracking the long and sometimes circuitous routes by which media reach the receptive eyes and ears of their audiences, readers, and users, builds on emergent fields that track media's infrastructures and industries. The logistics of media production often involves leveraging "soft" infrastructures, the connective systems of organization and classification that support the movement of information (from contracts to production logs), to produce efficiencies. It unfolds across "hard" infrastructures, not only transportation and power systems but also data centers, network exchanges, broadcast towers, and manufacturing facilities.[46] The choices of what infrastructural pathways to engage have material and ecological effects that form the sites of power plays between competing companies. Logistical decisions are often the result of—or crafted in reaction to—the globalized nature of contemporary media production, the regulatory regimes that structure it, and cultures of labor both above and below.[47] While media infrastructures research describes the sociotechnical systems that support the flow of signal traffic around the world, and the study of media industries orients the field to the various corporations, regulations, and operators responsible for the media's workings, the study of logistics describes how systems of coordination modulate flows across infrastructure, reinforce the dominance

of some companies, and connect media production to a multitude of other forms of commodity production. It reveals that media and information, like all modern industries, have not only been reworked according to demands of efficiency and automation, but that the logics governing their operation have been subsumed in service to global supply.

The history of media supply chains extends long before the era of shipping containers and logistical software systems. In the ancient world, the distribution of writing depended on the corresponding distribution of plants like papyrus, mulberry, and hemp. In early modern Europe, it came to rely on an increasingly complex industry that processed old rags into linen paper.[48] Even in the modern world, logistical concerns surrounding the difficulties of harvesting, processing, and moving wood as lumber shaped the development of at least two foundational forms of mass media: the telegraph and the newspaper. In *Wired into Nature*, James Schwoch describes the intense obstacles posed by environmental conditions in the spread of telegraphy through the American west. While the eastern United States had long been established in the timber trade, with sawmills and transportation routes along existing roads and rivers, regions like the Southwest and the Great Plains lacked trees, transportation infrastructure, and expertise. One of the most difficult parts of network construction was found in the procurement of telegraph poles. Harvesting, Schwoch writes, was "killing work for men and oxen."[49] Trees had to be hauled, sometimes by hand, to the telegraph route. This not only increased the cost of the network, it jeopardized long-term stability: poles made of poor wood would fall and require repair.

Effectively organizing the supply chains of their constituent components allowed media and communication systems to scale to the needs of industrial mass production. In turn, the operative techniques that pervade factory work and shipping schedules have become powerful organizing influences on media industries themselves. While early telegraph routes proceeded along routes that offered a ready availability of timber, the maintenance of the telephone network was possible only through dedicated stockpiles and specialists who could supply them. And as Michael Stamm writes in *Dead Tree Media*, the twentieth-century newspaper business reached the "pinnacle of industrial capitalism and mass production" in part due to its careful management of the supply of forest products. "Industrial supply chains," he explains, "connected trees to factories to readers."[50] In his research on the *Chicago Tribune*, Stamm tracks how the company assembled an extensive logistical network that reached from the forests of Quebec to the ships that carried logs to its paper mills in New York and Southern Ontario. The firm's

media production did not operate at the mercy of some distant supply chain: it secured logging rights to forests, hired lumberjacks, and owned its own fleet in a massive, vertically integrated operation. Streamlining logistical operations was essential to commercial success.

Media industries have often depended on materials sourced through the expansive global supply chains that leveraged prior colonial networks. The British success in constructing a global undersea telegraph network, for example, was due in part to the ready availability of gutta-percha from Britain's colonies in Southeast Asia. The emergence of the phonograph industry, Lisa Gitelman writes, "depended on a worldwide trade in materials" that included Indian lac and German chemicals.[51] The lac trade, initially organized by the British East India Company in response to demand for the lac insect's red dyes, underpinned the success of the phonograph in the United States. But like many logistical legacies, Jacob Smith points out, "It was small-scale, lacked precise standardization, and resisted modes of scientific efficiency."[52] As Kyle Devine has documented, the "quality of the supply was uneven" and as a result, "record compositions varied, prices yo-yoed, consumers complained about variable quality, and the industry searched restlessly for a new material."[53] The shift from shellac discs to petroleum-based 45s and LPs was underwritten by a shift in resource regimes and global supply.

Media's supply chains, from the newspaper to sound recording, were transformed with the introduction of mass manufacturing. One of the most obvious examples of this has been in cinematic production, which at the height of the studio system literally functioned as a factory. Cast and crew operated under exclusive contracts to their studios. Designs were done largely in-house, with sets, props, and costumes serving as supplies that could be deployed for productions of surprisingly diverse genres. Films were shipped from one theater to another.[54] As a counter to industrial modes of production, alternative media practices developed alternative logistics. Zines took advantage of reproductive technologies such as photocopiers and were distributed to their audiences through concerts rather than traditional publishing distribution channels. In *A Prehistory of the Cloud*, Tung-Hui Hu describes how the Ant Farm collective devised a "truckstop network," which could move media across the United States without relying on the rigid structures of the television networks. This programming was made possible by media vans driving across interstate highways, with Sony Portapaks enabling the capture of images and radio transmitters broadcasting their signals between nodes. Alternative media often inspire new forms of coordination, "grafting" new networks onto older ones to facilitate new forms of connection.[55]

The essays in this collection focus on the supply chains of contemporary media, examining how they have been influenced by the rise of logistics as a global industry. Many of these media forms, we argue, take the shape of "supply chain media." That is, their manufacturing and distribution adhere closely to Anna Tsing's description of supply-chain capitalism. They are "based on subcontracting, outsourcing, and allied arrangements," where "the autonomy of their component enterprises is legally established even as the enterprises are disciplined within the chain as a whole." These connections make possible mediative processes that span the globe, with the "labor, nature, and capital" that fuels them now "mobilized in fragmented but linked economic niches."[56] The distribution of signals, for example, requires the coordination of "digital supply chains." Logistical networks connecting centralized servers, edge caches, and data centers affect how quickly sites like Netflix load, where they can function in the world, and under what regimes they operate, but they are also composed of numerous digital actors: internet service providers, carriers, data center operators, content providers, and many more, all of which come to constitute the supply chain as a whole. Logistics companies such as Amazon have emerged out of existing forms of networked media distribution, and they have, in turn, directed how new kinds of media technologies circulate.

The chapters in this final section of *Assembly Codes* consider the production of sounds, images, and technologies in the most recent era of supply chain media. Michael Palm documents how new logistical technologies are catalyzing growth in the record industry through old logistical networks like the postal service. For vinyl records, online ordering has not replaced brick-and-mortar record shops any more than the digitization of music has replaced its physical production. In both cases, Palm argues, physical and digital practices remain deeply connected. Kay Dickinson considers the transformation of Hollywood into "supply chain cinema," demonstrating how this new formation not only entails a reorganization of materials and transportation networks but a conscious crafting of logistical subjectivity in workers. Drawing from extensive research on British Leavesden studios, Dickinson emphasizes the role of education in transforming populations into creative resources for media production. The final two essays in this collection follow the construction, production, and supply of digital networks themselves. Nicole Starosielski interrogates the logistics of submarine fiber-optic construction, showing how the cable network that facilitates contemporary supply chain media is actually more closely tied to the imperial legacies of its history than to the logistical networks of the present. In the

concluding piece, Tung-Hui Hu traces the logistical transmission of affect, circulated through racialized bodies, commodities, and digital environments. Taking as a starting point artist Yoshua Okón's installation *Canned Laughter* (2009), which depicts a fictitious maquiladora in Juárez producing shiny red cans of laughter destined for sitcoms ("evil laughter," "sexy laughter," and so on), Hu argues that a dystopian world where low-wage workers across the US-Mexico border laugh, cry, or otherwise emote for white audiences is not as far away as we might think.

With these interventions, we highlight the importance of media to the critical study of logistics, as well as the centrality of logistics to our understanding of media. These essays demonstrate how some of the most significant impacts of media and communication technologies have been not only to shape modes of popular perception, but to shape the logistics of global production. Contributors excavate media's fundamental logistical capacities and show how media forms depend on, and are constituted through, logistical regimes. Throughout the collection we have also linked these chapters with a series of short, logistically inspired stories, keywords, and object descriptions. Each of these interstitial pieces offers an evocative description that bridges, refracts, or otherwise mediates the arguments on either side of it. We are inspired by Rossiter's description, in this collection, of the "interval," the space between the zeros and ones that defines digital logic and yet forms their externality. Constructing these sections between contributing essays, we hope to draw attention to the work of assembly and connection, the gaps that remain, and the multitude of starting points for further inquiries into the logistics of media.

## NOTES

1. On the military history of logistics, see Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge: Cambridge University Press, 1977).

2. W. Bruce Allen, "The Logistics Revolution and Transportation" *Annals of the American Academy of Political and Social Science* 553, no. 1 (1997): 106–16, 109–10.

3. Charmaine Chua, Deborah Cowen, Martyn Danyluk, and Lalel Khalili, "Introduction: Turbulent Circulation: Building a Critical Engagement with Logistics," *Environment and Planning D: Society and Space* 36, no. 4 (2018): 617–29.

4. Deborah Cowen, *The Deadly Life of Logistics: Mapping Violence in Global Trade* (Minneapolis: University of Minnesota Press, 2014), 2.

5. Sandro Mezzadra and Brett Neilson, "Extraction, Logistics, Finance: Global Crisis and the Politics of Operations," *Radical Philosophy*, no. 178 (2013): 8–18, 10.

6. Ned Rossiter, *Software, Infrastructure, Labor: A Media Theory of Logistical Nightmares* (New York: Routledge, 2016), 4.

7. Paul Virilio, *War and Cinema: The Logistics of Perception* (London: Verso, 1989).

8. Ned Rossiter, "Locative Media as Logistical Media: Situating Infrastructure and the Governance of Labor in Supply-Chain Capitalism," in *Locative Media*, ed. Gerard Goggin and Rowan Wilken (New York: Routledge, 2014), 208–23; John Durham Peters, "Calendar, Clock, Tower," in *Deus in Machina: Religion, Technology, and the Things in Between*, ed. Jeremy Stolow (New York: Fordham University Press, 2012), 25–42; Judd Case, "Logistical Media: Fragments from Radar's Prehistory," *Canadian Journal of Communication* 38, no. 3 (2013): 379–95. See also Patrick Brodie, Lisa Han, and Weixian Pan, eds., "Becoming Environmental: Media, Logistics, and Ecological Change," *Synoptique* 8, no. 1 (2019): 6–13.

9. Peters, "Calendar, Clock, Tower," 40; and also Case, "Logistical Media."

10. Cowen, *The Deadly Life of Logistics*, 14–15.

11. Anna Tsing, "Supply Chains and the Human Condition," *Rethinking Marxism* 21, no. 2 (2009): 148–76, 148–49.

12. Anna Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (Princeton, NJ: Princeton University Press, 2015).

13. Tsing, "Supply Chains"; and Tsing, *Friction: An Ethnography of Global Connection* (Princeton, NJ: Princeton University Press, 2004).

14. Brett Neilson and Sandro Mezzadra, *The Politics of Operations: Excavating Contemporary Capitalism* (Durham, NC: Duke University Press, 2019), 154.

15. See, for example, the Invisible Committee, *The Coming Insurrection* (Cambridge, MA: MIT Press / Semiotext(e), 2009).

16. See Edward Humes, *Door to Door: The Magnificent, Maddening, Mysterious World of Transportation* (New York: HarperCollins, 2016), 221.

17. Sam Halliday, *Science and Technology in the Age of Hawthorne, Melville, Twain, and James* (London: Palgrave Macmillan, 2007).

18. Jasper Bernes, "Logistics, Counterlogistics, and the Communist Prospect," *Endnotes*, no. 3 (September 2013), https://endnotes.org.uk/issues/3/en/jasper-bernes-logistics-counterlogistics-and-the-communist-prospect.

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20. Marc Levinson, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger* (Princeton, NJ: Princeton University Press, 2006); and Alexander Klose, *The Container Principle: How a Box Changes the Way We Think* (Cambridge, MA: MIT Press, 2015).

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22. Adam Smith, *The Wealth of Nations*, ed. Jim Manis (State College, PA: Pennsylvania State University Press, 2005), 11–16.

23. Duncan Campbell-Smith, *Masters of the Post: The Authorized History of the Royal Mail* (London: Allen Lane, 2011), 165.

24. See Stefanie Markovits, *The Crimean War in the British Imagination* (Cambridge: Cambridge University Press, 2009), 12–62.

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26. Harold Innis, *The Bias of Communication* (Toronto: University of Toronto Press, 1951), 33.

27. Bruno Latour, *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge, MA: Harvard University Press, 1988), 227; and Rossiter, *Software, Infrastructure, Labor*, 19–20.

28. See Rossiter, *Software, Infrastructure, Labor*; and Benjamin Bratton, *The Stack: On Software and Sovereignty* (Cambridge, MA: MIT Press, 2016).

29. Bernhard Siegert, "Cultural Techniques; or The End of the Intellectual Postwar Era in German Media Theory," *Theory, Culture and Society* 30, no. 3 (2013): 48–65; Liam Cole Young, "Cultural Techniques and Logistical Media," *M/C Journal* 18, no. 2 (2015), https://doi.org/10.5204/mcj.961.

30. Klose, *Container Principle*.

31. Antoine-Henri Jomini, *The Art of War*, trans. G. H. Mendell (Kingston, ON: Legacy Books, 2008), 200–201.

32. Armand Mattelart, *The Invention of Communication*, translated by Susan Emanuel (Minneapolis: University of Minnesota Press, 1996), 208.

33. Van Creveld, *Technology and War*, 48–49.

34. See Gregory Evans Dowd, *War under Heaven: Pontiac, the Indian Nations, and the British Empire* (Baltimore: Johns Hopkins University Press, 2004), 190.

35. John Law, "On the Methods of Long-Distance Control: Vessels, Navigation, and the Portuguese Route to India," in *Power, Action and Belief: A New Sociology of Knowledge?* ed. John Law (London: Routledge, 1986), 234–63, 254, 257; see also John Law, "On the Social Explanation of Technical Change: The Case of the Portuguese Maritime Expansion," *Technology and Culture* 28, no. 2 (1987): 227–52.

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37. Frank B. Wilderson III, *Incognegro: A Memoir of Exile and Apartheid* (Durham, NC: Duke University Press, 2008), 489.

38. Stefano Harney, in Niccolo Cuppini and Mattia Frapporti, "Logistics Genealogies: A Dialogue with Stefano Harney," *Social Text* 36, no. 3 (2018): 1–16; see also Stefano Harney and Fred Moten, "Fantasy in the Hold," in *The Undercommons: Fugitive Planning and Black Study* (New York: Minor Compositions, 2013), 89–99.

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40. Virilio, *War and Cinema*, 26.

41. Benjamin Bratton, "Introduction: Logistics of Habitable Circulation," in Paul Virilio, *Speed and Politics*, trans. Mark Polizzotti (Los Angeles: Semiotext(e), 2006 [1977]), 7–25, 7–8.

42. Quoted in and translated by Alberto Toscano, "Logistics and Opposition," *Mute* 3, no. 2 (2011), original text from Sergio Bologna, "L'undicesima tesi," in *Ceti medi senza futuro? Scritti, appunti sul lavoro e altro* (Rome: DeriveApprodi, 2007), 84.

43. Sandro Mezzadra and Brett Neilson, *Border as Method, or, the Multiplication of Labor* (Durham, NC: Duke University Press, 2013), 206.

44. See Andreas Fahrmeir, "Governments and Forgers: Passports in Nineteenth-Century Europe," in *Documenting Individual Identity: The Development of State Practices in the Modern World*, ed. Jane Caplan and John Torpey (Princeton, NJ: Princeton University Press, 2001), 218–34.

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50. Michael Stamm, *Dead Tree Media: The Newspaper in Twentieth-Century North America* (Baltimore: Johns Hopkins University Press, 2018), 11.

51. Lisa Gitelman, *Always Already New: Media History and the Data of Culture* (Cambridge, MA: MIT Press, 2006), 16.

52. Jacob Smith, *Eco-Sonic Media* (Oakland: University of California Press, 2015), 21.

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54. This is central to Bill Morrison's film *Dawson City: Frozen Time* (New York: Picture Palace Pictures, 2016), where the eponymous city's media archive speaks directly to its place at the end of this supply chain.

55. Tung-Hui Hu, *A Prehistory of the Cloud* (Cambridge, MA: MIT Press, 2015).

56. Tsing, "Supply Chains," 148–49.