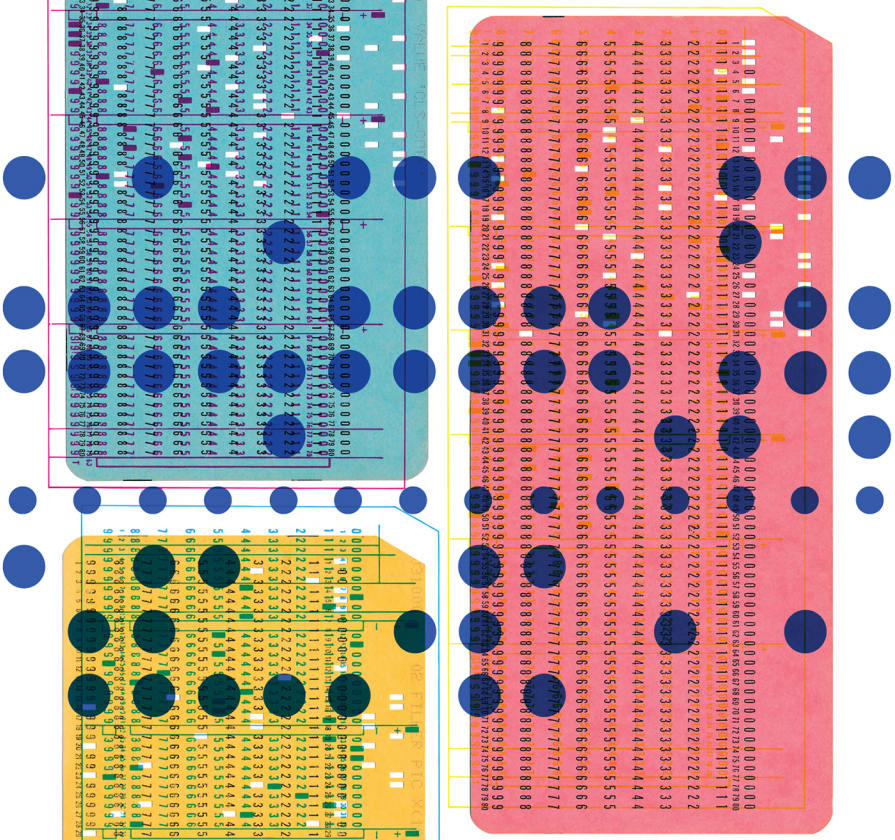
ARCHITECTS OF MEMORY



Information and Rhetoric in a Networked Archival Age

NATHAN R. JOHNSON

ARCHITECTS OF MEMORY

Rhetoric, Culture, and Social Critique

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The University of Alabama Press Tuscaloosa

The University of Alabama Press
Tuscaloosa, Alabama 35487-0380
uapress.ua.edu

Typeface: Minion Pro

Cover design: Mary-Frances Burt / Burt&Burt

Cataloging-in-Publication data is available from the Library of Congress.
ISBN: 978-0-8173-2060-7
E-ISBN: 978-0-8173-9296-3

For Meredith

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ACKNOWLEDGMENTS

This project has been fifteen years in the making and spans four different institutions, making for a long list of people to thank. In 2006, I enrolled in a degree program with the goal of becoming a professional librarian. It was during that time that I became enamored with the profession's history, largely due to the influence of Michele Besant, Christine Pawley, and Louise Robbins, a stellar group of library historians. This book would not have happened if they had not been inspiring teachers and scholars. Library school also introduced me to a number of innovative instructors, including Sylvia Contreras, Greg Downey, Kristin Eschenfelder, and Catherine Smith, who inspired me to explore the history of librarianship by expanding my horizons with interdisciplinary scholarship. Kristin and Greg in particular encouraged me to explore new areas of study, which is a fundamental reason why I have such a large group of mentors to thank. Rob Asen, Leah Ceccarelli, Christine Harold, Rob Howard, Stephen Lucas, Matt McGarrity, Gerry Phillips, and Candice Rai directed my study of rhetoric as a discipline, and I am forever grateful. I would not have pursued doctoral study, research, or book writing without their inspirational teaching. Of course, a learning community includes faculty *and* students, and I have been lucky to benefit from ongoing conversations with Melissa Adler, Pam Conners, Kelly Jakes, Jamie Moshin, Brenton Stewart, Anjali Vats, and Kate Vo Thi, who I consider to be my unofficial cohort: a mix of library science and rhetoric students. Each of them shaped who I have eventually become as a scholar. This book, a work of interdisciplinary scholarship, was written just as much by them as me.

More directly, I am grateful to the people who provided candid feedback on pieces of this manuscript. My conversations with Lauren Cagle, Scott Graham, Bill Hart-Davidson, Jennifer LeMesurier, John Lynch, Ashley Mehlenbacher, Damien Pfister, Pamela Pietrucci, Aimee Roundtree,

Julie Staggers, and Bill White each inspired rewrites of the material. Liz Angeli, Scot Barnett, David Beard, Greg Dickinson, Carl Herndl, Cath Gouge, Thomas Rickert, and Christa Teston provided line-level edits for different parts of the manuscript. The team at the *Journal of Information Science and Technology* also reviewed early drafts of this book, and the feedback from experts in the field I was studying validated the importance and interest in this work. Thank you to Amanda Wick at the Charles Babbage Institute for archival expertise and advice. A book largely about libraries could not have been produced without professional librarians and archivists. Amanda made several last-minute contributions that significantly improved the manuscript. I am sure I have forgotten numerous other contributors, but that is one of the fortunate results of being blessed with a fantastic group of colleagues.

Dan Waterman and the editorial team at the University of Alabama Press have been wonderful. Dan championed this project from beginning to end, and I am beyond grateful for his guidance as I completed my first published book. I am also thankful to my (formerly anonymous) peer readers, Krista Kennedy and Timothy Barney, who vetted this manuscript for the University of Alabama Press. Each round of revision was a joy because they both took on the role of collaborators who sought to improve the work I trusted them with. My experience with the University of Alabama Press has been amazing, and I could not have asked for a better publishing experience.

I have also been blessed with colleagues that made work a joy at both Purdue University and the University of South Florida. Hunt Hawkins, Nancy Peterson, Laura Runge, and Patricia Sullivan preserved a research environment that enabled me to complete an academic monograph. I am grateful to have been assigned courses that forwarded this research, supplementary travel funding, and a quiet space in which to write. Thank you to the graduate students who provided rich conversation during the numerous iterations of my graduate seminars on publics, memory, history, and rhetoric. Spencer Bennington, Peter Cannon, Jeff Gerding, Cody Hawley, Natalie Kass, Patrick Love Nick Marino, Josh Rea, Jaime Robb, John Sherrill, Kyle Vealey, Katie Walkup, John Williams, and Tanya Zarlengo all made a difference in the quality of the final text. My USF colleagues Kristin Allukian and Jarod Roselló also gave timely feedback on chapter drafts, but more importantly, they offered emotional support to a fellow junior faculty member. Our backgrounded instant messenger chatter was often the music of this manuscript. Mark Leahy has been a good friend and colleague, in addition to providing informal feedback. He makes it fun to come to the office. If I could give him an official award for best colleague, I would. A huge thank you also to Debra Garcia and Marisa Iglesias who made it a joy to work in the USF English

Department. They both made my everyday problems go away, seemingly magically. An even bigger thank you to Deedra Wollert who tirelessly helped me with the everyday details of teaching, professing, and writing at USF. She is a good friend.

Most importantly, I am beyond grateful to my family, especially my partner, Meredith Johnson, who I have the double fortune of living and working with. Meredith tirelessly pored over this manuscript with me, talking through the project and giving feedback on my occasionally awful drafts. Her encouragement and advice have kept me interested in the project over the long haul, especially on days when I wanted to give up. She teaches me to be a better and more well-rounded person. Our life together keeps me sane, whether it involves a trip to work, to visit family, or to the grocery store. Meredith also has given me a stepson, Henry Zoetewey, who has changed my life. Henry reminds me to have fun, make a mess, and be kind to everyone. You are both my favorites.

ARCHITECTS OF MEMORY

INTRODUCTION

> I went out to the World's Fair in Seattle recently and found the American Library Association had a splendid exhibit on electronic machines—through UNIVAC. I refer to one of these electronic devices whereby you go in, punch a button—after you have listed a topic on which you want information—and get a sizable list of citations of documents on that particular topic very promptly. . . . Why in the name of commonsense can't the Government do it?
>
> —Hubert H. Humphrey to US Senate Committee on Government Operations

It seems that today Hubert H. Humphrey's wildest dreams have come true. Internet search engines provide both citizens and government with near instantaneous access to information on any topic. If anything, Humphrey's desire for such antiquated technology seems charming. Smart technologies are now de rigueur for most citizens. With the help of Amazon's Alexa or Apple's Siri, users can ask personal devices for directions, recipes, or news, and they can expect, more often than not, to find what they are looking for. Recent estimates indicate that a full three-quarters of Americans own a smartphone, and among younger generations, saturation is more than 90 percent.[1] Globally, the number of Internet users continues to rise year after year.[2] Not only can the US government punch a button to receive omnipotent information, but a majority of global citizens can do the same.

The story of how this happened is now well-known. Engineers, funded by vast investments in the military, developed the first modern computers to decipher enemy messages and compute missile trajectories during World War II. Computers improved rapidly over the next few decades as the military invested more money in their development. The UNIVAC Solid State

90 that caught Humphrey's attention at the World's Fair in Seattle was one of the more famous mainframes. Weighing in at eight tons, it was promoted by the American Library Association as a demonstration of the "library of the future." Around the same time, the US Department of Defense funded the ARPANET, the predecessor to today's Internet and World Wide Web, to more quickly share data among research laboratories and universities. In the early nineties, Tim Berners-Lee invented the World Wide Web, and Marc Andreessen introduced the graphic user interface, inducing users from across the globe to log on with their personal computers that by then outpaced the room-sized mainframes they replaced. Now, computers continue to get smaller while exponentially more people access networked information on a daily basis. The early mainframes that were developed for performing rapid military calculations have matured into a protean social web of technologies. This historical infrastructure now augments nearly every imaginable human activity, and it has changed the way we live.

The behemoth infrastructure runs on sociotechnical regimes of memory practices, distributed acts that "commit to record."[3] Memory practices are struggles between individuals, institutions, environments, social mores, and technologies, and they are executed whenever and wherever there is recordkeeping. Because Internet protocols make, store, and distribute copies of data by default, even seemingly mundane acts like clicking hyperlinks become acts of memory. Web servers document site visits, clicked links, browser/computer characteristics, failed attempts, and so on, while users navigate pages, apps, and other software. To say that Internet infrastructure runs on regimes of memory practices is to recognize the aspects of memory that the technology routinizes, standardizes, and institutionalizes. For the network to remember even marginally differently, software must actively resist its infrastructural support. For instance, SnapChat, a photo-sharing app that automatically destroys users' messages, is one example that differentiates its memory practices by intentionally forgetting online content. Its developers actively program software that erases what is otherwise easier to store. The app's developers suggest that forgetting helps the software forge stronger user relationships by providing a memoryscape that encourages lower-stakes conversations.[4] Network users may not always have memory on their mind, but practice memory they do.

In addition to the memory work conducted in the background, users actively practice rhetoric's fourth canon. They implement software that takes advantage of computers' ability to make precise digital copies. Some of this software has been around so long that it hardly seems like memory technology anymore. When users execute commands like copy and paste or screen capture, it can appear to be a "natural" mode of remembering. Other

software uses more sophisticated techniques for remembering. Movie aficionados have access to numerous software suites they can use to rip, copy, and save online video. Amateur archivists use tools that allow them to make backups of entire websites. Avid readers have increasingly adopted bibliographic software such as Zotero and Goodreads to meticulously document reading material. Organizations continually experiment with new software that enables collaborative writing and record keeping.[5] Each year, data storage and access becomes exponentially less expensive and more ubiquitous, allowing companies, governments, and individuals to adopt increasingly complex regimes of memory.

The momentum of these networked memory practices has prompted many social pundits to reckon with the benefits and pitfalls of our new infrastructured practices of remembering and forgetting. Tech writer Nicholas Carr, for example, has suggested that the Internet is making users stupid, distracted, and forgetful because they never need to remember anything without their computers.[6] Physics professor John Edward Huth has argued that omnipresent bits of information encourage users to get lost in minute details while missing out on the bigger picture.[7] Gloomy critiques like these tend to essentialize humans as being under attack by nefarious technologies, and many note the similarities between these dystopian narratives and Plato's view of technology and memory, ridiculing the contemporary stories as sensationalist. Meanwhile, futurists, including Ray Kurzweil, see computers as a natural step in human evolution and have suggested that eventually computers will be fused with human brains, enhancing memory along with other cognitive capacities.[8]

Memory is, of course, more complex than these popular narratives imply. Often critics see memory as a given or unified whole—something that is good or bad, immaculate or failing. Yet, it is more helpful to approach memory as layered, variegated, shifting, and nuanced. Network technologies are one, albeit important, part of a more complicated, fluctuating rhetorical space that is public, shared, and open to intervention.[9] Anxieties about computers and networks shape popular understanding of memory, but the circulating narratives are very limited.[10] They frame remembrance as a storage and recall technique, but they do not draw attention to other vital aspects of public memory: how it evokes current concerns, instigates debate, produces narratives of common identity, and activates affective ecologies, all of which rely on the physical world (which includes digital networks).[11] Critics like Carr, Huth, and Kurzweil who suggest information technology inevitably changes people do not point out how people likewise change memory technologies.[12] These critics fail to note that technologies and people change along with the situated experiences, places, and values that emerge through

shared rhetorical practice. They also fail to note that staring too closely at memory technologies activates the very concerns and values they tend to write about: the ability of humans to mimic the storage and recall capacities of computers.

Imagining public memory as having an infrastructure helps to circumvent these issues. Memory infrastructures—backgrounded resources for practicing memory—explicitly obfuscate social issues related to memory because they are built to do just that. By concealing their rhetorical work, they activate a small number of concerns that draw critical attention. When Huth, for example, suggests that publics now focus on details to the detriment of a bigger picture, he is also tacitly noting that memory infrastructures have been entrusted with providing the bigger picture for those smaller details. Hidden infrastructures solve many other problems that have allowed these foregrounded issues to emerge. An inspiring antenarrative to Huth notes how publics trust their shared technologies enough to use them together as communities.[13] Critics often merely point to practices that have been delegated to machines, and their discomfort says more about the values of their era than about memory. While in 1962 Hubert H. Humphrey wanted a machine that would do memory work to support a stronger political state, today Nicholas Carr is concerned with individuals taking back some of those memory techniques from the computers. Then and now, issues of memory and recall are bound up with identity, affect, and meaning. Instead of lamenting lost memory, perhaps it would be more useful to ask where, when, and how publics disagree about shared practice.

A key problem is not *how to repair* modern memory but *where to locate* it. This book makes sense of the traffic between infrastructures and public memory by exploring historically situated and emerging memory techniques. By studying foundational decisions built into memory infrastructures, I locate *rhetorical commonplaces*, literally "material, concrete, material aspects of place" accommodating "competing rhetorical frames that circulate within and are tied to literal places," to better intervene in public memory.[14] Unlike popular commonplaces in circulation, mine are not invested exclusively in storage and recall but in reanimating and invoking more vibrant publics. I draw from the twentieth-century history of library and information science, connected and competing information professions invested in making decisions about long-term memory infrastructures. Libraries are arguably the oldest infrastructures developed to facilitate public memory.[15] They interpret, collect, classify, change, retrieve, distribute, and preserve information. Exploring moments of competing infrastructural approaches connected to libraries and information science helps to make sense of contemporary networked memory practices. Indeed, I maintain in my

conclusion that there is important interventional work for contemporary publics to do to support stronger memory infrastructures, but this must be done by circulating a new set of commonplaces. In chapters 2, 3, and 4, I argue that sensibilities developed during wartime promoted infrastructures built with tropes of ubiquity, automation, and expedience while eroding resources for alternatives critical for sustaining engaged publics. Encouraging memory infrastructures that value particularity, intervention, and deliberateness provided timely critical alternatives for public memory making during the era.

Examining the history of librarianship and information science is not the only way to explore memory's rhetorical commonplaces, but it is a particularly fruitful one for several reasons. As a field of research, information science invents, develops, and popularizes techniques and technologies that support numerous memory practices. Early versions of Google search engine technology, for instance, were predicated on algorithmic techniques invented by 1960s information scientists.[16] The field also trains human labor to build and sustain memory infrastructures. Thus, the theoretical tool kit of the discipline is taken up as its students enter the labor force and work with public memory technologies. Although some information science precepts could be traced to ancient librarianship, it was not until the 1960s that the field was named and acquired political force to demand professional space in public universities. Yet, venerable librarianship and the relatively young information science would both be profoundly impacted by the rhetorical conflicts that took place as the fields developed, conflicts rooted in the adoption of operations research (OR).

OR, a "mental technology" that provides techniques for problem solving and thinking, irrevocably transformed both fields.[17] Although OR was born in applied fields like probability and statistics, it emerged more popularly during World War II.[18] OR made its way to the United States shortly after the Battle of Britain when James Conant, president of Harvard, visited England as a chairman of the National Defense Research Committee and then made it a central part of the American military.[19] Several new technologies were particularly important for OR to gain traction as a mode of thinking, including radar, the dreadnaught battleship, the airplane, and the submarine. The OR combination of techniques and technologies allowed war planners to deploy more real-time, third-person planning strategies. OR was one of many new technologies that modeled novel kinds of "rationality practices."[20] Through a combination of information reconnaissance and scientific planning, it generated theories and quantitative models for efficient decision making with known resources. Enemy information could be collected quickly enough to implement more advanced analytical methods. Crucially,

one of OR's key assumptions was that problems could be modeled as parts of an efficient, machinelike system.[21] War strategists were able to strengthen their administrative tool kits because they now had access to information that let them "see" the enemy from new, "overhead" perspectives.[22] Game theory, statistical modeling, mathematical optimization, and logistical efficiency were the new rational weapons of war.

OR is not a memory technology per se until its concepts are translated into techniques to scaffold memory, and this is the opening that I work from to better understand public memory. OR provided librarianship and information science with "inaugural acts" of memory, circumstances where memory is assumed to be perfect so that omnipotent record keeping can begin.[23] Inaugural acts of memory initiate political regimes of truth. OR's advocates imagined it as the perfect analytic technology. Shortly after World War II, OR was critical for inventing the field of information science. Information science transformed OR into a regime of standardized technologies, labor strategies, and disciplinary knowledge dedicated to scaffolding memory. After its emergence, information science appropriated power from competing public institutions that had well-developed approaches to memory—libraries, research labs, and universities. Today, information science supplies theory, technologies, and labor that are pervasive throughout modern network designs for computers, databases, and software. Over the course of this book, I explore the commonplace work that realigned the information professions so OR could be mobilized as a memory tool kit. OR depended on computers as a metaphor for analysis, it devalued the competing ideas of information labor via gender stereotypes, and it was able to take advantage of a historical moment when public funding for information infrastructure was vulnerable because of World War II. By revisiting the politics that were lost, I offer a set of heuristics to intervene in memory practices and imagine counterinfrastructures that supplement the memory practices of today's networks. Intervention is needed to support a multiplicity of infrastructures to offer resilience to publics who now grapple with the legacy of their networked memory spaces.[24]

In chapter 1, I explore the intersections of infrastructures, memory, and rhetoric in depth to ground a theory and method for locating and intervening in public memory. After highlighting rhetorical studies' canonical myths of memory, I forward the terms *memory infrastructures* and *mnemonic technê* as a way of surfacing phenomena germane to rhetoricians. These twin concepts elucidate points in infrastructure where memory's affordances are black-boxed as inevitable, natural, or essential. Memory infrastructures consist of the backgrounds that expose particular modes of memory. Mnemonic technê are particular mnemonic resources made available

within the larger structure. I specifically adopt the terms to explore background infrastructures important for many modern digital networks used widely by publics. They provide a heuristic for intervening in any number of memory practices, not just those I detail in the following pages. While I use these concepts to identify competing topoi in interconnected memory infrastructures, I will not claim that memory is exhausted by any number of pervasive commonplaces. The strength and contribution of this book is that it provides guidance for opening up the black box of memory to better understand it before critiquing it for its faults. These types of interventions craft a new future in which an art of memory can adjust to the needs of its fluctuating publics.

I highlight the links between infrastructures and mnemonic technê as mnemonic coin of the realm. In popular use, *coin of the realm* refers to any substance that is seen as valuable because it can be traded for any other goods and services. Memory's coin emerges out of infrastructure as material to use in mnemonic practice. Books are a well-understood form of coin. Infrastructure has provided for a veritable book industry that legitimizes them as objects of memory. Books, in turn, lend themselves to mnemonic technê that can accommodate them. For instance, card catalogs originally depended on the affordances provided by physical books (titles, author names, and more) as a way to provide mnemonic tokens for remembering publics. Later configurations of coin, infrastructure, and technê contain the vestigial effects of the past. One reason it remains popular to compare digital materials with printed is that related coin shares a tremendous amount of infrastructure. The differences and similarities in coin, technê, or infrastructure point to transformations in how publics remember and forget together. The fact that digital books demand new electronic distribution outlets points directly to the speed, size, and velocity of remembering. The history of information science narrated throughout this book points directly to digital transformations in some of memory's longest-lasting coin.

Historical narratives, interspersed with shorter intermezzos, set the tempo for the remainder of the book. This technique draws out the relationships between a "long now" view of memory infrastructures and shorter, more contextualized mnemonic technê.[25] While the long now highlights interventions that sustain over time, the contextualized mnemonic technê point to particular "hacks" in memory's infrastructure. The first intermezzo provides an abridged overview of American library education, which was radically altered by the precepts of OR and information science that emerged after World War II. This initial intermezzo serves two purposes. First, it contextualizes information labor as a dominant mnemonic technê within infrastructure. In this context, I locate a comfortable place within infrastructure

to imagine even the most traditional notions of rhetorical theory and action because the intermezzo highlights the significance of human intervention as a central mnemonic technê of memory infrastructures. Often infrastructure is imagined primarily via its technologies, but labor is critical for holding together the resources of infrastructure, including those devoted to remembering and forgetting.[26] Second, the short history of American librarianship provides a starting point for exploring the tapestry of mnemonics introduced by OR in the next chapters.

Chapter 2 narrates the birth of information science as it developed in Europe at the start of the twentieth century. Information science is popularly imagined as an academic discipline, but it is just as accurately conceived as an arrangement of memory infrastructures and mnemonic technê: information science emerges through networks of pervasive, enabling resources supported by contextual social practices, embedded labor, and materialized technologies.[27] Information science's approach to memory (i.e., encode, store, retrieve, disseminate, classify) serves as a particularly noticeable counterpoint to rhetorical theories of remembering and forgetting (i.e., resources for invention). Chapter 2 captures a pivotal postwar moment and details how OR, military technology, and some of history's most committed mnemonists (and one very brash Marxist provocateur) came together to inaugurate information science as a support for public memory infrastructure. Once in place, OR provided technologies and commonplaces for a long-lasting memory infrastructure that would eventually be popularized for governmental, educational, and public spheres.

Managing science information problems and gatherings of librarians, documentalists, and bibliographers may seem far removed from the everyday concerns of rhetoric and memory. These postwar anxieties of science information organization, transfer, and management may seem less riveting than the bluster of a scathing political diatribe, and science information is not typically a topic in many writing classrooms.[28] Even more avant-garde approaches to rhetoric rarely acknowledge science information while waxing on theory. Rhetorical ecologies are many things, but they are certainty not driven by scientific information. More often than not, when rhetoric and memory are discussed, they are studied as ephemeral and in context, provisional and capricious. Rhetoric is an art that depends on kairos, a timely, appropriate response to a practical problem.[29] Because it is contingent on change, rhetoric is messy, which seems at odds with the mechanics of contemporary scientific practice that often aims to control and predict. Yet, rhetoric *must* look to science information to better understand its approach to memory.

Current approaches to rhetoric are often ambient, distributed, and networked.[30] The individual author has been displaced by a living rhetorical situation that evokes a response that is "inseparable from its conditions of emergence."[31] As such, rhetoric includes the imbrications of space, material, technologies, affects, and experiences, as well as the living beings that have often been its traditional focus. The postwar scientific problem invoked an emerging rhetorical exigence. Participants responded by inventing new memory techniques: regimes of informational technologies designed to archive and distribute the writing of scientists. Science supporters of the postwar era found themselves reinforcing one of the most powerful and lasting institutions of the twenty-first century: the background infrastructure that would support institutionalized science communication, an often omnipotent discourse of the modern era. Science information, as it often is, was infrastructured as though it were only truthful communication of the past. Successful war technologies had recently reinforced science information's effectiveness. Systems for scientific documentation were thus entrusted as distributors of global truths. The production of global memory technologies would later lend themselves to other public spaces. Moreover, the web of conversations about information would sustain a profession that would later work to sustain the public memory infrastructure of science and beyond.[32]

Chapters 2 and 3 explore historical exigences, technological developments, and conferences attended by those who founded information science to illuminate a surprisingly contemporary question and one of the most fundamentally frustrating problems of the information age: How do publics make sense of the provenance of materials they read, especially those that have been distributed through digital networks where the logics of delivery have radically changed?[33] Questions about rhetoric's role in information literacy can be fruitfully reframed as questions having to do with public memory. The question I suggest asking instead of "What is the credibility of this information?" is "What sort of public memory does this information invoke?" Instead of asking, "Do I believe in the truth of this information?" I recommend exploring, "What sort of rhetorical ecology is being strengthened with my participation?" Instead of asking whether something is right or wrong, I advocate focusing instead on the broader-reaching public a/effects of information's economy. What sorts of publics are being produced, repeated, and amplified by the sociotechnical regimes of memory? These kinds of questions have much more to do with the ethos of the infrastructures of memory, an age-old problem, rather than the invention of a new information literacy.

The second intermezzo describes American computer scientist Calvin Mooers's Zatocoding, an organizational technology that evolved concomitantly with OR at the end of World War II. Zatocoding was an early approach to information retrieval that used mechanically punched cards to organize information and is often described as a prototechnology of information science.[34] Zatocoding drew from probability theories and statistical analysis that were central to OR but redeployed them as part of a computational information retrieval device. The technology was meant to supplement or replace traditional library searching with a more "advanced" set of algorithms. Mooers's Zatocoding was intended to overcome fundamental human weaknesses, but librarians rejected it, often describing the technology as too mechanical for real knowledge work. This section points directly to infrastructural politics that emerged as technologies were black-boxed in memory infrastructure. It demonstrates how early decisions about what and where memory activities should be delegated can be particularly contentious and tenacious. While punched cards are no longer used as part of information science, many of their theoretical precepts of Zatocoding would inform enduring indexing algorithms. This overview of Zatocoding provides an introduction to a larger historical conflict between librarians and the new technologies being developed by the nascent information scientists.

Chapter 3 continues tracking OR as it was introduced into social spaces occupied by American librarianship. World War II triggered a "science information explosion," and during the 1960s, the National Science Foundation funded numerous projects aimed at containing the chaos. Many librarians saw the national funding as support for their particular professional expertise and a way to maintain professional relevance during the post–World War II era. Librarians hosted national meetings, most notably at Georgia Tech in 1961 and 1962, that gathered stakeholders from government, academia, and the private sector, each group interested in developing solutions to the postwar science information problem and combating rising Cold War tensions. During the Georgia Tech conferences, the science information explosion was often framed as a national security issue, and events related to the Cold War were accompanied by paranoia of Soviets becoming a global threat to peace. Paranoia subsequently cemented OR as a mental technology for the new memory discipline, which was consequently christened "information science." OR became so firmly entrenched by this period that it changed the way librarians talked about their roles as "apostles of culture" and guardians of public memory.[35] Following chapter 3, the final intermezzo describes the spatial politics of library book trucks. This section documents the shifting of memory's physical and material space as the new discipline of information science transformed librarianship. By focusing on

the humble book truck, I illustrate the effects of one decaying mnemonic technê slowly disappearing from memory's infrastructure. As the book truck slowly faded from public imagination, a regime of technologies that more closely resembled Zatocodes and computational algorithms were brought forward.

Chapter 4 ends the story of information science's crystallization by detailing the 1974 emergence of the first information school, located at Syracuse University. The new school, like numerous other academic programs that followed Syracuse's, was built on the foundations of librarianship but strengthened with tropes introduced during the Georgia Tech conferences described in chapter 3 to help ameliorate the postwar science information crisis. At Syracuse, there was a direct connection between the Georgia Tech meetings of the 1960s and the conceptual foundations of the new, emerging information school curriculum. The founder of the Syracuse school, Robert S. Taylor, attended and later credited the Georgia Tech conferences for his approach to education. In this chapter, I demonstrate how the school's students were re-educated with memory technologies that emerged as OR infrastructure was transformed into information science. As Syracuse's School of Librarianship became the School of Information Studies, Taylor demanded that students "think different." I document how not only did they think different but they encouraged an approach to memory that displaced past practices. This chapter dovetails with the first intermezzo that details human labor as foundational technê of memory. It demonstrates an intervention in the mnemonic imagination forwarded by professionalization.

In chapter 5, I narrate a new myth of memory to supplement rhetorical studies' canonical stories that are largely indebted to Cicero and Quintilian. By rewriting rhetoric's founding myth of memory, I directly connect the practice of rhetoric to a modern memory environment. This reimagined myth takes account of infrastructure as a key intervention for developing a more robust approach to public memory. My myth simultaneously foregrounds public memory practices, infrastructure, and conflicting commonplaces. Balancing coeval and colliding commonplaces of infrastructure becomes a way to support stronger memory infrastructures that can access and sustain multiple pasts, presents, and futures. My new myth consequently generates theoretical resources that better enable rhetoricians to intervene in modern memory infrastructures built on the back of digital networks, which I discuss in chapter 6, the book's conclusion. In the following, I do not claim to offer biting insight into the weaknesses of modern digital technologies or how they intervene in public memory. If anything, we live not in a mnemonically poor world but in one of the most impressive memory ages of all time. Memory infrastructures have exponentially increased in size, participation,

and complexity. It is not that we live in a digital age of forgetting so much as we have not developed an art of memory that aligns with the numerous infrastructures of memory that make for vibrant public remembering and forgetting. To forward that goal, I offer this study about the stakes of infrastructure as an offering that draws attention away from how we remember digitally and toward the spaces that support our modern-day memory infrastructures. I locate memory among its infrastructure, highlighting the invisible politics that keep public memory functioning. In doing so, I materialize memory infrastructures that have been lost along the way and craft the material to retell rhetoric's foundational myths of memory.

Depending on your goals as a reader, you may take several paths through this book. Of course, one could read straight through the book, but each intermezzo chapter works as a stand-alone narrative detailing the local politics of a particular mnemonic technê. The first intermezzo sediments the idea of labor as mnemonic technê. The second intermezzo on Zatocodes details politics of quantitative black boxes in changing material forms. The final intermezzo draws out the affordances of memory's transportation technologies. Alternatively, the three extensive chapters detailing the emergence of information science from war technology to educational regime can be read as a consistent narrative without noting the local effects of particular mnemonic technê. My suggestion, though, is to read the book as a whole, as it articulates the symbiotic relationship of memory infrastructures with mnemonic technê.

From a rhetorical standpoint, the following chapters illuminate the construction of the memory infrastructures that provides for rhetorical practices. It traces the movement of memory infrastructure over time, highlighting how shifting infrastructure is enmeshed in shifting forms of publicity. Mnemonic technê highlight durable techniques of memory that provide foundational logics for collective remembering and forgetting. They highlight the memory palaces of the modern era. They provide a compass through the complexity. They emerge in the margins of association, repetition, forgetting, natural, artificial, standards, classifications, protocols, algorithms, and information labor. The following history traces several mnemonic technê historically, drawing from the insight of infrastructural inversion as well as the discursive tools for understanding the various rhetorical work of memory. In the following chapters, I explore them in information science and librarianship as a way of better understanding memory's role in rhetoric.

1

BUILDING MEMORY'S INFRASTRUCTURE

What is a memory infrastructure?

Public memory is often imagined as a nebulous fog that holds a collective past. A key metaphor in this model is the history text, a published book that could be checked to see if the facts are accurate. Figuratively, the history textbook would distill the memory fog to provide a fact-based reference for the past. Even critical historical approaches often invoke the metaphor by suggesting they are revisions to official public memory. Howard Zinn's *People's History*, for instance, is often discussed as a corrective to an inaccurate text. There are benefits to this metaphor, of course. For one, it points to how memory practices are material (reading textbooks) and open for discussion (we can talk about what we read).[1] The trope also has stark shortcomings, though. It elides the sheer number of potential objects and affects that inform public deliberation via memory. It suggests that there *is* an official past to be set to rights. Yet, the invocation of consensus is much more complex than reference to a textbook, revised or otherwise. How many people, for instance, would have remembered Richard Nixon's dog had Nixon not been embroiled in political controversy? How many subsequent "first pets" have been activated in the public imagination because of their figurative relationship to Checkers?

A better metaphor for the background of public memory is infrastructure, "the different spaces, objects, 'texts,' that make an engagement with the past possible."[2] Infrastructure accounts for the vast networks of collective resources and activities working to sustain the resources for public memory. The word *infrastructure* is commonly invoked as a public good that provides jobs, services, materials, and utilities, even though it was originally used exclusively to describe twentieth-century French bases that supported military operations.[3] Its modern sense began after World War II when the term was used to describe municipal construction and engineering projects in

postwar cities. These infrastructure projects provided dependable resources for sustaining fundamental public services, and today's infrastructures support activities of all sorts.[4] State infrastructural projects improve roads for travel, provide water for drinking, and extend electronic communication networks. Like all infrastructures, these sorts of projects are enmeshed and depend on each other for their sustenance.[5] Their resources plug into each other and afford hybrids of background support for communal resources.[6] Memory infrastructures point to regimes of backgrounded resources that demand public support for their access to the past, present, and future.

Where does memory's infrastructure come from? Ancient Mesopotamian leaders, who built early archives in temples and palaces, stumbled upon one answer as they tackled a different problem—managing their ever-growing populations.[7] Their solution was to create and preserve documents that meticulously detailed the social order. Early temple archives held religious texts that moralized public conduct. The archives also stored national records of kings, wars, and major events. The library archives housed clay tablets that recorded debits and credits among the population.[8] The financial records acted as mnemonic devices that highlighted people as products of a shared economy. In unison, the religious texts, national records, and debt registers moralized and mobilized the subjects of the state by keeping taut the reigns of public memory.[9] Religion reminded the people of their moral obligations. National history reminded subjects of their rulers. The financial records provided a circulatory mechanism that disciplined the people through commercial transactions. Together, the documents insidiously invoked shared sovereignty. The ancient Mesopotamian temple archives provided resources enabling acts of remembering wrapped into the era's economic, religious, and juridical systems. Each time the tablets were referenced, the idea of the shared economy, religion, and state became stronger, reinforcing citizen identities and morality.[10] Memory infrastructures coordinate a public's shared sensibilities.[11] The Mesopotamians built a particularly powerful memory infrastructure by centralizing and distributing public records along with clay tablets, cloth scrolls, and metal coins.

Memory infrastructures do their work not only by circulating resources but also by intervening in acts of public remembering and forgetting. To recognize debt as morally sinful, for example, is to read religious texts over the top of what it means to participate in a given nation's economy. Publics are compelled to attend to all kinds of narratives (beyond the economic) that sustain their everyday existence, which can include institutional threats of imprisonment, expulsion, or punishment, all of which go a long way toward legitimizing the "official" record. These practices shape the complexities of the performance of publics' memory. Juridico-discursive force does

not exhaust the regulatory agencies of public memory.[12] Acts of memory often operate more poetically than not, drawing from any number of available rhetorical resources.[13] National monuments draw on narratives of death and mourning. Religious ceremonies often derive their poignancy through appealing to communal myths of morality and identity. As it invokes attention and action, meaning cobbles together public memory. Powerful loci like archives and libraries are parts of larger networks of memory. The Mesopotamian rulers were fortunate that they could dominate the attention of publics so thoroughly by monopolizing recordkeeping.

Memory infrastructures do not merely document pieces of a past, though; they anchor, shape, and compose remembering and forgetting. Cicero and Quintilian noted that personal memory could be wielded and changed by orators to manage invention and eloquence.[14] Their productive approach to memory operates as part of infrastructural remembering and forgetting as well. Many of the ancient Mesopotamian archives, for example, were intentionally assembled to shape political agendas, public support, and national identity. Assurbanipal, king of Assyria from 668 BCE to 627 BCE, orchestrated what would be allowed into his official palace library, which consequently ensconced the character of his empire. He even moved his capital city to make room for a larger library where he could devote more resources to his collection—eventually growing it to more than thirty thousand clay tablets. He sent agents to other countries to collect texts and had scribes learn to read Sumerian and Babylonian so they could translate the material for him, ostensibly ushering in protoacts of government intelligence. One of his royal scribes noted of the collection, "I shall place in it whatever is agreeable to the king; what is not agreeable to the king, I shall remove from it."[15] And so, acts of censorship, methods of public forgetting, arose concomitantly with even the earliest libraries and archives.[16] By actively training professional labor to select, translate, and censor texts, Assurbanipal leveraged power over the public's imagination. Assurbanipal used his library to extend his rule. While classical rhetoricians trained the mind for memory, Assurbanipal trained his labor.

Despite the efforts of the powerful, public memory is not obliged to any one individual's will. Infrastructural materials are forceful tools that are made available for public intervention, even if access is not distributed equally. Assurbanipal himself was constrained, as his collections depended on the labor of historiographers, translators, and couriers willing to transport texts for him. Each of these actors had a hand in shaping the material constraints of public memory. Assurbanipal's agenda was refracted through what he could move into his treasury of invention. The Assurbanipal collection showcased the asymmetrical distribution of power as the treasury was

made available to members of a public. His courtly scribes benefited from years of literacy training, and because most of the population was illiterate, the scribes also assumed power as oracles for the public. The couriers who recovered tablets to move into the library had physical access that few else had.[17] Assurbanipal had the resources to build the library because he was born into his position. These constraints produce the staging for performances of the public's past, present, and future.[18]

Infrastructures provide a collective material force, even if they are partially leveraged by the powerful. Their staging and props are not mere tools. The networked background makes a palpable difference in a public's memory practices. Clay tablets, etching tools, and archival spaces provide a unique resistance for a public's memory practices. Only so many marks can be engraved on a piece of clay. Clay may last longer than paper, but it still crumbles: it requires different types of preservation. A tablet's size makes it easier to locate, but it also provides a challenge because moving tablets is more difficult than moving spools of paper. Assurbanipal's desire to make a bigger library was part and parcel of an effect of the material constraints of clay. A desire for more clay relocated an entire city. Other technical practices made a difference too. The ancient Mesopotamian libraries were organized with fairly simple categories, making it easier to remember what was in the collection without a finding aid.[19] In comparison, today's modern digital libraries are often praised as having more capacity, while they have their own memory challenges. Storage capacity has become (seemingly) unlimited, but the time and space available to readers is not.[20] Retrieving and finding records in huge libraries is vastly more complicated. Today's classification strategies are exceptionally sophisticated and are often generated algorithmically to accommodate the large collections. Different gatekeepers vary in how well they understand memory's infrastructure, consequently changing the power dynamics of public memory. Infrastructure's material and sociotechnical practice provides physical resistance to public memory.

The materials of public memory's infrastructures are levers for ontological change.[21] Even minor infrastructural fluctuations in resources, use, or labor have force multiplier effects on public memory. Sometimes these changes are violent, like when archival resources are lost or destroyed. In 612 BCE, invaders from Chaldea and Media razed the city and destroyed Assurbanipal's library, effectively burying memory along with many people.[22] More often, though, infrastructural changes are implicit or understated. Information labor, for example, conceals a tremendous amount of tacit knowledge that makes memory infrastructure run. The undocumented labor is essential for a functioning infrastructure.[23] It pushes on memory, remaining hidden. When labor decides to make changes to the system, it has

cumulative effects on the whole memory infrastructure. For instance, when some of Assurbanipal's scribes suddenly learned a new language, they were able to collect and disseminate information from new cultures, consequently changing the public's access to memory available through Assurbanipal's memory infrastructure.[24] When infrastructure changes, it introduces new sources for the invention, arrangement, and delivery of public memory.

Over the long term, memory infrastructures often develop in predictable stages.[25] During *invention* stages, a few actors produce new technologies to extend human abilities. The invention of writing, for example, enabled the preservation of language and allowed it to move through physical space. In *development and innovation* phases, those technologies are further refined to extend human capacities. Writing was supplemented by clay tablets to provide an enduring medium that preserved records in Mesopotamia. When temple leaders recognized that the tablets could be used in the service of religion, they further extended the tablets, adapting them to a system of economic surveillance. In infrastructural *transfer, growth*, and *competition* stages, the technologies are further disseminated and networked with new locations where they face competition from other social practices. Infrastructure becomes ingrained because it is so widespread and publics learn to depend on it, and these stages are the most stereotypical of developed infrastructure. It marks the point when it is harder to imagine a world without the technology than with it. The final phases of infrastructural *splintering, fragmentation*, and *decline* often follow competition stages. For any number of reasons, infrastructures cease to support social practices, and they are diminished, replaced, and destroyed or become more specialized. Interventions during any stage modify the infrastructure's sensibilities.

The history of libraries like Assurbanipal's articulates much about memory's publics. Memory's infrastructure is vast, and libraries and archives represent only a small slice of its workings. But libraries have a long-term stake in what Birger Hjørland has called "memory institutions," institutions that traffic "across the borders of time and space, language and custom, people and individuality."[26] Libraries and archives are rich terrain on which to explore the networked material of public memory because they provide such strong purchase for understanding the more extended problems of public memory. Libraries and archives have developed some of the most sophisticated and sustainable practices of public memory. These institutions combine digital networks, organizational technology, information labor, and physical space into a material apparatus informing memory work. Libraries and archives have managed to preserve their highly visible, culturally complex roles over the long term. The Library of Congress serves as the primary source of information for members of Congress. The National Archives

preserves public records of government. Citizens benefit from national libraries that take it as their mission to serve the public. Fifty-four percent of Americans have used a library in the last twelve months, and 72 percent live in a household where at least one person uses libraries.[27] These users say that the closing of their library would have a major impact on their lives.[28] In addition, nearly every country across the globe keeps libraries or archives as a means of preserving the cultural record. Today, the International Federation of Library Associations and Institutions regulates practices across 1,400 member institutions in 140 countries. Some of this professional network can be seen through WorldCat, the world's largest collection of library content from 72,000 libraries across 170 countries. While it is clear that imagining libraries as infrastructures can tell us something about what role we want for them in our practices of public, the reverse is also true. Imagining memory infrastructures through libraries helps us better understand how public memory is constituted.

The Limits of Rhetoric's Founding Myths of Memory

> There seems little doubt then that, for the Romans at least, money in the form of coinage was an instrument of collective memory which needed divine protection, like the arts. As such, it was both a memento of the past and a sign of the future.
>
> —Keith Hart, *Money in an Unequal World*

It is notable that discussions of rhetoric and memory are frequently far removed from money, given the importance of debt as part of early archives sustaining public memory. Money was a central circulatory system for performing the memory of the archive. Instead, typical treatments of memory in rhetoric often include one of two myths: the story of Simonides or the memory goddess Mnemosyne. The first recounts how Simonides of Ceos, a fifth-century BCE poet, invented the memory palaces after the nobleman Scopas invited him to a banquet to recite a poem.[29] During the evening, Simonides was called away, and in his absence, the banquet hall roof collapsed, killing all the guests within. Simonides later identified the disfigured bodies by associating each with their place at a table, consequently inventing the method of loci (memory palaces) that associates images with places as an aid for recollection.[30] The Simonides myth references Plato's description of memory in *Theaetetus*—it compares memory to a pliable wax block shaped by the hand of experience.[31] Words, events, and ideas collide with the block, forming new memory impressions. Although the marks could be smeared or rubbed further into the wax, they forever changed its shape. Plato noted

that repetition, in particular, forged and deepened impressions, strengthening them in the wax of memory. As Simonides has been popularly adapted, the stories highlight a dual conception of memory as artificial and natural. Intervention in the mind's wax is an artificial enhancement of memory.

A lesser-told myth involves Mnemosyne, Greek goddess of memory and mother of the Muses. Each Muse represented a type of discourse, making them crucial for early oral cultures. The value of speech in the classical era is one primary reason that Scopas even invited Simonides to the party in the first place. The poet could properly memorialize the nobleman through verse. Bards of the era were institutionalized to disclose truths, *aletheia*, about the world. Their profession was charged with remembering lines of verse, often as many as one hundred thousand per poem.[32] The bards were the official documents of the past, and so their speech was thought to have a "magicoreligious" function.[33] Poetic composition was a learned skill, the work produced by memorizing rhetorical formulas for composition: word lists, figures of speech, and so on. The formulas were more important than the content. The figures organized poetic improvisation much like modern jazz musicians improvise new music. The rudiment poetic formulas were considered sacred because they drew upon the memory of the gods, particularly Mnemosyne and the Muses. Where else could the poet's gifts of memory come from? There were no written texts. Because the gods inspired aletheia, the poetic patterns were tightly bound to memory. Even later when written texts were more important for regulating memory practices, these poets still retained an honorary position as mouthpieces of truth.

When Mnemosyne was translated into Roman mythology, her name became Juno Moneta, derived from the Latin verb *moneo*, which means to remind or bring to recollection.[34] Because of her status as goddess of memory, the Romans made her the namesake of one of their sacred temples.[35] The Temple of Juno Moneta held official records of historical events documented in linen books. The symbol of Juno Moneta provided insurance to the Roman people of the accuracy of the recorded past, much like the seal of a national archive ensures the records of its country. Moneta's temple was more than a historical archive; it was a repository for all valuable resources that needed to be referenced: units of weight, measurement, and money. The blessing of Moneta ensured the temple's resources. Memory came to be associated with the past and in the selection and preservation of a treasury for invention. Money was one of these resources protected by Moneta, and to legitimize the currency that left the temple, the Roman mint printed Juno Moneta's seal on the coinage. This connection between memory and money was preserved for later generations, and Juno Moneta has since lent her name to the French, Spanish, Dutch, and English words for money. Memory

is the treasury of all valuable things. Instead of the poetic formula of bards being the rudiments of truth, its arbiters are the codified processes for relocating and inventing resources.

Moneta's story reveals how memory, measurements, and money affix onto technologies of circulation to extend their reach into publics, distributing memory's "coin of the realm."[36] Money—memory of exchange relationships—is dispersed with coins, bills, or electronic transactions between vendors. Measurements—memory of ontologically "correct" units—are standardized and disseminated through rulers, scales, and specifications hardwired in electronic devices.[37] Memory—the broader category of resources (as Mnemosyne was to the Muses)—circulates through money and measurement and also through a vast number of other memory objects, including books, letters, and digital information of all sorts. The poets of orality were some of the earliest circulatory technologies; they distributed divine inspiration through their institutionally legitimized mnemonic techniques. The poets moved through society in a way not very different from coinage.[38] The ruling class sent them from place to place to help perform the work of memory. Simonides was sent to Scopas's banquet because only a poet could memorialize the nobleman in perpetuity. His invention of the memory palaces, sacralized by association with noble death, invented a new memory figure that could be added to the rest of the poet's technologies.

Memory technologies depend on faith in a larger infrastructure of social relationships,[39] emerging as backgrounds that simultaneously "enact technological infrastructural and social order."[40] Coins drew from a shared sense of belief in a government that had the power to ensure commercial exchange. Measurements inform the ontology of the physical world (how many miles to Babylon?) and often lend themselves to legitimizing currency: coins are minted to a specific weight. Memory technologies of history depend on the infrastructural authorization of tokens. Powerful kings and rulers authorized the poets of orality, who were recognized as religious speakers—which substantiated the certainty they spoke. This recognition required a veritable cottage industry of sociality: norms for education, class, and cultural ideas. Today, we may point to publicly circulated textbooks that rely on a book trade industry. Without suggesting that belief in texts is better or worse than belief in bards, we can point to the number of background assumptions that must be in place so that publics can use and recognize memory practices. Memory materials rely on a larger infrastructure that provides not only their legitimacy but also resources of distribution. These infrastructures carry the imprint of its communities. Infrastructure reinforces facts of public circulation while obfuscating memory as a "natural" process.

Infrastructure's tokens, its "coin of the realm," change the shape and practice of memory. They have extensive effects for what memory is available to whom. Metal coins can travel long distances, extending the space of circulation, and they can be bartered repeatedly. They are light and durable, but a trade-off is that coins carry only simple information. Coin users must already know enough about the larger context so that they can fill in meaning.[41] They have little space of intervention in how to interpret its meaning. This is one of the reasons that Juno Moneta was so crucial for the distribution of Roman currency. Her image on Roman currency invoked a shared sense of community. Moneta's coins were not inherently valuable; they were the coins valuable to the Roman people. This strength was also a limitation: the coins performed memory for Romans only. The coins piggybacked on an existing mythology of the Roman people. Today, we might recognize the technique of credibility institutionalized on currency by its eagles, presidential heads, and flags. More obvious tokens of memory operate with their own material affordances. Textbooks, for example, document complex institutional pasts because their paper provides for long strings of texts. That paper, though, is more likely to be destroyed than coins. Textbooks require sophisticated interpretation strategies, ones that are taught in institutionalized schools. Access to schools constrains access to textbook memory. In addition, using a textbook requires a significant amount of reading time and space, which is distributed unequally.[42]

The circulatory systems distributing tokens point to public stakes concealed in memory's infrastructure. Focusing on tokens of memory provides strategies for understanding memory. This is because, much like the formulas of poets and bards of the oral period, their forms configure the resources available for public memory, providing arrangement to the treasury of things invented. Modern infrastructures no longer draw primarily from mystical resources, but they do depend on faith in institutional corroboration to select which pasts can be collected as accurate. Contemporary material tropes distribute evidence-based, peer-reviewed, or otherwise empirically legitimized documentation. They invoke attention by what they select from databases, both digital and analog. The tropes of memory provide figuration that influences resources of value. There are rich ways to understand the very real material stakes of memory's infrastructure.

Machines for Remembering and Forgetting

Infrastructural perspectives critically solve a key problem plaguing the relationship of memory and rhetoric by eliding a common reduction made by

the mnemonists between natural and artificial memory. The memory p(a)laces myth highlights that metaphorical cleaving.[43] Simonides improvised the artificial memory palaces technique on the spot so he could identify marred bodies with their place at a dinner table.[44] His inadvertent invention boosted the "natural" frailties of memory. The method certainly was not the only form of "artificial" memory; poets of the preliterate era were rigorously educated to memorize verse with rhetorical mnemonics.[45] Still, throughout the medieval period, the method of loci was taught as a technique for ameliorating memory's frailty. Peter of Ravenna sold the method using techniques similar to modern self-help gurus.[46] His 1491 *Phoenix Seu Artificiosa Memoria*, one of the first copyrighted works, remained influential for centuries.[47] The memory palace was one of many methods used to "artificially" augment powers of recollection. Mnemonic techniques were thought of as artificial technologies, much like tablets and phones are discussed as supplements to memory. Today, competitors in the World Memory Championships use similar "mnemotechnics."[48]

This conceptual division between natural and artificial memory structures how publics talk about memory. Technology seems like artifice only when it is differentiated as separate from human bodies. The divide precipitates much of the anxiety about remembering and forgetting by pitting technologies against people while obfuscating the politics of living in inequitable communities.[49] Critics like Nicholas Carr have warned that Google makes people forgetful and that reliance on computers hurts reflective reading and remembering.[50] Even technology enthusiasts like Ray Kurzweil adopt a dualist stance when they stress that new computer storage capacities enhance biological thresholds by providing access to larger troves of information than ever before.[51] This dualism is the reason new technologies are discussed as aids to memory rather than participants in a community's memory politics. Natural/artificial divides fall short when imagining how people remember together in groups, where it is easy to imagine that even writing or speech can be seen as vehicles of interconnectedness. Still, despite the best efforts of posthumanist rhetorical theorists, natural/artificial dualisms persist.

There are better ways to make sense of our public memories and technologies.[52] For one, focusing on the places of memory highlights the lived experience of making memory in publics.[53] Alternatively, it can be incredibly insightful to look at how archival collections shape materials of public memory.[54] These alternate concepts point to stakes that are not simply about technologies but about the people, places, and politics of memory and its interpretation. Still, I sense a continuing problem in these approaches because they tend to focus on a particular issue of memory: times and places where memory interpretation happens. They focus on the drawbacks and

alternative strategies for reading against the archive, but they miss out on the fantastic politics that have put the infrastructural technologies of memory into place. For instance, in the Simonides myth, the memory palaces emerged as a result of the cutthroat politics of a community that placed a tremendous amount of importance on the valor of poetic composition, foul play, and remembering.

The Simonides story also provides an unanticipated antidote for the natural/artificial divide, one that can interrogate the politics of memory's background. First and foremost, the backdoor politics of Simonides's host, Scopas, that led to the emergence of the palaces helps explain the types of memory practices created. In this case, the memory palaces were forensic tools. Cicero's interpretation of Simonides also documented an alternative approach to public memory. Cicero notes that Simonides recognized that a clear memory is an effect of "mental images" being put in an orderly arrangement and practiced repeatedly.[55] Cicero details these figures by giving more explicit instructions: that places are an ideal *linking* mechanism because they are well-known and mnemonists will *repeatedly* walk their memory places as an aid for their powers of recollection.[56] Later adherents of the memory palaces seemed to also agree that intensity of the link, ordering, and practice are critical for the technique. Cicero described rhetorical figures of association, arrangement, and repetition.[57] Simonides pointed to the background and the resulting figures of memory.

Thinking of memory through its rhetorical figures provides distance from the discussions of nature and technology, place and interpretation. History of figures points instead to the historical transformations of memory that circulate those figures. These transformations are embedded within the changing politics of production. We should then be aware that not all memory practices are tropes of association, arrangement, and repetition, although they have been critical for colonizing some important political pieces of the memory landscape, largely due to support from powerful groups in the Western tradition.[58] In this view of memory, technologies are not artificial so much as participating in regimes of tropes that forward political agendas. And like all politics, the moves that actors make emerge and are turned in public, occasionally resulting in hybrid beasts that would never have been expected. Association, arrangement, and repetition have lodged themselves not just in the method of loci but as a part of our modern-day memory landscapes. Centuries after Cicero popularized the method, adherents would literally build the idea into their environments, in religious, occult, and scientific architecture.[59]

Association, arrangement, and repetition do not exhaust all memory tropes, as evidenced even by Quintilian, who thought that although the

memory palaces had a place in rhetoric, a better method of memorization was careful study of texts. Still, association, arrangement, and repetition, have been particularly powerful forces of institutional memory because of the ability to codify them as rhetorical forms. Italian philosopher Giordano Bruno, for example, fervently defended the method of loci, even as the art was waning in popularity during the sixteenth century.[60] Bruno produced a memory wheel that used the logics of association, arrangement, and repetition. His wheel combined zodiac signs with letters to produce thirty interlocking segments that spun concentrically. Bruno believed that his wheel was blessed with religious power and that by producing 1 of 150 arrangements, including zodiac signs, the wheel's associative logic could unlock hidden truths about the universe. Bruno's logic is difficult to follow because it seems so strange. However, as much as the tropes of the classical bards and poets were thought to hold magical religious powers because they were blessed by Mnemosyne, Bruno codified and distributed a logic of memory that was organized through his memory wheel. Truth emerged as a by-product of an associative logic in which users placed a tremendous amount of faith. Those logics depend on a culture that can forward the system as rational memory work.

These sociocultural hybrids of codified associative logics are mnemonic technê, figures that become codified as part of public memory practices. Mnemonic technê embed and distribute themselves as regimes of memory that change public practices. Yesterday, Bruno codified a wheel. Today, codified associations, arrangements, and repeated use are part of search engines, information systems, and internetworks. These mnemonic technê require the dedicated labor of developers, designers, and managers. It is not a coincidence that the network era has demanded that users learn new sets of information literacies. The large-scale memory institution obfuscates the same sorts of tropes that the poets, monks, and occultists had more significant access to in previous eras.

This is the infrastructure of modern memory. An infrastructural perspective points to memory not as a problem of remembering or forgetting with or without technology but as an issue of figuration extended and distributed throughout unevenly distributed sociotechnical environments. Natural and artificial memory can be smoke screens for a much more expansive memory Leviathan. Indeed, because of the number of publics that participate in the same shared public memory infrastructures, it is no longer useful to talk about memory as a problem of remembering and forgetting. Here, I forge a new path. Memory infrastructures, the circulatory systems for the coins of memory, help to understand how powerful actors and institutions ensconce memory's treasury of things invented. Infrastructural perspectives do away

with arguments about whether technology is making us remember or forget and instead ask what regulatory forces are motivating a public's attention. The unified work of the actors, institutions, and materials provokes anxiety about how we remember. Publics excel at using the memory infrastructures made available to them as they enculturate to their environment. An important question, then, is who benefits from those acts? Who or what controls the medium of exchange that permeates our memory environments? To investigate infrastructure is not to open up its machines for remembering or forgetting but to dissemble the black boxes of its politics.

While the tropes of memory emerge with their own logics as part of contemporary information systems, they still carry the strange politics of history's memory practices. Histories of memory consist largely of different variations on its rhetorical techniques.[61] What we know is just as dependent on the hidden tropes of memory as it is on the events that have unfolded. The hidden tropes of memory demand a largely invisible set of resources to veil how public memory is put together. In this book, I trace a few of these tropes through the Cold War period of librarianship and information science.

Surfacing Memory's Infrastructure

Throughout the remainder of this book, to distinguish between memory infrastructures and other infrastructural systems, I adopt the terms *memory infrastructures* and *mnemonic technê*—portmanteaus of mnemonics, infrastructures, and rhetorical tropes. I use the term *memory infrastructures* to highlight memory as a facet of a larger network of infrastructural resources sustaining and enabling public activities. Infrastructures are "plugged" into a diversity of other infrastructures; they enable numerous activities, not just remembering and forgetting.[62] Resources embraced by memory infrastructures will simultaneously enable numerous activities ostensibly unrelated to remembering and forgetting. It is useful to have a term delineating infrastructures doing memory work from the infrastructural systems in which they are embedded. Focusing on memory infrastructures highlights first how infrastructures entrench new links among diverse resources, consequently shifting the significance of memory practices,[63] and second how memory emerges in variegated historical contexts. For example, Moneta's temple provided for acts of remembering and forgetting that simultaneously upheld (and were upheld by) public commerce, history, and law. Cicero's memory passages in *De Oratore* are rife with analogies to organized clay tablets and valuable assets, like those stored in the temple. Should we be surprised that the Romans were the first to refer to memory as a treasure house not unlike Moneta's temple? It would be an oversight to imagine

public memory practices of the Roman republic without envisioning memory's entangled infrastructures. The term *memory infrastructures* attends to colliding the trajectories of infrastructure while continually tacking back to memory and rhetoric.

Memory infrastructures are instantiated through mnemonic technê, specific techniques that support remembering and forgetting but depend on the resources of an encompassing infrastructure. Mnemonic technê emerge in particular times and places at the interfaces of remembering and forgetting. As techniques, they are instantiated in innumerable physical embodiments, including people, technologies, and commodities. Each invocation consequently shifts the sensibility of a larger network of infrastructures. For example, silver coins of the Roman republic served as mnemonic technê within an encompassing memory infrastructure. The coins drew power from the widespread acceptance of a government and economy that recognized the Roman currency as a legitimate agent of the state, latching it onto other civic infrastructures to enact memory of the republic. Coins circulated meaningful information, reminding their owners of a citizen's place in the larger republic. Each financial transaction inscribed anew a public's imagination of the state. A delinquent transaction, for example, performed a morality of state citizenry, which consequently shifted the overall character of the republic (e.g., the republic includes people who do not pay their debts).[64] Coins acted in parallel with other mnemonic technê, such as written legal codes, often kept in the same sacred spaces of the republic. Changes in moral behavior, like economic delinquency, demanded new written laws. Changes in laws encourage new social activities, like state-enforced debt collection (and evasion). The regimes of mnemonic technê and relations among each technique consequently change the resources of vast infrastructures of remembering and forgetting. Memory infrastructures and mnemonic technê are symbiotic.

The fluctuating relationship between memory infrastructures and mnemonic technê provides a conceptual advantage for exploring public memory. Memory infrastructures and mnemonic technê function on different scales of social time, space, and organization.[65] Memory infrastructures, like other infrastructures, support longer scales of time that encourage sustained certainty against the indeterminacy of the past.[66] This invisible work is often concealed as "natural." Infrastructure's "nature" provides a common sense of remembering and forgetting (e.g., when historical records entrench the importance of specific eras, sites, or persons). Memory infrastructures sustain themselves through mnemonic technê, which operate on shorter intervals of time. Particular mnemonic technê are often noticeable, especially when they are not functioning seamlessly, but they do not easily point to the

larger background power concealed within infrastructural sensibilities.[67] A single coin, for example, is difficult to track through larger artifices of public memory. Memory infrastructures and mnemonic technê are categorically very different as phenomena. Memory infrastructures are obscure, but they illuminate an overall politics of the memory they sustain. Mnemonic technê are easier to observe but provide only subtle clues of the politics of public memory infrastructures. Choosing to focus on one or the other leaves an observer with only half of a larger picture of memory—to miss the forest for the trees or the trees for the forest. Rome was not built in a day, but its people traded coin every day. Focusing instead on movements between memory infrastructure and mnemonic technê provides a way of identifying the everyday technologies and the overarching politics of memory along the multiple scales of infrastructure. The remainder of this book is structured to draw out this vacillation of memory infrastructure and mnemonic technê. I weave together a century-long narrative detailing the emergence of information science as memory infrastructure while punctuating each chapter with an intermezzo that zooms in on a mnemonic technê or set of mnemonic technê from the era. Each intermezzo's mnemonic technê would dwindle or evolve into a new form to support the larger goals of information science's memory infrastructure.

Throughout this book, I continually return to memory's labor as a way of foregrounding stakes of infrastructure in public memory. Labor is charged with seemingly technological infrastructural work. It provides humanistic glue to technical resources, which jury-rig the oftentimes messy background of infrastructure that goes unnoticed by publics. Today, they are the database administrators, mail sorters, or editors that iron out the wrinkles when infrastructure stops working. Information labor comprises the people "enabling and constraining the constant circulation of information across a wide range of technological and social contexts" who make media work.[68] In the following chapters, I focus on librarians and information scientists who were central to the development of modern information science as a discipline. I see this case as significant for a number of reasons but primarily because information science is concerned with "origination, collection, organization, storage, retrieval, interpretation, transmission, and utilization of information."[69] The field has produced technologies and techniques that are integrated into Internet search engines, services, library catalogs, and digital information services. The discipline is primarily application driven, developing mathematical approaches to the organization of information. Although it is not the only labor force invested in memory, it is an important and iconic profession.

Information labor is critical for coordinating infrastructural technologies,

durable standards that connect the circulatory systems of memory. Infrastructures materialize via their standards. Links between websites are a simple example of memory's materialization in standards. The hard-coded link associates texts, creating a reference used continually. The link suggests an association between texts. Hyperlinks encoded with HTML are fairly superficial, though. Search engine algorithms use mathematical calculations that have been coded into proprietary search technology. These calculations associate search queries with content, and therefore, the links perform the figuration of memory. Encoded associations are not random, especially as users develop navigational preferences, even if they often appear to be fragmented.[70] Companies like Google or Amazon have crafted their algorithms with sophisticated usability testing so that links appear to be so natural as to be nonexistent—invisible. Examples proliferate across other infrastructures. In the following chapters, I focus on labor forces, technê, and technologies that were largely built on a single theoretical way of understanding memory driven by operations research.

2

A UNIVERSAL MEMORY MACHINE

> All mnemonic organizational schemes are heuristic in nature. They are retrieval schemes, for the purpose of *inventio* or "finding." . . .
>
> . . . Tropes cannot be dismissed as "mere" formulas, for they indicate the values of a society and the way in which it conceives of its literature.
>
> —Mary Carruthers, *The Book of Memory*

It takes a spark to ignite a memory revolution.

By the end of World War II, Paul Otlet's dream of a universal memory machine had ended. Trained as a lawyer in Belgium, Otlet found himself bored by legal work, so he turned to bibliography.[1] In 1895, he began meticulously recording information on index cards. Each card was inscribed with one discrete fact. By the end of the year he had organized four hundred thousand cards into a Universal Bibliographic Repertory that was designed to catalog every fact ever produced. The sheer volume of his growing collection compelled him to seek assistance from an engineer who helped him record tiny microfilm versions of his cards. In 1904, with the help of future Nobel Peace Prize–winner Henri La Fontaine, he modified the Dewey decimal system to better organize facts about the social and natural sciences, what he thought of as the objective world. In 1910, Otlet and La Fontaine started building a "city of knowledge" meant to be a central repository for all the world's information. The two received overwhelming public support for their efforts. By 1919, with a subsidy from the Belgium government, Otlet hired more staff to catalog and answer information questions by mail. At the peak of his project, Otlet had created more than fifteen million cards, each documenting a single fact. All of this came screeching to a halt in 1940 when German armies razed Otlet's Mundaneum, the edifice that stored his collection. Otlet died before the end of World War II, his life's work largely

destroyed but for a few remaining cards and catalogs. The devices of war vaporized his universal memory machine, literally a lifetime in the making, but his legacy survived. Otlet is now recognized as the founder of information science.

Otlet was not the only obsessed mnemonist in the early twentieth century, but he excelled at his compulsion. His Mundaneum was meant to be an index of all knowledge, not just reading materials. He meticulously dissected books, excising only the smallest facts for each card. Otlet also collected photographs and files of all sorts, thinking of them as factual artifacts. This hobby was no ordinary pastime. It took a trained mind to amass discrete facts and objects as though they summed to a universal whole of knowledge.[2] Each of Otlet's recorded cards was a practice in memory, an act of committing to record, destined to be part of his universal machine for global memory. Why this particular obsession? Otlet said that his collection would bring about world peace. From an early age, he was unmistakably a product of his intellectual milieu, which was couched in a positivistic, Eurocentric progressive rationalism.[3] Global knowledge was global truth that could be a catalyst for social transformation. Otlet got closer to making a universal memory machine than anyone had before him. He had government support, a growing collection, and vision. War brought his project and dreams to a standstill. Yet, where Otlet's project died, others would find hope.

The decimation of Otlet's Mundaneum was a small blip in a more encompassing amnesia triggered by World War I and World War II.[4] Previously, libraries, archives, and universities of all kinds had been systematically collecting printed research as authoritative, global science, standardizing the time, space, and procedures of knowledge organization, transfer, and management. The conflicts disrupted national information exchange routines as enemies stopped sharing with each other and became more careful about what information was available. A depressed informational economy strangled the coffers of memory. National secrecy was particularly brutal for scientists, who had been developing a more accessible information infrastructure during the last centuries. World War I and World War II upended these established rhythms. Scientists and librarians and other information specialists were conscripted into defense efforts. Science's memory was cloaked behind a veil of war. Amnesia was followed by a new era of memory.

When World War II ended, a new era of remembering commenced. Nations adjusted to regulate a postwar memory economy. Scientists, freed from wartime duties, dedicated renewed energy to restoring science's infrastructure. Secrecy was still valued as a tactic of national defense during the Cold

War, but science was booming as an international phenomenon again.[5] The most brilliant scientists, engineers, and politicians of the era were brought together in the hopes of building memory machines capable of supporting a global science. Their infrastructural memory technologies would be wrapped up with war technologies that had been developed by scientists during the war, and new funding would intensify interest in science as a dominant part of public memory. An amalgam of timely forces met to regulate a new era of remembering.

Military planners, scientists, and politicians forwarded blueprints for science's infrastructure, but the actual work was carried out by other labor—librarians, archivists, documentalists, and bibliographers.[6] These information professionals, enjoying recognition they rarely received, adapted the imaginative proposals to lived practice.[7] During the transition from wartime to peacetime, they took the plans of those in charge and translated them into new regimes of memory. The memory techniques—a range of algorithms, standards, and technologies—would intervene to provide postwar memory infrastructure. Although many of the specific technologies would be updated over the following years, the theoretical foundation that was put in place would prove resilient. For instance, the Luhn Scanner, originally developed to store and retrieve chemistry information, would have its theoretical techniques adapted to other retrieval systems for industry, government, and public sectors; it currently lends its algorithms to technologies that validate credit card numbers.[8]

This chapter revisits the transition from global wartime amnesia to postwar remembering while detailing the characteristics of the emerging memory labor force. The historical incidence provided momentum to inaugurate the purpose of a new profession.[9] This foundation was the beginning of information science, a field that specializes in applying information theories to technologies. Information science first emerged as a regime of postwar techniques for managing "science information" and became a "science of information" interested in the properties of information as the medium of public memory.[10] It would draw from all the fields wrapped up in the postwar planning, including "computer sciences, cognitive science, psychology, mathematics, logic, information theory, electronics, communications, linguistics, economics, classification science, systems science, library science and management science."[11] The ensuing development of information science highlighted intersections between humans and technologies, labor practices, and shifting agencies among who can remember what and how it should be remembered. This is a story of how obsessive mnemonists developed a memory infrastructure to serve the public good.

A Global Scientific Memory Economy

> It seems that facts are too complex to be embraced by our brains. . . .
>
> . . . The human mind is no longer considered as an organ which produces the sciences, but rather as an apparatus for enregistration, whose unique role is to observe the laws which emerge from carefully collected facts and from scrupulously carried out experiments.
>
> —Paul Otlet, quoted in Rayward, *Universe of Information*

Paul Otlet, born in Brussels in 1868, spent his life seeking to improve the world.[12] His personal journals document a sensitive, earnest soul, a man dedicated to discovering his purpose and contributing to a greater good. He found meaning in religion but rejected priesthood because of his inability to discover scientific proof of God. He flirted with a legal career to fulfill his desire for civic responsibility but found the day-to-day practice of law meaningless. He turned to academia and because of his legal training found a world of facts to hold court over. Facts provided Otlet general laws for judging worldly truth, and he became enamored with the idea of writing a universal history that synthesized each fact into a universal code of human law.[13] Yet, he also thought that a single human mind was simply not meant to make sense of the whole of the natural world. He reasoned, though, that if he could at least collect and organize all facts that they would add up to a global whole, ready to be tapped by humanity. His life's purpose became a universal "database," one that would bring peace to the world. This goal became his reason and purpose. He came to see the world as a set of objective facts to record and organize for the sake of peace.[14]

Otlet was not alone in his beliefs. He was born to a time when empirical positivism and scientific rationalism rivaled the textual scholasticism of previous ages. Positivism and rationalism promised a unified world of knowable facts. While positivists usually valued careful observation and rationalists valued meticulous logic, both camps agreed that individual minds were too biased to be trusted to their own devices.[15] Otlet agreed with the positivists and rationalists, thinking of individuals and their literary interpretations as fallible.[16] This was the reason he took on his unique database project. The observer would need to be expunged as much as possible.[17] In embracing positivism, Otlet found himself at odds with legions of classical, medieval, and Renaissance philosophers who thought of the learned individual as the central proprietor of knowledge.

In contrast, Aristotle had explicitly positioned episteme as a self-cultivated, individual knowledge.[18] Aristotle distrusted writing, seeing it as an inferior vehicle of the human mind. For Aristotle, writing needed to

be interpreted by the knowing individual to be meaningful. Of course, the centuries that passed between Aristotle and Otlet brought with them many varying perspectives on the importance of print and the aptitudes of the knowing human mind.[19] By Otlet's era, print had been widely accepted as a legitimate form of media,[20] and rationalists and empiricists were rivaling the scholasticism of previous periods. Otlet, mystified by his own fragmented writing, could not see himself, or anyone, as a knowledgeable interpreter, but he *could* see the world as a set of positive, rational, empirical facts. And so, he *could* collect those facts in documents.[21] Otlet would document the world, but he needed tools.

His technê of choice was the three-by-five-inch index card, in which he placed a quasi-religious faith. Otlet recorded facts on the cards and organized them in an ever-growing assortment of filing cabinets. He had picked up this habit from American librarians who had been using cataloging cards as surrogates for books in their collection for several decades.[22] Otlet adapted this technique but used the cards as surrogates for all worldly facts, not just books in a library, believing that his full collection of cards could be a database of everything that could ever be known—the largest treasury for memory ever developed.[23] Along with La Fontaine, Otlet spent hours upon hours dissecting scraps of books, journals, magazines, and more, pasting the contents onto cards.[24] Otlet's cards were multimodal memory technologies that artificially split content (fact) and form (context) to facilitate effective automation. Otlet thought of all human knowledge as akin to the laboratory experiments of chemists and believed that memory could be reduced to empirical observations.[25] He wanted his cards to only document the raw data foundations so the facts could be remixed and assessed with the precision of a lab experiment.[26] He trained legions of assistants to read texts, photographs, and objects for their "facts," regardless of the context or language. Literary texts, for example, became sets of facts to record on his cards. As part of Otlet's project, the cards circulated facts throughout a memory infrastructure. To provide access for his growing collection of facts, Otlet looked again to American libraries and drew from another established mnemonic technê: the UDC.

Among his many contributions, Otlet is best remembered for his Universal Decimal Classification (UDC). The UDC expanded the capacities of Melvil Dewey's Decimal Classification. Both classifications provided order through a numbering system. Dewey billed his as a tool for ordering books in libraries,[27] but Otlet had bigger ambitions. His classification was meant to order every known fact, not just books in a library.[28] He transformed Dewey's classification, and his UDC could more extensively order categories and provide cross-references. This was the reasoning for his index cards—the

cards were the material that could be manipulated by the classification to represent a world of knowledge. UDC provided the secret formulas for rearranging the facts. His memory machine translated anything he could reference on his cards into "knowledge." Otlet's Mundaneum was a monumental accomplishment of memory infrastructure. Despite the limitations of Otlet's positivism, developing organizing principles for knowledge was a revolutionary achievement. Otlet's Mundaneum was a twentieth-century memory palace.

Otlet was producing a universal version of the classical memory palaces.[29] In his *World: Essay on Universalism*, he wrote that once his dream was complete, "everything in the universe, and everything of man, would be registered at a distance as it was produced. In this way a moving image of the world will be established, a true mirror of his memory."[30] The classical memory palaces were vivid imaginary pictures associated with ideas for the purpose of public address. The classical technique worked for speech but not for Otlet's universal knowledge. Instead, he replaced the imaginary places of the classical technique with cards. He even numbered them with addresses—decimal classifications—in order to sustain a larger memory infrastructure.[31] Over time, his collection grew from a set of card catalogs to the warehousesque Mundaneum. He made plans to expand it into a full city of memory.[32] Along with famed architect Le Corbusier, he planned a utopian city of knowledge where intellectuals could congregate in the name of world peace. Instead of walking through the mental memory palaces, mnemonists would walk through a physical memory space that had been constructed with cards.

Otlet was surrounded by thralls of obsessed twentieth-century mnemonists who were also constructing elaborate memory machines. During the second industrial revolution between 1870 and 1930, modern bureaucratic states and societies transformed into scientific decision-making states. Good decisions depended on good information. In an era of bureaucratic positivism, universal knowledge was good. In an era afflicted by the uncertainties of war, it sounded even better. Scientific methods, in terms of rigor and efficiency, were applied liberally throughout society—documented science research was no exception. Professional paper pushers in Europe and abroad were devoted to the efficient organization of records—a discipline they called documentation.[33] The most active organization representing documentalists was ASLIB, the Association of Special Libraries and Information Bureaux.[34] ASLIB was founded in 1924 under the auspices of a British government fully supportive of positive, rational, and public science. Although organization members did not always agree with Otlet, its members did appreciate the power of his bibliographic tools. Like Otlet, ASLIB

members were drawn to the natural sciences, largely because they thought of their work as critical for an efficient state. Members were often from scientific laboratories and business libraries. They were interested in organizing documents usually neglected by libraries but that were well-known among scientists and businesses. The organization prospered because its members ostensibly were doing work that forwarded the goals of a scientific state.[35]

ASLIB was founded by R. S. Hutton and J. G. Pearce, two scientists working in the commercial sector, to foster cooperation between special libraries, information bureaus, and other agencies. Pearce believed that linking the little information "morsels" of the UK would result in the "tremendous advance in knowledge itself" while unlocking the "intellectual capital of Britain."[36] Ostensibly, Hutton and Pearce seemed like they should have many shared interests with Otlet, which they did, but they differed from Otlet in crucial ways as well. ASLIB was fervently opposed to a centralized source of knowledge, like the Mundaneum, criticizing Otlet's work as inefficient, slow, and totalitarian.[37] Otlet wanted a utopian city of knowledge; ASLIB contented themselves with recording the documentary holdings of industries, libraries, and corporations. ASLIB was primarily committed to establishing directories pointing to other information sources. The organization ran a telephone service that located information for inquirers. It also produced several print directories of information sources. The most established was the ASLIB Directory, which was a list of organizations that provided information.[38] ASLIB also published a news sheet, *ASLIB Information*, which identified the newest sources of information.[39] The small organization located in London was a metatechnology of information technologies, aiming to make finding anything as easy as possible. This continued on until the late 1930s, when ASLIB's mission was disrupted by an upheaval in science communication during World War II that would change what it meant to remember.[40]

Memory Disrupted by War

Each time war interrupted science communication, it upended the plans of the documentalists.[41] Science was conscripted as a weapon of war, changing the predictability of its routines. World War I, known as "the chemist's war," introduced sophisticated chemical weapons and countermeasures into the world's arsenals. World War II was "the physicist's war," seizing upon new radar and nuclear technology that eventually culminated in the twin bombings of Hiroshima and Nagasaki. Massive government funding brought more people into science and consequently increased the sheer number of science documents produced. For example, in the United States, employment in a

majority of scientific fields increased exponentially outside of universities and colleges.[42] Between 1900 and 1950, for instance, the ranks of employed physicists grew from 800 to 7,500;[43] the number of chemists rose from 3,000 to 15,000.[44] Professions were growing to accommodate the economics of war, including those in science. Scientific labor growth was counterbalanced by reduced information sharing, though.

During wartime, science communication was frequently classified for national security, which depressed international sharing. As scientists entered into collaborations with the military, they produced new knowledge but did not communicate through established communication channels like the long-running *Philosophical Transactions* or any of the other numerous established academic journals.[45] Instead, they worked on war problems in sequestered groups, circulating less formal local information more intensely. As a result, both wars saw impressive innovation in agricultural science, medical science, geology, and nutrition, but this was done without the open sharing that peacetime scientists had enjoyed. The documentalists in previous decades had thought of transparency and sharing as critical for peace, but during World War II, information sharing could potentially give advantages to enemy forces. Ironically, perhaps, closed science was productive science. The openness that had been lauded as critical for science in previous years was substituted for the scientific secrecy of national defense.[46]

Paranoia instigated much science policy during World War II. Nations classified and encrypted their research while also trying to unlock the black-boxed research of enemies. Governments across the globe funded translation and abstracting services zealously. In the United States, several agencies were established to "capture" documents from enemy scientists. The Office of the Alien Property Custodian (APC), first founded in 1917, was fortified in 1942 to seize copyright for enemy-produced materials, reprint scientific documents, and circulate them for the national good.[47] The US Interdepartmental Committee for the Acquisition of Foreign Publication (IDC) was effectively an intelligence operation specializing in science documentation.[48] IDC field agents clandestinely secured foreign publications for US government officials. Meanwhile, more US funds than ever were dumped into translation in the hopes of finding enemy research that may have been a threat. Exponential growth obscured the everyday practices of science and produced a global information bubble where documents were ambiguous assets.[49] The spirit of documentation encouraged by Otlet and ASLIB was replaced with top-secret military committees that often treated documents as prisoners of war.

War kindled new informational tools that were more militaristic than the memory machines of the peacekeeping documentalists. Operations research

(OR) was the UK military's "mental technology" that used mathematical analysis of empirical evidence gathered during war.[50] OR was used for a number of war activities, like aiming missiles and planning attacks. It shared many similarities with the techniques developed by documentalists. It was positivist, efficient, and depended on the collection of facts. While the documentalist's techniques were aimed at collaboration, OR's were aimed at competition. The indexes produced by ASLIB, for instance, provided efficiency for the sake of shared knowledge. OR's goal was efficiency for the sake of annihilating enemy forces. During peace, documentalist techniques helped ensure the certainty of science information. During war, OR assessed uncertainty amid enemy threats.

OR shared other characteristics with documentation. It was an effect of the same public science movement that the UK promoted between 1870 and 1930. Scientific rationalism found its way into state policy, primarily through science advocates. The scientific rationalism forwarded the momentum for the next industrial revolution that encouraged efficiency in all spheres of the public. Rationalism produced planning techniques that had the guise of scientific method.[51] Before OR became a fully developed military technology, competing businesses often embraced it because it provided efficient logistics for moving commodities and capital. OR and documentation were parallel souls, each focused by a rationalism that was overtaking the UK and Europe more broadly. During war, the state and military embraced OR, which provided the new technê for enormous political clout.

Among scientists, John Desmond Bernal fiercely supported OR. Bernal was one of the brashest advocates of a public science for the moral good. Nicknamed "Sage" for his effervescent brilliance, Bernal conducted innovative cross-disciplinary empirical research. He was dismissive of the work of his colleagues and adept at fomenting controversy. He was notorious among his peers as a radical Marxist futurist.[52] Among his most famous contributions to science was the Bernal sphere, a futuristic space habitat for colonization. He identified politically with the Communist Party and would even dare to correspond with Soviet scientists during wartime. Likely due to his international scientific collaborations, he was sympathetic to the Soviet Union before, during, and after World War II. His unorthodox combination of innovative science and controversial politics turned him into a polarizing figure and also made him an ex officio diplomat for globalized, rational science. In 1939, Sir John Anderson appointed him to be the scientific advisor to the Ministry of Home Security, saying, "Even if he is red as the flames of hell, I want him."[53] It was at this time that Bernal became acquainted with OR because of his involvement with the British government's war planning. OR would prove to be a monumental force in Bernal's postwar work.

Bernal took great interest in many of the same problems that infatuated documentalists. Bernal's 1939 book, *The Social Function of Science*, predicted a third wave of science, one that would be restructured to meet the needs of a new type of scientist, one who worked in one of many specialized areas that added up to a complete scientific knowledge enterprise.[54] For Bernal, science needed to be conducted systematically, rigorously, and through global cooperation. In *Social Function*, he wrote, "Science, conscious of its purpose, can in the long run become a major force in social change."[55] He would take his peers to task for not conforming to his vision. He was adamant that scientists of every nation should openly share their work in the name of global progress, regardless of their country's political positionality. He notoriously claimed that 75 percent of science papers were not fit to be printed and that the central medium of science research should be the individual research paper. He imagined a centralized science information system that would fix the problems of the parochial academic journals.[56] Bernal was a futurist who saw it as his duty to lead the way in the postwar science era. *Social Function* was something of a bible for many interested in science information.[57] Bernal was joined by other scientists who were enamored by the scientific nature of OR as a planning tool because of its military success. OR advocates including Bernal had faith that its techniques could also ameliorate the problems of postwar science, and scientists adopted it as a planning tool. Where documentation had been the preferred technique of science communication before war, during war OR had taken over. OR had helped militaries decide what science to conduct, translate, and retrieve to win battles. In doing so, it had concomitantly altered approaches to science communication that would be carried over into peacetime contexts. And so, supporters of each of the two related sets of techniques, Otletian documentation and OR, were put in conversation with each other. Both were used to bootstrap a new memory infrastructure. Documentation worked to build infrastructures for certainty. OR assessed the uncertainty that it saw as inherent to all information.[58]

Otlet, ASLIB, and Bernal were just a few of the many notable mnemonists of the era.[59] The historical moment was rife with technologies and political interests that drew the attention of a number of memory architects. When World War II ended, secrecy and expediency were less critical than before. The end of war also provided pause and newly asserted the importance of managing documents, in some form, as the informational coin of the realm for science, technology, innovation, and humanity more broadly. Even as the Cold War loomed, scientists saw as critical the reassessment of the classified practices and findings that characterized wartime science. War had caused a document boom that encouraged scientists to accumulate research papers

in isolated professional bubbles. Scientists, especially those from Great Britain, thought that modern science demanded transparency and openness. And so, a major shift in memory infrastructure occurred as new regimes of document control proliferated, framed as scientific efficiency for the sake of renewed peace. The war disrupted science and created a sort of global scientific amnesia, which functioned as a reset point, consequently generating a rhetorical exigence. Who would step forward to fix science? How would they do it? What needed to be done? Was ASLIB an important part of the solution? War introduced new technologies, some conceptual like OR and some technical. Could these new technologies become a part of the universal memory machine? Parsing out the answers to these questions, like the war itself, would take an international effort. Responses to the compulsory wartime amnesia would also take on a uniquely scientific timbre because modernized states of the early twentieth century were technocratic states. And so, the postwar period of remembering drew insight from the projects of Otlet, ASLIB, and other documentalists interested in scientific literature. It depended on acumen from both European documentation and OR. Most importantly, it fed "senses of communal belonging" that were then transformed into the "material and symbolic supports" for memory's infrastructure.[60] These postwar mnemonists drew together to craft a public infrastructure of remembering—a new set of mnemonic technê. A slew of international science conferences, which acted as the setting for memory's rebirth, began.

Initial Attempts at Reconstructing Science's Memory: 1946–1958

World War II officially ended when Japan surrendered in September 1945. The following year science would start again. In 1946, international groups of scholars, scientists, politicians, and librarians gathered to tackle postwar science during the Royal Society Empire Scientific Conference held in England's warm summer months.[61] The conference gathered international experts to report on the state and future of every major scientific area. It became the first of numerous international gatherings over the next few decades that would shape new memory technologies. Sir Robert Robinson, president of the Royal Society, opened the event by highlighting the gravitas of the shared postwar problems: "Once more in peaceful freedom, scientific men, delegates from all parts of your Empire, have come together for the co-operative exchange of ideas and information, under the auspices of the Royal Society."[62]

Because the Royal Society organized the 1946 meeting, a palpable European public science tradition animated and framed discussions for the next

several decades. The same sensibilities that informed Otlet, ASLIB, and Bernal animated the language of mnemonists gathered at the postwar conferences. Many ASLIB members and Bernal were part of planning these events and presented their work as well.[63] Many more documentalists and OR supporters were involved as organizers and attendees.

Memory systems were, comparatively, an insular hobby before World War II, but postwar scientists were *obsessed* with developing better systems for distributing and assessing scientific research efficiently. The 1946 conference paved the way for a 1948 Royal Society Scientific Information Conference, an international meeting devoted solely to science information. The 1948 conference led to a 1958 international conference, the International Conference on Scientific Information in Washington, DC. The timing of this wave of mnemonic activity was critical. The major information theories popularized just prior to the conference—Shannon's (1948), Bradford's (1934), Lotka's (1926), and Zipf's (1935)—became part and parcel of thinking about science's memory systems.[64] These theories were quantitative, the work of mathematicians, and they dovetailed with the efficiency modeling of OR's mental technê. The new information theories were put to work as supplements of OR aimed at harnessing the information explosion.[65] The Cold War would still cast a long shadow, but scientists freed of their wartime obligations now had more time, energy, and vision to spend on constructing a global infrastructure for science communication.

A number of unconventional technologies, systems, and techniques were imagined as possible methods of taming scientific information. Bernal himself outlined an organizational scheme to control the overwhelming mass of science. His plans consisted of elaborate controls for shuttling information between institutions and people, based on techniques from OR. Bernal proposed a centralized institution replacing the existing universities, presses, publishers, and learned communities. In anticipation of critics, he said his scheme was not all that radical and merely reworked the "existing machinery of the scientific societies,"[66] a mechanistic trope that borrowed from the efficiency language of public science and OR. But radical his plan was. His retooling of well-established mnemonic infrastructures required a centralized process for disseminating, storing, and retrieving all scholarship as individual documents.

The National Distributing Authorities (NDA), Bernal's proposed institution, would decouple academic papers from academic journals and pare down monographs, all for the good of science's progress. To his mind, the NDA would ensure "that every scientific worker receives as rapidly as possible and with the least expense those papers in which he is most interested."[67] His institution would vet every bit of science. Because each of the

institution's products would resemble a standardized scientific paper, quality control could be sustained through standardization and routine, just as though it were any other twentieth-century assembly line. The NDA would function as the regulator for science. A 1948 paper Bernal had planned to present at the Royal Scientific Information Conference described the materialized instruments of his NDA.

"Provisional Scheme for Central Distribution of Scientific Publications" listed ten practices of an effective science system.[68] First, an author should send a paper and abstract to NDA. Second, the paper would be distributed to a panel that would review the research within a week and classify it with the UDC.[69] Third, the paper would be published for immediate dissemination to relevant scientists as a preprint. These first steps would replace the peer review mechanism that had developed along with the hundreds of journals and presses publishing scientific research. Instead of decentralized reviewing in any number of journals, reviewers would be organized and assigned by the NDA.

Bernal's fourth step described how the NDA would run subscription services through UDC topics instead of journals. Research would be bound as a "journal" named by its UDC classification and then sent to libraries. For instance, the numerous articles on probability that might be published in any number of journals would be bound by "UDC 519.2 Probability. Mathematical Statistics." The bundles of UDC journals would then be distributed internationally. Bernal would have NDA abet globalized science by managing knowledge production through every library in every country. His fifth step provided logistical rules for distribution, having more specific instructions for handling complex papers. For example, papers were disseminated weekly by mail to scholars named by the author. Papers would be more forcefully pushed to researchers than before because, to Bernal's mind, a scientist was "in no position to know what he needs."[70]

Bernal's sixth step would further bypass the scholarly journal as a technology of science communication. To create a permanent record in print, he wanted to bundle UDC classifications in varying intervals and turn them into bound volumes for libraries. His seventh step described how to abolish other publishing bodies. His eighth measure described how the NDA would be funded: he would charge subscribers to participate, creating a monopoly for research publication. He argued this was economical because centralization would reduce overhead costs, journal size reduction would save money, less printing would be required, fewer individuals would need to be paid, and the cost of distribution would be lower. His ninth point suggested that his "scheme" would be more rapid, efficient, and effective. His tenth step discussed how he would bootstrap his system. He wanted UNESCO to donate

to NDA and start his system in a few disciplines until there was a "complete world organization for scientific publication and distribution."[71] Bernal's proposal centralized science for maximum economy. It was uncompromisingly aligned with OR principles and the ethos of British public science.

Bernal never presented this work at the 1948 Royal Society Scientific Information Conference because it was met with such contempt that he chose not to present the paper he had circulated in advance of the meeting.[72] Even many of his strongest supporters, including those who advocated for rationalist approaches to science, were shocked and accused his system of being extreme, dangerous, and despotic.[73] Royal Society president Sir Robert Robinson called Bernal's plans "propaganda."[74] Some claimed the NDA amounted to a "totalitarianism" of science memory, with the most outspoken criticisms lodged against the NDA's centralization.[75] Bernal's opponents *hated* centralization because it bypassed the learned societies, journal editorial boards, and university presses, the gatekeepers of science. In the eyes of his detractors, the NDA left little room for the development of new fields, ideas, disciplines, or creativity. Critics argued that their long-established journals were not just organizing tools that could be replaced by UDC classifications. The journals were living institutions that embodied important relationships, labor, and practices of science. Journal boards, for instance, identified new topics and drew new authors to otherwise unknown research. Bernal's critics each recognized that his memory infrastructure would change the fabric of science. Most did not like the outcomes. And few scientists saw their work as akin to Bernal's descriptions of it. Science was capricious, haphazard, and idiosyncratic. Chemist, documentalist, and future director of library and information services at CERN, Herbert Coblans, for example, noted that Bernal had "not given enough weight to the irrational elements" of science communication.[76] In the face of overwhelming opposition, Bernal eventually became disenchanted with his initial NDA proposal.[77]

Yet, Bernal's NDA and the ten practices that underpinned it, as fanciful, controversial, and unacceptable as they ultimately were, provided a critical distance that enunciated the mechanisms of shared memory infrastructures. His plans included a scheme that controlled the mass of ideas. They included the mechanisms that decided what would be earmarked for memory. While any one of these technologies on its own is fairly mundane, the agglomeration of them as a regime fundamentally would reshape the contours of memory by limiting how the past could be practiced. Bernal's mnemonic visions were aligned with and organized by the conceptual apparatus of OR. He outlined technologies of distribution. He hinted at the sort of labor force involved and the hierarchy of command.

Scientists hated NDA, but Bernal had fortuitously also circulated an idea that appealed to the sensibilities of a professional group looking for theoretical foundations in the postwar period: the eventual founders of the field of information science. When Bernal's retracted 1948 paper was printed with the conference proceedings, it found more receptive audiences, especially among those who handled libraries, archives, and other information processing centers. Indeed, Bernal found more responsive audiences when he started attending ASLIB and other science information conferences in 1945. In 1958, Bernal addressed the International Conference on Science Information in Washington, DC. Meanwhile, his *Social Function of Science* became a citation classic among librarians, documentalists, and bibliographers. Decades later, founders of the field of information science would credit Bernal as the driving force behind the field's earliest manifestations.[78]

While Bernal's schema found no purchase in the larger scientific circles of the Royal Society, those attending the science information–sharing conferences of the 1940s and 1950s listened intently. Indeed, this eclectic group of librarians, documentalists, and bibliographers would later found the field of information science as it emerged in the UK, the United States, and abroad.[79] The foundational figures were all present. This includes Jason Farradane, who would later coin the term *information scientist* and invent a new approach to classification called relational indexing, a technique informed by psychology as a way to organize documents.[80] After the conferences, Donald J. Urquhart would go on to apply quantitative techniques to the library collection at the National Lending Library for Science and Technology in Britain and become a powerful voice during the postwar period.[81] Jesse Shera, Allen Kent, and James Perry would pen the first textbooks and start the first schools of information science and documentation. Mortimer Taube, the technowizard who would devise a new approach to document indexing, also attended the conferences.[82] The list of postwar conference participants could easily mirror the inductees in an information science hall of fame. These participants would genuflect to Otlet and Bernal as the posthumously recognized founders of information science.[83]

Nearly every foundational theory and method that shaped the discipline has some direct tie to this era, its meetings, and its exigencies.[84] Bernal's fully imagined plan for centralized control failed to gain traction, but technê for centralizing documents were being publicized at the conferences and then adopted piecemeal as parts of a systematizing scientific communication infrastructure. Thanks to Bernal's influence and the OR perspective, the chief unit of scientific communication during this period transformed from "document" into quantifiable "object" that could be assayed as rigorously as any chemical element. Conference attendees envisioned solutions

for the postwar science information problem that hinged on approaching scientific literature as standardizable, objective carriers of facts and scrutinizing it for patterns of inefficiency that could be ferreted out. Librarians, documentalists, and bibliographers produced pages and pages of their own research devoted to understanding science information organization, transfer, and management. Those attending the science information conferences spent their time weighing science journals to maximize postage costs. They reported on their own surveys about whether scientists received the publications to which they subscribed too late and how late and how often their sources were relevant to their research. Librarians, documentalists, and bibliographers quantified research papers published per year in charts that broke down their page counts, widths, and heights. They pored over science journal article titles, too, examining title word content, count, and position for maximum reading efficiency.[85] Mnemonic technê were distributed into the environment, bit by bit. A postwar memory infrastructure was emerging as the memory techniques, and practices and the commonplaces of public science that had been fomenting for decades in the UK were coalescing in a profession.

The science of information would be grounded in a number of tenets and memory technologies that were affordances of and responses to the era. Technologies that had gained traction during the war would continue to develop. For example, microfilm was treated as novelty upon its prewar introduction. But after it was recognized for its military applications as an easily distributable space saver, microfilm was more fully funded, and a groundbreaking media for documentation advanced. Index card and punched card technologies—including Zatocards, Dyson systems, and Peek-a-Boo techniques—matured similarly after demonstrating wartime utility.[86] Although many of these systems came and went, the idea of investing in memory's infrastructure stuck. New government support would initiate a labor force to organize, retrieve, and store documents.[87] The new labor would specialize in producing new black boxes for memory. This historical moment provided the funding, interest, and support for a new field of inquiry that would spend its time developing systems for memory—mnemonic technê. Otlet, ASLIB, Bernal, and others ignited a labor force that focused its efforts on (1) archiving records, primarily scientific, of the past; (2) providing storage and retrieval techniques; and (3) acting as protectors of the intellectual record. Although other labor forces had been doing this work, librarians for instance, information science provides a hard case that demonstrates the social dynamics of memory. Immediately after World War II, information science began redefining memory with computer technologies, using new storage metaphors, and redefining memory in terms of the infrastructure it

could erect. Because of the interest in science, the new field would change the overall landscape of memory by virtue of its ongoing work.

Disciplining Memory's Practices

I return to an important thesis that I forwarded in the opening chapter. Mnemonic technê are the circulatory mechanisms of memory. Each of the sociotechnologies deployed or proposed during this era were techniques used to undergird a memory economy. Together, they wove into regimes of public memory. They interconnected in a global memory economy. The memory economy consisted of human labor, technologies, materials, techniques, and media that changed the shape of what could be retrieved from the past, how it could be retrieved, and who could retrieve it. Each mnemonic technê, be it a scientific document, classification system, OR-inspired logistics plan, or microfilm project, would be interlocked with an increasingly networked whole. Bernal wanted to coordinate UDC with his NDA system, for instance. Although Bernal's system was never put in place, it provides a sketch of a complex and real economy of memory that depended on dedicated workers collecting, evaluating, classifying, and disseminating the materials identified as important for remembering. The public backlash to his efforts demonstrated the limitations of any regime of memory. Memory infrastructures provide a treasury for invention. The limitations of the infrastructure provide the constraints of invention. Otlet's Mundaneum, which was actualized for a brief period of time, provides another example of a mnemonic regime. The combination of people, processes, environments, technologies, and technê worked together as a fully functioning memory machine. Both Otlet and Bernal were obstructed by the fact that it takes more than a single person to sustain and maintain even a small infrastructure for public memory.

ASLIB supplied a labor force that would act as an engine for an ongoing memory economy. Single leaders can raise awareness but rarely can they do enough on their own to sustain their plans without the backing of a larger community.[88] ASLIB rallied a group of professionals who took plans like those Bernal or Otlet forwarded and tried to build them into a permanent memory economy. ASLIB paid people, grew their organization, and institutionalized a body of professional knowledge, which enabled the continuation of a community invested in memory. Isolated memory technologies came and went (or died on the vine in the case of Bernal), but the larger infrastructure was being established and stabilized. The initial postwar discussions produced a field of interest that renamed documentation as "information science." They inaugurated a peculiar profession interested in

developing memory infrastructure with techniques and technologies popularized during war. The founders were putting in place the mechanisms of a labor force that would challenge existing guardians of memory.

Of course, ASLIB and the documentalists were not the first or only people toiling with systems of memory. Librarians and archivists had sustaining memory infrastructures for centuries. For nearly as long as there have been printed books, technologies like reference books, bibliographies, and indexes have also been printed. The second industrial revolution integrated a number of global technologies across countries—postal service, telegraph, telephones, and railways—which better enabled standardized memory practices.[89] The theories of classification necessary for creating a foundation for the work of people like Otlet, Dewey, and the members of ASLIB had roots in Bacon's classification of knowledge. The efforts so embodied by Otlet, ASLIB, and Bernal were long in the making. Yet, the events of the postwar period described in this chapter provide a unique opportunity for better understanding how an ecological rhetoric of memory acts. War acted as a sort of restart where the participants involved were forced to reinvent themselves. Information science's birth was one of these restarts. Following the historical trajectory of information science and investigating its earliest debates about creating and sustaining technologies help elucidate the sunken infrastructure of public memory. The postwar era was critical for producing a number of tensions that would never be resolved but continue to be the focal point of participants in public memory.

What were some of these tensions in the development of public memory? They included disputes about the proper media of memory; the mechanisms for transporting memory; the speed of memory; the places of memory; the mechanisms for preserving memory media; the selection of a labor force for assessing, evaluating, and disseminating the cultural record; the organizational principles of the memory economy; the access points for public consumption; and the very reasons for and purpose of the memory economy. This scaffolding depended on mnemonic technê organized with ubiquity, automation, and efficiency as their commonplaces. War had introduced information as a ubiquitous substance. Because it was everywhere, postwar planners intended to tame it with machines to shuttle it efficiently from place to place. To do this, they depended on OR as a mental technique for organizing the logistics. More insidiously, the "map" for information was projected through organizational tools developed decades earlier. Otlet's plans for a universal memory machine, couched in positivism and rationalism, were not the end of a plan for memory infrastructure; they were only the very beginning.

INTERMEZZO

Exorcising the Library Spirit: Library Labor as a Technê of Memory

As information science solidified its earliest mechanisms, the field of professional librarianship underwent its own revitalization. At the end of World War II, librarianship bloomed into a veritable profession, in part thanks to a turf battle with science and the documentalists. The postwar information crisis had stirred scientists to a newfound interest in record-keeping (an interest explored in chapter 2). Science was a tool of war, and someone needed to preserve the history of the conquerors. Few would have argued that voluminous science records produced in the shadow of World War II were not also public records that documented the legacy of national science as war's secret weapon. Even fewer could have predicted that a group stereotypically consisting of "timid women" would so fiercely protect their jurisdiction over public records. Librarians from public and private sectors flocked to the science information crisis, recognizing the stakes involved.

A century earlier, librarians may not have been nearly as interested in defending their positions as keepers of the cultural record. In previous eras, libraries and archives were often maintained by the elite who could afford to own them. Librarians had only started professionalizing during the nineteenth century, the same time that advances in industry initiated waves of professionalization in numerous areas of society.[1] Libraries and archives had been foundational to all literate societies, but it was not until the late nineteenth century that practitioners set to knit disparate local libraries into a more complex infrastructure specializing in serving and preserving the cultural record.[2] The transition extended the library domain from local, autonomous places into professionally regulated spaces. Before the mid-nineteenth

century, each library was its own idiosyncratic bundle of recordkeeping techniques. Generally, head librarians acquired and arranged books according to their personal whims. The primary organizational tool, if there was one, was a shelf list of hardcovers and paperbacks unique to each library. As librarianship matured, a standardized set of transferable skills, practices, and policies for managing and networking institutional spaces dedicated to preservation took root. Professionalization enabled practitioners to coordinate libraries so that each space could be treated as one piece of a larger institution of memory. New portable technologies for order and arrangement allowed librarianship to imagine itself as part of a coherent networked memory space. Many places became one space. And so, the professionalization of librarianship was also the standardization of a major institution of memory invested in the ethical imperative to regulate public knowledge.[3] The profession abandoned its insularity in favor of defining its space through its codes of ethics enacted via specialized techniques. Professionalization ignited even the most faint-hearted souls with a colonizing "library spirit" that roused practitioners to a shared ethical mission to practice those techniques.[4] So much for a group of timid women.[5]

Manufacturing Infrastructure's Technê: The First Era of Library Education

In the United States and abroad, the American Library Association (ALA) empowered libraries to function cohesively and efficiently. It was instrumental for library labor redefining professional space via memory work. In 1876, during the inaugural meeting in Philadelphia, 103 librarians laid out the association's first constitution. They elected a board of officers, distributed the first issues of *American Library Journal*, and forwarded standards for library activities. The early constitutional documents encouraged solidarity for the labor force as it connected libraries across the United States. The profession further codified its ethical imperatives in documents like the ALA 1879 Code of Ethics, which encouraged "promoting library interests throughout the world by exchanging views, reaching conclusions, and inducing cooperation in all departments of bibliothecal science and economy," which should "promote the diffusion of ideas through libraries easily accessible to all the people."[6] The leaders of ALA were driven to regulate a cohesive society by collecting "genteel," "moral," "proper," and "elite" printed media, and they would guard their public treasury of memory with all their moral might.[7] ALA was also essential for standardizing the mnemonic technê that enabled libraries to link their collections. Of these, the most recognized was founding ALA member Melvil Dewey's classification system. Once homogenous

classifications and similar technê were put into place, all libraries became part of the same memoryscape bounded by rules of its labor. Dewey's classification furnished the zoning map for American libraries. A Dewey number in one library was a Dewey number in all libraries.

The growth of ALA propelled a memory infrastructure by transforming disparate libraries and librarians into *librarianship*: the profession and its set of coordinated technê invested in supporting a code of ethics, techniques, and practices of memory. Classifications were important, but they were impotent without a labor force to enact them across different spaces and times. Regulated professional education was crucial for this transformation. Before 1876, librarians had been taught primarily through experimentation, apprenticeship, and local politics (what librarians could manage given who frequented their libraries). Students shadowed mentors to gain experience in reference, collection management, and community service. Just as often, they had no guidance at all: university libraries were often managed by a single professor with no experience curating collections, save a personal interest in reading. Library education began changing rapidly in 1887 when Dewey opened his School of Library Economy at Columbia University.[8] Dewey's school was the first formalized library education anywhere. Dewey's early classes at Columbia included library hand, classification, bibliography, and cataloging. These classes imparted techniques that translated ALA's constitutional ethics into routinized, infrastructural, mnemonic practices carried out by graduates. By 1900, Dewey's school was joined by library programs at Pratt Institute, Drexel University, and the Armour Institute, but these early library programs saw little support from their universities. Even Dewey's program at Columbia had a very short shelf life. Dewey was fortunate in that he knew people in universities willing to lend their fiscal and political support to the founding of his school. His backers provided him enough capital and institutional support as he bootstrapped a new educational program. But soon after it was established, his school met resistance because Columbia administrators hated admitting the women who comprised the majority of Dewey's students. It did not help that a number of faculty and administrators loathed Dewey too.[9] Columbia terminated Dewey's program, and he moved it to the New York State Library in Albany in 1889. These setbacks are emblematic of the profession's first attempts to formalize a discipline, and they would continue to haunt the ethos of the field for decades. The profession's training lacked sustainable institutional support.

Programs for professional library education struggled to find bearings in universities that penalized the practitioners for their gender and rejected the ethical imperatives of librarianship. ALA tried pushing back. At the beginning of the twentieth century, national library leaders began demanding a

rigorous education system in universities. As with Dewey's attempts at Columbia, these efforts met resistance nationwide from administrators and faculty, who saw librarianship as too feminine and too clerical. Most librarians of the era were women.[10] The memory labor of librarianship was trivialized in comparison with "legitimate" academic fields. It was dismissed as a mechanical service for storing and retrieving books.[11] The profession was certainly not as respected (or male-dominated) as physics, chemistry, mathematics, or sociology.[12] Still, groups like the ALA understood that librarianship was not merely a job collecting books; it involved an art of curating and circulating artifacts deemed worth remembering.[13] They promoted librarianship as a demanding profession that required the rigorous educational offerings of universities. Even though some progress was made through advocacy efforts and educational initiatives, the marginalization of librarianship suppressed the profession's growth. Fifteen library schools were founded before 1920, but apprenticeship would remain the primary method of instruction.

This was the first of several early eras of American librarianship, periods when the memory practices of the profession were increasingly codified.[14] Between 1880 and 1920, institutionalized expertise evolved slowly. The few library schools, all of which existed in the northeastern urban metropolises, formalized the aspects of librarianship that made it a teachable profession. Early curriculum focused on the library as an institution, selecting the "best" reading material for publics, library administration, and providing access to library materials. The profession was devoted to providing the "best reading for the largest number at the least cost."[15] After graduating, students often moved west, where libraries did not have professionally trained librarians. These recent graduates often would serve as the sole librarian in a city in the western United States. They proselytized the value of librarianship and acted as "missionary-librarians" with a quasi-religious library "spirit" or "faith."[16] They championed the value of good books and reflective reading.

Fortifying Memory's Infrastructure (1920s to 1940s): The Second Era of Library Education

Industrialist and leading philanthropist Andrew Carnegie began fervently funding libraries throughout North America in the late 1880s, and libraries and librarians flourished and multiplied. The second era of American librarianship, from the mid-1920s to the 1940s, was one of expansion and shifting priorities. Like the first era, most librarians were woman, and the profession's goals continued to reflect the social position and mores of white Protestant women from that era. Carnegie funding encouraged an ethos of

service, which replaced the earlier call to westward expansion, and the library was fostered as a more communal space throughout North America. Early expansion was eclipsed by fortification and changing priorities. Libraries relaxed previous policies that encouraged only the "best" reading material and included more popular culture reading in the hopes of luring more patrons inside. When World War I broke out, the libraries continued to position themselves as supporters of the community, galvanizing to salvage, collect, and distribute reading materials to soldiers overseas and starting mobile libraries in war camps.[17] Many altered their collection management policies to emphasize pro-American literature while banning enemy reading.

Education during the second era of American librarianship was marked by the publication of the eponymous *Williamson Reports of 1921 and 1923*.[18] The author, New York librarian Charles Williamson, had been an outspoken supporter of library education. Funded by the Carnegie Corporation, Williamson led an assessment of US library education that produced reports chastising the current education programs for being too technical and lacking a theoretical base. He suggested professional librarians earn at least a college degree followed by one year or more of graduate training in librarianship. Williamson argued that this caliber of education for librarians was a public good that would benefit all citizens. For Williamson, reading was key for the health of the republic; it encouraged a stronger, educated citizenship. The nation's reading infrastructure was abysmal, but library education offered a promising point for intervention. Persuaded by the reports, the ALA began accrediting schools by overseeing standards for education. And so, more stringent regulation of library programs marked the second era. This accreditation inspired growth. Several university programs earmarked funding to start offering a bachelor of library science (BLS), a second bachelor's degree that took one year to complete after a four-year undergraduate program in a different subject area.[19] This degree offered hardly more than it had before, but it put librarianship on par with other degreed education programs and therefore held symbolic and material weight. Though the new courses in librarianship were modest and primarily taught by working librarians, the BLS wedged a stronger foothold in universities, and programs benefited from the intellectual atmosphere.

ALA redoubled its efforts to improve education in 1948 and increased pressure on library schools to offer a master's degree. By 1951, ALA accreditation standards demanded that library professionals have master's degrees. Even though librarianship garnered more esteem, and the Williamson reports had impacted programs nationwide, implementing its recommendations was an ongoing struggle.[20] The idea of an advanced degree

for librarianship was still undervalued outside the profession. Librarianship, a historically service-oriented profession, would continue to advocate for space and resources in universities that valued research, elitism, and citizenship.[21] Accreditation was critical for enhancing the prestige of library education. It was also essential for standardizing the memory infrastructure that dominated library education for the next several decades. Accreditation normalized education across the schools. More than before, the curriculum a student was taught on the East Coast would resemble one taught on the West Coast. Dewey may have provided the spatial zoning plan to design libraries (dictating exactly where books should go in relation to other books), but the ALA's accreditation provided the infrastructure to teach labor how to implement that zoning plan, as well as numerous other mnemonic technê. The rules of memory were calcifying as mnemonic labor was taught how to think with the homogenized mnemonic technê.

Library Science (1950s to 1980s): The Third Era of Library Education

To bridge the divide between librarianship and other university disciplines, library educators more closely aligned their teaching with the social sciences, which helped marshal in a third era of American librarianship. The "library science" era ran from the 1950s to the 1980s. The first PhD program was at the Graduate Library School (GLS) at the University of Chicago, which epitomized this approach. The faculty members published original research written in genres from other fields. They started the prestigious *Library Quarterly*, a journal devoted to the study of librarianship.[22] The establishment of GLS and similar library schools separated administrators and faculty from the everyday workings of practitioners. Educators, less immersed in practical library problems, drew from a variety of academic fields for new inspiration. New courses on research methods informed by psychology, sociology, and history were added to the curriculum.[23] The older courses on managing library buildings and selecting the materials for readers were updated with research about those topics. The new approach fit more readily with the traditional teaching in universities, even though librarianship still did not command the respect of longer-established disciplines. GLS produced library science PhDs better able to tap into the social capital of the university. GLS was an enormous success, and other library schools soon modeled themselves on its approach, hoping to secure better positions in their universities as well. Librarianship as library science did not just encourage universities to become more accepting of librarianship; it also meant that librarianship was being taught and practiced differently.

The profession's skill sets were being adjusted in response to the changing context.

The GLS library science approach turned a research gaze on the spaces codified and distributed during the earlier eras of American librarianship. Library science faculty drew from established research fields, but their objects of study were libraries or reading materials.[24] Early research focused on reader's choices, library collections, cataloging techniques, historical studies of libraries, and library management.[25] The activities that had been important for librarianship in previous ages were turned into measurable phenomena.[26] To assess practices normalized in earlier decades, statistics were collected and surveys were administered. This approach to library education fundamentally changed the memory practices forwarded by library labor. Selecting reading materials had been taught as a quasi-religious ethical responsibility in the first era to those who had caught the "library spirit." During the second era, choosing sources rose to an act of community-centering patriotism. In this third era, library technê were now being assessed by surveying library patrons and observing use. Library management, which had been taught by happenstance and practical experience in previous eras, became an activity that could be measured for cost and time effectiveness. The language of research improved professional reputation in universities, and it shifted the labor practices of a memory institution. Institutional memory practices were increasingly quantified via a distancing perspective that resembled the research gaze of many social sciences. A suite of assessment tools supplemented librarianship's core, the deliberate selection of materials for the purpose of intervening in public reading practices.

The library science perspective surged immediately after World War II, when a swelling postwar population, increased federal support for education and research, and the GI Bill ushered in a golden age of universities and librarianship.[27] The research university was flooded with public adoration, students, and most importantly money. As a newly established research discipline, library science benefited right along with the rest of the university. Libraries, as part of the nation's educational system, flourished outside of universities as well. The numbers of libraries and librarians in the United States ballooned.[28] New funding led to flourishing library collections and new technologies. Libraries had more capital to experiment with microcards, punched cards, magnetic films, cassettes, and computers. The growth in practicing librarianship reinforced the prestige of library educators within the universities, and the new library science in turn legitimized the recognized expertise of librarians across the country. Because of their increasing importance during this golden age, practicing librarians often framed their work as a civic activity, one that sought to support an educated citizenry.

Their management practices were attuned to selecting and distributing materials to serve citizenship in the liberal democratic United States. By the time of the golden age, once disparate libraries and librarians had become a cohesive librarianship. The normalized labor force was armed with a slew of standardized technologies (classifications, card catalogs, book trucks, etc.) situated in standardized spaces (libraries, archives, etc.). Labor was taught to use space and technê in predictable ways. Uniformity provided infrastructure for standardized approaches to memory. The new labor force prepared to protect its domain as a human mnemonic technê abetting a major memory institution of the nation.

The professionalization of American librarianship, decades in the making, highlights critical technê of memory's infrastructures: the labor educated to orchestrate memory from within infrastructure's available means. In rhetoric's classical tradition, memory had been conceived of as a mental technique that manipulated words and images. Memory's infrastructure was the architecture of language. The classical rhetoricians, largely poets and other word technicians, were trained in the nuances of language use. In the twentieth century, American librarians had developed a related but alternative infrastructure of memory. They worked primarily in books. Instead of expertly understanding the structure of language use, they understood the structure of library use. Instead of manipulating words for public consumption, they manipulated books and related media.

Human labor is foundational technê of memory infrastructure.[29] Labor facilitates, directs, and sustains the reproduction of mnemonic objects and processes. A labor force that has been instilled with the right "spirit" will reproduce a mode, a doctrine, an ontology of remembering and forgetting.[30] When infrastructure gains solvency, that memory ontology may appear to be a "natural" practice, even while it depends on invisible labor to repair and sustain remembering and forgetting.[31] The most technically sophisticated infrastructures still depend on human labor. This intermezzo highlights how librarianship's labor force became attuned to a memory infrastructure of libraries, classifications, book transactions, and much more. For that labor force, learning to see and support infrastructure meant drawing mnemonic commonplaces of particularity, intervention, and deliberateness. These commonplaces helped the profession develop new technologies and sustain the network of memory. Of course, there were always other modes of remembering and forgetting, but librarianship had standardized its approach across a nation. In the postwar period, clashing infrastructure would pit labor from conflicting infrastructural approaches against each other as librarians reckoned with new professional interest in memory's space.

3

HYBRID MEMORY LABOR

> If we allow the word "machine" to extend to any physical or material structure that is useful for information retrieval, we find that classified documents, index lists, and card catalogues are all machines for the organization of knowledge. This being so, it will be useful to examine them here to give perspective to our discussion.
>
> —Calvin Mooers, "Zatocoding Applied to Mechanical Organization of Knowledge"

In the middle of the twentieth century, librarianship was one labor force of numerous interconnecting memory infrastructures that each had its own histories, constraints, and affordances. Business clerks, archivists, tax collectors, and many others also systematically sustained records that were committed for public memory. Each of these labor forces developed different goals and technologies for memory. Railroads, for example, developed sophisticated timetables for recording the times of arrivals and departures to coordinate remembering across various times and spaces, a practice that changed the expectations of interested publics.[1]

Perhaps because of the historical importance of libraries to scientists, postwar memory planners often compared their ideas to the historical infrastructures produced by professional librarians. They attempted to start anew, seeing the past as flawed, thinking that an "inaugural act of memory" would fix the mnemonic chaos that World War II had brought on.[2] In practice, this meant they were trying to produce a memory infrastructure with very little scaffolding or experience. Many of the new high-tech memory technologies planned immediately after World War II were obsolete before they hit the production floor. The organizational systems were impractical, the systems for controlling journals were unrealistic, and the universal memory

machines were impossible dreams.[3] Still, the kernel of an idea was planted in the minds of scientifically minded mnemonists, a germ that would flourish in the following decades. Documentalists and scientists reveled in the possibilities of universal memory imagined during the postwar. War ushered in a new memory age, one with a regime of new techniques for collecting, organizing, and circulating documents. Burgeoning mnemonists inspired by the mass of documents worked to reshape memory's infrastructure. Even twenty years after the war ended, belief in world peace was often still tightly bound to the impossible dreams of a universal memory. This was particularly true in the United States and Great Britain where the precarious information labor force would find strong backing from governments terrified of Cold War enemies. But infrastructure required more scaffolding than had been available in the postwar conferences. That scaffolding would eventually tap the heritage of librarianship that had burgeoned in the United States.

The Cold War cast a particularly long shadow over the United States. Although a number of countries were affected, the Cold War was largely fought between the powerful United States and the equally powerful Soviet Union. Before World War II, only a few in the United States had taken the initiative to better support science communication.[4] The United States, due to an isolationist bent and a rather naive intelligence policy, lagged curiously behind the science information policies of other Allied countries. But US entry into World War II changed both their isolationism and intelligence plans. The postwar United States symbolically stood as a champion of world peace, largely because its entrance into World War II had sealed the Allied victory. After war, the United States rushed to modernize its science infrastructure.

The United States met every Soviet provocation with an equal and opposite reaction. The 1957 launch of Sputnik prompted US politicians to examine science information practices with new fervor.[5] The Soviets strengthened VINITI, the highly secretive institute dedicated to collecting science documents from around the world,[6] and US politicians responded by pushing for better science information agencies to rival VINITI and to accelerate military and space research.[7] Science information was foregrounded as a national defense issue because policy wonks suggested that overlap and waste in science communication would lead to the United States's ruin.[8] Politicians lobbied to fortify a national science information infrastructure.[9] Federal support of science information projects resulted in groundbreaking information technologies, like global indexes of research journals and new analytic techniques.[10] It was good government policy to fund any projects that might lead to better science communication.

The international memory boom that immediately followed World War II stirred a second one concentrated primarily in the United States. This

second boom eventually codified a set of informational techniques into a codified, recognized science: the science of information. Codification materialized through professional associations, journals, educational programs, and government institutes. Once entrenched, information science as a discipline became a tent pole for mnemonists inspired by the information theories set out by the European documentalists and scientists. In practice, codification was stimulated by a series of national studies that framed a national information crisis, which prompted funding to support the scientists, librarians, and documentalists of the era. And of course, there was a little serendipity: representatives from national funding bodies were friends with opportune institutional gatekeepers. The studies and funding provided enough capital to lodge information science into US institutions, government, business, and higher education. The new science of information was then positioned to deploy its theories, techniques, and technologies in the name of a utopian information society.

This is not to say that information science was the sole or most powerful producer of mnemonic technologies during the late twentieth century. Information science depended on sympathetic librarians for its foothold among the numerous memory institutions. It did, however, become a new, powerful force that changed memory's infrastructure, first in the United States and then more globally. Information science became its own church, competing with the many other institutions of public memory in the United States. The new discipline would compete for resources with other memory practices and mnemonic technê being deployed by librarians, curators, computer scientists, and more. A slew of technologies for bibliometrics analysis, information retrieval, and user studies was about to be put into the same public imagination as the Dewey decimals, Library of Congress classifications, card catalogs, and more. Moreover, information science would usurp fiscal resources from competing fields, thus enabling its technologies to help define what counted as modern memory. The ecology of public memory was about to be overrun by a new species.

This story picks up in the United States in the late 1950s, when a second major wave of events codified information science in the United States. These events drew attention and funding away from alternative memory institutions while also supporting a shift from concern about science information to interest in information science. Conversations about the document problems up until this time primarily focused on organizing science documents. The discussions involved many scientists. Moreover, government and military were fully in support of science as a proprietor of peace. Discussions were peppered with dreams of computers, both mechanically and metaphorically.[11] The frame of conversations about science documents provided

for a conceptual shift that was dubbed information science because any approach to science documents should naturally be a scientific pursuit. Science information was transformed into information science. The emergence and naming of information science in the United States and beyond would then sustain a labor force that would from there on out produce its own academic church, one that would go on to specialize in its own rites of memory.

Information to Fight the Cold War

Fearing the spread of communism, politicians initiated a program of science assessment in the United States after World War II. More than twenty government papers were produced that explored the state of science information. Three studies for the president's science advisor were particularly relevant: the Baker Panel report of 1958, the Crawford report of 1962, and the Weinberg report of 1963.[12] Each report agreed that there was an obvious "science information problem." The studies encouraged the US government to (1) consider science information as important as other parts of research and development, (2) create government-run clearinghouses for science information, and (3) institute a centralized national office that coordinated science information. Many of these recommendations mirrored the operations research (OR) ideas forwarded during the international conferences. The proposed centralized national science information office would operate very similarly to the National Distributing Authorities (NDA) that Bernal had proposed, and like Bernal's plan, a centralized national office never materialized, but new national panels and committees were established to counsel the government about science information.

The recommendations in the national reports were never fully realized, but they did foreground the science information problem for audiences in the United States. *Science information* was still an amorphous term for Americans, as highlighted by the fact that each report had a different assessment of the concept. The 1958 Baker Panel indicated that science information consisted primarily of journals and books in libraries and went on to note that even though the Soviets centralized their science publications that solution would not be ideal in the United States, primarily because of the differences in how each publication developed. Meanwhile, the Weinberg report of 1963 had a more abstract notion of science information. For Weinberg, science information could be "transferred," "processed," "disseminated," and "retrieved." The Weinberg report referred to information as though it were part of a structured system—an "information process" in the "information transfer chain"—that needed repair.[13] While the report does reference "literature" and "technical reports," it is clear that the Weinberg

report's science information did not consist only of journal articles and monographs. "Communication," "ideas," and "data" are all included in descriptions of science information. Meanwhile, the Crawford report seemed to split the difference by taking a twofold approach to science information: some information consisted of "science data"—mostly science documents, and some consisted of "resources information"—funding, manpower, and scheduling.[14]

Despite differences, research reports like these yoked science information problems with inefficient science and put that yoke in the minds of politicians. The landmark National Defense Education Act (NDEA) of 1958 and its later amendments devoted a section to science information, which gave the National Science Foundation (NSF) the power to "provide, or arrange for the provision of, indexing, abstracting, translating, and other services leading to a more effective dissemination of scientific information" and included direction to "undertake programs to develop new or improved methods, including mechanized systems for making scientific information available."[15] The 1958 act was later supplemented by more targeted initiatives. Sen. Hubert H. Humphrey of Minnesota, for instance, was one of the most outspoken advocates for government intervention in science information. He directed the omnibus Science and Technology Act of 1958, which was the result of numerous hearings about science information infrastructure.[16] This act could be seen as the flesh to the frame set out in the NDEA. Humphrey's 1958 act aimed at "assembling, translating, abstracting, storing, indexing, retrieving, and disseminating scientific information."[17] Paralleling many of the Crawford report recommendations, Humphrey's act supported a centralized government office for science information. His 1958 act was largely unsuccessful, but it was followed by a larger corpus of science-related policies that he pursued in the following years. Between 1958 and 1965, Humphrey focused much political effort on solving the science information problem, a problem that was shared among national minds.

Congressional floor minutes captured the spirit of the national hearings on the topic at that time. The discussions involved numerous types of professionals—politicians, scientists, government officials, defense representatives, and librarians. Much of the debate focused on defining the meaning of the science information problem, and excerpts from the hearings demonstrate just how much uncertainty there was. Participants described the problem with different examples, figures, and tropes. By far, the most popular way of talking about the information problem was with computer metaphors, those similar to the language that appeared in the Weinberg report. Policy statements from Louise P. Hammett, a professor of chemistry at Columbia University and chair of the American Chemical Society, and W. T.

Knox, manager of the technical information division at Esso, offer examples of computer metaphors being used to discuss science information. Speaking in 1962, Hammett suggested that "our system of scientific communication originated in an older and far simpler period. . . . We face a *major crisis* in communication between scientists, a crisis which will inevitably require the *abandonment sooner or later of long accustomed habits of procedure*" (emphasis in original).[18] For Hammett, the information crisis was closely related to antiquated systems of scientific communication.

Still, others were not at all convinced that efficient information "systems" were the key to beating the Soviets. Bertram Gross, professor of political science at Maxwell Graduate School of Citizenship and Public Affairs at Syracuse University, and Bradford Stanerson, secretary of the American Chemical Society, both present during policy hearings, had different perspectives. They argued that US attempts to outwork Soviets were misguided and that it was a mistake to compete in document circulation. Gross even labeled the approach as "KUJ (keep-up-with-the-Joneses)."[19] In addition, Allan Waterman, director of the NSF, suggested that it was important to wait before rashly acting in response to Sputnik.[20] Overwhelming numbers of documents, many in foreign languages, did not necessarily suggest any problems with our own information systems. Scientists in the United States certainly could not be accused of being unsuccessful at their work; after all, the Allies had produced the atomic bomb that won the war. Many other breakthroughs were also made during the war; yet, Sputnik often was cast as a metaphorical turn in the Cold War, a failure of US science, and consequently those at home looked to the science practices in the Soviet Union as a model. From afar, their centralized VINITI institute for science communication appeared to be humming along as an efficient computerized information system.[21] Creating (or at least funding) systems more effective than the Russian scientific enterprise was a way to assuage national anxiety over Sputnik and the impression that Russia was ahead of us. Apprehension is palpable in descriptions of Soviet science that populated news and legislative reports, this one worth quoting at length:

> On river-front Bereshovsky Boulevard in Moscow an imposing seven-story building houses the headquarters of an organization more powerful, disciplined, and far-reaching than the most elaborate espionage system conceivable. Title of the organization is given as the simple initials, "I.R." Strangely enough, these stand for the words in English, not Russian: "Information Retrieval." . . . The function of I.R. is to gather quickly and collate properly every item of scientific or technological importance published everywhere around the globe, in whatever language the item may be printed. Speedily

> translated into Russian, all such material—in such varied fields as chemistry, physics, agriculture, metallurgy, medicine, and, of course, military and nuclear research—is made immediately available to that most favored class of Soviet society: its research-scientists. . . . The hugeness of the task may be realized when the I.R. itself computes that the annual world output of scientific writing to which it has access includes 60,000 books, 100,000 research treatises, 55,000 magazines, and about 1,200,000 individual articles. Besides, I.R. endeavors to obtain the written description of newly patented inventions, and keeps a watchful eye for casual mention in general newspaper columns of any research in process or soon to be begun. Taken in stride the assembly of such voluminous data—plus immediate and accurate translation—is a job that might stagger veteran editors. Yet the staff of this unusual institute, under urgent governmental goading, takes it in stride. . . . Thus I.R. combines the functions of the world's leading news gathering agencies with those of maintaining possibly the world's largest scientific research library.[22]

This is the language of dystopian science fiction. The Soviet Union's prowess was attributed to its information collection and computational systems. The report also identified a sort of transparent opaqueness. The writer described an ominous building that can be witnessed but has mysterious inner workings, much like new computer technologies, and much like the American view of the Soviets during the Cold War.

The various US policy hearings reveal the extent of the paranoia being linked to Soviet science during the Cold War. Descriptions like that of the IR building were often only hearsay. US science information was ambiguous and ill-defined because the Soviet threats, like the launch of Sputnik, produced ambiguous and ill-defined fear. Policy makers did not know what the enemy was up to and that included their chosen methods of science communication. Cold War fears drove public paranoia. Politicians and scientists felt competition from countries like the Soviet Union, which was conducting world-class science within a communist regime. Fears were high that the Soviet Union would "metastasize" communism throughout the United States and the world.[23] Without a war, there was no clear way to attack communism, and metonymically, science documents could battle communism where bullets could not. But how?

Cold War Paranoia Instigates Funding

While many ideas about science information were circulated, there was at least one decisive event that came out of the government hearings. The landmark NDEA of 1958, largely a result of fear of Soviet science and technology,

established a science information service within the NSF. The NSF met that mandate by adding new responsibilities to its Office of Scientific Information Services (OSIS), giving it the power to "support research and experimental efforts to devise new techniques for communicating information."[24] Burton W. Adkinson directed OSIS during the time, and his support proved critical for burgeoning information services within the United States. NDEA allowed OSIS staff to develop their own goals, and the department fulfilled its duties primarily by funding potentially groundbreaking projects for science information. All ideas were welcome. Knowing Adkinson personally made a difference in what became considered innovative and fundable.

Before OSIS, Adkinson had been a reference services librarian at the Library of Congress. While there, he developed a reputation as an enthusiast of science and technology and was responsible for establishing the science and technology division of the Library of Congress. Because of his position, Adkinson was present at a landmark 1958 International Conference on Science Information, as well as in attendance at many of Humphrey's congressional hearings.[25] He was a fervent supporter of the ideas about science documentation forwarded during the postwar. Later in his career, he would become president of the International Federation of Documentation, an international organization that promoted universal access to all recorded knowledge. The International Federation was established by the same documentalists that had avidly supported the plans of Bernal and others like him. Adkinson's role as director of the NSF's OSIS would prove critical for allocating money to science communication projects that resembled the earlier information theory developed immediately after the war. Many of those projects were linked with professionals in librarianship and documentation. For instance, he provided necessary funding to sustain the American Documentation Institute, which would later be transformed into the American Society for Information Science in 1968.[26]

In 1961, Adkinson earmarked grants to the Georgia Tech libraries for training science information specialists. The Georgia Tech grant was a product of Adkinson's relationship with Dorothy Crosland, the head librarian at Georgia Tech. Crosland was a force. She started as a Georgia Tech librarian in 1925, and she became director of libraries in 1953, remaining so until retirement in 1971. She was named Atlanta's Woman of the Year in Education in 1946 and had developed a reputation as a leader at Georgia Tech and on a handful of regional and national library committees.[27] The Georgia Tech libraries were her life, and she often sought support from outside the university to keep them relevant.[28] Crosland fought to add government reports from the US Publication Board and translations of Russian materials from the Office of Technical Services to her collection.[29] This entrenched Georgia

Tech within the workings of national government, not just the university's funding structure. Her libraries became one of twelve national research libraries that were Federal Technical Report Centers, which housed government unclassified research and development reports.[30] Georgia Tech later became a sanctioned repository for federal government documents.[31]

At the end of the 1950s, Crosland's libraries were no longer large enough to support the research mission of the institution, and she needed funding to keep her libraries at the forefront of Georgia Tech's mission. Relying on what she learned during the 1958 International Conference on Science Information (and her friendship with Burton Adkinson), Crosland sought and received funding from the NSF for a project called "Programs for Training Personnel for Scientific and Technical Libraries."[32] When recalling her relationship with the NSF, Crosland referenced these links between science information, the NSF, and her library: "In March 1961, we in the library at Georgia Tech and several faculty members of the science and engineering departments began to consider the possibility of training students to handle technical information effectively. We were stimulated by the encouragement and enthusiastic support from the National Science Foundation. When our proposal for a feasibility study was submitted, NSF endorsed it, suggesting that two conferences be held at Georgia Tech, one in October 1961, and the second in April 1962."[33]

In this political context, educators from across the nation found themselves assembled together for the Georgia Institute of Technology Conferences on "Training Science Information Professionals," first on October 12 and 13, 1961, and then on April 12 and 13, 1962. The participants gathered to remedy "manpower shortages in information facilities of all types" and to "train students to handle technical information."[34] Thirty-two attended the first meeting. Fifty came to the second. Scientists, research librarians, and information scientists composed both groups. Many who attended the first conference also attended the second.

OSIS funding also paid for supplemental research by Georgia Tech. After the first conference, Georgia Tech teams, under the supervision of Crosland, completed three projects. The most extensive involved research trips to organizations across North America and Europe where "science information specialists [were] being trained."[35] In North America these places ranged from the Library of Congress to Oak Ridge National Laboratory. In Europe, the team visited England, France, Germany, the Netherlands, Denmark, and Sweden, where they visited the likes of ASLIB and the Gmelin Institute, which was the German organization responsible for publishing the *Gmelin Handbook of Inorganic Chemistry* and which staffed around a hundred employees who compiled information in card indexes for the Gmelin

Handbook project. These trips provided accounts of primordial memory labor in action.

Research reports from the trips noted that the preferred term for science information specialists in much of Europe was *documentalist*.[36] In a report from the trip, Crosland wrote that it "should be noted here that the term 'documentalist' is used at many centers in Europe to describe personnel referred to as science information specialists."[37] The remainder of the report usually omitted documentalist from its descriptions. While documentation had a tradition in Europe, the Americans had not developed similar approaches for handling science documents. In an appendix from the study, a report glossary discussed the terms "*documentation* and *documentalist*."[38] The definition noted, "We have avoided use of these two terms because of the wide variation in their use and in the numerous interpretations of their meaning."[39] The reports of the trip are notable in that the American team insisted on reporting with the terms *science* and *information* in place of the European vocabularies that included *documentation*.[40]

The OSIS funding also paid for conferences that convened experts from across North America to a shared location. Representatives from a dozen experimental science information programs attended. Crosland eventually would use the conference research and proceedings to start a graduate program at Georgia Tech, a prototype information science program that addressed "manpower shortages in information facilities of all types."[41] Her libraries would benefit directly from the new program. Librarians at Georgia Tech were directly involved with the new school, frequently teaching and collaborating with full-time faculty in the program for information science. The program would also conversely be intertwined with the operations of the library. Its training would encourage use of the libraries in ways that were tied to national trends. Crosland simply hoped that the national interest in science information could be used to ease financial and space pressures on the library. More pervasively, though, Crosland and the conference participants had accidently planted seeds for an information labor workforce that would prove critical for developing new memory infrastructures, primarily through the way its labor was instructed to think about information storage and retrieval.

A series of opportune events were hardening into long-term public memory infrastructure. The international discussions from the postwar period led to paranoia in the United States and a second period of national policy discussions. The national policy discussions led to a broad set of funding policies that aligned with the librarianship in the United States. Librarians like Crosland and Adkinson, meanwhile, saw conversations about science abstracting, indexing, classifying, and organization as an opportunity. Geor-

gia Tech was a leader in this movement, later starting what may have been the first information science program of its kind.[42] Crosland's conferences were funded because it seemed logical to give her library funding to figure out a national science problem. With Adkinson's encouragement, she could pursue the development of a science information program that would foster long-standing relationships with powerful science communities of the era. Crosland's conferences would also become consequential for memory practices in a critical way: it shaped the future of information labor's education in the United States. Georgia Tech's one-of-a-kind program in information science was a direct result of the conferences, and its curriculum would be adopted internationally.[43] These meetings would irrevocably revolutionize information science and librarianship.[44] Information science's mnemonic imagination was gaining traction.

What Sort of Memory Is Information Science?

Crosland orchestrated a twentieth-century art of memory attuned to the information crisis, and she made sure that it included her libraries. She invited librarians from across the United States to her conferences along with scientists who had been involved in discussions about the US science information crisis. Because of the two overly represented professions, Crosland's cohort continually voiced two sides: one as science and one speaking as librarianship. The dueling perspectives provided the intellectual firepower for planning memory's labor and its emerging mnemotechnics.

Crosland's cohort frequently resorted to a conceptual chiasmus, a rhetorical figure that works to promote "the parallel crisscrossing of intellectual space."[45] The figure encouraged participants to consider "an issue in terms more appropriate to their counterparts in another discipline, *and* vice versa."[46] At Georgia Tech, because participants insisted on defending their professional territory, attendees would imagine what science would be like as part of librarianship and what librarianship would be like as part of science. During the meetings, conference goers spent time revising different pedagogical and professional situations while implicitly using the chiasmus as an organizing tool—classes, curricula, work locations, and work skills. They also sketched stereotypical profiles of the kinds of people they thought would be doing the work. One side would suggest an idea, the other side would reply with its perspective, and the chiasmus would generate a solution.

While the chiasmus helped with problem solving, it also narrowed what participants invoked as science and librarianship and created, perhaps inadvertently, new areas. When discussing science, contributors primarily

highlighted scientific research methods. Thus, librarianship was reduced to a few archiving, collection, analysis, and search strategies. These reductions were simplifications constrained by the context: limited time to sort through vast amounts of material and a recognizable set of audience needs. The conceptual chiasmus would also prove consequential for naming new memory professions. As science ideas were being injected into library science curricula, participants proposed that the resulting curriculum trained "science librarians," and when library ideas were transported into science curricula, conference goers decided the curriculum was for "technical literature analysts."

During a keynote at one of these science information conferences, Georgia Tech's Mario Goglia, one of Crosland's cardinal collaborators, circulated a chart that encouraged participants to imagine a shared future involving scientist librarians and librarian scientists (fig. 1). A conceptual chiasmus unquestionably informed this chart. Goglia said the graph illustrated "that there is an organic relation between traditional science and information science."[47] He positioned science on one axis and librarianship on the other. But Goglia, an engineer by training, in the chart he used to illustrate this science-librarianship nexus, reduced librarianship to mere information. And so, science was put into tension with information rather than with librarianship, at least in name. Goglia performed this tension visually, as the y-axis about science is labeled "interest in science," and the y-axis for librarianship is labeled "interest in information." How was the transformation of librarianship into information so ready to hand?[48]

Computers provided rhetorical firepower during these discussions among librarians and scientists.[49] Computer tropes provided new hybrid languages for science and librarianship. Computer metaphors let documents be reimagined as information that could be processed and analyzed. Of the more powerful terms coined was *information retrieval*, which was used to describe machines that retrieved science documents. Some of the first documented uses of this phrase emerged during World War II and peaked in 1968. The first government reports mentioning information retrieval described how "electromechanical devices" would "increase efficiency and speed" for library card catalogs.[50] Computers became a way of thinking of old issues with new language across the world—librarianship most definitely was not immune,[51] and computers irrevocably changed the public imaginary of librarianship.[52]

Computers obfuscated powerful gender dynamics brought into stark relief during the conferences. American librarianship was a profession mostly employing women since its institutionalization in 1876 during the founding of the American Library Association. Although most library administrators

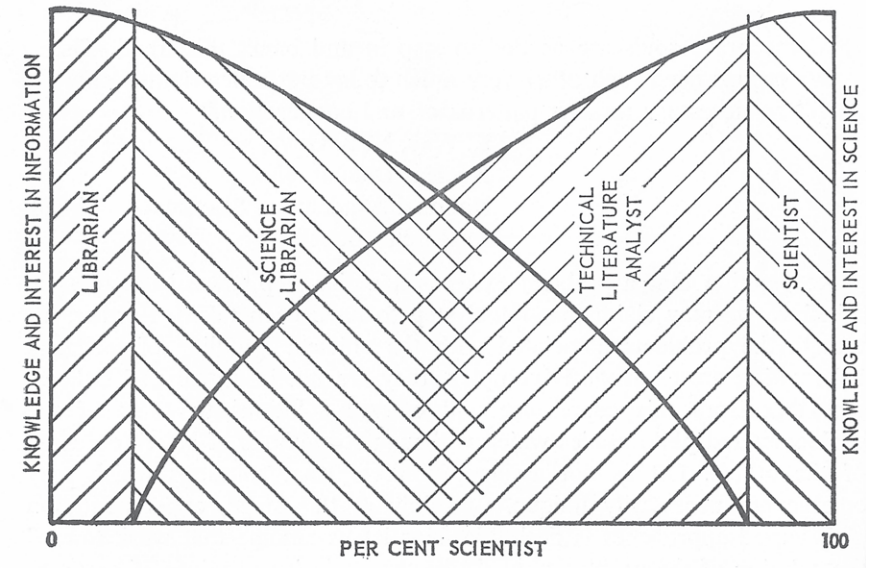

Figure 1. Mario Goglia's chart, produced for the Georgia Tech Conferences on Training Science Information Specialists. Source: Crosland, *Proceedings of the Conferences*, 10.

were men, library work was stereotypically and practically a profession practiced by women.[53] Popular press represented librarians as spinsters, and the profession overwhelmingly employed women for low wages.[54] Science professionals, however, were stereotyped as men, and employers overwhelmingly hired the stereotype.[55] These dynamics generated a clashing resistance. In previous decades, scientists balked at adopting librarians' language, even though they were greedy for the professional knowledge amassed by librarians. It was not until the information crisis pushed scientists to the breaking point that they pled for help from librarians but not without invoking a few masculine tropes to assuage their anxiety. Crosland was willing to put up with the gender inequality for the long-term welfare of her libraries.[56] She had confessed to a colleague, "I know nothing about these computers, but I have a feeling in me that they're going to be important for us."[57] She was right. Computer metaphors inundated the Georgia Tech conferences and enabled librarians a formidable place at the conference table.

The conference language was specific enough and crucial enough that Crosland authored a glossary to institutionalize it.[58] The glossary named the new professions, who would do them, and where they would take place. The glossary defined the technical literature analyst as someone "trained in a substantive technical field" who "can analyze the literature for researchers"

and who "differs from the conventional science librarian in that he is sufficiently deep in science to be able to make value judgments of its literature." The science librarian was a "librarian with a broad, though not necessarily deep, acquaintance with science, and a comprehensive knowledge of the literature of science."[59] This glossary was often invoked during and after conference discussions, effectively performing and forwarding the conceptual changes. Waldemar Ziegler of Georgia Tech remarked that during "the beginning of the conference we used three definitions: science librarian, technical literature analyst, and information scientist. . . . If we refer to these definitions we can understand more clearly."[60] Many agreed that the definitions were helpful,[61] and participants considered creating a professional directory organized with those definitions.[62] Crosland's glossary laid the foundation for these fields: it crystalized the tropes and their performative work for the future. In just a few years, the tropes would be critical for imagining the new work practices of technical literature analysts (scientists who knew much about how institutions organized research) and librarians (professionals who understood better how science was conducted so that they could better assist scientists).

The chiasmus and computer metaphors touched nearly every aspect of the conference. The University of California Berkeley's LeRoy Merritt described how his library school curriculum had been changed with insight from a 1960 report on science information personnel,[63] a study that was a companion piece to the Humphrey legislation.[64] Berkeley's curriculum added special classes on organizing science literature. Meanwhile, John Harvey from Drexel University noted that computers changed searching processes and that contacts from IBM, Remington Rand, and Zator were needed to fill in the curricular gaps.[65] Most others also noted a need for better training for handling the documents of science with new technologies. Memory was being reduced to a set of mnemotechnics drawn from science and librarianship. While these metaphors provided strong models to make sense of some ways that computers were intervening in documents, they also shifted the terrain of scientific research by transforming activities that had formerly been more closely associated with literacy, exploration, and scholarship, language more closely associated with reading and discovery. Despite the range of research, preparation, and presentations, the Georgia Tech conference cohort suggested best practices for a fairly limited set of issues.

Some of the more novel suggestions for the new curricula came from William Atchison, who described Georgia Tech's field trips to computational programs. Atchison was the head of the computer center at Georgia Tech. With a background in programming, he embraced computers as part of

degree programs, both nationally and at Georgia Tech.[66] During the conferences, Atchison discussed programs emphasizing artificial intelligence, information retrieval, and mathematics, and he thought the "computer [was] one of the most promising tools available from our current technology to help solve some of the problems of information processing."[67] The programs were research oriented, interdisciplinary, and in high demand. Most presentations discussed blending science with librarianship. Atchison and a few other presenters were interested in how computers would help with the science information problem. Everyone wanted new training programs for educating information labor. Participants focused on two timeframes: short-term and long-term needs.

Short-term needs would focus on retraining professionals already employed in organizations inundated with piles of science information. The short-term work was to deal with the information mess instigated by war. Short workshops and internships would be the solutions, and they would differ based on distinctions made between the types of training appropriate for those with science backgrounds and librarians. Participants decided that it was important to offer different courses to librarians and to industry personnel. Georgia Tech librarian Graham Roberts suggested that librarians should be taught things like specialized bibliography, scientific method, scientific language, and foreign language skills.[68] He said that industry professionals needed education in search, retrieval, and storage skills and techniques. Both professions needed to better understand, write, and speak foreign languages. More generally, librarians needed to be taught more science. Industry professionals and scientists needed to learn more about "information storage and retrieval," phrases that had become popular in librarianship because of computers. The skill sets of science professionals and American librarians were being fused as professional specialization. Short-term solutions were thought of as stopgap fixes for long-term problems caused by new information demands.

Conference participants saw in-service training or internships as an intermediary step for long-term solutions that met science information problems head on.[69] Long-term solutions required entirely new training programs, and they would produce a fundamentally different type of student for the information workforce. Long-term solutions consisted of designing strategic programs designed to indoctrinate new kinds of information professionals. Of course, many of the courses were drawn from existing curriculum, but there were also novel amalgams. Georgia Tech's science-technology librarian Arthur Kittle discussed a course that addressed the "communication of information, covering theoretical and perspective aspects of the field."[70] Other courses planned at Georgia Tech focused on how computers

changed library techniques. In Georgia Tech's plans, Kittle presented a curriculum that provided a more extensive version of the conceptual chiasmus discussed for short-term courses: teach students equal amounts of science and librarianship. Long-term solutions would produce new kinds of memory labor, not just alter existing forms. Discussions on long-term solutions snowballed into the invention of information science.

In addition to discussion of the relationship between scientists and librarians, the Georgia Tech research also distinguished the term *information scientist*, positioning it center stage for much of the conference. Crosland noted that the conferences led to "the development of a new profession, which we in the NSF-Georgia Tech study have called the information scientist."[71] Despite the fact that this word had been coined earlier, its use in these conferences was noteworthy because the Georgia Tech coinage was later widely recognized.[72] These conferences were the primordial ecology for the American tradition of information science. Many of Crosland's cohort suggested they did not even know if an information scientist existed. Several participants noted that "with respect to the training of information scientists, there is considerable doubt in the minds of many people as to whether or not a separate discipline actually exists."[73] Morton Malin of the NSF noted that there "is occasional overlapping in the education of the science librarian and the literature analyst, but almost none between these categories and the information scientist."[74] With the rummage lying about from conference discussions, conference participants readily supplied the characteristics of the professional.

The "information scientist" from Georgia Tech was largely an effect of discourse that occurred as participants worked with the conceptual chiasmus and *simultaneously* deployed computer metaphors to describe the new arrangement. The newly coined information scientist was a professional who used scientific techniques to understand research documentation. The "so-called documentalist was often a combination of librarian and information specialist, but this occurs not because the two are considered synonymous, but because specific needs do not always permit a clearer distinction."[75] While the science librarian was interested in the research practices of scientists and the scientist was interested in information practices, the information scientist would specialize in hard research on information as its own phenomenon. And the scientist was as gendered as science. In different sections of the Georgia Tech conference proceedings, the information scientist is described as "a research man,"[76] "who will do research on new methods of data processing and information retrieval,"[77] and "he must understand data processing. His interest is neither the computer nor the people; it is the processing itself."[78]

Georgia Tech's Mario Goglia described the information scientist as someone "whose concern is with information *per se* rather than with information *ad hoc*."[79] Conference goers suggested the information scientist needed a doctoral degree, whereas the science librarian and technical literature analyst degrees were master's degrees.[80] Information scientists were not to just handle science information; they would work with research scientists to solve information problems.[81] The descriptions readily adopted the computer metaphors that had been popularized by new technology and circulated in policy and education. These new metaphors would be central to educating regimes of labor informed by the new information science. Still, the information scientists would need to be worked out in practice in new programs, like those Crosland was about to launch at Georgia Tech.

Emerging Memory Regimes in Information Science

Georgia Tech's conferences grounded a graduate program in the information sciences.[82] Crosland returned to NSF's Adkinson after the conference and received start-up funds for Georgia Tech's program, which was one of the first that taught the new "science information" curriculum.[83] Faculty developed courses that were discussed during the Georgia Tech conferences. New faculty members were hired to develop new courses from scratch, and Georgia Tech's innovative curriculum would go on to be imitated in both Europe and the United States.[84] Crosland's mnemonic labor was gaining traction.

In the fall of 1964, a mere two years after the conferences, Vladimir Slamecka became the first director of a new School of Information Science at Georgia Tech. Crosland personally selected Slamecka to establish the vision of her conferences. Slamecka had not attended the conferences, but his eclectic background made him a favorable choice for the role. Born in Czechoslovakia, he was a survivor of World War II refugee camps.[85] Before coming to the United States, he had been awarded degrees in engineering from Benes University of Technology of Brno and had also attended graduate school at the University of Sydney and the University of Munich, focusing on physical sciences and sociology.[86] After coming to the United States, he received a PhD in library science from Columbia University in 1962. He petitioned the dean of the School of Library Service so that he could pursue a variety of interests as an interdisciplinary degree. His awarded degree was in library science, but his coursework was in symbolic logic and computing, in addition to librarianship. His advisor was Mortimer Taube, who was not only in attendance during the conferences but also mentioned repeatedly for his research by other participants.[87] Taube began his career working for libraries but made his name developing new methods of computer indexing,

abstracting, and retrieval with his company, Documentation, Inc. With Taube's help, Slamecka blazed his own doctoral education. After graduating, Slamecka took a position creating computer indexes with Taube's Documentation, Inc., before coming to Georgia Tech. Slamecka's experience in librarianship, in computers, and with Taube created an uncannily fitting director for Dorothy Crosland's agenda.

Slamecka's early information science program at Georgia Tech included both undergraduate and graduate degrees. Georgia Tech's description of the school in its early bulletins recognized the importance of the NSF in its founding, acknowledging that the program would not have been started without NSF's funding. Also in the description were traces of the conferences: "Students entering these programs may elect one of two primary areas of specialization. The first is designed to prepare students for careers as specialists in science information service and technical literature analysts in industrial and research laboratories, science libraries, and technical information centers."[88] Four courses were available for undergraduate students. They covered reading, synthesizing, and organizing scholarship about science and engineering. Some were on translating foreign languages. Some were on bibliographies, catalogs, abstracts, and indexes. These courses were steeped in the conceptual chiasmus that had fueled the training at the conference. The engineers and science technicians already at Georgia Tech were being taught a little bit about librarianship. Classes were also started that were oriented toward aspiring science librarians, even though Georgia Tech did not offer a professional degree in librarianship.

A graduate program for the "information scientist" was initiated: "The second area of specialization is for students interested primarily in information problems as an area of scientific study and research and in the design and operation of information systems as a field of applied engineering. It stresses the theoretical aspects of Information Science and the technological problems in developing and operating systems for the storage, processing, retrieval, and use of information of all kinds."[89] The graduate degree program for the information scientist was very different from the undergraduate courses. The curricular language was suffused with abstract theory and computer metaphors: Georgia Tech's initial information science curriculum was a hybrid of computing and systems metaphors that had been making their way through public concerns about science information. Courses were on the "properties, structure, and functions of scientific and technical literature," "organization of information for storage and retrieval," "mechanized information storage and retrieval systems," "information sources and search techniques," and "special problems in information science."[90]

This curriculum established an agenda for a new set of information science–inflected memory practices. In the following years, courses on information system design, information systems, methods of information control, information representation and structures, and information storage were added. Courses on mathematical techniques for storage and retrieval, computer organization and programming, and non-numeric information processing supplemented the undergraduate curriculum. Techniques drawn from librarianship were being supplemented and transformed with new technologies and ways of thinking about historical documents. Information science was not so much about handling science documents as it was about using new technologies to do jobs that had previously been the concern of professional librarians, particularly those jobs related to providing access and preservation. The science information problem produced "information science." At least within one professional group, remembering and forgetting were being rewritten with new metaphors, materials, technologies, and goals. Crosland's, and now Slamecka's, students learned new memory heuristics for serving the public.

Slamecka often paid homage to the history of the program as it was indebted to Crosland, her libraries, and the NSF, suggesting that the "resulting milestone in education for science information work [was] primarily due to the unceasing enthusiasm of Mrs. Crosland, and to the encouragement and support of Dr. Burton W. Adkinson, then Head of the NSF Office of Science Information Service."[91] Slamecka also summarized the historical trajectory of the program. In 1970, the program had been redubbed as "Information and Computer Science."[92] He suggested that the curriculum had four areas: information systems engineering, computer systems engineering, information science, and computer science.[93] The PhD was theoretical and research oriented. Slamecka described it as having a "deep research involvement."[94] It focused on "the development of a scientific foundation of the discipline, especially to the theory of information and its processes."[95] Research from that era helps to clarify the types of theoretical scholarship being undertaken. Slamecka reviewed the state of the art, noting the following were particularly important: "The development of advanced memory systems likely to come from studies of higher order associative memories; the development of fast processors for manipulating complex information representations and structures; the development of advanced displays and control for man/computer interaction; the development of procedure-oriented, field-oriented, and user-oriented languages with which to control the processing and application of the body of knowledge; an understanding of machine processing of natural languages; and the development of multiple-access computer systems."[96]

A 1978 retrospective of the Georgia Tech program's accomplishments highlighted the information science curriculum. The retrospective demonstrated two theoretical bases for those in the school: One focused on language, and the other focused on the meaning of signs. The camp focusing on language used a theoretical perspective that attempted to synthesize all languages into one medium of communication, not unlike the plans that had been laid out during the international conference. The camp focusing on the meaning of signs worked on a universal theory of classification, one that would provide backbone and structure for information. When representatives of the information science program talked about what they were doing, they often used the term *artificial intelligence*. Computer metaphors, science, and librarianship reshaped approaches to documentation that had been put in play during the new postwar era of memory.

Waning Rhetorical Memory; Waxing Informational Memory

In 1965, Edward Corbett surveyed the state of rhetorical studies and announced memory to be a dead canon: "Not much can be said, in a theoretical way, about the process of memorizing; and after rhetoric came to be concerned mainly with written discourse, there was no further need to deal with memorizing."[97] Corbett was at the vanguard of scholars renewing rhetorical studies in the sixties.[98] Because he defined memory as concerned only with the "memorizing of speeches," he cast it out as an atheoretical vestige unfit for contemporary studies of rhetoric. The following years saw very little development in memory theory from twentieth-century rhetoricians.

While rhetorical memory was neglected, its governing technê were repressed. Memory, at least in the classical tradition, invaluably coordinated the resources for inventing and arranging arguments.[99] Without a strong rhetorical theory of memory, rhetoric could easily devolve into a useful but optional stylistic tool. What rhetors remember, intentionally or not, is a part of their inventional practice. Rhetors can set aside memory and language as easily as they set aside the communities they live in.[100] The classical theorists of rhetoric, from Aristotle to Quintilian, had written of memory as the source and "groundwork" of rhetoric.[101] Plato reckoned it to be the conduit to the soul.[102] Rhetorical memory was not merely an act of memorization. It included considerations for improving, retaining (in both the short- and long-term), ordering, selecting, and delivering from heart.[103] It was the backdrop that provided the very subjectivity of individuals, which needed to be molded for their participation in public. Ancients consequently theorized a vastly complex approach to memory that touched on writing, speaking, visualization, and psychology.[104] This part of rhetoric did not disappear when

Corbett debased the fourth canon, but it was distributed among a number of technologies and disciplines. It is curious that Corbett suggested it.

In the 1960s, Corbett saw a dead canon, but the emerging information scientists saw a new opportunity for a discipline. This discipline's concern with memory was invoked by the exigence established during the "information crisis," which sought to make renewed sense of the accumulation of science documents. Information science practitioners were fascinated by how computers and mechanical technologies could intervene productively in the organization of knowledge. They sought to improve access by building better tools. They developed new storage technologies. They drew from classificatory technologies to order, arrange, and select documents. The emerging discipline took up concerns of memory that had been temporarily set aside as part of rhetorical theory. Their memory practices informed twentieth-century subjectivities through "scientifically" organized documents, not just because they theorized memory but because the discipline produced public memory technologies informed by their theory.

Of course, many other disciplines also continued to take interest in memory during this time but often as a contemplative issue rather than a productive technê. Psychologists, sociologists, philosophers, and more approached memory as a phenomenon to first understand rather than practice. Production concerns *consumed* information science because its practitioners were very realistically trying to produce technologies to attenuate a perceived information crisis brought on by a new era of memory. If anything, the field was theory light in that its production technologies were largely reacting to the contexts of war. Professionals spent their time inventing new memory technologies with the insight gleaned from the politics of war. When the field began to teach production in the universities, information science developed its own pedagogy drawn from the scientists and librarians who had been invested in solving the information crisis. The hybrid programs that emerged became their own unique schools of memory devoted to production, a *rhetorica docens* of cultural praxis.[105]

This early period was critical for information science's approach to memory. Many of information science's vocabularies emerged as a by-product of the postwar era and with the popularity of early industry computers. Early definitions, funding, and interests critically fueled the sensibilities of information science. The postwar concerns with science information that referred to scientific documents provided scaffolding for a profession of information scientists to theorize "information" as a broader set of media that could be scientifically engineered. As computers became popular as cultural tropes, they simultaneously inflected the tropes of the emerging field. Computer technology black-boxed printed science documents, transforming them into

machine-readable bits of information; concepts like "information scientist," "information retrieval," and "relevance" provided new ways of understanding a postwar issue. Their speed and data-processing techniques changed how researchers conceptualized information and memory practices.

The urgency of the science information problem prompted limited government funding that could have been allotted elsewhere. Advocates like Crosland seized the opportunity and integrated it into librarianship. In tandem, organizational techniques from librarianship were renewed with computer metaphors to support science research. These changes were reflected in the everyday practice of an emerging profession that intellectually separated itself from librarianship. The changes provided the warrants for a new intellectual identity: the information scientist, a professional who viewed information as though it were something to be controlled. In information science's disciplinary lore, information scientists "contained the information explosion" and "pioneered innovations in indexing systems that were very different from traditional subject cataloging in libraries—automatic indexing and abstracting, KWIC and KWOC indexing, citation indexing, keyword indexing and postcoordination, text analysis and natural language searching systems. They also developed thesauri or controlled vocabularies for thousands of disciplines and specialties."[106] The stakes were high, given the urgency of Soviet threats that were felt in the United States. And so, a community prepared to delegate the associative work of memory to new information labor, with the hope of creating information systems that could once again tame public memory.

Where did that leave rhetorical studies? Memory would not remain suppressed in rhetorical studies. Corbett's beliefs were later reconsidered, and rhetoricians better attuned themselves to memory, finding it in numerous artifacts and technologies ranging from public monuments to architecture to museums. Still, even in this new age of rhetorical memory, the production and training of the art have remained understudied. The document booms provided a kairotic exigence in which teachers of rhetoric had dismissed memory as important for their pedagogy. The information crisis encouraged governments, militaries, scientists, and librarians to think of memory as something needing to be produced and controlled. And so, information scientists acted as an invisible counterpart to rhetoric and would contribute to theory that produced memory techniques for personal libraries, business files, government archives, social media databases, and much more, all accomplished by intervening in the technologies available to the public with retrieval devices, computer databases, and online interfaces. Information science shaped its own coin of memory's realm, one that competes with other economies of remembering and forgetting.

INTERMEZZO

Calvin Mooers's Zatocodes

It was 1951, well into the Cold War. Eugene Garfield remembered being repulsed by Calvin Mooers, the businessman who had tried to hard-sell him a brand new document system informed by state-of-the-art information retrieval theory for the medical library at Johns Hopkins University.[1] Garfield did not think Mooers or his wares seemed particularly academic or altruistic. Information was supposed to be free, but Mooers wanted his cut. Mooers, whatever his motivation, was attempting to circulate new information science technology among a public of librarians.

When Garfield met him, Mooers was thoroughly established as an authority in science information management. Born in Minneapolis, Mooers was a strong student who eventually enrolled at the University of Minnesota and majored in mathematics. When he graduated in 1941, one of his professors recruited him to the DC-based Naval Ordnance Laboratory (NOL), a research and development division of the US military. NOL was immersed in the groupthink that venerated the operations research (OR) approaches of World War II. At NOL, Mooers worked on projects that involved antimagnetic mines, radio waves, and computers. Still in his early twenties, he found himself in the same military-scientific complex that was responsible for the exponential increase of science documents after World War II.[2] While at NOL, Mooers remembered that the organization "was just awash in reports which presumably had very valuable information in them."[3] He was assigned to a project team to routinize library report classification, hopefully to tame the problem. After five years in the military, his team had made little progress on the project, and he opted to leave to enroll in graduate school at MIT. After arriving, Mooers looked for a thesis topic that would combine his interests in mathematics, computers, and science documents. Then, he

met James W. Perry, a chemist who had taken an interest in chemical literature. Perry's interest in chemistry research would be consequential for Mooers's thesis topic and ensuing private ventures in science information management.

As a research field, chemistry had a unique literature. The disciplinary terminology, consisting of chemical elements, reactions, and analytic methods, was vastly different from the subject classifications used in most libraries. Because of the idiosyncratic terminology, chemists published more, cited more, and handled more documents than scientists (or humanists) in any other discipline.[4] Chemists lived and died by their own distinctive documentation practices, driven by the field's intellectual specialization and drive for rapid scientific progress. Chemistry research was indelibly yoked to its own highly specialized and distinctive use of academic literature. As a result, scientists like Perry had been developing document systems that would effectively organize chemistry literature.[5] During the forties and fifties, the most widely used solution consisted of personal punched card collections.[6] In these systems, a punched card represented a single research document (article, white paper, notebook). A list of subject terms relevant to the entire collection supplemented a full stack of punched cards, a personal library of research. The subject terms were listed in a pattern repeated around the outside of each card. Only the subject terms relevant to the single document would be punched on a card (fig. 2). When a chemist needed to retrieve documents related to a subject, they would insert a metal rod into the punched space adjacent to the term on the complete stack of cards.[7] The rod would mechanically select the relevant documents by displacing the appropriate cards from the stack.

The number of chemistry research documents multiplied during World War II. Chemists were working with more literature than ever before because more people were conducting chemistry research than ever before. As a result, the older punched card systems grew less effective. The stacks of cards grew larger, harder to manipulate by hand. The number of chemical subject terms grew as well, making it difficult to list full taxonomies on each card. The metal rods, which already needed to be used carefully in the smaller collections, tended to rip and tear the perforations in bigger, bulkier, and cumbersome collections. The physical material and durability of the punched cards was no longer effective for accommodating chemistry literature. Chemists would need information systems, both organizational and material, that could support their postwar needs. When Perry described this problem to Mooers, the burgeoning information scientist was inspired.

Mooers wrote a thesis on organizing documents with a technique he

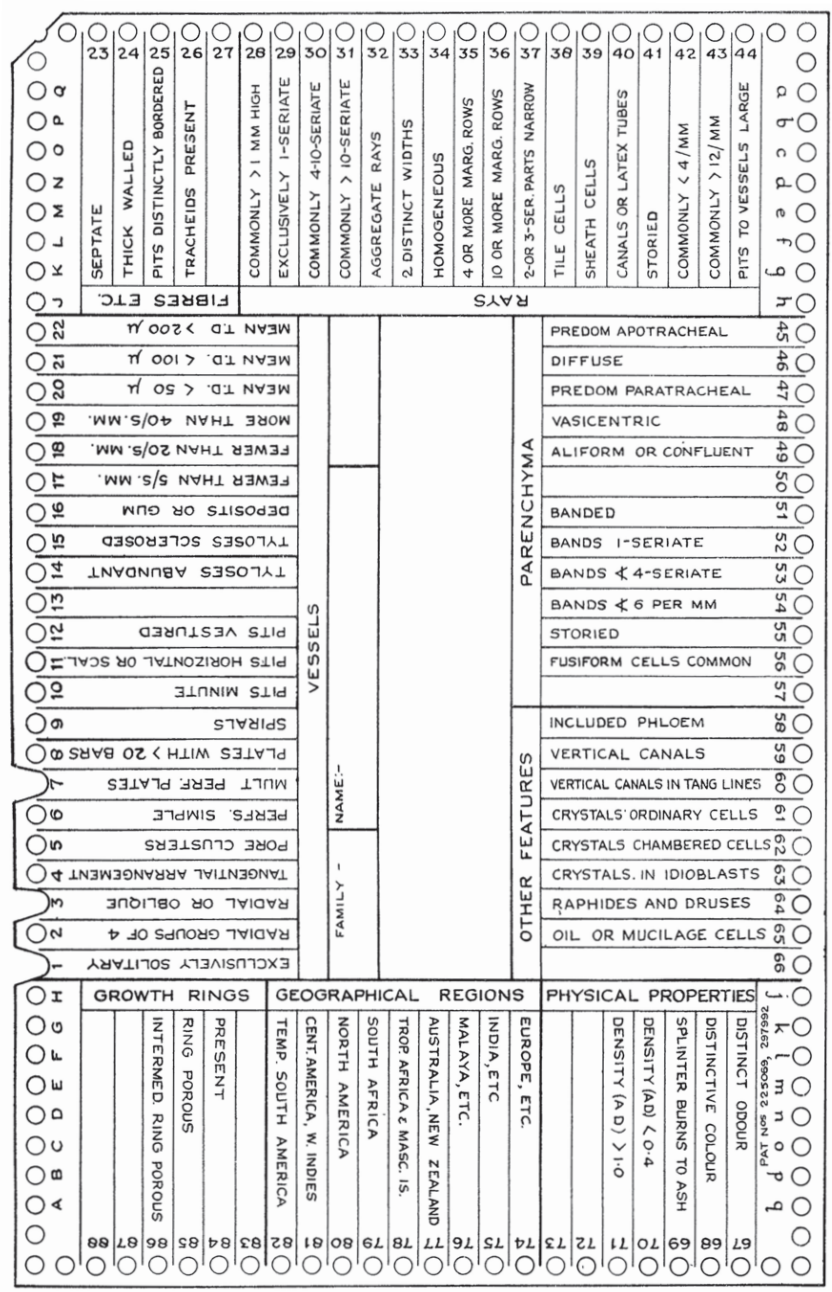

Figure 2. Layout of an early punched card used for chemistry. Actual size was 5 × 8 inches. Source: Clarke, "Multiple-Entry Perforated-Card Key."

Figure 3. A 1948 image showcasing the Zator Selector. The photo identifies the user as Lois Mooers, the sister-in-law of Calvin Mooers. Source: "Zator Selector," 1948, Calvin N. Mooers Papers, 1930–92, Charles Babbage Institute Archives, University of Minnesota Libraries.

called Zatocoding.[8] Zatocoding solved the problem of organizing and locating documents in large collections by using the punched cards and rods that were widely available at the time. Mechanically, his Zatocards functioned very much like the older punched card systems that Perry was familiar with. A Zatocard user would select cards from a collection by inserting metal rods into punched spaces. Mooers's cards were housed in a Zator machine, which steadied the stacks and the rods, making it easier to manipulate the larger collections (fig. 3). Zatocoding also saved physical space by removing the

taxonomies from the face of each card. A number referenced in a master key of Zatocodes represented each retrieval term. To further economize the space on the cards, Mooers associated each punched space with multiple Zatocodes, a technique he called superimposed coding.[9] This saved card space but also meant that selecting one single punch would retrieve all documents associated with the superimposed Zatocodes. For instance, if a user wanted to select cards classified as "septate," a single rod would simultaneously select the other codes superimposed with septate. To overcome the problem, Mooers ingeniously increased the number of selection rods and used combinations of punched spaces to represent each Zatocode.

The system depended on a governing mechanism black-boxed in the Zator machine. Because multiple punches on the edge of the cards represented each subject term, the rods needed to be carefully controlled to select multiple punches (fig. 4). For instance, in figure 4 the subject term "selective device" was denoted by the combination of punched spaces 3, 11, 15, and 39. Users wanting to see cards marked for the subject selective devices would set the rods of a Zator machine for positions 3, 11, 15, and 39. Each card that was punched at positions 3, 11, 15, and 39 could then be retrieved. When the multiple rods were used in unison, they only selected cards marked with *all* codes associated with a term, like a combination lock. In this case, even though photo-electric sensing shared punched space 11 with selective device, it would not be selected from the deck without also selecting punches 1, 34, and 40 (at least, if the cards had been punched correctly). This more complex retrieval strategy allowed Mooers to reuse physical material on the edges of cards, layering memory spaces over one another.

Increasing the complexity of the retrieval mechanism allowed Mooers to fit more subject terms on each card. He noted that a typical Zatocard "has only 40 positions that can be notched. . . . The card is suitable for a collection of 10,000 items, or larger."[10] His intervention also made it more difficult for individuals to manage their own collections, though, since the mechanics of the rods and punches were not nearly as straightforward as in the older systems and each collection now required more planning. Mooers translated the mechanics of his technique into the formula $n = N(1 - 2^{-1/r})$, where n stood for the number of rods needed, N stood for the number of punch spaces available, and r stood for the total number of subjects in the library. The Zator machine, produced with the raw materials then available to chemists, helped invent a new algorithmic technique for information retrieval.

Zatocoding may seem far removed from rhetoric's purview on memory, but the two are related. The Simonides theory, for instance, mobilized rhetorical memory by reorganizing images and speech through a place-based mnemonic device. Imagine that the ancient poet needed to keep track of

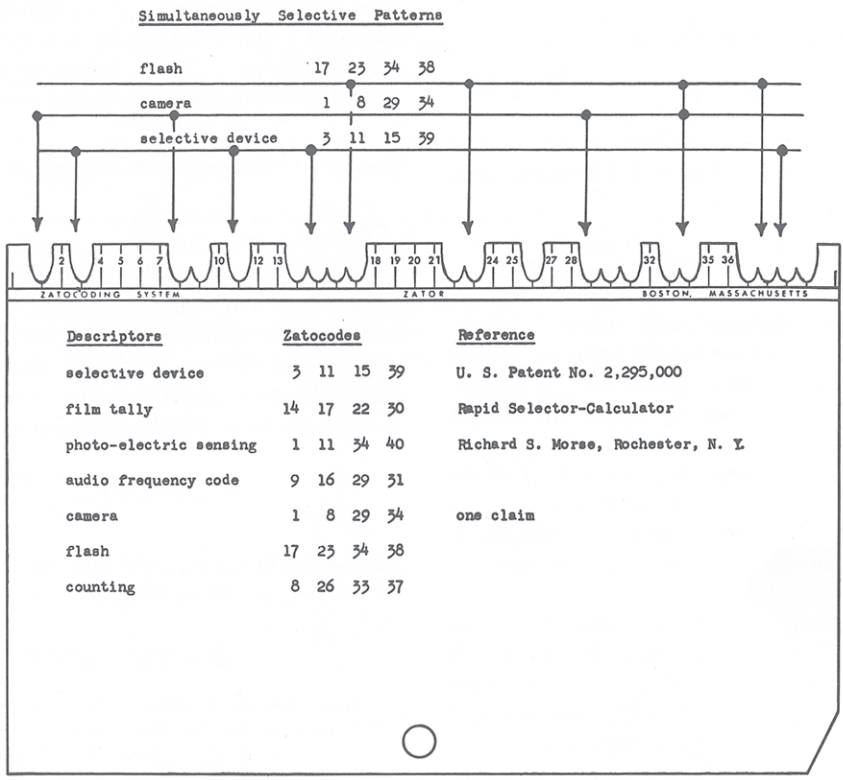

Figure 4. A diagram of a Zatocard drawn by Calvin Mooers. Source: Mooers, "Zatocoding Applied to Mechanical Organization," 24.

many more people at Scopas's party and that guests outnumbered available seats. The myth tells us that Simonides needed a place to remember each guest. Mooers found himself in a similar situation as he was designing new systems for the growing chemistry vocabulary. There was so much chemistry literature that there were not enough places for mnemonic association. If Simonides had used a form of superimposed coding, he would have stacked multiple guests on each chair. This would not solve Simonides's memory problem because each chair would now be associated with multiple guests. Any one chair would not definitively identify a specific guest. But if Simonides took a cue from Mooers, he would dissect the guests into multiple pieces, distributing their appendages among available seating. He would produce a key that tracked which combination of chairs held each complete guest. When Simonides chose a chair combination, he would collect the parts of one complete guest from multiple chairs (and a few extra pieces). Of course, Simonides would never have had the time, faculty, or immorality to

preslaughter guests so that he could identify their bodies later (at least I hope not). The available infrastructural materials make a significant difference for the capacities of memory. Simonides could not dissect guests as Mooers had done with the Zatocoded subject terms. It would take too much planning and premeditated surgery. Simonides's mnemonic technê depended on the architectural infrastructure available in Scopas's home.

Memory technologies like Zator machines do not just change the memory capacities of a user; they also alter the infrastructural landscape of remembering and forgetting. The vastly changing capacities of memory are often framed as improvements even though they always come with tradeoffs. For Mooers, Zatocoding increased the quantity of information that could be recalled. But the new Zatocoded infrastructure concurrently introduced new memory anomalies that further altered the qualities of remembering and forgetting. In the Mooers system, document selection worked as expected if each card was punched for a single subject, but few documents would ever be cataloged that way.[11] In figure 4, for example, the Zatocard is marked with a total of seven different subjects: selective device, film tally, photo-electric sensing, audio frequency code, camera, flash, and counting. When cards were punched with multiple subject terms like this, their perforations could align unintended punch combinations, returning misfires.[12] For instance, if a subject term were coded for punches 3, 8, 11, and 22, this card would still be selected even though the card in figure 4 has not been coded for that combination. If any combination of the punches on the card overlapped with unintended subjects, the card would still be selected, the equivalent of an algorithmic homophone. Mooers reduced the possibility of overlap by suggesting an ideal ratio, informed by probability theory, of subject terms to available punch spaces as well as distribution ratios.[13] The introduction of his new memory aid was able to handle larger numbers of documents that came with conceptual surplus. Zatocoding improved information management for larger quantities of records by introducing a known mechanical margin of error—a glitch in memory's infrastructure.[14] The overlapped card punches introduced a miniscule ratio of error, adding mnemonic surplus to memory's infrastructure.

This accompanying glitch would be foundational for one of the central theoretical issues in the field of information science. It became the basis for information science's theory of relevance.[15] *Relevance* was defined as the ratio of correct documents to incorrect documents encountered during any selection procedure, the ratio of documents that were intended to be retrieved and those that were not. Information scientists stripped relevance of much of its material context, even though Zatocoding introduced relevance as part of the constraints of superimposed memory. Once theory, relevance

lent itself to a disciplinary theory of misremembering—"error"—which was primarily translated as a mechanical issue. Error would be joined by many new issues of memory in the burgeoning information science, which Mooers classified as problems of "information retrieval," which became a major branch within information science's theoretical approach to memory. Early information retrieval problems were represented as mathematical/mechanical issues. Information science would eventually widen this perspective of false memory, but the concept would remain lodged as something to manage between the contextual relationships between informational machines and people. Much like the critiques of modern pundits who see forgetting as advancing problems of the digital world, relevance and error shaped the meaningfulness of remembering and forgetting within information science. Infrastructure ensconces "memory" and tropological responses.

Mooers's invention restructured the infrastructure of memory even more subtly than this. New technologies like his Zatocoding invited political discord among memory's labor, activating groups of supporters and enemies. The burgeoning information scientists were in awe of his machines, but librarians *hated* them. The machines delegated tasks that librarians of the era thought should be conducted by people. Professional librarians had been trained to think of catalogs as heuristic tools, part of their craft of matching users with reading material. They demanded to intervene in that process. No librarian would have thought humans could be effectively removed from reference work. Zatocoding did not support the commonplaces of librarianship. Even the most conservative librarians recognized that taxonomies became outdated and were less helpful for some people than others. But chemists were a relatively homogenous group that was largely enculturated to think of their research as discovering eternal truth and progress. For chemists, the subject taxonomies pointed to facts. The taxonomies were by-products of that factual world. Mooers (and the chemists) diverged from the professional ethos of librarianship: "I was trying to demonstrate that you could do it mechanically. I did it, and it worked!"[16] It is unlikely that librarians would agree with his assessment. This disagreement would eventually disappear as Zatocoding faded, but the emotional and political conflict between librarians and information scientists remained.

And this is how Eugene Garfield, inventor of the notorious journal impact factor, met Calvin Mooers. Garfield was initially repulsed by Mooers but later grew to appreciate what he represented. Both had become interested in inventing new organizational technologies for science documents during the postwar period. Zatocoding has since largely disappeared from the memory of information science, but Mooers introduced new laws of information science that helped reshape the infrastructure of remembering

and forgetting. His most ominous is the one named for himself. Mooers's law states that an "information retrieval system will tend not to be used whenever it is more painful and troublesome for a customer to have information than for him not to have it."[17] By black-boxing the complexity of memory and automating it, Mooers helped institute contemporary infrastructure valuing tropes of ubiquity, automation, and expedience while eroding more contemplative infrastructures that value particularity, intervention, and deliberateness. Black boxes of information science acted as technê that transformed a memory infrastructure that had been established through librarianship.

4

MEMORY CONFLICTS

> I am pleased to be included on this program because I think our approach at Lehigh is somewhat different from the others.
>
> —Robert S. Taylor, in Crosland, *Proceedings*

The anonymous author of *Rhetorica ad Herennium* thought of memory as the treasury of things invented that provided the raw materials of invention: the richer the treasury, the richer the resources of invention. As part of classical rhetorical education, poets like Simonides were tasked with managing their own mnemonic spaces, but what does that mean for the publics who witness their mnemonic performances? If public memory is the treasury of things available for a public, then the richer a public's treasury, the richer its resources for invention.[1] Did the classical treasuries taught to individuals translate into public memory? If so, who would manage a publics' treasury? Who gets to decide what is valuable?

Even though postwar scientists had taken an interest in managing science materials, librarians had already been practicing their art of public memory for centuries. In the twentieth century, librarians had even professionalized and standardized their labor and set to networking an infrastructure of resources available to personal, public, and professional spheres. Professionalization enabled the labor of librarianship to develop its own theories and approaches to public memory. That theory guided the profession's judgment for deciding what was valuable and what was needed for the public's mnemonic coffers.[2] Librarians materialized this knowledge in memory infrastructures that included their library buildings and related technologies. After World War II, scientists found themselves in professional spaces infrastructured by librarians, and this is a major reason why scientists found value in librarianship during the postwar information explosion. Shared space can make for unlikely companions. An enormous amount of work had already gone into

building and sustaining a memory infrastructure. Crisis instigated intervention, but the legacy of memory's infrastructure held a tremendous amount of rhetorical firepower. As an established infrastructure, the technê of librarianship both resisted and accommodated future infrastructures of memory that were being altered by the presence of information scientists.

Changes in the infrastructure of public memory are controversial and political: even minor modifications alter the memory practices available to publics. Upheavals can activate unforeseen consequences and have far-reaching effects. At Georgia Tech, for instance, Dorothy Crosland took a gamble by inviting postwar scientists to contribute to infrastructures that had been developed for American librarianship. The postwar scientists were politically much more powerful than librarians. Crosland was risking the professional space of librarians by inviting new, more powerful allies with different ambitions. Her risk did not always benefit the profession. When the postwar scientists disagreed with librarians, they frequently did what *they* wanted, changing the infrastructure to fit their wishes. To get their way, information scientists often disparaged the library profession, suggesting its practitioners were antiquated, irrational, or foolish. They seized resources from librarians to forward their own agendas while defending their actions in the name of progress. Librarians came to the postwar science information crisis hoping to contribute their expertise to a collaborative effort, but they were often used for their labor while being belittled for their approaches. These larger politics caused the Georgia Tech program to implode in less than a decade.

Failures at Georgia Tech Provide a National Exigence

If memory politics were defined exclusively through the presence of new ideas, Georgia Tech would have been the new pedagogical nerve center for a modern art of memory. Tech's program benefited immensely from the intellectual milieu of the Atlanta-based National Science Foundation (NSF) conferences. The conferences had produced a new "information science" vocabulary for memory, predicated on the interests of those attending the Georgia Tech conferences. Because of her early success, Crosland was able to secure more funding, and she used it to found her program at Georgia Tech in 1963.[3] Because the new Tech program initially had no permanent faculty, Crosland contracted teachers of national and international renown, which boosted the reputation of the education.[4] Increased funding provided resources to recruit the founding director, Vladimir Slamecka, who had experience as a librarian, chemical engineer, and documentalist and consequentially embodied the numerous perspectives from the conferences. Crosland

had personally headhunted Slamecka after hearing him speak at a conference.[5] She even persuaded Tech's president to offer him a generous salary to convince him to move from his home and give up a lucrative career in industry.[6] The school addressed a gripping postwar exigence, garnered funding, inspired supporters, and, perhaps most importantly, was led by the unstoppable Crosland.

But the shadow of memory's politics haunted her initiatives at Tech.[7] Crosland's innovative program was hindered by an uncomfortable fit between her library and the rest of the STEM-heavy campus. Although the Tech conferences produced a collaborative information science language, political differences boiled close beneath the surface. Crosland was a librarian, and library work was still considered the managerial and the clerical occupation of "timid women." Complicating the problem, university administrators understood how conventional departments worked, but Crosland's library lacked the prestige and recognition granted to more conventional university units in mathematics, engineering, or chemistry, for instance. Georgia Tech administrators largely understood the vision of the university in terms of traditional academic departments. The library's activities did not make sense to many important stakeholders at Tech.[8] The university libraries were, if anything, merely a ceremonial right of a prestigious university, a nicety for the "real" academic units. Crosland's forceful persona made a difference, but when she retired in 1971, her information science program was left without its strongest champion.[9] With Crosland gone, administrators pushed for the program to more closely align with its engineering department. Even though Slamecka was a fervent Crosland supporter, most of the other faculty held conservative views of librarianship and supported a focus on machines rather than information. Slamecka's support of Crosland's vision irritated faculty, and he eventually stepped down because of the conflict.[10] By the mid-1970s, the Georgia Tech information science program had become a computer science department, more focused on computers as objects than tools of information science. Politics caused the program to implode at Georgia Tech, and the burgeoning information science would need to find its druthers elsewhere.

The emerging art of memory would find its place, but it would locate itself far away from Georgia Tech.[11] A science of information, predicated on taming war paranoia with information, was an appealing notion during the science-infused Cold War.[12] Among the most devoted of information science advocates was Robert S. Taylor. Taylor had attended the Georgia Tech conferences in 1961 and 1962. At the time, he was a librarian at Lehigh University in Pennsylvania. In the summer of 1961, sandwiched between the first and second Tech conference, he had taken the initiative to found the Center for

Information Sciences in the Lehigh University Library. His center was a research space for training "young scientists and engineers" to "pursue research in the information sciences."[13] The curriculum was "centered around four basic ideas: information sources; flow and use of scientific information; linguistic and information analysis; and the design and evaluation of systems."[14] Before the end of his career, Taylor had successfully launched the "Original Information School" at Syracuse University in New York.[15]

The previous chapter highlighted how the intermingling context of war provided for a new vocabulary, the information science grammar of memory. The following decades were marked with the politics of building the infrastructure to support the new language's approach to remembering and forgetting. Georgia Tech's decline is part of that story, but Syracuse's rise concludes a larger narrative about the politics of memory's infrastructure during the twentieth century. Syracuse was successful where Tech was not, and Taylor's program became recognized as a model for a new configuration of memory labor. Information science built new infrastructures that aligned with its own peculiar language of memory, and the success of the Syracuse school continues to highlight the persistent politics that are part of sustaining memory's infrastructure. To train memory labor to think differently, Taylor needed to forcefully seize resources that had belonged to library educators. While doing so, he usurped previous approaches to memory's infrastructure. In this chapter, I detail how information science's emerging tropes of ubiquity, automation, and expediency became the common sense that overwrote librarianship's values of particularity, intervention, and deliberateness, first at Syracuse but then more broadly.

The Making of a Mnemonic Labor Leader

Robert S. Taylor found himself fortuitously positioned to promote information science's memory infrastructure. Born in 1918 and raised in Ithaca, New York, he took a degree in history from Cornell. He then moved to Dallas, where he worked in several media jobs in journalism, reporting, broadcasting, and advertising.[16] His early work put him in contact with some of the era's cutting-edge communication technologies.[17] While that work was important during his later career, it is hard to overestimate the influence of his next position doing intelligence work during World War II. In November 1942, he was drafted into the US Army where he served in the Counter Intelligence Corps (CIC) during the Second World War.[18] Taylor was a World War II spy.

The CIC, established in 1917, was the forerunner of today's US Army Intelligence and Security Command (INSCOM), a part of the US Army and

the National Security Agency.[19] Taylor's unit was responsible for commandeering communications systems and records from occupied European cities. His unit interrogated enemy troops, assessed information from spies and civilians, and destroyed communication lines that the German army could exploit. He recalled that his information work in the CIC was "ambiguous" and would often lead him to question his own judgment.[20] He and his partners had "no regular proven sources of information—we had to work from our own intuition."[21] At one point, Taylor helped the infamous German war criminal Klaus Barbie escape Germany.[22] He was misled about Barbie's wartime activities and believed the German torturer could be a useful addition to US intelligence operations.[23] After the war, Taylor reflected on how these experiences shaped the way he thought about the world: he was "liv[ing] in a sea of information," and it made him "slightly paranoid (in a gentle sense of course)."[24] Feelings of paranoia were common among intelligence agents, who were not the only group experiencing informational paranoia and uncertainty after World War II.[25] They had good company among the postwar scientists who had been meeting to fix scientific information after the war. Postwar scientists found like-minded compatriots in the returning war vets, and a large number of the first information scientists would be drawn from the ranks of intelligence agencies.[26] War changed the way Taylor and his generation thought.

After returning from war, Taylor used the GI Bill to enroll and later graduate from the Library Science School at Columbia University in 1950. There, he became familiar with the legacy of American librarianship. After graduating, he became a Fulbright lecturer to continue his studies, and he eventually directed two university libraries, first at Lehigh University and then at Hampshire College. While working a reference desk at Lehigh, he "suddenly realized that, trained as an historian, working as a newspaper reporter, intelligence agent, freelance writer (unsuccessful), and now as a librarian, [he] had been doing the same things all along—gathering, evaluating, analyzing, organizing, storing, retrieving, and communicating information."[27] Taylor was a dynamic personality with library experience who had been personally involved in the wartime activities that gave rise to the language of information science and operations research (OR). He found kindred spirits when he attended Crosland's Georgia Tech conferences. Spies, scientists, and politicians were in thrall of the new information science.

The Georgia Tech conferences inspired Taylor to establish the Center for the Information Sciences, which was devoted to "instruction, research, and the operation of pilot substantive information centers" in the still largely undefined information sciences.[28] Taylor's past, present, and future converged as he founded the center. As a journalist, he had gained appreciation of

electronic media often not found in libraries. His stint in the military, when much of his time was spent intercepting enemy messages through all sorts of communication channels, reinforced this appreciation. The experience attuned him to the complexities of managing and assessing information in unprecedented places. He was paranoid. His approaches in librarianship would consequently be inflected through commonplaces established before he had become a librarian.[29] In librarianship, as in war, he valued tropes of ubiquitous information that was ready to be assessed at any time. He would overlay those commonplaces atop his brand of librarianship, first at Lehigh and then elsewhere. When offered a new leadership position at Hampshire College, he saw the opportunity for "extended and experimenting" testing grounds that would give support to emerging information science.[30] As director at Hampshire, Taylor had control to remake the library in whatever image he chose.

Taylor described the changes he instituted as director at Hampshire in *The Making of a Library*.[31] In it, he narrated the conversion of the traditional Hampshire library into an "information institution" that calculated "the probability of effective use of data, information, knowledge,"[32] and his language was saturated with the logistics of OR rather than the established values of American librarianship.[33] He asked, how "do we design a new library without sacrificing its assumed symbolism or without diluting the functions it now accomplishes?"[34] He answered that it was "necessary to find new library configurations—of people, space, materials, and concepts."[35] Hampshire presented "a challenge to redefine the library by exploring some rather basic questions about its usefulness both as a symbol and as a functioning organism."[36]

Taylor's book described traditional library services with the new commonplaces of information science. His library effectively "managed" the "ubiquitous" information. The library was an "automated," "interactive," "and "functional" "operating system."[37] The old library was an outdated "humanistic institution (which many mistakenly think it still is)," but his new library was a "supply depot concerned with inventory and control."[38] This language carries with it affordances that assume topoi of ubiquity, automation, and expedience, while casting off the traditions of American librarianship. In rewriting the commonplaces for a library space, he composed what it meant for an institution to remember and forget.[39] Under his authorial guidance, libraries became institutions that managed all-encompassing swarms of informational materials.

Taylor's war paranoia was exhibited throughout the book. He was mistrustful of the deployment of new media technologies across campus, most notably Hampshire's INTRAN system, which he viewed as competition for his library. INTRAN was a closed-circuit television and radio system,

providing continuous, instantaneous updates to the college community. He begrudged that the college's president praised INTRAN for its ability to "deliberately develop its technological information-transfer capability . . . of liberal education,"[40] while noting that he thought of the library as just "a place of great books."[41] Taylor thought INTRAN threatened the long-term sustainability of the institution he directed. He treated INTRAN like an enemy force. He tried to take control of the campus communication system so he could use it to make his own campus updates. His obsession with Hampshire's INTRAN communication system demonstrates how much he had adopted information science commonplaces as natural. Time and energy that could have been spent on collection building or reference development was spent habituating on a closed-circuit communication system.

These sorts of obsessions were emblematic of Taylor's directorship at Hampshire. Taylor directed Hampshire libraries with questions: "What are the predictable internal traffic patterns of staff? of users?," and "At what points are materials (books, nonprint media, equipment, studio sets, gallery material, etc.) received; that is, where do they enter the building? How do they move in the building?"[42] These logistical questions are questions that make more sense to supporters of OR and information science than libraries and librarianship. These sorts of questions nudged him to take on problems that the theories of OR could solve.

Taylor's initial changes were relatively mundane. For example, *Making of a Library* details how audiovisual materials were located closer to a loan desk to make them easier to check out quickly to nearby departments.[43] Most of his problems and solutions were remarkably low tech. He developed better sharing policies between nearby libraries. He had student assistants bring library books directly to faculty offices. He bought new media technology whenever he could. The initial changes may have been unremarkable, but Taylor was posing solutions with language that had been sharpened on the stone of information science. The more he used it, the more natural the language became for his libraries. Every problem could be diagrammed for efficiency. Every problem defined users' needs within the ubiquitous information environment. Taylor deployed postwar language in ways that reorganized the physical environment and the commonplaces of information labor. By Taylor's account, his Hampshire library was an innovative success, further validating his understanding of libraries as distributors of information.

Making of a Library was not just a report; it was a manifesto for all libraries. It included imaginative essays to guide future librarians. Taylor predicted the future of libraries in 1985, 1995, 2000, and 2025, relying heavily on a study from the RAND Corporation's Institute for the Future. Predic-

tions for 2025 suggested that machines would directly stimulate the human cortex for "man-machine symbiosis" that would "extend their intelligence by being connected to a computer."[44] Taylor's book reimagined librarianship as information science and the library as "a media- and communications-oriented institution."[45] He described libraries as though they were the larvae of a radical transformation and suggested they would be "cocooned" to become a new social institution.[46] Libraries would transform from static, book-centered institutions into dynamic, communications organisms. He included quotes from technologists like Peter Drucker, Alvin Toffler, and Fritz Machlup that described the importance of knowledge workers in a future economy. Quoting Drucker, he wrote that "knowledge is what is in a book. But as long as it is in the book, it is only 'information' if not mere 'data.' Only when a man applies the information to doing something does it become knowledge. Knowledge, like electricity or money, is a form of energy that exists only when doing work." Each line of his writing drew attention to a transformation in librarianship, which was required to avoid "future shock" and "the sudden realization of a new and completely unfamiliar landscape." Without change, librarians will "have lost the opportunity to have any influence on the future."[47]

Making of a Library closely outlined Taylor's vision for future information institutions: (1) processing and organization, (2) distribution and dissemination, (3) information and instruction, (4) educational technology and systems, (5) institutional research and evaluation, and (6) management. The first focused on developing, acquiring, organizing, and storing materials, regardless of format or media. The second meant that users would be a focus and that information workers would repackage resources to meet their needs. The third induced librarians to market resources.[48] The fourth, on educational technology and systems, meant designing and developing systems to support information literacy and become engaged instructors in classes. The fifth function was a directive to continually reassess the processes of information. The sixth was concerned with four activities: defining decision data, collecting data, evaluating data, and translating data into action. The library of the future dealt with making sense and automating the ubiquitous environmental information and marketing them to potential users.

Taylor's *Making of a Library* was literally rewriting the language of libraries as memory institutions, at least at Hampshire. He mobilized his ideas through crisis. He wrote that librarians needed to "cut our umbilical cord to the institution of the library,"[49] emphasizing that action must be taken because librarians "have not yet made the transition[,] . . . have not cut our umbilical cord to the library and other document-based systems."[50] He insisted the word *library* was misleading and should be omitted if the

profession was to be an important part of tomorrow's "knowledge economy." Throughout the book, Taylor resisted using the term *library* and repeatedly implied that "the word carries too many connotations which, partially truth and partially myth, may not let the library get to tomorrow, may inhibit its adaptability."[51] By revising the narratives of librarianship, he simultaneously changed the commonplaces and sensibilities of a major memory institution. Of course, the language of crisis was not a new theme for American libraries, which had been in a constant battle for legitimacy, but Taylor suggested those earlier struggles were merely the early stages of even more profound change.

Taylor anticipated his contemporaries' discomfort with his manifesto. In a book that librarians would read, he was hesitant to use terms like *data*, *information*, or *user*. He recognized that the vocabulary and dismissal of libraries could alienate librarians. He continually attended to anticipated resistance by suggesting that librarians were already in an "information business"; they just used different language.[52] He tried to overcome resistance with his rhetoric of crisis that bolstered an inevitable evidence turning point: a "dilemma that libraries will soon face—the break with a long tradition and a redefinition of objectives."[53] Taylor's information science language was a necessary vocabulary for an institution that either changes or "dies in content and purpose,"[54] and that the "next 10 to 15 years will be critical, not only for the redefinition of the library as a more significant part of an institution, but also for the process of translating these new operational arrangements into viable and functional spaces."[55] *Making of a Library* took language that had been percolating since World War II and overlaid it on the activities of libraries.[56]

Taylor's directorship at Hampshire shifted the sensibilities of the library and its institutional memory practices, at least while he was there. His library would solve information problems wherever they were to be found to "stay relevant to *rapidly* changing student needs and *emerging* techniques."[57] He focused his efforts on building an institution that would effectively "wire" students and faculty on any part of campus with information.[58] He replaced the language of librarianship to discourage the "place of great books" model that had rattled him.[59] Along with often-mundane changes in everyday practice, Taylor's language steered the institutional infrastructure of memory in a different direction, away from the historical concerns of librarianship and toward the interests grounded by postwar science. His published writing circulated his perspectives more broadly among a community of librarians and burgeoning information scientists. His ideas had influence when he took the helm of institutions—first at Lehigh, then at Hampshire, and later when arrived at Syracuse University in 1972. At Syracuse, though, he would not just transform a single institution; he would transform a labor force to

think differently with language drawn from the postwar crisis. Re-educating librarians to think like him had the potential to change every library institution and globalize his vision.

Rhetoric of Memory Infrastructures: Exigence

> The idea of information overload keeps cropping up in our own rhetoric; and has for four hundred years. However, the problems we must deal with are far larger, for they have to do with the structure of total social communication and information systems.
>
> —Robert S. Taylor, *Curriculum Design for Library and Information Science*

As Taylor was putting the finishing touches on *Making of a Library*, he was preparing to leave Hampshire to become the new dean at the School of Library Science at Syracuse. The faculty at Syracuse knew Taylor well. During the Hampshire project, he had become the first president of the American Society for Information Science (ASIS). In 1968, shortly after the Georgia Tech conferences, ASIS emerged largely through the collaboration of people like Crosland and Taylor who took advantage of postwar funding aimed at solving the science information crisis.[60] Taylor was a prolific contributor to ASIS publications and had garnered a reputation as an innovator, theorist, and leader for the new information science. The year Taylor started at Syracuse, ASIS honored his *Making of a Library* with its Best Information Science Book award. Outgoing Syracuse dean of library science Roger Greer and faculty member Pauline Atherton spoke proudly of him as "a librarian and pioneer in the field of information science, who chose total disassociation from traditional library schools to forge new educational paths for this field."[61] Syracuse vice chancellor John Prucha remembered that Taylor "came with an idea in his head of what Information Studies could become in the computer age."[62] Syracuse hired Taylor to transform the school.[63] Deanship brought with it power to train labor with practices that would be noticed across the country, if not the globe.

Taylor's deanship was the latest at a school that had followed the stereotypical curve of library education from Dewey to the University of Chicago's Graduate Library School (GLS). The library school at Syracuse, started in 1896, was one of the first five in the country, located just a few hundred miles north of Melvil Dewey's school at Columbia. Like Dewey's program, Syracuse's program was initially very small and attended by women. Henry and Mary Sibley, a couple who taught classes while they ran the Syracuse University library, offered a two-year certificate in library economy.[64] Some

of their earliest courses were on vertical penmanship, book reviews, and library building and appliances.[65] The small program flourished as increasing numbers of students enrolled and matriculated each year. A few decades later, the Syracuse University library collection was mushrooming. The Syracuse staff convinced Andrew Carnegie to fund a new building in 1908, which provided better training grounds for local librarians. In 1908, the American Library Association (ALA) accredited Syracuse's program.[66] Librarianship and library education were still thriving at Syracuse University after weathering two world wars, and the school had developed a rich legacy of educating traditionally trained, dedicated librarians who would go on to become national leaders. Syracuse's library school was successful in comparison to its peer programs.

In the 1970s, Syracuse's library science faculty welcomed Taylor's new approaches for good reason. During the 1960s, the same era that information science was emerging in the United States, a number of national events signaled problems for professional librarianship. At the zenith of the GLS-inspired library science era, education had experienced unprecedented growth. Thousands of returning GIs, like Taylor, enrolled in the programs. Forty new ALA-accredited schools opened. If anything, the new prosperity pushed Syracuse to batten down as a conservative library school and cling to its successful past as a symbol of traditional librarianship in the United States. All seemed well. The library and the library school were even successful enough to become independent units in 1965.[67] By the end of the 1960s, the faculty, who had just recently made curricular changes to better align with the newer library science approach established at GLS, hoped a few updates would invite better standing and a doctoral program to rival Syracuse University's other academic units.

At the start of the 1970s, growth in professional librarianship and its education reversed course overnight, both nationally and at Syracuse. In 1968, the Nixon administration cut funding for libraries, leaving aid to the discretion of state and municipal governments.[68] Public funding for libraries dwindled under this model. The effects on library education were disastrous.[69] Due to the recent prosperity, the library schools continued churning out more librarians than ever before, but due to cuts in public funding, the graduates rapidly outnumbered paid positions being offered by libraries.[70] Enrollment continued full speed while professional demand slowed. Some schools started having more difficulty placing their graduates, and as word of the national job shortage became widely known, student enrollment waned. Meanwhile, Nixon cuts and a national recession affected all units in universities, not just the library programs. Because many of the library schools had never attained the status of conventional academic programs,

they were often the first to be cut, along with other service-oriented departments. Economic slowdown led to programmatic shutdown. Beginning in the 1970s, financial problems would cause seventeen library schools to shut their doors.[71] The biggest effects would culminate decades later when the iconic GLS closed in 1990 and Dewey's first school at Columbia shut down in 1992. Syracuse's faculty sensed trouble early on and sought to change the school before bigger problems developed. They hired Taylor. Taylor, whose *Making of a Library* was grounded on transformation, was their champion to thwart potential crisis.

Several issues critical for the future of information science, librarianship, and memory's infrastructure, all instigated on the earlier science information crisis, now collided. In the United States, many librarians like Crosland had been drawn to national funding for science information, seeing it as a way to better sustain their libraries. This national funding put librarians in conversation with scientists from academia and the military who were trying to make sense of science after their wartime obligations had ended. The result was that the science information crisis unwittingly forwarded information science, the scientific, OR approach to memory. The science information crisis invented a masculine approach to memory distinct from American librarianship, first as an approach for managing *science information* but then later *as a science of information*. The discipline of information science helped assuage the anxieties of men who were newly interested in science librarianship but were unwilling to delegate the work.

The ongoing Cold War ensured that funding for science information remained foregrounded during from the 1950s through the 1970s. During this time, information science garnered a prestigious national reputation because its advocates promised imaginative mechanical solutions to information problems. In an era that was being characterized as the information age, information science technologies were convincing symbols of national prosperity, as was prominently depicted by Hubert Humphrey's fascination with Library 21's UNIVAC during the 1962 World's Fair in Seattle. Many of the early technologies did not pan out, but the aura of informational machines, like Mooers's Zator machines, offered peace and prosperity in the guise of sophisticated black boxes. Despite its reputation, information science was still largely undeveloped as a profession, scientific discipline, collection of technologies, or approach to memory.

By the late 1960s, the information scientists still lacked a sustainable home in institutions. Even at Georgia Tech, the discipline had failed to gain institutional traction. The recession that replaced post–World War II prosperity left library schools financially vulnerable, and information science advocates now had an opportunity to move into librarianship's tenuous

professional space. The stars aligned when Syracuse hired Taylor. Champions of information science were being invited into educational programs that influenced how memory labor was professionalized, which concomitantly changed the types of technologies, artifacts, and spaces involved in librarianship's approach to public memory. Information science's still undeveloped approaches for managing information were now given material force and momentum in programs that trained labor for memory institutions *across the globe*.

Taylor's hire certainly was not unique. The crisis in librarianship was a national phenomenon. Taylor's numerous peers, many of whom had attended the Georgia Tech conferences, prompted similar changes elsewhere. Many other schools invited the nationally esteemed information science into their institutional spaces, grasping at the reputation of the nascent discipline with hopes of saving their flagging programs. Crosland had worked to start a program at Georgia Tech. At Case Western Reserve, Jesse Shera and James W. Perry had been integrating a Center for Documentation and Communication Research into the university's library school. At the University of California Berkeley School of Librarianship, Robert Hayes had opened the Institute for Library Research that approached librarianship with a new "system analytic" approach that was informed by his background with mathematics and computers.[72] Allen Kent and Anthony Debons were making information science a part of the University of Pittsburgh library tradition.[73] The tenets of OR and information science had started seeping into librarianship.

Taylor may not have been unique, but he does provide a particularly noticeable example of the changes that were occurring more gradually in other programs. Syracuse's school was still relatively conservative as an educational program for librarianship when Taylor arrived. Many classes were still taught by librarians working in local Syracuse libraries, both public and academic. The full-time faculty had been educated as library professionals, and many of them had terminal degrees in professional librarianship accredited by the ALA. Meanwhile, Taylor was fully steeped in the language of information science because of his experiences during World War II, attending the Georgia Tech conferences, directing Lehigh and Hampshire libraries, and then presiding over the newly formed ASIS. Taylor had little investment in traditional approaches to librarianship. His ideas for professional practice were vastly different from what Syracuse had been doing, and when he moved to Syracuse, he was given tremendous flexibility that starkly juxtaposed the differences in two approaches for training memory's labor. The national library crisis urged Syracuse faculty and administrators to consider radical guidance from outside the institution. Syracuse's transformation provides a vivid picture of the changes occurring gradually elsewhere.

Originating Myths of Memory

> If everything is information, then a general statement about the nature of information is a general statement about the nature of the universe.
>
> —Geoffrey Bowker, "Information Mythology"

In 1973, Taylor replaced Roger Greer as the dean of library science at Syracuse.[74] The incoming dean arrived to find a curriculum steeped in canonical models of library education in which students took courses in reference, bibliography, book selection, and cataloging. Syracuse may no longer have offered classes in penmanship, but the program thrived on courses on children's literature, library history, and cataloging. When Taylor became dean, he immediately instituted a review of the curriculum and started writing manifestos redefining the future of a major institution of memory—at his school, for library education, and for information science.[75] The first change was the school's name. In 1974, the year after he arrived, the School of Library Science became the School of Information Studies, a retitling that received overwhelming support from faculty and alumni. He and his colleagues defended the new name as a mere expansion of the school's mission, which previous deans said was the education of "librarians for professions in school, public, and special libraries," a mission justified because the "history of librarianship parallels the progress of our civilization."[76] Taylor adjusted the language, describing the new School of Information Studies as "concerned with the transfer and use of information in society and with all the agencies active in its movement," a mission that could just as easily apply to intelligence agencies as libraries. The school would now draw from "a broad and rich geography of information agencies, such as information retrieval systems, the publishing trade, museums, news services, mass media, archives, community organizations, regional and national planning agencies, and media centers."[77] Transfer of information? Movement? Agencies? This new direction was steeped with tropes more akin to the logistics of a war science than the history of professional librarianship.

In parallel, Taylor had the school's informational bulletins overhauled to complement the new direction. Just one year earlier, the bulletins had been bound pamphlets of twenty-five pages, 8.5 inches in width by 5.5 inches in height (approximately the size of a half sheet of standard office paper). These older pamphlets appeared mundane: they listed contact information, school history, faculty information, course descriptions, and a message from the dean. Students interested in enrolling at the Syracuse library school primarily used them. Taylor's new bulletins were not bound at all, physically signifying the unbounded terrain of the new information environments. In

explanation, Taylor added a note to the bulletins: "We are a school adapting to and participating in the creation of a new environment, to a new focus of interests. And the process of adaptation means change, sometimes short-term change while we plan and develop new courses or better statements of our directions, sometimes long-term change in programs. This format makes it easier and less expensive to make changes in the bulletin."[78] The new bulletins consisted of a collection of folders, eight inches wide by eight inches long, which Taylor described as "modules." Each was color coded to designate an aspect of the school.[79] One of the modules, for example, was devoted to new careers for professionals in the information industry, where students would be "linking people to other people and to the information necessary for them to carry on their activities."[80]

Taylor recognized that these initial changes would have minimal influence on education, at least in the short-term.[81] It takes time to overhaul an entire school's educational program, and Taylor had just arrived and was also learning how to administrate the everyday activities of the school. Although he had extensive support from faculty, he simply could not plan and sustain an entirely new curriculum overnight. In the first years of his tenure, the faculty remained largely the same, possessed of the same education in librarianship they had before he arrived. It would be years before a critical mass of new faculty could be hired. He obviously did not have enough help. Taylor anticipated that others might sense his rebranding was a marketing campaign, and in bulletins and trade advertisements for the school, he argued that the new name was "not a cosmetic cover, but a recognition that the activities, interests, and courses we presently have cover a much broader spectrum than librarianship."[82] These changes—the school's name and the bulletin—may have been some of the most important he could make.

Taylor and other Syracuse faculty openly discussed the significance of the early changes. They were designed to recruit different types of students. Taylor's colleague Allan Hershfield wrote that at "the mere mention of the words 'library' or 'librarian,' a self-selection process begins to operate which almost guarantees that, psychologically, the new student will closely resemble previous graduates."[83] Librarianship, since it had been professionalized, was stigmatized as a "'female' occupation" that was "weak, dependent, conservative, non-intellectual."[84] The psychological attributes Hershfield described were superficial, but his gendering of the profession was accurate. Throughout the twentieth century, libraries overwhelmingly employed women, a tradition started in Dewey's first school. Libraries had been one of the first places where women could gain employment throughout the United States. Blatant sexism affected professional pay rates and social standing. Although true across professions, this had a particularly notable effect of reinforcing

stereotypes of librarians.[85] The few men in the field usually were promoted into administrative positions. After World War II, the ALA had been concerned with these issues and had even started several campaigns to stimulate better pay and encourage men to stay in more positions in the profession by rebranding librarians as "merchants of ideas" or "idea consultants."[86] This gendering of the profession was also one of the central reasons the library schools lacked prestige in universities, which had been historically dominated by men.

Taylor tried to gain prestige by dumping the stereotype. He also held the psychological stereotypes that Hershfield espoused and wanted to enroll students that more closely resembled his intelligence colleagues from World War II. Taylor's information studies aimed to appeal to students who were more "dynamic, flexible, imaginative, innovative, receptive to change and people-oriented" than the "traditional image or stereotype of a librarian [that] is far more accurate than any of us care to admit." These incoming students would be "tolerant of ambiguity" and would know "a thing or two about computers." To encourage new students, Syracuse's School of Information Studies would "avoid the use of the terms 'library' or 'librarians' in the initial stages" so that new students could be "exposed to current opportunities and future potential in the information field." Taylor wanted the kinds of students who were "not coming to library school,"[87] and he would "drastically change admission standards . . . and recruiting procedures . . . for students who [were] both numerate and literate, who already [had] a background in computers and in research methods."[88] Taylor recruited students who would think more like him so that he could easily change the Syracuse curriculum. Within a few years, many of the new students would be teaching graduate courses that the full-time faculty had never taught.

Images in the bulletins and other promotional materials reinforced the recruiting strategy. Before Taylor arrived at Syracuse, bulletin pictures most often portrayed women, frequently teaching in classrooms or sitting in libraries, and showed numerous images of books and bookshelves as well. Other images included classrooms depicting men lecturing to rooms of women, which reinforced internal stereotypes of the few men in the profession. In the bulletin published after Taylor arrived in 1973, the first picture was of Taylor's head, captioned with a reference to Peter Drucker, reading, "In the late 1970's . . . every other dollar earned and spent in the American economy will be earned by producing and distributing ideas and information, and will be spent on procuring ideas and information." The second image depicted a man at a typewriter loaded with continuous form paper, complete with pin-feed edges. This image was captioned with a quote from physicist John R. Platt that read, "We must remember that what is

precious is not the physical 'artifacts' of a system of writing but the 'mentifacts,' the human communications they contain."[89] Each year after Taylor arrived, promotional materials depicted increasingly more men and computers. Each year, the bulletins added more images that invoked technologies symbolizing operations research and information science: computers towering over students, drawings of Babbage machines, and state-of-the-art audiovisual equipment. Perhaps the most bizarre image appeared in the 1982 bulletin—an illustration of two human-faced computers holding hands to supplement the bulletin's career section.

Taylor had every course description in the bulletins revised. The earliest changes still anticipated the future curriculum rather than classroom practice. Still, these early changes would still be meaningful to students considering enrolling for future classes, and they provided goals for the future. Before Taylor, the school's courses had the prefix LS, which stood for library science. After he arrived, the courses were prefixed with IST in honor of the school's new name.[90] In previous years, LS courses had been numbered between 200 and 500. Now, the IST curriculum was numbered between 500 and 800. The course numbers of each class were raised to indicate a new, more rigorous graduate curriculum, on par with any other department at Syracuse University, be it engineering, computer science, physics, or mathematics.[91] Then Taylor had faculty revise every course description and title by replacing library terms with equivalents more easily associated with information science. Any one of these changes alone may have seemed mundane, like describing a book as an information source or literature as media, but shifting a program-wide vocabulary transformed the ambience of the educational program.[92] For instance, the pre-Taylor curriculum included a course called Bibliography of the Sciences, on evaluating literature for scientific disciplines. The course taught students how to compile reading lists of materials for scientists:

> **208. Bibliography of the Sciences (3). One term. Miss Van Hoesen**[93]
> Planned as a background for the knowledge and use of the literature of general, natural, pure, and applied science; including units on agriculture, engineering, home economics, and medicine. Each student is responsible for the preparation of a bibliography in a pertinent section of the area.[94]

Taylor had the course renamed, and the 1974 Scientific and Technical Information course carried this description:

> **IST 608. Scientific and Technical Information (3)**
> Role of physical and life sciences and technology in society. Structure and

communication channels of the scientific community. Research trends, user needs, information systems in selected disciplines and interdisciplinary areas.[95]

The new descriptions dealt with new technologies, new imperatives, new goals. The older terms, closely related to traditional librarianship and its stereotypes, were replaced with language more akin to the masculine information science. The older course taught bibliography and literature and included sessions detailing particular academic subjects, such as home economics. The newer informational course taught students the structure, channels, and systems of a universal scientific community, replacing the older terminology with logistical terms of OR and information science. The previous descriptions suggested students were expected to understand a subject area of their choice. The newer course description suggested students would learn to conduct research to understand the inherent structure of a scientific community.[96] Throughout each revised course, similar refigurations ensued: a course that formerly focused on librarianship was revised with the new information science language. Other pre-Taylor courses were also renamed; for example, Bibliography of the Humanities became Humanities Resources and Information Systems and Bibliography of the Social Sciences became Social Science Information. The technologies referenced in course descriptions changed. Previous descriptions included references to Dewey decimal classification, Library of Congress subject headings, and book repair equipment. The new courses more often referenced MARC (Machine Readable Catalog), online information retrieval systems, and statistical research methods (ANOVA, etc.). Lists of electives in other departments were now more often from social sciences or instructional technology departments rather than education, journalism, or public administration, as they had been in the past.

Research methods listed in the new course descriptions drew directly from the tenets of OR and its drive to use scientific, logistical, and mathematical techniques to solve problems. The new IST 720 seminar in research methods listed "probability and statistics, sampling theory, *operations research models*, survey techniques, interviewing, observation, and experimental design" (emphasis added) as the foundation of research. These tools would aid "analysis, design, management, and evaluation of existing and hypothetical information systems."[97] Students would be able to construct their own information models and then assess them in whichever situation they found themselves in, in the public or private sector.[98] Once mobilized as a professional imaginary, Taylor's new students could intervene, optimize, and control an informational space with technologies that more closely resembled

Zator machines than card catalogs. The school would begin teaching students to analyze, assess, and design information environments rather than libraries.

The careers section of the new bulletins prompted students to imagine alternative futures working in the "information environment." Past bulletins had not included a careers section at all because postgraduate employment was straightforward, and students overwhelmingly enrolled to be credentialed to work in libraries. But when the library job crisis diminished that prospect of employment, it became more important to argue for the value of the education, and Taylor's information science tropes provided new reasons for enrollment. Some of these involved rebranding librarianship's value as a traditional science, not that different from computer science, chemistry, or physics, but many were also career related. The bulletins' careers section indicated students would now be trained to be "information brokers" working with "information networks, data bases, and retrieval systems" in the "information industry." Information brokers were "linking people to other people and to the information necessary for them to carry on their activities." Information brokers were "aware of information as a process, not something merely to be stored." When Taylor noted data about existing information jobs, he highlighted positions as freelancers in large cities, suggesting that a variety of opportunities existed, which required "some capital for support in the beginning, an ability to take risks, a certain amount of chutzpah, and a belief in one's capabilities."[99] Employment prospects were moved to the free market private sector.

These first interventions at Syracuse highlight two alternative forms of memory labor, one from the past, Library Science Syracuse, and one projected onto the future, Information Studies Syracuse. Library Science Syracuse more frequently depended on commonplaces of particularity, intervention, and deliberateness. Library Science Syracuse described librarians producing objects to mediate patron activities and protect a critical social institution. The LS 208 class on Bibliography of the Sciences had students produce lists of library materials (bibliographies) to define the literature of a field for users. The LS classification courses taught students to catalog literature so they could be more easily located for patrons. The reference courses taught students to use their classifications and other library tools (bibliographies, shelf lists, encyclopedias, etc.) to mediate what patrons read. Library technologies supported an institution meant to slow down users and intervene in their lives. While the techniques of the discipline were no longer blatant religious enculturation, as they had been during the early years of professional librarianship, the profession's impulse to change its publics remained. The library institution was a public, state-funded good, important for the "progress of our civilization."[100]

The new alternative, Taylor's information science approach, drew from OR tenets to imagine Syracuse's program "scientifically and impersonally, as would be required in operations research."[101] Information Studies Syracuse referenced memory through commonplaces of ubiquitous information. Students did not intervene in the activities of users; they analyzed existing information environments to understand the structures and channels of information more effectively. Students were taught to understand human communication as part of the ubiquitous information environment. Human memory was designated as a sort of automated storage and retrieval that drew from the information environment. Users had information needs that modern information technologies could ameliorate, metaphorically similar to how agricultural equipment helped extract human nutrition from the land. The new research methods would help students understand structures, channels, needs, and information scientifically. The new information science was not a public good but a science of the natural environment.

These conflicting commonplaces of memory proliferated through diverging rhetorical ecologies. The profession of librarianship, particularly American librarianship, developed an approach to memory indebted to its professionalization at the end of the nineteenth century, which instantiated a service profession interested in a "library economy." The profession codified memory practices that encouraged practitioners to intervene in the everyday lives of its publics, originally by selecting the "best reading, for the largest number, at the least cost."[102] The materials that constituted the "best reading" would change over time, but the profession remained invested in interventionist approaches toward the publics they served. Because the profession was one of the spaces that employed women, the field's service ethos was inflected through the professional practices and historical conflicts of the women able to gain employment. Conversely, information science transformed memory into a scientific problem, something to be scientifically measured and evaluated through information in the environment. Information science automated encoding, storage, and retrieval as scientific approaches for managing ubiquitous information. Commonplaces of information science invoked a distancing scientific perspective to smuggle in the communal values that saturated modernist science and war. Librarians had no problem recognizing the implicit bias of their work. They welcomed it. The information science perspective discouraged any notion of biased intervention on its part.

These differences were put in stark relief when Taylor replaced the foundational course Introduction to Librarianship with the Information Environment, a class he both designed and taught. His personal syllabus noted that there "is no text for the course" because it "is the first time . . . that

such a course has been organized and offered as a whole in a professional information/library curriculum."[103] His course materials consisted of short readings and lectures on "agencies, industries, and services whose primary concerns are the creation, processing, storage, distribution, and use of information, consideration of technological impact, role of the information professional, and cost-benefit questions." Taylor's class adopted scientific language to indicate that librarianship was outdated. Librarianship's humanistic values were "Luddite" and lacked "an appreciation of various technologies on society."[104] Students needed to "move away from this Ptolemaic world" of librarianship and "to accept and to build from a Copernican universe, with information at the center, the sun—and the library, the computer, and other such artefacts as planets."[105] In Taylor's approach, information environments were as real and observable as particles, organic elements, or gravity.[106] They were naturally occurring phenomena where information needs could be assessed, measured, and evaluated.

Taylor's new course consequently displaced librarianship by adopting information as its foundational god term. Taylor materialized information with mathematical models that included Shannon's theory of communication, source/receiver-based models of communication, and signal transmission measurements, each of which mathematicians and communications theorists had popularized shortly after World War II. Taylor gave practical examples from mathematicians who developed sophisticated measurements and technologies decrypting information through bits and as a code. With the models, Taylor forwarded information as a discrete, measurable phenomenon independent of human intervention. Information was the unifying substance of the universe, the new sun of his Copernican universe. People were "prewired" into the information environment through their genetic code,[107] and postwar science and technology had produced new communication technologies that additionally "wired" communities through "man-system interfaces."[108] Taylor's definitions situated information technologies as tools that altered access to naturally occurring information environments. These mobilizing definitions allowed Taylor to argue that information environments were as natural as the physical world and could be measured and analyzed as though they were part of an objective experimental science.

Crisis led Taylor to characterize information environments with five recent developments: an "exponential increase in the volume of information *flow*" (emphasis added), "communication no longer constrained by time and space," "breakdown in traditional systems for handling information," information as "a non-depletive resource" that all other resources depend on, and the "emergence of an information elite." These developments presented new problems for postwar publics and especially librarians. He said that humans

could no longer adapt fast enough, and they needed better "information filters."[109] The population needed better structures for channeling information from the environment. Informational professionals, like those he would train at Syracuse, could help bridge the gap between the elite and unsophisticated wielders of information. Taylor positioned his students as the new information professionals, swapping in his new memory commonplaces for those of the former librarians. Information environment language positioned the former librarians as an information elite who would manage "potentially explosive problems" for the "information unsophisticated."[110]

Taylor's syllabus adopted chaotic lists of institutions, technologies, products, services, users, needs, theories, and processes to build the information environment. Information environments included any of "those variables . . . that affect the *movement* of information" (emphasis added).[111] They included authors, painters, libraries, crisis hotlines, satellite weather photographing, publishers, consultants, scientists, and on and on. He added universities, postal services, television, radio, data, theories, and computers, all in the same breath, consequently flattening differences among the items, suggesting that the same informational phenomenon linked them all. His 1978 syllabus on the Information Environment ran on for six pages listing parts of the information environment. Libraries were one component of his environment, but only a small part within a rapidly evolving ecology. Along with definitions of information as a measurable thing, these lists allowed Taylor to define information as a force that connected everything. [112]

The new environment, embodied through his lists, could be charted with OR techniques that had been deployed previously during war. He suggested that bits of information flowed to and from institutions through communication technologies that automated the information environment. OR language subsequently choreographed new temporal and spatial geographies in the information environment. Taylor suggested that information moved without impedance, that it was "no longer constrained by time and space" because information produced all human notions of space and time.[113] Recent changes in the information environment produced a "consequent decrease in 'time cushion' between events and their consequences, between social changes and their impact; the 'acceleration of history.'"[114] Taylor was stingy with examples of the new space-time but cited the imaginative language of media theorists like Marshall McLuhan to reinforce his theory.

Who would take umbrage with Taylor's new space-time? Where were real people located in his "acceleration of history"? Where were the particularity, intervention, and deliberateness historically valued by librarianship? It took human labor to coordinate, select, organize, arrange, and curate information for a public, even as new electronic tools supplemented older media

technologies. Labor could not escape physical realities being elided by information technologies. Taylor's information environments often obfuscated the interventions of the people involved in his transfer of information. He flattened space and time into the effect of a single, fluid information environment. During war, soldiers like Taylor worked around the clock to decrypt, retrieve, and assess information. Their efforts were often invisible as war planners used the information to develop strategies that focused on winning a war. Perhaps soldiers were willing to write off their labor as a cost of war, but during peacetime, OR obfuscated the people who were involved in producing information for a heterogeneous public. Taylor disembodied information by overlooking the tremendous planning and work involved in sustaining information environments that supported friction-free technologies.

Taylor did not mention his war efforts, but his explanations of the information environment drew from a vastly different history from the canonical stories that would have appeared in the earlier Introduction to Librarianship class. For Taylor, the modern information environment emerged in the preliterate age. Using a metaphor from mid-twentieth-century communication theories, he said that speech allowed for the first "transmission of culture."[115] Later, writing replaced speech and supported the growth and development of business communication, first by enabling records of business transactions and then by enabling cities to expand their governance. Both transitions further networked people to their information environment. Taylor continued that writing was later replaced by the printing press, which allowed more precise access to information. In the modern electronic age, new media like radio, television, and telephones provided better access to information while changing the speed at which it was transferred. Each historical epoch considered information as though it were a naturally occurring part of the environment. Taylor's history was dotted with copious references to media theorists and historians like "Harold Innis, Edmund Carpenter, Father Walter Ong, Eric Havelock, and Elizabeth Eisenstein."[116] Taylor referenced libraries as part of the story but only in passing: "The library (capital L) until three or four decades ago was indeed recognized and accepted—at least by the literate—as a major channel for the transmission of knowledge, information, and culture. That this no longer the case is the story of this course."[117]

Taylor's history was not exactly wrong, but it drew from a myth vastly different from what had previously been inculcated as part of American librarianship. During librarianship's short history in the United States, the profession was most commonly taught as a centuries-long chronicle of libraries,

beginning with ancient libraries in the East. The stories concentrated on developments occurring after the formalization of library education.[118] Historical references were not to Harold Innis, Walter Ong, and Claude Shannon but to Melvil Dewey, Justin Winsor, and Andrew Carnegie. In the canonical library history, new technologies did not displace libraries because the institution was never just a communication technology but "a creature of society"; its goal was the improvement of society; its methods were to control what the people read.[119] Or to put it more perversely: librarianship was the "'science' of administering an institutional bureaucracy and an expertise unique to the institution being administered."[120] Ensuing narratives of librarianship tended to focus on subjects like the free library movement—the American adoption of tax-supported libraries—as one of the milestones of the profession. In this historical canon, librarianship was an art of intentionally coordinating the memory of publics, not of technology in an information environment. The description of Syracuse's 1965 pre-Taylor course on library history noted the "significance of libraries in the development of culture and communication from ancient to modern times; origin and growth of the modern library movement in the United States and abroad." The Library in Society course from the same year was on the "development and function of the library as a social institution."[121] Libraries were an institution of the public, not a science of information.

Taylor countered canon, though, arguing that those who disagreed with his history had no appreciation of new technologies and that a key problem for librarianship was that it did "not yet have accepted vocabularies to describe our phenomena," that a "larger vision and a more relevant sense of structure and process [was] needed."[122] Taylor was in the business of inventing both vision and vocabularies. He asked his Information Environment students to develop "an awareness of the varieties of information needs and uses in society" and to be "more aware of their own information environment," to now "be concerned with processes, with the movement of messages" and make "rational choice[s] among competing devices to store and to move messages."[123] These arguments drew attention away from librarianship as a critical social institution that had been hurt by cuts to public funding and implied instead that librarianship's real crisis was that of an obsolete technology.

Like he had first argued in *Making of a Library*, Taylor said the current age was defined by unprecedented crisis, especially for libraries, which were no longer a "major channel for the transmission of knowledge, information, and culture."[124] His argument coincided with the events that had led to librarianship's declining enrollment and student placement. Libraries may not

have been as potent as they had once been, but it was primarily because of the recent cuts to public funding. Instead of waging an argument for relevance, Taylor's syllabus described libraries as one technology in a larger turning point involving the information environment: the technological innovation of the postwar period had disrupted the environmental homeostasis. Taylor insisted that the older, information-poor environment depended on centralized institutions like schools and libraries to provide learning materials but not the new environment. Schools and libraries acted as warehouses of materials, filling an informational need by providing access to limited material. The environment, which had been "information-poor and experience-rich" since the preliterate age, had rapidly become "information-rich and experience-poor" because of new communication technology.[125] Books, radio, movies, and more oversaturated the new information-rich environment. Taylor claimed that the new information environment did not support librarianship.

Taylor's claims about an information crisis had relevance, which is exactly why they were so powerful. The postwar period *was* marked with unprecedented changes that affected nearly every aspect of society. New technologies *were* being popularized. New global relationships *were* being forged. New economies *were* being shaped. But Taylor was hardly addressing the public funding crisis, which was grounded on a lack of national support for public institutions that American librarianship faced. When selecting stories to tell about the past, he ignored the lapses in public funding that were the reason librarianship staggered in the 1970s. In retelling the past, Taylor's solutions likely entrenched and reinforced the public funding problem. His narratives, drawn from the postwar, encouraged the library schools to offer training for informational work in the private sector. His ideal information professional was "a person who works for a fee and a person who can step into a variety of situations."[126] In Taylor's view, new information professions simply required some startup capital, a modicum of courage, and the willingness to take risks.[127] Instead of addressing state support problems, Taylor used language indebted to information science to entrench different memory commonplaces within librarianship. In practice, this meant Syracuse students, and later other students, would now learn new practices, ones increasingly invested in the commonplaces of postwar information science.

The syllabus, the school's name, and the bulletins, along with the other program-wide changes, distributed a new founding myth of memory for Syracuse University's School of Information Studies. Libraries were becoming an extinct part of the information environment, and the profession needed to evolve or die.[128] Those who understood how to effectively "gather, evaluate, analyze, organize, store, retrieve, and communicate information"

would rule those who could not.[129] By placing librarianship into his new geography, Taylor managed to alter the traditional values of librarianship with tropes of memory drawn with insight from information science, drawn from his prelibrary World War II spy work to librarianship. Taylor had "lived in a sea of information," was "slightly paranoid" and constantly questioning his "ability to interpret the signals (i.e., information) and to estimate their validity."[130] Now, he asked a profession of mnemonists to do the same. He drew from the same backdrop but transformed it from a wartime strategy of intelligence agents into a peacetime profession of the public. Instead of intervening in publics through libraries, students would learn to manage and evaluate the rapid streams of changing information.

Today, Syracuse's School of Information Studies, recognized as the "Original Information School," is joined by ninety-five peer institutions, committed to "progress in the information field."[131] The awkwardly named iSchools organization, a "consortium of Information Schools," now rivals the intellectual domain of the ALA. Of the ALA's sixty-one accredited members, thirty-five also share membership in the iSchools organization. The ones that do not are frequently smaller and lack the ability to commit to the recurring annual fees. The iSchool programs that do not intersect with the ALA are often housed in units for computer science, mathematics, information technology, or more recently data science. The hybrid iSchools organization points to the increased approaches to memory, those that espouse a practice very different from the one imagined by the founders of the ALA. Meanwhile, ALA-accredited library schools all have hired new faculty from cognate disciplines, teach new information-infused curriculum, and reach new students.[132] In the 1970s, the emerging information science was invited into the institutional homes of professional library education, and the schools developed new perspectives because of it. Commonplaces of particularity, intervention, and deliberateness were put in conversation with commonplaces of ubiquity, automation, and expediency.

Of course, librarianship is not dead, as Taylor had suggested might happen. If anything, it may be richer for the new approaches to memory. Librarianship still struggles for public funding, and sex-based discrimination is still a large problem for practitioners. But in an era marked by waning support in public institutions, libraries retain an unprecedented reputation as one of the bulwarks of democracy.[133] They provide access to publics regardless of race, gender, and class and serve as one of the most important equalizers for a diverse society. Librarianship is still a critical art of memory in the public sphere. Like other sectors of society, it has needed to adjust to new technologies that emerged during the postwar period. Its oftentimes tumultuous relationship with the postwar information scientists has generated

great internal conflict but also pushed the field to adapt to changing contexts. The field and its commonplaces provide important mnemonical guidance to its publics.

Cartographies of Memory

> The ancient meanings survived a paradigm shift during the Enlightenment, when memory moved from ars memoriae to systems of recording and retrieving information. Scientifically and psychologically mediated memory became a key for preserving knowledge; the old practices for memorizing wisdom were disparaged as fraught with error.
>
> —Nathan Stormer, "Recursivity"

In the above passage, Nathan Stormer suggests that the art of memory has often been delegated to those who manufacture information machines while being repressed in rhetorical education. Where was rhetoric during this resurgence of mid-twentieth-century art of memory predicated on the infrastructures of information science? Ed Corbett had just declared it a dead rhetorical canon. In the 1960s and 1970s, many of his peers agreed and abandoned the art, considering it a vestigial waste from the classical tradition. Memory, as a "tradition of inwardness," was no longer imagined an important canon in an age dominated by writing technologies.[134] Although memory is no longer neglected as a part of rhetoric today, the canon still has not fully recovered. Even today, memory is often regarded as an unteachable technê, a taken-for-granted aspect of information systems that record and retrieve information instantaneously.[135] But memory's twentieth-century dismissal was not universal, and in intellectual domains like librarianship, memory remained critical. Writing, the invention that convinced rhetoricians to desert the fourth canon, was the very technology that activated librarianship's and information science's interest. The twentieth-century information crisis acted as a force multiplier that activated information science as a technê of memory.

The new information science that emerged to manage the crisis invigorated librarianship. Early information science professionals adopted operations research as a tool for mapping memory and designing information systems. Motivated by fear and paranoia of war, a small band of intelligence agents codified practices that aligned with their wartime goals: command, control, and conquer information. And so, information science as a discipline would forever retain traces of OR tropes as it translated early tenets into a science of remembering and forgetting. Robert Taylor, for one, imagined elaborate information environments so that he could teach others to

design, manage, and evaluate information systems and services. The techniques of OR—quantification, abstraction, engineer, logistics, and more—had been strategies to cope with the atrocities of war, and now, they conquered floods of postwar information. The techniques were predicated on commonplaces of ubiquitous, automated, expedient information. Across the United States and the rest of the world, information scientists codified a regime of approaches.

The information scientists had no dependable home until they were invited into professional spaces of librarianship. Librarianship provided institutional space and a labor force to substantiate the new information theories and technologies in everyday practice. Librarianship also acted as a counterbalance in grounding information science's untested approaches to memory. Information science as a field tended to produce abstracted models of perfect information, like when protoinformation scientist Paul Otlet attempted to document every last bit of knowledge in the world, and librarians drew attention to the practical realities of new theories and technologies. Librarianship's humanistic commonplaces tempered the overly idealized approaches of early information science. Practitioners in the new memory discipline adopted the new automated technologies while also developing a deep wisdom about their limitations. Librarianship and information science consequently entered into a critical dialectic in which they pushed each other into new intellectual space. For each new technology introduced by information scientists, librarians would counter by advocating for lived practice. By adopting the new technologies, information science also forwarded new technologies that changed the mnemonic horizon of publics. Librarianship's interest in managing public memory and information science's fervor for postwar technology forwarded an art of memory that was both ancient and modern.

The story of information science's introduction into librarianship highlights the politics at the interstices of memory infrastructures and mnemonic technê. Both librarians and information scientists succeeded in coproducing memory infrastructures, the networked resources of public memory, while they also coordinated mnemonic technê, the particular uses of memory infrastructure. Before information science's popularity, librarians had developed technologies to govern the cultural record, galvanizing the field with the motto, "the best reading, for the largest number, at the least cost," through libraries and library service.[136] Professionalization enabled librarians to practice some control over public memory technologies. Early mnemonic technê, like the Dewey decimal classification, altered the possibilities of public memory practice. Dewey decimal classification coordinated epistemological access to memory's coffers. Each new mnemonic technê subsequently shifted the affordances of extant infrastructural regimes. The

introduction of INTRAN at Hampshire, for example, changed the affordances of Hampshire's local library operations. INTRAN realigned the library's mission while providing a tool that practiced memory through new affordances—at different speeds and places. Each new mnemonic technê realigned the reach of memory infrastructure; each memory infrastructure provides the context of each mnemonic technê: text and context, foreground and background, personal and public, mnemonic technê and memory infrastructure. The next intermezzo highlights how even a technology like the library book truck creates often unpredictable tensions in memory's infrastructure. Those who toil at the interstices of memory find themselves embroiled in a politics of background and foreground.

Conflict and tension marked memory's politics as librarianship and information science clashed in the same institutional spaces. Information science's union with librarianship introduced many hurdles for the profession. Although today many of the early growing pains have faded,[137] the second half of the twentieth century has been a time of upheaval, foment, and conflict for librarianship and information science as the two fields learned to share institutional space and aligned their communities and values. Initially, many information scientists did not respect the work or historical legacy of librarianship. A field dominated by men, information science carried blatant sexism with it as it arrived in library schools that had already been marginalized by universities that saw them as women's schools. Almost immediately, those aligning with information science occupied positions of esteem and garnered higher salaries, largely because of the sexism that pervaded memory's politics.[138] Consequently, librarians often felt like their space had been invaded even when their profession benefited from the new arrangement in numerous ways. Taylor was accepted at Syracuse because his ideas were thought to protect the program from demise. Librarianship benefited from new memory techniques invented by information scientists. Information scientists benefited from the humanistic perspectives afforded by librarianship. Today, the two approaches are often seen as a single discipline that embraces interdisciplinary approaches to the administration of memory materials. Plurality has made for a stronger working relationship, professional values, and institutional space, but there still remains a memory politics.

The historical clash of librarianship and information science happened during a critical postwar window when funding for higher education was golden. The fields developed a rich perspective because of it. Rhetoric's dismissal of memory during the same time period came at a cost. Widespread social upheaval established by global war tectonically shifted nearly every aspect of life on earth. Most historians now agree that the two World Wars did more to transform communication technologies than any other event

before or after. The postwar period was a critical moment when many technological black boxes were still exposed. The postwar period was marked by a technological gold rush that produced new information tools. Emerging technologies were just starting to calcify and lay foundations for information infrastructures that would become lodged in acts of public memory. These new technologies may not have immediately lent themselves to performing speeches or composing essays, but they coordinated the mnemonic horizons of publics who spoke and wrote.[139] Developing memory infrastructures of the postwar calcified sociotechnical boundaries for public memory practices.[140] Today, there is inveterate interest in better understanding how large-scale infrastructures and their algorithms, classifications, protocols, and standards transform communities and their discourse. The fields that participated in the initial boom developed rich vocabularies for understanding new informational black boxes, often because they helped build them.

What sort of knowledge could rhetoric possibly add to memory fields that have been so well developed? Unfortunately, many rich, nuanced perspectives on memory elide concern for the relationship between action and memory. Many of rhetoric's rich, nuanced perspectives on situated communication elide the work of memory infrastructure. Knowing the difference between informational matrices and arrays says little about how the algorithms work over publics. Knowing that Google searches are racist, sexist, and classist says little about the nuanced techniques that fortify and entrench social relationships. There are now hundreds of memory palace–like technê black-boxed in information machines that were constructed without the insights of the rhetorical tradition. Rhetoric draws out transformations of meaning and material. Rhetoric can draw attention to the changes that occur as mnemonic technê percolate through memory infrastructures and vice versa. The previous intermezzo on Zatocoding provides one of these operations that depicted the techniques that were scaled into larger memory infrastructure. As Zatocoding and similar technologies became widespread, they embraced mechanical technologies that simultaneously inserted a transformation in what could be misremembering—the wrong documents could be retrieved because of a technological necessity. In the following intermezzo, I demonstrate how the library book truck transformed the relationships established through the granularity of memory via its materiality. Book trucks crafted one of the coins of memory's realm. Rhetorical knowledge of memory highlights transformations between the public and the personal.

Today, many information scientists continue to develop theories in the name of controlling and predicting systems. However defined, in each system, information becomes the standardized coin of memory's realm, the

hidden substrate undergirding what should be remembered or forgotten. The information science approaches do not exhaust every aspect of rhetoric's formulation of memory, but rhetorical practice is saturated with information systems—archives, libraries, online databases, and information networks. Information systems store and organize many of the materials available for rhetoric. Indeed, the ubiquity of information systems was one of the reasons why many thought memory to be a dead canon. The systems of information science have acted as invisible infrastructures in rhetorical ecologies, providing the material available for circulating and ambient effects, affects, enactments, and events.[141] But memory is only dead if one considers the act of building public memory spaces to be insignificant for rhetoric.[142] The twenty-first century demands new hybrid rhetorical approaches. In the next chapter of this book, I elicit a new myth of rhetoric memory, one that brings together personal remembering and forgetting with publics.

INTERMEZZO

Dorothy Crosland's Book Truck

> Wood does not go through metal, Helen.
>
> —Dorothy Crosland, from Bain interview with Helen Waltzer

Old memory tech does not die; it provides the blueprints for the future of memory politics. Information science machines may have been changing the mnemonic infrastructure of librarianship, but librarianship's existing technologies critically shaped the politics of information science's future.

Back at Georgia Tech, Crosland glared at Helen Walzer, the diminutive New York native she hired as a cataloging librarian. Crosland had just marched out of her office into the staff area. Walzer remembered that Crosland always *plowed* when she left her office, usually because she was on important business. So when the library director's door opened that day, Walzer rushed to move the book truck (often popularly called a book cart) she was using because it was located in Crosland's path.[1] In her haste, Walzer accidentally slammed the truck into a nearby metal cabinet, damaging both the wooden truck and the cabinet. Crosland glared at her: "Wood does not go through metal, Helen."[2] The statement sent chills through Walzer, who had for the most part become more or less accustomed to Crosland's forcefulness. She thought the seemingly innocuous statement captured Crosland's approach to her Georgia Tech library: curt, forceful, and determined.

Library book trucks like Walzer's foreground key issues of public memory. First, memory technologies are not simply storage and retrieval devices.[3] They occupy public space. They can be obstacles, furniture, eyesores, and more. Second, memory technologies are political.[4] Because they occupy space, they provide more access to some people than others, and

consequently, technology is a lever for memory's practices. Those nearer the lever often wield a sort of political authority. Third, memory technologies participate in an affective ecology.[5] They stir qualitative experiences, affordances, and dispositions. A library book truck, bookshelf, or card catalog ensconces acts of memory differently from how databases, hard drives, and interfaces do. Their material modifies the qualities of remembering and forgetting. Finally, memory technologies reconfigure the time and spaces of remembering by creating bottlenecks, tempos, and other logistical demands.[6] A book truck only moves so quickly but can carry quantitatively more material for memory than a one-body sneakernet. The truck introduces new privacy and security risks by exposing the materials being ferried (a truck full of books is harder to hide than a pocketful of digital notes, and both are immune to the security problems of network attacks). The trucks carry fewer data bits than a digital network but they transport a wider variety and heft of physical materials. The trucks are vehicles of public memory, both literally and metaphorically.[7]

Walzer probably was not imagining how critical her book truck was for larger issues of public remembering and forgetting. But the humble library book truck highlights the broader stakes involved in technologies of public memory. Moreover, the trucks provide a critical distance that puts similar issues in sharp relief. The trucks are easier to follow than network traffic, and they still change the landscape of memory by changing what is available to remember. Moreover, the trucks are relevant today, having remained a cornerstone of library technology. They still transport books, papers, computers, and more. Librarians fight over them, often hoarding them so they can better complete their work, and librarians of all sorts celebrate them as iconic of the profession.[8] Even as more memorable technologies like the card catalog have disappeared, the book truck has remained part of library practice.

Patented in 1899 by David E. Hunter, the book truck became one of the most popular items in Melvil Dewey's Library Bureau Catalog, which marketed office equipment primarily to libraries. Dewey promoted the trucks as "one of the most useful devices ever made for an active library."[9] Many businesses and professions bought Dewey's office equipment, but the library book truck remained popular primarily in libraries.[10] Other library equipment—cards, catalogs, custom-made cabinets, and cases—lent themselves to organizations interested in circulating, organizing, and storing internal records that were accessed by a small number of employees. Businesses valued Dewey's catalog cards, shelves, and filing cabinets for their institutional records, receipts, and transactions.[11] Businesses less frequently needed to transport materials as heavy or cumbersomely shaped as books.

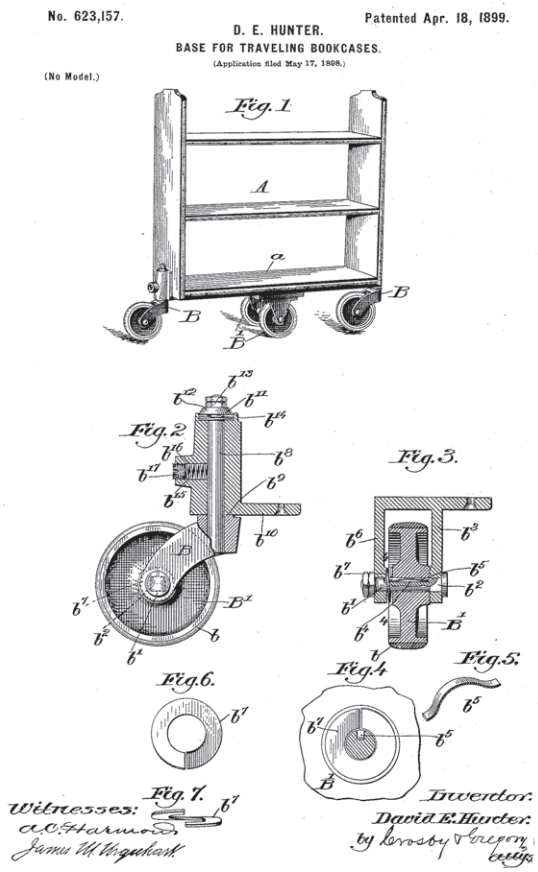

Figure 5. An image from the patent for David Edgar Hunter's 1899 Traveling Book Cart. Source: Hunter, Base for Traveling Bookcases.

Before the popularization of the Internet, libraries, archives, and their books were considered the storage space of memory. Libraries differed from businesses in that they needed to continuously circulate books throughout their communities, shelving, unshelving, and reshelving millions of volumes both within and outside the library. The trucks provided a "traveling bookcase" that solved some of their more pressing mobility problems.

Dewey's early catalogs point to how the truck was custom made to solve library problems. At forty inches wide by forty inches high by twelve inches deep, and with three shelves, the trucks could hold the equivalent of six shelves of books: a full standing bookshelf (fig. 5).[12] Their small rubber casters made for a quiet ride but kept the trucks from rolling quickly on outdoor

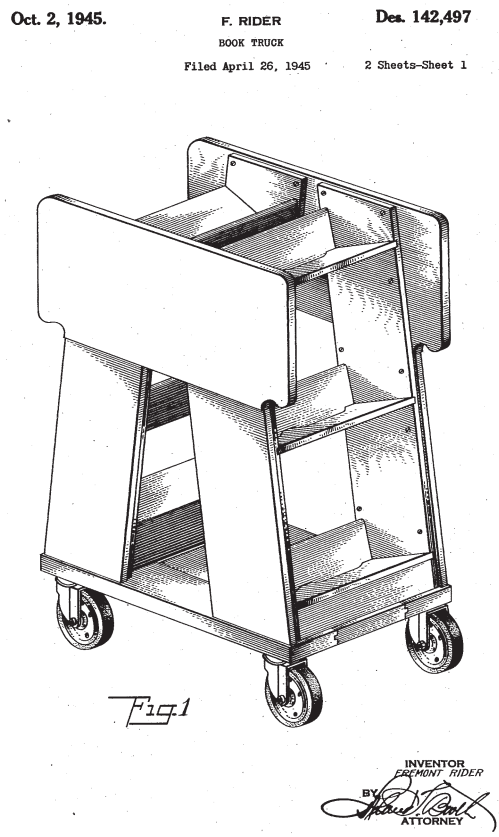

Figure 6. An image from the patent for Fremont Rider's 1945 Book Truck. Source: Rider, Library Book Truck.

surfaces, confining them primarily to inside use.[13] The book trucks have been sold in a variety of different models, some with fewer shelves, made with different materials or different wheel sizes. They can often transport between two hundred and five hundred pounds of books, but when fully loaded, the wheels provide just enough leverage to move the truck—slowly. Despite their variations, trucks are better for moving a shelf full of books than carrying them by the armful. But in the day-to-day of library work, this was not a problem. Speed was not an issue so much as the ability to move large numbers of books through the quiet, indoor library spaces. The trucks support the type of memory infrastructure that had developed US libraries.

Libraries changed over time, though, and during the wartime information explosion, Fremont Rider, a librarian, theorist, and visionary of library services, updated the book truck.[14] Rider was a student and admirer of

Dewey, nearly as committed to efficiency as the famed decimal classifier, and in addition to working for Dewey, he also invented a number of technologies to make libraries more efficient.[15] One of Rider's inventions was his updated truck (fig. 6). The wheelbase for his truck was sturdier and more stable, and he also ingeniously steadied the truck's freight by adding a fortifying wall, angled bookshelves, and handles. His updates made it easier to navigate the trucks in confined quarters. His truck was approximately the same size as the previous models, but his modifications made it easier to load and unload the trucks directly to the library's bookshelves. The shelves on his truck were angled so that someone could easily grab a book and see its classification number while standing. His modification was immensely useful for shelving books that had been removed from the stacks.

What do Rider's updates tell us? For one, they made it difficult to use the trucks for anything other than books. The older trucks consisted of rows of shelving on wheels. The original 1899 patent was for a "base for traveling bookcases." Because the trucks consisted of flat shelves, they could hold any item that could be set on a flat surface—records, catalogs, bills, trinkets, and more. This was incredibly useful for librarians working with paper files because the trucks could be positioned near desks as auxiliary workspaces. But Rider's "book truck" fitted the space to primarily carry books. Objects not shaped like books would easily fall to the floor because of Rider's angled shelves. The minor change limited what the technology could be used for, which narrowed the types of memory objects that could be moved around libraries. While Rider no doubt saw this as an improvement because it enabled speedier reshelving, he was simultaneously limiting what could be reshelved. Books were prioritized as memory's coin of the realm.

But why Rider's intense interest in creating book technologies? In addition to being a librarian, Rider was an early theorist of the information society. In 1944, he noted that research library collections doubled in size every sixteen years, some every nine and a half.[16] He calculated this with statistics collected directly from libraries he was familiar with. The libraries kept statistics that measured the size of their collections in number of books—primarily because books were an iconic part of libraries and easy to count. For instance, Rider noted that Dewey's own Amherst had 5,980 books in 1831; 13,700 books in 1849; 38,533 books in 1876; and so on until 1938, when it housed 213,810 books. Rider thus was familiar with seeing an information problem as a problem with growing collections of books. Of course, this posed a serious problem for any theorist of the information society, since Rider's unit of measurement represented just one type of memory artifact. Still, he reasoned that every book was equally valuable and that a collection of books added up to a whole of memory problems. The

classical theorists of memory would likely not have agreed to that approach, since their memory aids were carefully cultivated. They winnowed away materials that did not help them perform their civic duties. Rider, though, responded to the information explosion as though it were simply a problem of too many books taking up too much space, not a problem of considering how to only keep the materials useful for imagining the future.

Each futurist of technology predicting an end of memory tends to work with his or her own preferred measurements, which they use to shape the problem. Modern theorists tend to think in bits and bytes, much the way that mathematician Claude Shannon did when he was inventing information theory just before World War II. Predictions and problem solving tend to align with what sorts of problems are foregrounded by the frames of the problem. Information theorists working with bits are not concerned with the amount of space available in libraries like Fremont Rider was. They are more often concerned with the amount of space available on computer hard drives. This is one of the key transitions supported by information science as it was beginning to gain momentum in the United States. A new profession, with its own preferred artifacts and ways of managing memory, was building an infrastructure that was reshaping memory's coin. Not only this, but it was translating the materials that libraries often worked with. Instead of books, they worked with a ubiquitous mass of information. When the information scientists emerged, the new labor force brought a regime of tools that shifted what was considered worth remembering, how it got remembered, and who would have access. They laid groundwork to support a new infrastructure of memory, one that would need to be irrigated rather than shelved.

Rider went about inventing technologies that made it easier to manage books as the primary coin of memory's realm. His modified book truck was a good example, but he also invented other technologies including the microcard, a competitor for other storage technologies like microfiche and microfilm. The microcard changed the size of books by shrinking their pages by 99 percent. Because of its size, the microcard also required a large reading device, which was usually only available in libraries, and consequently, this invention also changed how and where memory could be practiced. He later noted one of the reasons that microcard technology failed: "We tried our hardest to treat them in the way we treated books. And we became annoyed when this didn't seem to work out very well."[17] Microcards did not fit into existing library practices. Librarians and library users were never motivated to make them work, despite their advantages. So Rider's microcard never caught on. Indeed, this was the case for his book truck as well. When librarians needed to decide on spending money, they favored the older, more flexible trucks to Rider's speedier, sturdier truck. Rider's truck is rarely

used today, and the infrastructure of memory's mobility remained indebted to past library use.

Today, despite Rider's failures, the book truck still remains an important part of librarianship. As many technologies have come and gone, book trucks and the books they carry have remained stalwarts of librarianship. Often when arguments are put forth about the future of libraries, they overlook this fact. Yes, libraries can change, but can the ethos of librarianship change to accommodate a truckless and bookless future? Trucks are part of what it means to identify as a librarian, despite how useful digital texts have become. The trucks do not just transport materials from one space to another; they scaffold the very identity of librarianship. Annual Book Cart Drill Competitions are good examples of how central they are. Each year, the American Library Association hosts a drill competition celebrating the truck. In it, competitors from across the nation dance to elaborate routines while twirling a host of book trucks. While the competitions are tongue-in-cheek, the point is clear. Trucks are part and parcel of the profession. To take a truck away is to change the affective ecology of librarianship as a memory profession.

When Crosland told Walzer that "wood doesn't go through metal," she was not just upset about the furniture; she was condemning Walzer for damaging equipment that represented the mission of librarianship. As a profession that often considers itself an "apostle of culture," a "missionary of the book," and a keeper of the cultural record, the truck garnered the same sort of gravitas from Crosland that others would afford to the important events of the past.[18] Walzer never forgot the transgression with Crosland, and she respected her more because of it.[19]

5

MEMORY'S COIN

> Knowledge infrastructure never disappears from view, because it functions by infrastructural inversion: continual self-interrogation, examining and reexamining its own past. The black box . . . is never closed.
>
> —Paul Edwards, *A Vast Machine*

During the Cold War, information science transformed American librarianship, but memory professions across the globe were also changing. Postwar technê transformed memory practices in numerous and unpredictable ways. Modern computer science emerged as a codified discipline when war algorithms were black-boxed in the rapidly developing calculating machines. Psychologists normalized new models of mind and therapies that adopted computational metaphors. Educators produced new standardized curricula to prepare students for the oncoming information society. A knowledge economy replaced the industrial workplace. World War II realigned the social fabric, and war changed mnemonic technê of remembering and forgetting for the increasingly globalized world. Contemporary critics often overlook this memory boom, even though it fundamentally changed what could be considered remembering and forgetting. Still, the upgraded memory infrastructure was built on a much older art of memory. Computers and algorithms were just one particularly salient aspect of a longue durée of memory produced wherever technê were linked with networks of memory resources.

The postwar did provide a short-lived crescendo in that longer historical process. World War II accentuated an art of memory that had always been bubbling, one evident even in rhetoric's origin myth of memory. Recall that to remember the dead at Scopas's party, Simonides invented a mnemonic trick, his method of loci. The method of loci made use of his available mnemonic infrastructure: the architecture of Scopas's banquet hall. The method depended on the affordances of available architectural infrastructures.

Simonides's loci required spaces he had experienced personally. Of course, the method also depended partially on his mental shrewdness, which was why his technê involved human labor. Simonides blended the architecture and his mental selection device. His new mnemonic technê was added to the numerous others adopted by classical poets. Simonides's celebrated achievement is the mnemonic strategy that could be ported from architectural space to architectural space. Today, mnemonists balance numerous configurations of mental gymnastics and machines, some involving monuments, computers, or Dewey decimals. Public memory is always the shifting space between a mnemonic technê and the background networks of available resources. Memory is constantly reinvented and practiced anew as new technê collide with changing infrastructure. The affordances of that collision set the horizons of memory.

The history of librarianship and information science highlight the back-and-forth relationship of technê to infrastructure. The history is illustrative, and rhetoric benefits from new orienting myths to highlight infrastructure as part of practice, one that locates memory rather than fixes the weaknesses of natural or artificial memory. This chapter crafts that narrative by reframing two of rhetoric's oldest myths of memory. Simonides Retold combines the Simonides and Juno Moneta myths to narrate a rhetorical art of infrastructural memory. The original Simonides myth provides examples of technologies used to remember the past (mnemonic technê). Juno Moneta points to the networks of power (memory infrastructures) that enabled and provided for particular mnemonic technê. In my retelling, Simonides's mnemonic technê are illuminated anew when placed against the backdrop of infrastructures similar to Juno Moneta's. Together, Simonides and Juno Moneta plot a myth for a practiced art of memory.

In the vernacular, *coin of the realm* refers to any material deemed valuable because it can be traded for any other goods and services. National currencies are modern examples. Dollars, kroners, yen, or dinars are not inherently valuable: they are bestowed with value by particular communities that find meaning in the items the money can be exchanged for. Much as money is a "creature of law" so is memory. Institutions, nations, and publics produce infrastructures that reinforce particular boundaries of memory. Memory's coin consequently points to the boundaries of communities. Coin ceases to have value outside of those communities, at least until it is translated into new currencies of remembering. Coin marks memory's tempo, providing friction for when and where transactions can occur.

We need to complicate the canonized Simonides myth to draw attention away from the misleading pieces that the rhetorical tradition has lionized. Several anomalies in the story make more sense when juxtaposed

with the building of the Roman Temple of Juno Moneta. My retelling ends by pointing out several theoretical points that clarify potential heuristics for the modern production of memory, rhetoric, space, and time. The kernel of public memory, memory's coin, mnemonic technê, and memory infrastructures exists in rhetoric's founding myths. This hybrid myth paves a previously blocked path for memory, one that offers a new productive rhetoric.

In this chapter, I retell rhetoric's Simonides myth to highlight how infrastructure, technê, and coin transform collective memory. By doing so, I bring often backgrounded aspects of memory work to the foreground—material, affect, and shared infrastructure. For example, in the previous intermezzo, the book cart doubled not only as a vehicle for distributing memory's coin (books) but also was itself affected by the politics of an organization. My own experience as a librarian reinforces this problem. Book carts are inherently valuable. The library employees who control them are able to better accomplish their goals. This is all fine and good, but where is rhetoric? In this chapter, I use Simonides to make the connection between infrastructure, technê, coin, memory, and rhetoric.

Simonides's Unfounded Memory Palaces

Simonides was a Greek poet living between 556 and 468 BCE, making him just antecedent to Socrates (470–399 BCE), Isocrates (436–338 BCE), Plato (428–348 BCE), and Aristotle (384–322 BCE). He is listed among the nine lyric poets canonized by the Greeks. Born on the island Ceos, he moved to nearby Attica around 526, drawn by the prospects of being paid for his poetry. When his primary patron, the ruler Hipparchus, was assassinated, he fled to Thessaly, where he benefited from the compensation of several noble families, most notably the Scopadae. Although little remains of his actual writing, Plato's *Protagoras* references some of his poetry as an exemplar of the poet's competence and wisdom. Most of what is known about Simonides is written about him rather than by him, and his peers revered him as one of the greatest poets of his era. His patronage in the court of Scopas of the Scopadae drew the attention of Cicero and Quintilian as they wrote about his art of memory.

Cicero and Quintilian provide the oldest accounts of the Simonides myth.[1] Simonides's tale was apparently such a well-known myth that both used it to illuminate memory as part of their rhetorical handbooks.[2] In both accounts, Scopas hired Simonides to compose poetry to honor an unnamed boxer.[3] Simonides composed the work in a fashion characteristic of the Roman panegyric, the typical speech of praise taught as part of Greek education. Simonides's panegyric contained numerous references to the Dioscuri

Castor and Pollux, the twin Gods of athletes and athletic contests. Quintilian and Cicero both noted that Simonides's invocation of the Dioscuri was part and parcel of the genre. The Dioscuri were a familiar chorus of the panegyric, especially one dedicated to boxing.[4] Scopas disliked the references to the Dioscuri, though, and refused to pay Simonides the full amount for the poem, suggesting the poet should collect his due from Castor and Pollux since his poem was clearly for them and not him.[5]

Despite the conflict, Simonides attended the banquet, where his poem was to be performed after an extravagant feast. During the meal, Simonides was called away by "two youths who had ridden to the door urgently."[6] The two youths were alluded to be Castor and Pollux, even though both Cicero and Quintilian questioned that part of the story. Simonides left the banquet to meet his visitors but attested to have never found them. In his absence—"he had scarcely crossed the threshold on his way out"—the roof of the banquet hall collapsed, killing everyone inside.[7] The dead were all disfigured beyond recognition, and only Simonides could identify the bodies so their relatives could bury them. Quintilian and Cicero told readers that Simonides was able to recall the victims because he remembered where each person had been sitting at a table. Simonides eulogized the newly buried guests. This myth motivates the method of loci as part of the Roman rhetoric. The technique was also described in *Rhetorica ad Herennium*, sans the story about Simonides.

Rhetoricians of the classical era, under the direction of Cicero, Quintilian, and the author of the *Rhetorica ad Herennium* used the memory palaces technique to codify rhetoric's fourth canon.[8] The resulting approach to memory effectively embraced several theories of mind, the most prominent being the division between natural and artificial memory. Natural memory consisted of inborn capacities, those "born simultaneously with thought," while artificial memory supplemented natural memory with technical precepts drawn from the method of loci.[9] This split roughly corresponds to Aristotle's division between inartistic and artistic proofs, the former being concerned with material naturally available as evidence, the latter needing to be invented to supplement the former.[10] The natural/artificial split made memory a teachable skill of rhetoric and motivated interpreters of the Roman handbooks to translate the codified method of loci as a technê.

The artificial memory method of loci consisted of several distinct parts: the first was identifying loci for each part of a planned speech. Loci were places, which Cicero described as "localities" and Quintilian called "sites." The Roman rhetoricians advised choosing loci that were striking, so as to be easily remembered. They also suggested that the categories should be different enough so they were not easily confused and that visual images

work the best because the "keenest of all our senses is the sense of sight."[11] Once striking images had been selected, they were to be mentally organized in a known loci so they were easy to recall. Although the anonymous author of the *Rhetorica ad Herennium* did not mention Simonides, he distilled precepts similar to those attributed to Cicero and Quintilian. In place of the myth, he offered a bizarre example of the complete mnemonic that involves remembering court testimony about a man poisoned for his inheritance money. The example involved a mnemonist imagining a sick man (the dead) holding a cup in his right hand (the poison) and a pad in his left hand (the inheritance), while holding a ram's testicles on his fourth finger (noting eyewitnesses). In this case, the loci were translated as different objects in a scene. All three authors treated the method as widely familiar and offered only a cursory description, as though it did not need further explanation. This codification of memory was widespread.

As the Roman authors expanded on the method of loci, they further explained its principles. Both Quintilian and Cicero noted that it was not helpful to associate specific words with loci, which was, ironically, what Simonides had done during the story's act of recall. Cicero and Quintilian both emphasized matter or vivid images over specific words. Cicero said that the technique could be used to remember speeches word by word, but he did not recommend doing so for anything other than practice.[12] Another tip was that the memory places needed to be "held together as it were by a sort of outer shell" with striking backgrounds.[13] The collection of "shells" becomes the mnemonist's unique memory palace. The example from *Rhetorica ad Herennium* used "shells" associated with a sick man, a cup, a pad, and a ram's testicles located within a bedroom. The author offered other examples of what constituted a vivid image: lunar eclipses are more desirable images than sunrises or sunsets because the mind is aroused by exceptional wonder.[14] As a unit, then, the authors described an art of memory that consists of supplementing natural memory with a technique that involves ordering striking visual images with associated ideas. In later decades and centuries, the descriptions would be twisted and turned to make sense of a wide variety of memory practices, ranging from note taking to graphic design architecture.

Are Cicero's and Quintilian's versions of Simonides more elaborate than they need to be? If the classical mnemonists simply wanted to discuss a memory trick, it does not seem like they would need to go to the trouble of retelling nearly as much of the Simonides story. The author of *Rhetorica ad Herennium* certainly did not do that. There are also several details of Simonides that were mentioned but never fully explained. The fact that Scopas shortchanged Simonides seems an extraneous detail for the introduction of

a mnemonic device.[15] Castor and Pollux made a notable appearance at the banquet despite being relatively unimportant for making sense of the mnemonic technique. Complicating matters, both Quintilian's and Cicero's handbooks are bathed in a style that does not lend to straightforward interpretation. Quintilian, for example, ended his story by doubting how well the method of loci actually works.[16] And finally, there is also a problem with the overlapping notion of loci and its closest Greek translation—topoi—which Aristotle distinguished as a place "under which many enthymemes fall."[17] Are we really seeing what the classical authors wanted their audiences to see?

Simonides Retold

The memory p(a)laces myth is inferred from one miniscule part of the Simonides story: he remembered banquet hall positions to remember identities of the dead. Cicero wrote that Simonides's method "was enabled by his recollection of the place in which each of them had been reclining at table to identify them for separate interment."[18] This means that a position in a banquet hall would suffice as a loci, but that does not reconcile with either Cicero's or Quintilian's suggestion to choose striking visual images of locations. The image of a person in a banquet hall would be a rather mundane image, especially for a worldly poet like Simonides. Also, both Quintilian and Cicero suggested that the technique involved ordering the loci, but Simonides would not have been involved in arranging the guests or their positions in the hall. Further still, this story does not lend itself to one critical difference between natural and artificial memory. Artificial memory needs to be trained and practiced, which is why it was included as a canon of rhetoric. Simonides, though, remembered by happenstance after the banquet hall collapsed. We are to believe he discovered the method of loci by accident.

The meaningful parts of the myth lie elsewhere then. Both Quintilian and Cicero wrote about the story as though it is well-known and offer only pieces of it for an audience explicitly noted as being familiar with the story.[19] Several details lend themselves to a different reading. One clue is the character of Simonides, a poet who was remembered as much more than just the inventor of the memory palaces. In addition to his method and his prestige as a canonized poet, he was also legendary as a poet preoccupied by the economics of poetry. A significant corpus of his verse was devoted to the importance of payment for verse,[20] and among his peers, Simonides symbolized the struggle for artistic compensation better than any other classical figure.[21] His obsession was so legendary that he was often ridiculed for it.[22] Aristophanes used him as a symbol of artistic greed in his *Clouds*, comparing the aging Sophocles's desire for wealth to the extraordinary greed of

Simonides.[23] Aristotle's *Rhetoric* also reinforces this view of the poet as it depicted a dialogue in which Simonides was asked if it is better to be wealthy or wise, and he answered that it is better to be wealthy because the wise are servants to the wealthy.[24] This facet of the poet's legend is left unstated during Cicero's and Quintilian's memory palace retellings, even though it is likely critical for understanding the squabble between the poet and his patron, Scopas. Simonides was never paid what he was owed. Why was his outrage never articulated? Why did he not seek any recourse? We are to understand, if anything, that the gods paid Simonides by saving his life, but religion seems an inadequate substitute for revenge.

The inclusion of Castor and Pollux provide some clue for understanding how money was involved. In Quintilian's retelling, he specifically noted that the parts about the Dioscuri were fictitious, that the twin gods should be symbolic of something else. In both Quintilian's and Cicero's retellings, Castor and Pollux *only* appeared when money was being discussed, first when Scopas refused payment and second when they paid their debt to Simonides by saving him from death. The twins symbolize currency. There is more than mere symbolic allusion to suggest the link too. The first Roman coinage was the denarius, and it remained so for four and a half centuries.[25] The front of a denarii pictured the head of Roma, the personification of the Roman state. The backside of many of the earliest denarii pictured Castor and Pollux on horseback. The first coins of the Roman republic carried the image of Castor and Pollux.[26] While the Roman coinage, minted after Simonides's death, would have been unknown to the poet, and while the coins carried other images by the time of Cicero, it is reasonable that the story's earlier allusions to memory and money had been transformed during popular retellings of the story. Or that Castor and Pollux still symbolized money by the times Cicero and Quintilian wrote their handbooks.

If Castor and Pollux are not just extras but symbolize the movement of money, they change the tone of the myth. Readers have often inferred that the collapsing roof was the will of the gods, shoddy architecture, and the poet's divine compensation. That is quite a coincidence. But if the Dioscuri symbolize money, they point directly to the reason for the rubble. Simonides, an unpaid poet and the sole survivor of an "accidental" slaughter, likely had something to do with the demolition. The enraged poet took his revenge by razing the home of a client who refused to pay. He even had an alibi: the poet was contracted to give the boxer's panegyric. The myth also provides the reason he did not die with everyone else: he left because he was "mysteriously" called away, a fact that no one else could confirm.[27] The collapsing roof warranted contracting him (payment) for a set of eulogies, which would result in his payment for his poetry. He was the patron poet of the

Scopadae, making him an apt choice. Contrary to the Roman writers, Simonides was not repaid with his life; he took his payment by dropping a roof on the guests and collecting a fee for their eulogies.

This art of memory projected onto the Roman handbooks is only one part of a larger art of memory. It is unlikely that the simplistic method of loci exhausted the art of memory adopted by Quintilian or Cicero. Quintilian doubted the technique even worked for memorizing speeches.[28] He was suspicious that it was more than a parlor trick, for good reason. Quintilian himself never had any luck using the method of loci of oration, and Simonides never had to prove that it worked in the myth. He simply claimed that he accurately remembered the dead. Simonides would not have needed to demonstrate the precision, since no one else could have verified the data. All the witnesses were dead. He could have jumbled every identity, and the families of the dead would not know because the details of the banquet were a mystery to everyone but the poet. As a plot point, this enabled Simonides to contract poetic employment as part of his revenge.[29]

Quintilian may have doubted the method, but it is not necessary to discredit it in its entirety. The method of loci was an important part of Simonides's approach to memory. Many, including competitors in today's World Memory Championships, have used it successfully. But it would have been one technique in a more encompassing art of memory that lyric poets had practiced for centuries. Lyric poets were esteemed for their commemorative abilities. They were commissioned for their ability to retrieve a narrative past and provide ritualistic, epideictic remembering. The method of loci would have been particularly useful as one aspect of lyric poetry.[30] It lends itself well to the catalog, a technique popular for recalling long lists of ships, warriors, or horses, palpable even in Homer.[31] But the lyric poets also developed hundreds of memory techniques to perform verses for commemoration. It was likely a technique that Simonides did know as part of his poetic training, even if he was not its inventor. Instead, the Simonides myth can be read as him telling the families of the dead that he invented the technique on the spot, since it would implicate him in murder to admit he had been meticulously studying the positions of the guests before he left.

There is ample evidence in Cicero's account of Simonides to suggest alternative readings. Cicero's *De Oratore* is unusual in that it teaches rhetoric through a dialogue in which interlocutors discussed ideal orators to illustrate rhetorical artistry. Cicero's is a guide for living a good life, which he believed crucial for good oratory, and he taught through philosophical dialogues modeled after his appreciation of the works of Plato.[32] He opened book two of *De Oratore*, which includes the Simonides myth, by noting that the best speaker "could not exist without a knowledge of all subjects that

contribute to form that wisdom and that force of oratory which were seen in them."[33] Cicero believed a talented orator needed to have a rich philosophical education, which included history, civics, politics, ethics, and more.[34] Education was central for the Cicero's orator: "No man has ever succeeded in achieving splendour and excellence in oratory, I will not say merely without training in speaking, but without taking all knowledge for his province."[35] For Cicero, oratory was a part of a virtuous, well-educated life in which the citizen develops a strong sense of judgment, cultivated through education and practical experience.[36] The section of *De Oratore* narrating Simonides more likely offered problems of memory, rhetoric, and education, which extend far beyond a mnemonic technique. Cicero's readers are to work through the dialogues as though they are civic puzzles, providing reason for reading the myth not as the description of a memory technique but as a problem indebted to a more abstract memory function of oratory.

Cicero's passages on Simonides and memory are presented as a dialogue between Marcus Antonius, one of the greatest orators of the Roman republic, and Lucius Crassus, Cicero's mentor. Several other famous orators, including Quintus Catulus, Gaius Julius Caesar, and Sulpicius, each prominent orators of their day, witnessed Antonius and Crassus's discussion. The method of loci story first appears just after Antonius finished describing the characteristics of an ideal panegyric and its opposite, the satire. Antonius noted that both genres were meant to memorialize the subject of the speech. He pointed out that the content of panegyric is virtue and the purview of satire is vice. He ends the section by saying that recognizing the proper genre, of virtue or vice, depends on the prudence of the speaker.[37] This note should be read as foreshadowing for Cicero's readers. The panegyric is the genre that Simonides would be hired for just a few lines later. But before the myth started, Crassus poked fun at Antonius because he, a thoroughly trained orator, already knew how the panegyric and the vice functioned as genres. Antonius replied by saying he was not describing them for Crassus, but that their discussion was meant for their listeners. This is the beginning of a transition where Cicero introduced one of the philosophical problems that are sprinkled throughout *De Oratore*. Antonius stated, "I am not myself as clever as Themistocles was, so as to prefer the science of forgetting to that of remembering."[38] Cicero composed an introduction to a memory puzzle by pointing to the panegyric and satire, both oratories of commemoration, and then introduced a problem about remembering and forgetting. The Simonides myth is a moral lesson, not a mechanical description of a mnemonic device.

Reading Cicero's puzzle would benefit from the rich education he demanded of his citizen orators in Rome. Simonides required supplementary material from the era to provide context for Cicero's puzzle. While it would

be difficult to piece together the liberal education of the orator, the masters of lyric poetry, Simonides's peers, the other canonized poets, provided clues to better understand the memory practices demanded of Cicero's orator. And of these, Sappho provided both points of comparison and contrast that illuminate the value of Simonides's memory. Sappho, like Simonides, was one of the nine canonical lyric poets, regarded as a genius, and often listed as a tenth Muse.[39] She was practiced as a lyric poet, but her style varied because of her gender and social position.[40] Her work, which Cicero knew well, provides context for the Simonidean method of loci.[41]

Sappho's memory loci were not mere mnemonic tricks. Her loci were grounded in locations that "arouse yearning (pothos)" because when "one can feel desire, can yearn for a different future, a just response to a past act, a fair valuation of a leader," then "one can persuade and be persuaded."[42] Sappho's loci were selected to evoke aura and atmosphere rather than mnemonic accuracy, as has been projected onto Simonides's loci. Much of her poetry is dotted with pastoral landscapes to invoke serenity, peace, and beauty.[43] She did not try to recall exact detail to enumerate facts but rather to affect a feeling contingent on her chosen loci. Her space was animated for its affective resonance.[44] Her verse frequently included women and religious space for the purpose of directing and forwarding the political projects enrobed in the affective ecologies of memory. Her memory loci swept objects into a rhetorical space for the sake of atmosphere,[45] and for the ineffable experience of being and feeling in a space.[46] With insight that would predict modern cognitive science, Sappho recognized that readers had to care about the loci of memory to marshal them.[47]

Sappho's verse accommodates the undeterminable spillage of space, "the existence of multiplicity in the sense of contemporaneous plurality."[48] Sappho's loci forwarded polysemous aurae in lieu of precise definitions, which allowed her to attune her lyric to the ever-changing multiplicity. Because she drew on an ineffable sense of loci, her view of memory was not limited by the definitional qualities of association and recall that have often been considered to be the method of loci. Sappho's loci more resemble the Greek *koinoi topoi* or the Latinate *loci communes* to wield a "generative and adaptive memory of substance."[49] Her loci depended on affective backdrops from which memory emerged in situ during each performance. These are the loci of the lyric poet: emotional resonance, not precision. Sappho's loci were likely shared by the other lyric poets who had not been adulterated by the modern mind that valued resonance and authenticity over accuracy and representation. Poets were not actuaries; their memories were not ledgers of loci.[50]

Sappho's views of memory guide a different reading through the Simonides myth. She foregrounded beliefs about memory often lost to modern

readers looking for accuracy over ambiance.[51] In the Sapphic understanding, commonplaces were not just tools for discovering arguments; they provided important resources for structuring the sensibility of the past, present, and future. Memory, invention, time, and space were inexorably conjured through the topoi that became Cicero's loci. Identifying memory's loci was part of a process of developing "a kind of attention, the cultivation of a skill necessary to learning."[52] The memory loci were navigational aids for drawing attention. Selecting loci primed the mind to structure past, present, and future, which consequently provides a storehouse from which to argue.[53] Sappho highlighted an art of memory invested in the cultivation of loci from which an imagined future springs, not a sterile, mechanical practice often associated with the memory palaces.[54] If anything like Sappho, Simonides and the other canonized poets would have adopted similar views of memory, although perhaps not as brilliantly. Their loci would have been contingent on their experience, education, and interests. The interests of the other lyric poets, all men, often focused on war, competition, and battle, while Sappho's loci were pastoral and peaceful. Still, Sappho's memory theory undergirds the poetic approach of the canonized lyricists, including Simonides.

The Sapphic loci clarify an enigma in Quintilian's version of the story. Quintilian had written that the method of loci required a "symbol of navigation" so mnemonists could "have their memory put back on track by the cue of a single word."[55] But neither Quintilian nor Cicero identified Simonides's symbol. Or did they? There is one symbol left largely unexplained in both Quintilian's and Cicero's versions—the Dioscuri, whose presence Quintilian believed to be fiction and who only appeared when money was involved. Quintilian never straightforwardly wrote that the Dioscuri were Simonides's navigation aid, but he did continue to point out their importance in historical retellings of the myth. Is it possible that Quintilian was identifying Castor and Pollux as the poet's mnemonic aid? The twin gods, who were represented on currency, would be a powerful reminder for Simonides. Currency had been a powerful navigational symbol throughout Simonides's life.[56] Not only that, but they would have triggered Simonides to remember people involved when Scopas refused payment. The Dioscuri as symbol motivated the way Simonides remembered Scopas's banquet hall. A room full of people had cheated him. Castor and Pollux were Simonides's poetic navigational aid. The twin gods continually pointed the poet's attention to payment. Indeed, the Dioscuri were important in nearly all of Simonides's memoryscapes. Coin organized Simonides's poetic work to such an extent that his ancient rival Pindar had said he "invented" the idea of remuneration for poetry.[57]

Simonides can now be read for an ethics of selection since, like Sappho, an affective ecology saturated his memory places. The primary difference is that Simonides's were motivated by coin. When Quintilian described the disagreement regarding the Dioscuri in the panegyric, the language about the dispute is ambiguous: Simonides "was told to ask for the balance from those whose deeds he had celebrated."[58] Modern readers have taken the passage to mean Scopas told Simonides that he was not going to be paid. But the passage could just as easily be read with Simonides in the subject position: the poet for hire motivated himself to make sure he *was* paid in full, in any way possible: in other words, Simonides told himself to make sure he was paid. This reading would align with Simonides's lifelong obsession with compensation. This interpretation also makes Quintilian's next line more ominous: "And, according to the story, they did indeed pay."[59] "They" no longer refers to the Dioscuri. In this new reading, it refers to Scopas and his banquet attendees, who paid with their lives when Simonides plotted to have the "the dining hall [collapse] on to the heads of the diners."[60] Simonides's navigational symbol helped him remember Scopas and his compatriots because the banquet hall was dotted with lawbreakers. Simonides's affective loci were mobilized through the rage he felt toward them, and as a result, Simonides premeditated their massacre. His views on money and poetry invoked vengeful loci in him that moved him to condemn the actions of his perpetrators and become their executioner. Revenge drove him. He "remembered" the dead because he had already committed them to memory as he planned a punishment for each and every one.

The entire story from Quintilian is now more coherent under this new reading. When describing how loci are "impressed on the mind," Quintilian instructed that, when "we return to a certain place after an interval, we not only recognize it but remember what we did there, persons are recalled, and sometimes even unspoken thoughts come back to mind."[61] Quintilian noted that places that mnemonists were familiar with were rich with mnemonic ambience because of their personal experience. The method of loci is consequently not just a mnemonic trick. The loci are the lived places and affects of the past, at least as experienced by the poet. They were selected *for* the poet by his lifetime of experience not just *by* the poet simply to perform a feat of remembering. So, for Simonides, when he returned to the place where Scopas refused to pay him, he remembered the offense ("what we did there"), who was with Scopas ("persons are recalled"), and his moral outrage when he was cheated ("unspoken thoughts come back to mind"). The memorization involves the associative resonance from his personal experience, both affective and literal, and the more vivid the better. Loci "are recalled"

because mnemonists have had memories impressed upon them that they embody. Loci called forth the ethical commitments of the poet's historical trajectory of time and space. The poet did not just use the memory spaces; they used the poet to forward their resonance. Memory is past, present, and future.

This new view of loci helps clarify several of the details in Cicero's story as well. He ended his version by summarizing the Simonidean method: "He inferred that persons desiring to train this faculty [memory] must select localities and form mental images of the facts they wish to remember and store those images in the localities, with the result that the arrangement of the localities will preserve the order of the facts, and the images of the facts will designate the facts themselves, and we shall employ the localities and images respectively as a wax writing tablet and the letters written on it."[62]

This passage has been taken to mean that Simonides identified sitting positions and associated them with the identities of the dead. But if the poet did not know the banquet hall was going to collapse, he would not have had a reason to remember the dead in advance ("wish to remember"). Instead, Cicero suggested that those wishing to train memory should be mindful of the localities they visit and images they see. Memory is a lifelong act of cultivation, travel, and witnessing. Memory changes the present and the future through recursion to the past. For Simonides, his obsession with money compelled him to remember Scopas's compatriots as criminals. His mnemonic certainty motivated him to raze Scopas's house. Before the massacre, he had etched his offenders and their positions into his memory. Simonides indeed preserved "the order of the facts," as Cicero said, but not as though they were modern evidence to put in order, rather as the rightful order of the world put into equilibrium. Premodern facticity was unabashedly attuned to the ethical compass developed by the poet. Simonides's art was not a precise matching device (though it could be when called for) but an ordered set of symbols meant to evoke affective resonance. Simonides had a grisly, but vivid, reason for identifying the bodies for their burial. His symbols were evoked by the poet's morality of remuneration. This new reading helps to explain why readers never find out the identity of the boxer, the names of the guests, or the location of the banquet in either Quintilian's or Cicero's handbook.[63] Those details distract and draw attention away from Cicero's lesson on understanding how loci are attuned to right and wrong, virtue and vice, panegyric and satire.

It is now possible to see that Quintilian and Cicero both forwarded an affective memory theory, not a simple mnemonic device. Both tell the story to canonize a Roman rhetorical tradition invested in education and experience as the foundation of speech. Or, as Quintilian put it, "only a good man

can speak well."[64] Both Quintilian and Cicero recognized that what was remembered emerged from affective ecologies honed over a lifetime. The art of memory emerged in the life experiences that orators accrued.[65] Each mnemonist developed their own signature memory loci signifying values that brought their past into the present and future. The politics of memory continually is put in relief as conflicting pasts are brought to the fore. This politics is the real art of memory. While Sappho's loci often resonated with backdrops of peace and pastoral beauty, Simonides's places were enrobed in miserly greed. And so, the method of loci myth also highlights the risks of selecting loci. An ignorant orator may dangerously invoke and circulate memory among a corruptible public. Memory, in this guise, grounded politics and citizenship, as do the rhetorical teachings of both Quintilian and Cicero. The art of memory in the Roman handbooks emerged in spaces between the loci of memory and the moral systems haunting the background. One has to wonder what both teachers actually thought of Simonides.

Coin as symbol is crucial for making sense of Simonides's memory loci. Without its navigation aid, the art of memory is lifeless, lacking in any affective resonance to motivate remembering. Coin, translated as a media of exchange, attunes the moral system of memory. Without the systems of economic exchange that motivated Simonides, he would have never had the desire to remember the dead, nonetheless move to Thessaly to serve Scopas and eventually take revenge on a banquet hall of nobles. The method of loci as an associative technique is inert without an affective resonance that binds loci to images. The affective resonance binds the loci while intervening in the past to change the present and deliver the future. For Simonides, the loci carried the ambience of a moral system that qualified revenge as fair play for financial delinquency. The poet's memory could be purchased for a price, and so, his powers of forgetting could be invoked by violating the ethics of his loci.

Simonides's art was far more than a mnemonic trick, and it consequently introduced a theoretical problem into rhetorical approaches to memory. If a moral system inflected the rhetorician's memory loci, then it is critical to look to the contexts and translator coin that enable those values to emerge in the ongoing practice of memory. These contexts inform the spaces of memory. The previous chapters on librarianship and information science chart this relationship as a practice of public memory, locating memory spaces where "representation immediately covers its own tracks, concealing its own interruption of nonrepresentational identification with hypostasis."[66] Of course, Quintilian and Cicero both hoped that a liberal education would inform memory, but the canonized expert poet Simonides was infused through more powerful social infrastructures. One can hope for education's

infrastructure to attenuate memory, but in practice, remembering and forgetting are more complicated. Simonides's loci were powerful, driven by a coin of memory wrapped up in economic exchange. This coin was part of an infrastructure that supported capital as a medium of social relations. And so, a twenty-first-century art of memory should be able to account for the forces that produce symbolic coin as a token of memory that circulates in publics.[67]

Moneta's Memory

The theme of mnemonic coin is taken up in the story of Juno Moneta's temple. Moneta was the Roman incarnation of Mnemosyne, Greek goddess of memory, inventor of language, and mother of the Muses. Mnemosyne translates to remembrance or memory, while Moneta's name was derived from the Latin word *monēre*, which meant to remind, warn, or instruct. This translation inflects remembering and forgetting as acts of attention just as much as of recall. As the Romans appropriated Mnemosyne as Moneta, they transformed her mythic functions of memory as well, which provides an auxiliary tale that contextualizes Simonides and his loci. Whereas Simonides inherited a Hellenic mythology including Mnemosyne, Cicero inherited Roman Moneta.

In contrast to the Greek goddess, the Roman goddess of memory's dominion was shared between mnemonic deities: Moneta and *Juno* Moneta.[68] Moneta, sans Juno, was still a goddess holding sway over memory, forgetting, and language, and she accrued cults of religious followers as Mnemosyne had in Hellenic Greece. Juno Moneta, however, was more important in the everyday practice of the state.[69] Juno Moneta was a super-powered version of Juno, wife of Jupiter and patron goddess of Rome. As Juno, she protected the state.[70] As Juno Moneta, she took special interest in the state's memory. Like Moneta, Juno Moneta was imbued with domain over memory, but she was also the protector of the people of Rome. The relationship between the two memory goddesses is complex, but Juno Moneta took precedence wherever the Roman state was involved. Consequently, the Roman people symbolized her and worshipped her differently from the Greek Mnemosyne, who was primarily interested in poetic memory. Juno Moneta, protector of the state, provided a story for making sense of memory's public infrastructure, one invested in the goddess's attention to memory, truth, and res publica.[71] Juno Moneta therefore helps clarify the state's intervention in memory.

Juno Moneta's symbolism was critical of public memory, as it was solidified in the Roman tradition as the fourth canon. A temple to Juno Moneta was established in 344 BCE by Lucius Furius Camillus in honor of a Roman

victory over the Aurunci, a tribe in southern Italy.[72] Camillus had honored his victory by blessing the new temple in the name of Juno Moneta, the goddess he believed protected his state during the battle. The temple was constructed in Rome's citadel near the Forum, a central part of the city. Once blessed with the name Juno Moneta, the temple became a place to worship both the goddess and the properties of the state protected within the temple. For instance, the *Libri Lintei*, the official records of the Roman state, were housed in Juno Moneta's temple. Symbolically linking the space of Juno Moneta with state records strengthened the documents' legitimacy as official historical records of the (re)public.

The temple was an archival space for other state records, too. The sacred space held numerous materials for the standardized official measures and treasures of the republic, including official measurements for weights, lengths, and other standards; maps, charts, and city blueprints; and plunder appropriated during war. The sacred memory space was extended shortly after it was built. Juno Moneta's temple was eventually connected physically through underground passageways to the Tabularium, the official records office of ancient Rome, which further reinforced Juno Moneta's role as protector of the state, its archives, and its official memory.[73] Other records offices extended the web of official state memory. The yoke of Moneta legitimized documents as public records. Her threshold separated personal from public remembrance. In following, references to the temple's archives could be treated as credible references for classical Roman historians, surveyors, and politicians, despite the actual appropriateness of any particular record to a context.[74] Juno Moneta, who was also referred to as Veridica (she who tells the truth), symbolically protected the items deemed appropriate as part of the official public memory.

The temple by happenstance became the location of another coordinating function of the state, which is where this myth reconnects with the story of Simonides. Juno Moneta's temple was the first mint of ancient Rome. Consequently, Moneta's name, which had been associated with reminding, warning, and instructing, also became associated with currency, and it is still today. Monēre, the root of Moneta, still lends its name to the English words for money and mint. What is more, once these various artifacts and effects of memory's space became enmeshed, their meanings began to merge. After the temple's mint was established, the money of the Roman republic underwent a *monumental* shift, both in terms of scope and symbolism. For the first time, images printed on Roman coin were used to portray politicians, their families, and notable historic events.[75] Prior to 137 BCE, the coins had depicted the head of Roma, goddess of Rome, on one side and the Dioscuri on the other. The colocation of official records and archives cued moneyers

to the possibility of commemorating and legitimizing themselves through the circulating coinage, essentially extending public memory anywhere money could travel. Politicians, aspiring and incumbent, had their likenesses printed on Roman coinage. In a culture obsessed with honor and reputation, the money came to be one of the numerous *monumentums* that commemorated and sustained the reputation of the powerful. Once the possibility of coining politically inflected memory objects was realized, the temple's office of *triumvir monetalis*, the moneyer, became very popular among people who aspired to higher office. Infrastructure was shifting and reshaping the materials of public memory. Even the Romans recognized this transition. Historical archives from the Roman republic demonstrated paranoia about the office of triumvir monetalis manipulating the money for its own political ends.[76] Money manipulation even sped to the fall of the empire when Commodus produced coin to circulate and strengthen his image as emperor but accidentally inflated the money supply in the process, which helped hasten the empire's decline.[77]

Money circulation extended the reach of the state and its control over the republic and later empire. Coin was not just a system of exchange but also a means of symbolizing the authority and memory of the entire state. Coin represented Moneta's memory, which included all records of the state. It provided a lever for shifting the relationship of the public with its institutions of control. Of course, Simonides had been galvanized by the medium of coin (albeit Hellenic coin), a symbol that came to embody his sustenance as a poet. The Roman cross-symbolization of legitimacy carried in coin explicitly points to the sorts of mnemonic power at stake in public infrastructure. Coin was media that could be exchanged and translated into nearly anything: food, houses, slaves, and political office, for example. Consequently, the state symbolically afforded things like food, houses, slaves, and political office. Today's US money reminds us that we are symbolically dominated by a nation "under God," represented by presidential or otherwise influential heads and national symbols. Coin authorized the domination of the livelihoods of a public. Juno Moneta's temple and its connected sites were centers of calculation, able to effect power from a distance.[78] The temple, the Tabularium, and numerous state records offices acted in plurality and communicated via coin.[79] These coordinated spaces of remembering and forgetting were linked via their establishment as part of a legitimizing state. This networked apparatus of legitimatizing memory circulated via coin and functioned as part of the Roman memory infrastructure—the networks that coordinated technologies, labor strategies, and knowledge to be remembered by the public. Each time coin was handled, it became a reminder of the power of the state as an authorizing infrastructure. Money was a galvanizing force of memory not

just for poets like Simonides but for all those wrapped up in the work, interests, and remembrance of the state, and not just financially but in any way the state had been able to translate its domain. And so, coin was the state's tenth (non)canonized poet. It circulated as mnemonic loci.

Juno Moneta's temple points to the work being done to infrastructure the memory of the state as part of control of the public. Money acted as public memory's coin of the realm, both economically and rhetorically. This metaphorical transition surfaces a shadow history of memory, one that contextualizes Simonides and his patron Scopas, especially as the Romans usurped the story as part of their rhetorical tradition. Currency stripped away the context of experience while exerting affective force over remembering, much as moderns have stripped away the affective force of the poetic method of loci and interpreted it as a decontextualized mnemonic trick. Moneta's temple provided infrastructure for memory, obfuscating itself as a representation while actually performing and intervening in the past, present, and future. For Romans, money meant that the people were given their due in remembrance of the state.

Memory's coin traveled the webs of infrastructure, providing a marker that traced the intersections of memory infrastructure and its mnemonic technê. By doing so, it highlighted the commonplaces that provided sensibility for Simonides's memory infrastructure. In this infrastructural art of memory, coin was the reason that Simonides's services would be rendered because coin rendered Simonides. Simonides spent his life following the coinage of the republic. His sense of value had been inflected through the values deployed through the state. His patronage and consequently his leverage as a medium of memory were navigated through the push and pull of memory's infrastructure. This is the history of the Sophistic tradition of rhetoric: teachers who sell their services for pay, who consequentially are pushed and pulled by the objects of memory's coin. Coin is tied to the same web of relations that standardized time, space, and their ensuing social relations. Simonides's method of loci was one stock topic that emerged out of the affective web swept up in coin's exchange.

Memory's Coin as Mnemotechnics

> The text nearest money is the one that is blankest.
>
> —Michel Serres, *Genesis*

Simonides Retold provides a key for rhetoricians seeking to intervene in the production of public memory. Simonides Retold locates memory's technê while drawing attention away from any individual mnemonic tricks from

the classical Simonides story. There is nothing inherently wrong with learning mnemonic tricks; they certainly can help with some kinds of memory work. But the older interpretation also encouraged a naturalized account of the fourth canon that differentiated between artificial and natural memory. By doing so, it discouraged intervention in mnemonic technê that did not fit into natural categories. Simonides Retold refocuses on the infrastructures and mnemonic technê that sustain rhetorical practice across multiple publics. This focuses on the globalizing forms of mnemonic technê rather than on any one contextualized act of recall. Memory *can* be imagined as a mental weakness, but it can also be imagined as a backgrounded intensity, a shimmering force to be operated during rhetorical practice through the resources of infrastructure. This new myth situates memory as an enduring architectonic rhetoric rather than a personal psychological phenomenon.[80]

Rhetoricians who learn to play with the available means of infrastructure learn to participate in this art of memory. Mnemonic technê often appear natural while intervening in the *form* of memory instead of its content. Infrastructural technê propagate their affordances throughout the entire mnemonic network, altering not only specific memories but all resources it makes available across spaces and times. Infrastructure standardizes, normalizes, and transports mnemonic resources across variegated times and spaces, changing the quality of public memory in the process. Simonides Retold points to how the poet both wielded the conditions and effects of mnemonic infrastructure. Razing Scopas's hall forwarded mental technologies that were newly valued by publics. The memory palaces were newly important because they could capture the death of the nobles.

Simonides Retold highlights the consequences of memory's infrastructures and technê as public work. In the hybrid myth, memory's coin, both literal and symbolic, was a token that traveled along the networked infrastructures of memory. Coin drew attention to the churning of memory against its technological, contextualized practices and its distributed treasuries of invention. In this new myth, Simonides's method of loci, often interpreted as a simple mnemonic trick, emerged as just one of many available public technê (rhetorical figures, money, etc.) that drew from faculties available in the fluctuating infrastructures of the era. Money brought Simonides to Scopas, and the poet was ultimately the reason that Scopas died. In parallel, the Temple of Juno Moneta, often imagined as a tribute to a memory goddess, loomed instead an authoritative institution that managed public memory resources via the authority granted by the most powerful of the era. Simonides Retold points to the vacillating movements between memory's technê and infrastructures, of memory practices and their supplying memory institutions. This new myth highlights the conflicts that arise in the

sustenance of mnemonic infrastructure, the deployment of their technê, and the processes that align the relationships between rhetoric and memory.

Simonides Retold is cobbled together from the popular stories that shaped rhetorical approaches to memory. Stories simplify, and this is precisely their value: they provide guidance through chaos.[81] They help to make sense of the world, to provide theory for the work of rhetoric. For too long, the story of Simonides and his mnemonic device has afflicted rhetoric's approach to memory. Simonides pushed practicing mnemonists to focus on cognitive effort while overlooking the informing infrastructures shaping their available practices. The original Simonides myth cast memory as the work of individual genius rather than communities. Focusing on place as a mentality of individuals overlooks the infrastructures and labor that shape memory's spaces for publics. Memory is the shared work of communities that develop and sustain background resources for invention. In the previous chapters, individual remembering is just a tiny part of a larger story about information science, a memory discipline distributed across numerous information technologies, theories, and institutions. Simonides Retold elucidates memory's infrastructure as the sustenance of public remembering and forgetting. This new myth points to the back-and-forth dynamics of mnemonic technê and the background of public memory.

The goal of this hybrid myth is not to suggest a cause-and-effect relationship between Simonides, Juno Moneta, or information science. Simonides was a product of the classical Greek era, not the Roman one that built the Temple of Juno Moneta. Simonides lived in a different time and place from the communities that worshipped Juno Moneta; the poet died long before the establishment of Moneta's temple. Cicero and Quintilian, the canonized translators of Simonides, wrote their handbooks centuries after the temple had been built in 345 BCE. By the time Cicero and Quintilian canonized Simonides, the temple had undergone numerous political transformations. It was not nearly as powerful an institution as it had been. There was little causal relationship between Simonides, the temple, his chroniclers, or any of the modern memory professions from the previous chapters.

By drawing from canonized history, though, Simonides Retold places the concerns of librarianship and information science squarely with the concerns of rhetoric. The new myth locates lived places, activities, and resources for memory and rhetorical invention. This chapter illuminates memory's coin as the topological mediator of memory. Coin carried the commonplaces of memory's infrastructure. Coin, for both Simonides and Juno Moneta, was a mediating token that connected mnemonic infrastructures with the technê of remembering and forgetting. The infrastructures of memory choreographed Simonides, master mnemonist, and he concomitantly

choreographed (and was choreographed by) memory through coin. There was no mnemonic technê without the supporting mnemonic infrastructure of his environment. In parallel, technê/infrastructural couplings defined the very relationship of librarianship and information science as they came into conflict in the twentieth century. Those couplings point to the churning of practice against authorizing infrastructure, and they elicit a twenty-first-century approach attuned to the continual assessment of memory's trajectory—a moving, transitional space where memory emerges. As a myth, Simonides Retold points to tenets for interpreting and practicing public memory, one that asks mnemonists to play in the space provided by infrastructure and craft mnemonic technê from the bricolage as a "means of producing new social possibilities."[82]

Where Technê and Infrastructure Collide

Where does Simonides Retold locate public memory? How does this new myth transform rhetorical practice and theory? Juno Moneta's temple, centralized within the Roman state, created opportunities for mnemonic technê entangled with the economy. The Romans added the coins to the lush caches of monumentum they mobilized in their culture of competitive monumentality. The coins doubled to exert economic and mnemonic control over the rapidly changing republic.[83] Consequently, the use and distribution of coin sustained (and was sustained by) memory's infrastructure. The Moneta(ry) coins were one critical aspect of a politics that critically hinged on whose past would be commemorated. The coins, impressed with the heads of politicians, functioned as mnemonic tokens that reminded publics of their place in the state wherever and whenever money changed hands. Memory's coin latched onto the financial coin already widely used for the economy and politics of the state. Once affixed to coinage, memory was tokenized to buy and trade other mnemonic technê. Coins reminded the public of their place in the state during transaction, but they could also be used to purchase new monumentum, like memorials, statues, and scrolls. And coin could buy the destruction of mnemonic resources. Moneta(ry) coin was technê, one of many, for organizing public memory. Coin circulated memory among the public.

Moneta(ry) coin predated the Roman Temple of Juno Moneta by centuries, and it was the reason Simonides traveled to Thessaly nearly two hundred years before the temple's construction. Indeed, the poet's obsession with payment for poetry hamstrung him into an overlapping set of memory infrastructures. One of these was the embodied education of the poet. As Cicero hoped, education *was* a critical component of mnemonic art. Poets like Simonides drew from their education. Education enabled poetic

embodiment. For instance, the common topics that were used in the various genres of commemoration (politics, war, sports, gods, death, etc.) depended on a rich understanding of civics and history. This background helped poets develop a keen sense for the issues worth commemorating. Their training made references to the commonplaces second nature. Poets also learned numerous spoken techniques to render their verse memorable to both themselves and their audiences (vivid imagery, rhythmic meter, repetition, etc.). These skills depended on a thoroughly embodied understanding of language and its affordances as a mnemonic resource.[84] In an era lacking widespread literacy and access to books, poets were transformed into major mnemonic technê of public remembering. They were bundles of embodied mnemonic practices that could be bought, sold, and trafficked to new places.

Poetic education was not the only or most important part of public memory's practice, though. Simonides's poetic technê were embedded in numerous volatile infrastructures that were vulnerable to the whims of the most powerful of society. Money, as it had been in Juno Moneta's temple, was a critical media for distributing memory across publics. Poets worked for the affluent because they depended on them for their livelihood. Unpaid poets went hungry. It was a good fortune for a poet to be contracted to a powerful ruler since it meant a continual source of food, water, and shelter. In Thessaly, Scopas was purchasing public memory by enrolling Simonides and demanding an ode for his boxer. Simonides obeyed, at least at first. Simonides had thought of poetic remuneration as freedom, but coin bound him to the impulses of his employer. Simonides was a means to Scopas's ends, embodied technê that Scopas could purchase to produce memory.

The powerful were gatekeepers of other numerous resources that sustained infrastructures of public memory. The rich had the means to invoke publics. Although not explicitly mentioned by Cicero or Quintilian, Scopas's feast was a symposium.[85] Symposia were held in banquet halls, like the one that provided the scenery for Quintilian's and Cicero's descriptions of the Simonides myth. These Greek parties included food, music, dancing, discussion, and poetic performances. The most powerful men in the community attended them, which made them *public* events for the Greeks. The parties provided dependable access to publics, and Simonides was contracted for them consistently.[86] Simonides spent much time in banquet halls that others could not take so readily for granted. One of the reasons Simonides remembered the dead was because he was familiar with the space and people in it. The customs normalized for the symposia provided sociotechnical scaffolding that supported the production and sustenance of public memory. Like the poets' bodies, this part of memory's infrastructure depended on the resources of the powerful, which included their use of the poets.

The physical architecture and design of the symposium banquet halls were important aspects of memory's infrastructure, the one most prominently documented in the Quintilian/Cicero myths. Poets learned the nuance of these spaces, their acoustic resonance, architecture, and design. Understanding the spaces was critical for delivering effective performances of memory. The poets knew how loudly to speak, what times their audiences would pay attention, and where they could situate their bodies in relation to publics in attendance, much like a musician who learns the qualities of their performance space to optimize the performance.[87] Simonides's method of loci, framed as a mnemonic trick, was an articulated effect of familiarity of spaces that were controlled by the rich. His method of loci consisted of his honed expertise playing in this particular space of memory. Memory was attenuated to meet the physical demands of the banquet halls, which further attenuated memory's mediation across spaces (where there was a banquet hall) and times (when a poet could be contracted). The seemingly ubiquitous, omnipresent space of poetic memory, the supposed universality of Simonides's method of loci, was confined to just a few spaces and places that were only veils of omnipresence. The banquet halls and symposia normalized public memory's performance throughout the Greek region.

Both Quintilian and Cicero described in their handbooks this architectural memory as a universal mental technique, but to do so, they abstracted principles that rendered it powerless as anything other than a parlor trick.[88] Quintilian even said as much![89] The Roman rhetorician doubted memory loci could be reused for new circumstances, noting that physical spaces may aid memory but primarily only for the events that occurred in them. This interpretation corresponds with the myth: Simonides only used the method to remember what had actually happened in the banquet hall. While Cicero was more optimistic, he noted it critical to use loci that were well-known. Twenty centuries later, Cicero's chronicler, historian Frances Yates, argued the method of loci inculcates memory with the qualities of the original loci (i.e., loci constructed with occult places render memory with occult qualities).[90] Memory's infrastructure exerts force and mediates remembering and forgetting, primarily via the material that tunes memory's qualities.

In myth, the qualities of memory's infrastructure became most visible when mnemonic infrastructure's components conflicted. Simonides's inclusion of Castor and Pollux was a standardized part of the panegyric, the ode of commemoration, he was contracted to deliver. As a lyric poet, he had been trained in common topics for athletic events, and mentioning the twin gods of athletics was a customary reference for commemorating a boxer. The poet's training compelled him to compose with verse for the Dioscuri. Scopas's displeasure with the standard commonplace highlighted a conflict in

memory's currency. Scopas, an affluent noble, fully expected that he could pay for whatever type of memory practice he wanted. Simonides, an expertly trained lyric poet, would only accept limited direction for payment and drew technê from his education. Memory organized through money did not always favor what had been earned through education. The poet was incensed that Scopas tried to manipulate the form of his verse. He obliterated the banquet hall and induced a public amnesia, both by refusing verse and by murdering the publics poised for commemoration.[91] When Scopas refused payment, memory's expected infrastructure came screeching to a halt.

There are numerous other technê/infrastructural conflicts and couplings hidden within Simonides Retold. But just as importantly, the myth illuminates the lived mnemonic infrastructure sustained between librarianship and information science, a set of memory professions exerting tremendous mnemonic force over contemporary publics. This relationship intervenes in the sorts of practices and publics involved in modern public memory. Librarianship has been developing a robust infrastructure for centuries. Its technê were located among its proud labor force, a group that supplemented their labor with numerous mnemonic aids—book trucks, cataloging systems, and much more. For thousands of years, librarians developed an infrastructure with only minimal competition. World War II bootstrapped information science as a competing memory field, and the competition better highlighted the stakes involved in two competing infrastructures. There are numerous memory professions and related infrastructures (accounting, lawyers, statisticians, economists, etc.), but these two professions better highlight the stakes of memory as they eventually competed for the same institutional space. Their forced marriage highlighted their shared and diverging core values.

As Simonides had conflicted with Scopas in institutionalized space, librarianship and information science conflicted with each other over institutionalized space. Librarianship had developed to circulate memory as a service to its publics. The early ethos of the "missionary-librarians" kickstarted a memory profession centered on tropes of service to the public. Because of the historic media that coincided with the growth of librarianship, its mnemonic coin primarily resembled books and other popular print materials. Books and other print materials were transported from space to memory space with tropes and mnemonic systems adapted for books. These systems were attuned to tropes of particularity, intervention, and deliberateness. Book trucks, for example, provide easy access for handling books one by one. Information science, though, had developed as a response to wartime problems. Operations research (OR) provided a mental technê that induced its practitioners to view memory as an analyzable substance. The resulting

infrastructure aimed to document every last bit of information so that it could be understood and manipulated to ward off information overload.

Information was not coined for mnemonic technê that favored intervention because the information's granularity had been coined as a contiguous substance, a "sea of information."[92] This meant that planning and creating infrastructure revolved around commonplaces for handling limitless quantities of material: ubiquity, automation, and expedience. Systems designed with OR technê consequentially delegated memory's coin primarily to machines that treated it as a ubiquitous mass (information cannot be placed on a book shelf, but it can be quantified in information systems). These commonplaces, which seem relatively minor, grow into massive mnemonic assumptions. Librarianship's memory could be counted (books, microforms, newspapers, etc.). Information sciences could be massed (information, bits). The difference in the two memory infrastructures was more perverse yet. Information science's adoption of OR had pushed the field to imagine information as something that could be logistically organized to manage enemies. The emerging discipline made the development of new mnemonic coin central to its work, which meant defining what could be operationalized as "information" to include in its new machines. When librarianship and information science were forced to share institutional space in order to sustain themselves, the professionals conflicted over differences in their mnemonic coin. Memory's coin had been forged with conflicting commonplaces.

These differences were put in stark relief when the two memory approaches were forced into the same educational institutions. These differences came to a head and produced hybrid memory infrastructures. The conflicting memory professions were put into conversation in spaces where their mnemonic practices vied for institutional authority. Both professions needed the space, and consequently, this meant that their labor and infrastructures were united into a collaborative set of technê and outcomes. This clearly did not work. Every conflict highlighted underlying assumptions about memory. Librarianship's memory was built on the backs of women. It was a qualitative skill set that librarians practiced to change the reading habits of the publics they cared about. Information science had developed as a war technology. It was aimed at documenting every last bit of memory across the globe in an effort to perfectly understand the world as a way to protect itself from the enemy—information overload. The two infrastructures had vastly different goals and technê.

The collision of two diverging mnemonic infrastructures forced new approaches to memory. Librarianship began adopting more of the tropes of information science (information retrieval). Information science began adopting more of the tropes of librarianship (user studies). Librarianship began

incorporating more of the quantitative approaches to information science. Information science was being changed because it found itself depending more and more on the labor force that was drawn to librarianship. Book trucks were put side by side with Zator machines, and the two formerly diverging professions began developing fluid conversions for their unlikely coin. Memory's infrastructure was evolving for the mnemonic landscape.

Simonides Retold highlights the fraught politics of sustaining an infrastructure and the mnemonic technê that emerge to manage remembering and forgetting. Within librarianship and information science, mnemonic infrastructures conflicted when memory professions that used differing infrastructures vied for the same space. The result was that the conflicts that emphasized the taken-for-granted assumptions of each set of mnemonic infrastructures. Librarianship had developed as a missionary type profession that was being ignored because it employed women. Its mnemonic technologies supported a memory infrastructure that was emplaced in recurring spaces, like the banquet halls of Scopas. Information science's volatility as a tool of war was put in sharp perspective, since its practitioners had no reliable place or funding for which to sustain their unique practices—which included a number of impressive but untested new machines as mnemonic technê, deployed "information" as a circulatory coin. Conflicts between the two mnemonic infrastructures rendered the moral mnemonic values of each open to scrutiny.

6

MEMORY'S INFRASTRUCTURE

> So the world is always breaking; it's in its nature to break. That breaking is generative and productive.
>
> —Steven Jackson, "Rethinking Repair"

Throughout this book, I highlight a concealed art of memory that connected publics and their memory institutions, technologies, and human labor. Public memory materialized where actualized practices (mnemonic technê) collided with available networks of memory resources (memory infrastructures). The resulting collisions often produced unexpected and new mnemonic capacities, like when information science's notion of relevance emerged when calculating machines could be dependably linked to large collections of standardized data resources. And so, an art of memory emerges wherever technê and treasuries collide, both by happenstance and human intention, both by mechanical and mental means.

The spaces of memory that this book describes were hidden from publics that used them for their everyday remembering and forgetting. A library patron rarely considers how a book is categorized for a shelf. A user of search engine technology rarely can trace the algorithmic reasons materials are answers to their queries. Nowhere was this obfuscation more obvious than in the transforming infrastructures of twentieth-century librarianship and information science. When librarianship was supplemented by information science's mnemonic techniques, the resources supported by the age-old profession shifted, so subtly that many practitioners did not notice. The shifting infrastructure enabled libraries to be imagined as rich information environments rather than warehouses of books. Of course, this had real implications. The new mnemonic imaginary was not necessarily better for publicly funded libraries needing to support diverse communities because the information environment had been designed to cater to postwar science

information devotees. When the theories devised by information scientists filtered into education for librarianship, the profession, which served multitudes of publics and counterpublics outside of science, changed the way it trained its labor and collected its resources. Memory's politics are subtle and located far away from public concerns.

Human labor is an important and necessary part of these politically fraught infrastructures.[1] The mnemonic workforce provides public access to the manufactures of infrastructure by reinterpreting, adjusting, and rebuilding memory's infrastructure for ever-shifting publics. Librarians of the twentieth century did this by adding new mnemonic techniques that had recently been made available after World War II. Memory's labor intervenes as new events occur or when mnemonic technologies are invented, transformed, or become antiquated. These activities "churn" public memory by grinding technê against infrastructure and making adjustments to provide mnemonic access to publics. Seamless churning sees publics accommodate infrastructure, often by implicitly adjusting their expectations and activities for what memory is available to them. Less seamless churning and friction attune publics to disjunctions between their desired remembering and actualized practice. I began this book with a quote from Hubert H. Humphrey, who was astounded by a public lapse in memory. I end this book by pointing to all the invisible work that happened just so Humphrey would notice a problem. The mnemonic landscape continually adjusts. The work of infrastructure is a work that shifts the resources of the public.

Cynics of memory technologies often frame them as either progressive or harmful. A perfect memory machine will never exist, despite the dreams of social critics and early information scientists like Paul Otlet. The desire to control memory is a desire to tame risk, uncertainty, fear, and paranoia of unknown—unknown people, events, and ideas. The desire to control memory points to unrest about whose memory to prioritize, and criticisms about imperfect memory are just as accurately imagined as an affective identification with an authoritarian and partisan past, present, and future. When critics seek better control of memory, they simultaneously seek power over alternative forms of remembering and forgetting, forms that are often valued by conflicting publics and counterpublics. A "perfect" memory can only perform a limited assortment of activities, usually those that fit the needs of an even more limited public. It is far more important to encourage an imperfect memory that is able to adjust to the needs of ever-fluctuating publics. We will never be able to remember perfectly, and we should always be vigilant to retain the capacity to remember anew.

At the beginning of this book, I promised to locate rhetorical commonplaces invested in vibrant publics rather than accuracy, storage, recall, or

another stereotypical trope of perfect memory. I found these new commonplaces being constructed in the spaces and times where memory's coin was being exchanged. Coin and its transactions animate and support networks of memory practices along with mnemonic technê and labor. The eventual calcification of infrastructural networks generates force and momentum that encourage particular types of remembering and forgetting, particular configurations of mnemonic technê. Book trucks and Zator machines, for example, emerged as part of technê to transport differing acts of memory. These acts can be difficult to compare, especially since they tend to be adept and particular kinds of memory, even as infrastructure encourages global practices.

Locate coin and memory's infrastructure will be near. Locate memory's infrastructure and rhetoric will be near. Memory and rhetoric emerge in the space invoked by networks of infrastructure. To exemplify this view of rhetoric's memory, throughout this book I document varying mnemonic technê and supporting infrastructures embraced by two competing memory traditions of the twentieth century. Professional librarians wielded technê that allowed them to trade mnemonic coin that favored their professional commonplaces of particularity, intervention, and deliberateness as part of public memory practices; information scientists adopted ubiquity, automation, and expedience as topoi for mapping memory landscapes meant to ward off enemies. In practice, this meant that librarians stocked their libraries with bookshelves, card catalogs, and book trucks, technologies that helped the profession traffic book coin for public consumption. Information scientists practiced memory by inventing technologies like Zator machines that automated and assessed information to make efficient decisions designed to command and control memory with minimal human intervention. The mnemonic sensibilities of these two professions clashed as they were forced into the same institutional spaces by the historical wake of World War II. Memory's coin was consequently altered as one set of technê and coin were networked into another.

Conflicts point to controversy, and where there is controversy, there is rhetoric. The historical conflicts between librarianship and information science do not straightforwardly point to rhetoric's place in memory infrastructure, which is why I bookend the history of the two memory professions with the Simonides and Simonides Retold stories that provide theoretical guidance for the continued exploration of rhetoric and memory. The original Simonides myth pointed to personal mnemonic techniques, which still unquestionably have a place within memory's practice. Mnemonic tricks are technê that depend on mental infrastructures to reliably sustain embodied habits. These are often materialized in infrastructures that include new neural connections.[2] In the Simonides myth, the poet depended on the

physical layout of a known space, Scopas's banquet hall. Simonides Retold adjusts the narrative to locate the work of rhetoric in memory's infrastructures. My new Simonides myth highlights the movement of coin and infrastructure in mnemonic space. It highlights mnemonic technê as phenomena thoroughly entangled with the multiple affordances of coin and memory infrastructure.[3]

Mnemonic technê and infrastructure emerge to accommodate the desires of memory's publics. Differing commonplaces and technê point to differing coin and infrastructure, which points to the historical affordances and affects of remembering and forgetting. Librarians primarily traded in books, a form of mnemonic coin that had been standardized over centuries. Books allowed librarians to practice commonplaces they had foregrounded as professionally valuable. Books and their affects helped support circulation practices framed through particularity, intervention, and deliberateness. The supporting webs of infrastructure were dependable, sedimented over thousands of years. This enabled the profession to develop numerous technê that intervened in book circulation. They stockpiled buildings with rows of book-sized shelves. Card catalogs, book trucks, and classification systems connected professional commonplaces with existing affordances of the book. Librarians thickened the dependability of their networks by solidified professional trade networks. Books, a stable currency, provided a key sensibility for one part of memory's infrastructure.

After World War II, scientists were prodded to develop technê for new types of coin. The atrocities of war pointed directly to forms of memory that required new coin. For Bernal, the extant scientific journals no longer attended to the needs of a scientific enterprise that was moving faster and more globally than before. In the 1960s, the National Science Foundation funded Dorothy Crosland to investigate new memory technê that could better attend to the needs of scientists. An amorphous information environment, not books, drove Robert Taylor's paranoia of enemies. Driven by uncertainties articulated by war, mnemonists from across the globe crafted new "informational" coin and supporting technê. A central labor force for this technê was the new information scientists. Information's coin was amorphous. It was stretched and shaped in parallel with new technologies, divisions of labor, and social systems. New infrastructures were tentatively put forward to handle the volatile coin. Calvin Mooers, for instance, codified information in his Zatocards. He built new machines, but this form of mnemonic technê did not have the longevity or labor force to sustain longer than a few years. Information science's new forms of memory were aided by the malleability of its coin, but its infrastructure was weak. It lacked dependable spaces and times of memory.

After World War II, librarianship was forced into institutional spaces with the information sciences, resulting in conflicting coin, conflicting values, conflicting professions, and conflicting infrastructures. Forced cohabitation produced a rhetorical exigence in which the two professions codeveloped infrastructure. The result was a hybrid infrastructure with some pieces drawn from librarianship, some drawn from information science, and some created to network the two. When I started this study, librarianship seemed like a ubiquitous public good. Supporters of libraries often talk about the institution as a public good undergirding diversity, democracy, and informed citizenry. Information science seemed like librarianship's mnemonic foil—military technologies intensified by the creep of neoliberal policies and Cold War paranoia of the twentieth century. At the end of this study, I have a more nuanced view of both. Librarianship and information science each had their weaknesses and strengths as parts of memory's infrastructure. The "missionary-librarians" of the early phases of American librarianship were colonizing and patronizing. The urge to enculturate readers with "God-sanctioned" reading material demonstrated the weaknesses of mnemonic technê that depended on humanistic intervention.[4] Information science had its own problems. Its coin was volatile and undependable. Its underlying conceptual technê, operations research, tended to frame memory as an automated practice for controlling information. Despite these problems, both professions marched forward. At the end of this study, it is difficult to imagine that the historical baggage of either librarianship or information science would have lent itself to a vibrant public memory. If anything, the long-term infrastructures of the two professions introduced memory bloat.

Both librarianship and information science had their own unique benefits and drawbacks. Librarianship provided women with gatekeeper access to socially legitimated memory labor. This meant that the humanistic interventions favored by librarians were better attuned to at least one underserved population. Information science, meanwhile, provided new opportunities for remembering and forgetting. It provided distance from more embedded infrastructures and consequently highlighted shortcomings in public memory. At the beginning of this book, Hubert Humphrey marveled at the mnemonic powers of new computing machinery. Those sorts of innovations would not have happened without a background to compare it to. Many of information science's technê have changed everyday practices of memory. For each drawback, a memory infrastructure emerges with new forms of memory that excel in kairotic acts of public memory.

While I did not find a specific set of mnemonic practices that secured more vibrant publics, I found something much more hopeful. The politics of librarianship and information science highlighted how it is possible to revise

coin, technê, and topoi of the infrastructures that served public memory. Publics and professions laboring in the mnemonic trenches actively work to change infrastructure in response to ever-fluctuating public needs. Librarianship and information science conflicted, and out of their arguments, they built new hybrid forms of technê, labor, and infrastructure. Librarianship and information science may never settle into an easy relationship, but they do share institutional space, and their formerly polar commonplaces have been better integrated. New information technologies are now important aspects of librarianship. The labor force of information science has become more egalitarian.

I have a newfound respect for the importance of keeping flexible the commonplaces of memory to support transition and change as infrastructure solidifies to black-box the mnemonic practices of shimmering publics. The work of twenty-first-century mnemonists is to identify and locate memory's commonplace so they can be reassessed continually. By locating major levers of public memory, rhetoricians have a blueprint pointing to how publics can get better involved with the infrastructures and professions that adjust public access to memory. Publics should intervene and advocate for their own needs as stakeholders in public memory, but it is the purview of the rhetorical tradition to draw attention to the valences of commonplaces that alter the desires of publics.

NOTES

Introduction

1. Smith, "Record Shares of Americans."

2. Poushter, "Smartphone Ownership and Internet Usage."

3. Bowker, *Memory Practices in the Sciences*, 7.

4. Bradford Vivian's *Public Forgetting* details the relationship between remembering and forgetting, making the argument that forgetting is not the absence of remembering. He details case by case how forgetting is taken up with similar rhetorical effects as remembering: to narrate the past, to bring communities together, and to provide a sense of togetherness. Vivian, *Public Forgetting*; Xu et al., "Automatic Archiving versus Default Deletion."

5. Whittemore, *Rhetorical Memory*; Van Ittersum, "Distributing Memory."

6. Carr, *Shallows*.

7. Huth, *Lost Art*.

8. Kurzweil, *How to Create a Mind*.

9. Phillips, "Failure of Memory," 220; Edbauer, "Unframing Models of Public Distribution," 9.

10. Draaisma, *Metaphors of Memory*, 200; R. Johnson, *User-Centered Technology*, 26; Connerton, *How Societies Remember*.

11. Blair, Dickinson, and Ott, introduction to *Places of Public Memory*, 5–11.

12. Andrew Pickering refers to these technological processes as mangles. See Pickering, *Mangle of Practice*, 22.

13. Jones, Moore, and Walton, "Disrupting the Past."

14. Rai, *Democracy's Lot*, 34.

15. Harris, *History of Libraries*.

16. Price, "Networks of Scientific Papers"; Garfield, "Citation Indexes for Science," and "Tracing the Influence of JD Bernal"; Battelle, "Birth of Google."

17. Elichirigoity, *Planet Management*, 28.

18. McCloskey, "Beginnings of Operations Research."

19. Elichirigoity, *Planet Management*, 29.

20. Elichirigoity, 29.

21. Batchelor, *Operations Research*, x.

22. Elichirigoity, *Planet Management*, 29.

23. Bowker, *Memory Practices in the Sciences*, 10.

24. For a description of what constitutes healthy publics, see Bruner, *Strategies of Remembrance*, 98–101.

25. Ribes and Finholt, "Long Now of Technology Infrastructure."

26. Simone, "People as Infrastructure."

27. Hjørland, "Documents, Memory Institutions."

28. Halloran, "Growth of the Rhetoric Society."

29. Trapani and Maldonado, "Kairos."

30. See Rickert, *Ambient Rhetoric*; Rivers, "Future Convergences"; Boyle, "Writing and Rhetoric"; Hallenbeck, "Toward a Posthuman Perspective"; DeVoss, Cushman, and Grabill, "Infrastructure and Composing."

31. Rickert, *Ambient Rhetoric*, xii–xiv.

32. N. Johnson, "Rhetoric and Cold War Politics."

33. Morey, *Rhetorical Delivery and Digital Technologies*; Gurak, *Persuasion and Privacy in Cyberspace*.

34. R. Williams, "Use of Punched Cards."

35. Garrison, *Apostles of Culture*.

Chapter 1

1. Blair, Dickinson, and Ott, introduction to *Places of Public Memory*, 10.

2. Irwin-Zarecka, *Frames of Remembrance*, 13.

3. Young, "Innis's Infrastructure"; Carse, "Keyword."

4. Star and Ruhleder, "Steps toward an Ecology of Infrastructure."

5. Star and Ruhleder, 113.

6. Star and Ruhleder, 113.

7. Harris, *History of Libraries*.

8. Harris, 17; Graeber, *Debt*, 21.

9. Graeber, *Debt*, 21.

10. Casey, "Public Memory."

11. Phillips, introduction to *Framing Public Memory*, 3.

12. Foucault, *History of Sexuality*, 88.

13. Warner, *Publics and Counterpublics*, 114.

14. Quintilian, *Institutio Oratoria*, 11.2.1; Cicero, *De Oratore*, 3.16.

15. Harris, *History of Libraries*, 21.

16. Connerton, "Seven Types of Forgetting," 60–61.

17. Downey discusses how in the early twentieth century white boys were strategically deployed as telegraph messengers because they were cheap and able to deliver to places where women were not welcome. Downey, *Telegraph Messenger Boys*.

18. Casey, "Public Memory," 17–18; Rickert, *Ambient Rhetoric*; Edbauer, "Unframing Models of Public Distribution."

19. Harris, *History of Libraries*, 19–21.

20. Levy, "No Time to Think."

21. Karasti, Pipek, and Bowker, "Afterword."

22. Star and Ruhleder narrate a variation of this problem. As they investigated a shared information system among biologists, they found that some labs only had limited terminal access. This caused the community to phenomenologically disappear for some scientists because they interacted almost entirely through the system terminals. The community returned when the estranged biologists were able to access the computer terminal again. Star and Ruhleder, "Steps toward an Ecology of Infrastructure."

23. Bowker and Star, "Building Information Infrastructures."

24. This is essentially what Ribes and Polk pointed out when they studied how scientists changed a background information system so that new knowledge of HIV could supplement and replace old resources. Ribes and Polk, "Organizing for Ontological Change."

25. This is the large technological systems theory of systems development. See Edwards, *Vast Machine*, 10–11; Hughes, "Evolution of Large Technological Systems."

26. Hjørland, "Documents, Memory Institutions"; Byrne, "Institutional Memory and Memory Institutions."

27. Zickuhr et al., "How Americans Value Public Libraries."

28. Mattern, "Library as Infrastructure."

29. F. Yates, *Art of Memory*, 1.

30. Yates; Enos, "Rhetorica ad Herennium"; Cicero, *De Oratore*.

31. Quintilian, *Institutio Oratoria*, 11.2.22; Cicero, *De Oratore*, 2.354; Cicero, *Rhetorica ad Herennium*, 3.17.

32. Notopoulos, "Mnemosyne in Oral Literature," 472.

33. Detienne, *Masters of Truth*, 43.

34. Meadows and Williams, "Moneta and the Monuments," 41–42.

35. Meadows and Williams.

36. Bowker, "Time, Money, and Biodiversity"; Warner, *Publics and Counterpublics*.

37. Johnson and Johnson, "Glitch as Infrastructural Monster."

38. Of course, human bodies remain important for memory practices; they just are institutionalized differently. Early twentieth-century messenger boys, for instance, were not viewed as religious, but they were innocuous in enough spaces that they could deliver telegraphs without trouble. Downey, *Telegraph Messenger Boys*, 106–25.

39. Star and Ruhleder, "Steps toward an Ecology of Infrastructure," 113.

40. Star and Ruhleder, 117.

41. Star and Ruhleder say that infrastructure must be learned as part of membership in a community. Star and Ruhleder, 113.

42. The space and practice of use often changes the configuration of the objects of memory. Space between words in a text resulted from readers who could not depend on oral recitation. Saenger, *Space between Words*.

43. In this section, I focus on extending rhetoric's relationship to memory. Many fields are interested in the phenomenon of memory, and they each have valuable approaches and models. My description here is meant to develop an approach that hopes to better understand how memory is entwined with the concerns of rhetoric. Although

I import some ideas from other disciplines, my intent is not to craft a new interdisciplinary approach to memory. Roediger and Wertsch, "Creating a New Discipline."

44. Cicero, *Rhetorica ad Herennium*; F. Yates, *Art of Memory*; Enos, "Rhetorica ad Herennium."

45. Notopoulos, "Mnemosyne in Oral Literature," 472.

46. F. Yates, *Art of Memory*, 112–13.

47. Budd, "Copyright," 170; F. Yates, *Art of Memory*, 112–13.

48. Foer, *Moonwalking with Einstein*.

49. The tension between artificial and natural is largely a remnant of seemingly outdated modernist perspectives that adopt a dualism between subjects and objects. Brooke, "Forgetting to Be (Post)Human"; Rivers, "Future Convergences."

50. Carr specifically asked, "Is Google making us stupid?" *Shallows*, 257.

51. Greenemeier, "Down in the Data Dumps."

52. Rivers, "Future Convergences."

53. Much scholarship takes this approach. The following are exemplary and foundational. Dickinson, Blair, and Ott, *Places of Public Memory*; Blair, Jeppeson, and Pucci, "Public Memorializing in Postmodernity."

54. For example, see Enoch, "Changing Research Methods, Changing History"; Graban, Ramsey-Tobienne, and Myers, "In, through, and about the Archive"; Haskins, "Between Archive and Participation."

55. Cicero, *De Oratore*, 2.86.351–54.

56. F. Yates, *Art of Memory*, 4.

57. Memory is also often linked to history, but not by necessity. For an overview of how various scholars have linked memory to history, see Hutton, *History as an Art of Memory*.

58. Haraway, "Ecce Homo."

59. F. Yates, *Art of Memory*.

60. Yates, 202–3.

61. Yates.

62. Star and Ruhleder, "Steps toward an Ecology of Infrastructure," 113.

63. The network provides metaphors for coping with memory. Draaisma, *Metaphors of Memory*.

64. It is beyond the scope of this book, but David Graeber's *Debt* details the shifting paradoxes of debt and public morality.

65. Edwards, "Infrastructure and Modernity," 186.

66. Ribes and Finholt, "Long Now of Technology Infrastructure."

67. Much literature has discussed breakdowns as useful for identifying infrastructure's social organization. Star and Ruhleder, "Steps toward an Ecology of Infrastructure," 113; Edwards, "Infrastructure and Modernity," 195–96; Howe et al., "Paradoxical Infrastructures," 550.

68. Downey, "Making Media Work," 141.

69. Borko, "Information Science," 3.

70. Warnick, *Rhetoric Online*, 91–92.

Chapter 2

1. Rayward, *Universe of Information*, 15–16.

2. Rayward, 16.

3. Rayward, 20.

4. Mazower suggests that Otlet and other internationalists often did not recognize the national politics of science because they were independently funded. Mazower, *Governing the World*, 238.

5. Ceccarelli traces the history of scientific progress through its frontier metaphor. She notes that Vannevar Bush's *Science—The Endless Frontier* yoked scientific progress to efficient memory machines. Ceccarelli, *On the Frontier of Science*, 39–49.

6. These related forms of information labor are described in the rest of this chapter primarily as documentalists, the word that was popularly used to describe librarians who were involved in postwar planning. Documentalists often differentiated themselves from librarians and archivists by their interest in new technology. These differences were just emerging during this time period and would become more important in the following decades. The next chapter will explore those differences more, but for simplicity I use the word *documentalist* to describe librarians, archivists, bibliographers, and similar professions.

7. Suchman describes how this often happens with planned use in any technological situation. Context imposes demands that are not predicted by planners. Suchman, *Human-Machine Reconfigurations*.

8. Luhn, Computer for Verifying Numbers; Yao, Li, and Tao, "Application."

9. Most historians agree that information science emerged shortly after World War II along with the computer. For instance, see A. Meadows, *Origins of Information Science*; Robinson, "Information Science"; Robinson and Bawden, "'So Wide and Varied.'"

10. Borko, "Information Science," 3; N. Johnson, "Rhetoric and Cold War Politics."

11. M. Williams, "Defining Information Science," 17.

12. Wright, *Cataloging the World*.

13. Rayward, *Universe of Information*, 16.

14. Rayward, "Visions of Xanadu."

15. Daston and Galison, *Objectivity*.

16. Rayward, "Visions of Xanadu," 247.

17. Haraway, *Modest Witness@Second Millennium*.

18. Wellmon, *Organizing Enlightenment*, 22.

19. Wellmon, 54–57.

20. Wellmon, 23.

21. Rayward, *Universe of Information*, 27–28.

22. Krajewski, *Paper Machines*, 113–14.

23. Rayward, *Universe of Information*, 278.

24. Wright, *Cataloging the World*, 71.

25. Wright, 80.

26. Wright, 80.

27. Wiegand, "'Amherst Method,'" 179–80.

28. Rayward, "Case of Paul Otlet," 136.

29. Vivian, "Memory."

30. Quoted in Wright, *Cataloging the World*, 8.

31. Many other mnemonists inscribed their memory systems in the physical environment. In *Art of Memory*, Frances Yates describes connections between various memory palaces from the classical to modern era.

32. Rayward, *Universe of Information*.

33. The documentalists had turbulent discussions about what counted as a document. For most, it included film, images, and audio recordings, as well as paper media. Notable French documentalist Suzanne Briet argued that an antelope was a document in her *Qu'est-ce que la Documentation?* This multimodality would become one of the factors that allowed documentation to transform into information science in the following years. Farkas-Conn, *From Documentation to Information Science*; Buckland, "What Is a 'Document'?"; Briet, *What Is Documentation?*; Buckland, "Brief Biography of Suzanne Renée Briet."

34. ASLIB was stylized as Aslib after 1948 to better align with a more "corporate" focus. For sake of simplicity, I use the capitalized ASLIB that was used during the majority of decades covered in this chapter. Muddiman, "New History of ASLIB"; Bawden, "ASLIB."

35. In the United States, a similar organization, the American Documentation Institute (ADI), was founded in 1937. ADI founders often drew from the insight of ASLIB. These networks would prove crucial for the liquefying of information, which is discussed in the next chapter. Farkas-Conn, *From Documentation to Information Science*.

36. Muddiman, "New History of ASLIB," 407.

37. Rayward, "Case of Paul Otlet," 135; Muddiman, "Documentation under Duress."

38. Muddiman, "New History of ASLIB," 407.

39. Muddiman, 407.

40. Muddiman, 409.

41. Lugya, "What Counts as Science and Discipline?" 143; Robinson, "Information Science," 579.

42. Carter et al., *Historical Statistics*, 2.142–50.

43. Carter et al., 2.142–50.

44. Carter et al., 2.142–50.

45. Richards, *Scientific Information in Wartime*, and "Gathering Enemy Scientific Information."

46. During the two wars, Germany, which had been one of the largest producers of science information, was particularly obsessed with controlling science documentation (and those who produced it). They boycotted foreign research papers, removed Jews from professorships, and encouraged Nazi materials in their libraries. The obsession crippled Germany's science and effectively ended the use of German as a lingua franca of international science. See Richards, *Scientific Information in Wartime*; Gordin, *Scientific Babel*.

47. Richards, "Gathering Enemy Scientific Information," 255–56.

48. Richards, 258.

49. Bowles, "Liquifying Information"; Price, *Little Science, Big Science*.

50. Edwards, *Closed World*, 115.

51. Muddiman, "Public Science in Britain," 203.

52. Brown, *J. D. Bernal*.

53. Swann and Aprahamian, *J. D. Bernal*, 164–66.

54. Bernal, *Social Function of Science*.

55. Bernal, 45.

56. Brown, *J. D. Bernal*, 296; East, "Professor Bernal's 'Insidious and Cavalier Proposals,'" 293.

57. Muddiman, "Red Information Scientist," 388; Bernal, *Social Function of Science*.

58. The Frankfurt school noticed these differences at approximately the same time, and some facets of their critical theory were similar to the perspectives adopted by OR. Horkheimer, "Traditional and Critical Theory."

59. English writer H. G. Wells entertained his readers with stories of a World Brain that could bring peace to the world. Russian-born Emmanuel Goldberg was making mechanical memory technologies with sophisticated searching mechanisms. In Scotland, Patrick Geddes was curating museums that would serve many of the same goals as Otlet's World City. German Nobel Prize–winning chemist Wilhelm Ostwald was engineering a "brain of humanity."

60. Blair, Dickinson, and Ott, introduction to *Places of Public Memory*, 6.

61. Delegates and scientists were from Australia, Burma, Canada, Ceylon, East Africa, Eire, Gold Coast, Hong Kong, India, New Zealand, Nigeria, Palestine, Sierra Leone, South Africa, Southern Rhodesia, the United Kingdom, and the West Indies, as they existed in 1946. Many of these dominions and colonies would gain independence in the following few years.

62. Royal Society, ed., *Royal Society Empire Scientific Conference*, 15.

63. Muddiman, "New History of ASLIB," 410.

64. Shannon, "Mathematical Theory of Communication"; Bradford, "Sources of Information"; Lotka, "Frequency Distribution of Scientific Productivity"; Zipf, *Psycho-Biology of Language*.

65. Bowles, "Crisis in the Information Age?"

66. Royal Society, ed., *Royal Society Scientific Information Conference*, 253.

67. Bernal, "Provisional Scheme for Central Distribution," 253.

68. Bernal, 253.

69. Bernal, 254.

70. Bernal, "Transmission of Scientific Information," 79.

71. Bernal, "Provisional Scheme for Central Distribution," 257.

72. East, "Professor Bernal's 'Insidious and Cavalier Proposals.'"

73. East, 294.

74. East, 293.

75. East, 299.

76. Coblans, "Communication of Information."

77. Bernal's later user studies even demonstrated that few scientists were as logical or rational as his system demanded. Bernal, "Transmission of Scientific Information."

78. Garfield, "Tracing the Influence of JD Bernal"; Gaillet, Eidson, and Gammill,

Landmark Essays on Archival Research; A. Meadows, *Origins of Information Science*; J. Meadows, "Fifty Years of UK Research."

79. This time period and the initial conversations on science information eventually developed into information science as a discipline. Saracevic, "Information Science."

80. Brookes, "Jason Farradane and Relational Indexing"; Shapiro, "Coinage of the Term Information Science."

81. Bensman, "Donald J. Urquhart: Part 1 and Part 2."

82. Kilgour, "Origins of Coordinate Searching."

83. Garfield, "Tracing the Influence of JD Bernal"; Rayward, "Case of Paul Otlet."

84. Information science historian Fred Kilgour noted that "the Second World War introduced a new kind of information service, one which required immediate action by intelligence officers in obtaining and delivering information." Kilgour, "Origins of Coordinate Searching."

85. International Conference on Scientific Information, *Proceedings of the International Conference*; Royal Society, ed., *Royal Society Scientific Information Conference*.

86. Kilgour, "Origins of Coordinate Searching."

87. Bobinski, "Golden Age of American Librarianship."

88. Edwards, *Vast Machine*, 9–11.

89. J. Yates, *Control through Communication*.

Intermezzo

1. Wilensky, "Professionalization of Everyone?"

2. Mattern, "Library as Infrastructure."

3. Wilensky, "Professionalization of Everyone?"; American Library Association, "American Library Association."

4. Pawley, "'Missionaries of the Book.'"

5. Human labor is *the* critical mnemonic technê bounding memory's domain. Abdou Maliq Simone argues that human labor is critical infrastructure for outcomes that are "radically open, flexible, and provisional." Labor embodies aspects of infrastructure that have not been automated. This was especially important for early professionalization that had no existing codification of practice. Simone, "People as Infrastructure."

6. American Library Association, "American Library Association."

7. Garrison, *Apostles of Culture*, 9–11.

8. Wiegand, *Irrepressible Reformer*.

9. Wiegand, 96–97.

10. The ratio of men and women was around 50 percent in 1880, and in relationship to many all-male colleges from the time, this was a high percentage of women. From the 1920s to today, the field has been between 70 percent and 90 percent practiced by women. Beveridge, Weber, and Beveridge, "Librarians in the United States."

11. Vann, *Training for Librarianship before 1923*.

12. Stieg, *Change and Challenge*; Readings, *University in Ruins*; Thelin, *History of American Higher Education*.

13. When librarians discussed the cultural record, they meant the elitist reading ma-

terials favored by the Anglo-Saxon community that made up the majority of librarians. Wiegand, "Tunnel Vision and Blind Spots."

14. Pawley, "'Missionaries of the Book.'"

15. Wiegand, "Tunnel Vision and Blind Spots," 3.

16. Pawley, "'Missionaries of the Book,'" 73.

17. Wiegand, "Tunnel Vision and Blind Spots," 8.

18. Williamson, *Williamson Reports*.

19. Bobinski, *Libraries and Librarianship*, 114.

20. A 1980 comprehensive eight-year study written by Ralph Conant continued to urge many of the Williamson report suggestions, recommending that professional training be on par with any graduate-level curriculum. Conant, *Conant Report*.

21. Lynch, "Research and Librarianship."

22. Waples, "Graduate Library School at Chicago," 26.

23. Richardson, "Library Science," 3441–42.

24. Waples, "Graduate Library School at Chicago," 30.

25. Waples; Richardson, *Spirit of Inquiry*.

26. Pawley, "'Missionaries of the Book.'"

27. Thelin, *History of American Higher Education*, 260–61.

28. Bobinski, *Libraries and Librarianship*, 88–91.

29. Simone, "People as Infrastructure."

30. Hoeppe, "Mediating Environments and Objects," 26; Peters, *Marvelous Clouds*, 38.

31. A library patron rarely notices the hours of cataloging or statistical analysis conducted to stock materials; a mnemonist who has inculcated the method of loci can use it habitually without thinking.

Chapter 3

1. Schivelbusch, *Railway Journey*.

2. Bowker, *Memory Practices in the Sciences*, 11–12.

3. Line, "Information World Apart."

4. Colin Burke describes how vastly behind the United States was to the information boom in his book *America's Information Wars*. The US government started catching up to the British after 1940, when President Roosevelt was persuaded to found the Office of Strategic Services, a wartime intelligence agency. Information science in the United States was imported in toto from the postwar discussions in Europe.

5. Reagan, "Committee on Scientific and Technical Information," 4.

6. Bowles, "Information Wars"; Shera, Kent, and Perry, *Information Resources*.

7. Cochrane, *National Academy of Sciences*, 552–58.

8. Kidwell, "Material Culture"; Varlejs, "Technical Report and Its Impact"; Weinberg, *Science, Government, and Information*, 2–4.

9. Bortnick, "Role of Congress," 356–57.

10. Cornog, "History of Indexing Technology."

11. Edwards, *Closed World*, 147–74.

12. Adkinson, "Federal Government's Support of Information Activities"; Baker, *Improving the Availability of Scientific and Technical Information*; Crawford et al., *Scientific and Technological Communication*; Reagan, "Committee on Scientific and Technical Information"; Weinberg, *Science, Government, and Information*.

13. Weinberg, *Science, Government, and Information*, 2.

14. Crawford et al., *Scientific and Technological Communication*, 6.

15. US Congress, National Defense Education Act, 1601.

16. *Science and Technology Act*, part 1.

17. *Science and Technology Act*, part 1, 2.

18. *Interagency Coordination of Information*, 42.

19. *Interagency Coordination of Information*, 43.

20. Hartwig, "Making of National Science Policy."

21. Weinberg, *Science, Government, and Information*.

22. Committee on Government Operations. United States Senate, "Documentation, Indexing, and Retrieval," 8.

23. Black, "Second Persona," 113–14.

24. Adams, "Office of Science Information Services."

25. *Science and Technology Act of 1958*, part 1.

26. Sophar, "In Honor of Burton W. Adkinson"; R. Williams, "Changed and Changing ADI/ASIS/ASIS&T."

27. Price, Kinman, and Vidor, "History of the Georgia Tech Library."

28. Slamecka, interview.

29. Price, Kinman, and Vidor, "History of the Georgia Tech Library," 99.

30. Price, Kinman, and Vidor, 99.

31. Price, Kinman, and Vidor, 99.

32. Slamecka, interview.

33. Crosland, "Georgia Tech and the NSF Study Grant," 590.

34. Crosland, *Proceedings of the Conferences*, 2.

35. Crosland, 129.

36. The history of documentation and its overlaps with library and information science in the United States is well documented. For examples, see Rayward, *Universe of Information*; Buckland, "Documentation, Information Science, and Library Science," and "Emanuel Goldberg."

37. Crosland, *Proceedings of the Conferences*, 129.

38. Crosland, 115.

39. Crosland, 115.

40. The conferences and research trips were further supplemented by surveys sent to two hundred industrial organizations and accredited library schools. The surveys assessed interest in "science information" courses for staff. The surveys were supplemented by an analysis of industry advertisements from *Special Libraries*, the primary trade journal for librarians working in industry, government, and other nontraditional libraries, which identified skills that organizations were seeking in job advertisements. For instance, these skills included composing bibliographies, abstracts, and indexes for specific industries. The surveys provided evidence that industries from chemicals

to electronics to glass to textiles wanted their labor force better equipped to organize, record, file, and sort printed records. Indexing, abstracting, and translation were highly regarded as professional skills. The analysis identified specific techniques and technologies of information management.

41. Crosland, *Proceedings of the Conferences*, 2.

42. Slamecka, interview.

43. Slamecka.

44. Schrader, "In Search of a Name"; Wellisch, "From Information Science to Informatics."

45. Ceccarelli, *Shaping Science with Rhetoric*, 5.

46. Ceccarelli, 5.

47. Crosland, *Proceedings of the Conferences*, 10.

48. The conceptual traffic between science and librarianship had seen precedence just a few years earlier. Jesse Shera, one of the pioneers of information technology in libraries, had been exploring similar problems at Case Western. Besides being one of the founders of modern information science, he also established the Center for Documentation and Communication Research at Case with James Perry and Allen Kent. This center was associated with Case's library school. Shera was fascinated by technologies of librarianship and society. He wrote in an early issue of *Special Libraries* that the "education for special librarianship is the principal battleground between those who consider the special librarian to be first of all a librarian, hence in need of a traditional library training, and those who view him as a subject specialist and maintain, with some heat, that library education is so stereotyped, so tradition-bound, that it constitutes a handicap rather than an asset to those who would prepare themselves to be special librarians." Shera noted that "special librarians" were typically found "abstracting, indexing, searching, editing, translating, and performing a variety of other miscellaneous duties associated with the organization, retrieval, dissemination, and communication of recorded information." Shera saw a tension in this space between librarianship and modern organizations that were rooted in the industrial organization, including scientific industry, which were further proliferated in the science boom of World War II. It is no accident that the Georgia Tech conferences caught the attention of Shera, who attended both, updating conference goers about Case's explorations in documentation. He was also present during many of Humphrey's congressional hearings and the 1958 International Conference on Science Information. Shera, Kent, and Perry, *Information Resources*, 122.

49. Edwards discusses how computer metaphors supplemented popular ways of thinking about the brain that were indebted to Descartes's more mathematical model. See also Elichirigoity for the ways computers changed visual language to make sense of Cold War problems. Edwards, *Closed World*, 158–59; Elichirigoity, *Planet Management*.

50. National Bureau of Standards, *Annual Report*, 95.

51. Edwards, *Closed World*, 160.

52. Edwards, 161.

53. Garrison, *Apostles of Culture*.

54. Radford and Radford, "Power, Knowledge, and Fear."

55. This was also the case during the conferences. The only women present were as-

sociated with libraries. Even so, because Crosland primarily invited administrators, the conferences were attended primarily by men. Crosland, *Proceedings of the Conferences*.

56. This concession would help win a bigger battle. Crosland had been an advocate for women at Georgia Tech since her arrival. She was instrumental in the school admitting women. Link-Wills and Lameiras, "Dorothy Crosland"; Bix, *Girls Coming to Tech!*

57. Slamecka, interview.

58. Crosland, *Proceedings of the Conferences*, 113.

59. Crosland, 114.

60. Crosland, 107.

61. Crosland, 107.

62. Crosland, 109.

63. Crosland, 82.

64. Cohan and Craven, "Science Information Personnel," iv.

65. Drexel's program is sometimes cited as the first of its kind, but the report of the dean and director of libraries John Harvey suggests that the program would be underway in six to twelve months. Even if Drexel's program admissions predated the Georgia Tech program, it depended on the conferences to the same degree. Crosland, *Proceedings of the Conferences*, 86.

66. Atchison, "Evolution of Curriculum Development."

67. Crosland, *Proceedings of the Conferences*, 103.

68. Roberts would become library director after Crosland retired in 1971. Price, Kinman, and Vidor, "History of the Georgia Tech Library."

69. In-service training targeted a specialized part of a debate in librarianship that had been exploded by the science information problem. Retraining workers was not enough for the new type of information labor that was needed in the computer age. Conference participants suggested that the science information problem was too big, and in-service training was a less-than-ideal solution. Because in-service training would be time and resource intensive, the resource exhaustion from the institutions would also weaken the in-service training. This decision was also made partly because of Georgia Tech's own financial constraints. The staff simply did not know if they could devote the type of resources required for in-service training, even though they were very excited by "the development of in-service beginning science librarians in six or so of the top technical libraries in the country." Crosland, *Proceedings of the Conferences*, 15.

70. Crosland, 90.

71. Crosland, "Georgia Tech and the NSF Study Grant," 590.

72. Taylor, "On Education"; Saracevic, "Essay on the Past and Future."

73. Crosland, *Proceedings of the Conferences*, 33.

74. Crosland, 79.

75. Crosland, 79.

76. Crosland, 36.

77. Crosland, 100.

78. Crosland, 113.

79. Crosland, 10.

80. Crosland, 88.

81. Crosland, 99.
82. Slamecka, interview, and preface to *Information Processing & Management*.
83. Slamecka, interview; Crosland, "Georgia Tech and the NSF Study Grant"; Drake, "Georgia Institute of Technology Libraries."
84. Slamecka, interview.
85. Slamecka.
86. Slamecka.
87. Kniffel, Sullivan, and McCormick, "100 of the Most Important Leaders."
88. Georgia Institute of Technology, "Georgia Institute of Technology Bulletin," 132.
89. Georgia Institute of Technology, 132.
90. Georgia Institute of Technology, 133–34.
91. Slamecka, "Georgia Institute of Technology," and interview.
92. Slamecka, "Georgia Institute of Technology," 381.
93. Slamecka, 381.
94. Slamecka, 382.
95. Slamecka, 382.
96. Slamecka, "Methods and Research," 553.
97. Corbett, *Classical Rhetoric*, 38.
98. "Edward P. J. Corbett."
99. Cicero, *Rhetorica ad Herennium*.
100. Welch, "Reconfiguring Writing and Delivery."
101. Reynolds, *Rhetorical Memory and Delivery*, 6.
102. F. Yates, *Art of Memory*, 36–37.
103. Yates.
104. Carruthers, *Book of Memory*.
105. Gaonkar, "Idea of Rhetoric."
106. Hahn, "What Has Information Science Contributed?"

Intermezzo

1. Garfield, "Tribute to Calvin N. Mooers."
2. Richards, *Scientific Information in Wartime*.
3. Mooers and Mooers, "Oral History Interview," 9.
4. Bernal, "Transmission of Scientific Information."
5. Kilgour, "Origins of Coordinate Searching."
6. Kilgour.
7. Saracevic, *Notion of Relevance*.
8. Zatocoding was named after a proprietary business, Zator Company, that Mooers had established in 1949. Mooers, "Application of Random Codes"; Mooers and Mooers, "Oral History Interview."
9. Mooers, "Application of Random Codes."
10. Mooers, 22.
11. Another obvious problem was that the machine required knowing ahead of time how many subjects would be used in the collection. Zatocoding limited the ability to define new subject areas by requiring that the number be predetermined.

12. Mooers's thesis points out this problem but says it comes at "a relatively small price." Mooers, "Application of Random Codes," 1.

13. Mooers, "Zatocoding Applied to Mechanical Organization."

14. Within rhetorical studies, Johnson and Johnson note that an infrastructural glitch is an "actant that exerts critical mass agency when translating a phenomenon into a number to match against a threshold." They build on Boyle's scholarship, which treats a glitch as one of the "the conditions of possibility for rhetorical action." Johnson and Johnson, "Glitch as Infrastructural Monster"; Boyle, "Rhetorical Question Concerning Glitch."

15. Saracevic, *Notion of Relevance*; Saracevic, "Relevance."

16. Mooers and Mooers, "Oral History Interview," 12.

17. Austin, "Mooers' Law."

Chapter 4

1. This was Michael Lane Bruner's argument as he discussed national identity and memory. Bruner, *Strategies of Remembrance*.

2. This is not to say that librarianship produces all public memory but that it is *devoted* to understanding and creating infrastructure to be used as memory. See, Hjørland, "Documents, Memory Institutions."

3. Freeman, "Origins of the College of Computing," 3.

4. Freeman.

5. Freeman.

6. Freeman.

7. Georgia Tech libraries were subject to the competing demands of each of these eras but had never bolstered a professional education program. The first library was founded in 1889 by an English professor, untrained in librarianship, both hallmarks of the first era of library education. The library occupied space in an administration building and was later run by librarians with a professional education from one of the northeastern schools. During the second era of librarianship, Andrew Carnegie provided Georgia Tech with money for a renovated library space. Crosland was hired during this era. When the library science era began several decades later, Crosland was at the vanguard of library technology initiatives, her most memorable being the Georgia Tech conferences. But throughout these eras, Tech had never supported professional library education, and the university's library remained a constellary unit to the academic departments. When Crosland attempted to bootstrap information science at Tech, she lacked the ethos of library science, a field of research that fit into the modern university. Crosland's information science program faltered because it could not find its bearings in the university ecology.

8. Tenure is an example of the power imbalance between libraries and other academic units. Librarians have historically had to fight to be recognized as tenure-track faculty. Moreover, because their work is different from faculty in other units, their requirements are hotly contested. Welch and Mozenter, "Loosening the Ties That Bind."

9. Information science did not only change librarianship; Saul Gorn suggested that the information sciences were changing twelve disciplines across the natural sciences,

professions, and social sciences. The techniques associated with the conferences did indeed affect a number of disciplines, but not to the extent that they did in librarianship. Georgia Tech's backslide into a computer science program is a good example of that phenomenon. Many informational techniques were assimilated so quickly that they caused little friction within the field. The tension with information science has continued to shape schools of library and information science to this day, in particular because it caught on at a time when library job placement was waning and information science was seen as an anecdote. That tension continues to influence the memory work of the discipline. Greer and Atherton, "Professional Aspects."

10. Freeman, "Origins of the College of Computing."

11. Saracevic, "Essay on the Past and Future," 12.

12. Saracevic, 12.

13. Taylor, "Information Sciences."

14. Crosland, *Proceedings of the Conferences*, 92.

15. Syracuse was one of seven other schools that were affected at approximately the same time. The University of Pittsburgh's School of Library and Information Science also claims to be the first information school. In this chapter, I focus on Syracuse as a good case of a larger phenomenon occurring after the Georgia Tech conferences. So while this chapter was written about Robert Taylor and the faculty at Syracuse, it could have just as easily been about the arrival of Allen Kent (who also attended the Georgia Tech conferences) and the creation of the school at Pittsburgh, for instance. Olson and Grudin, "Information School Phenomenon."

16. Taylor, "Intelligence Work," 7.

17. Taylor, 12.

18. Taylor, 8.

19. CIC School Counter Intelligence Corps Center, "Counter Intelligence Corps."

20. Taylor, "Intelligence Work," 12.

21. Taylor, 10.

22. Morgan, "Barbie File."

23. Bower, *Klaus Barbie*; "Former Dean Robert Taylor."

24. Taylor, "Intelligence Work," 12.

25. Bowles, "Liquifying Information."

26. Williams and Lipetz, *Covert and Overt*.

27. Taylor, "Intelligence Work," 10.

28. Taylor, "Information Sciences," 4161.

29. Nathan Stormer points out that memory is produced by what he calls a curvilinear function in which pasts, presents, and futures are assembled to produce a place of memory. Taylor's experience was producing this memory space for him. Because of his experience, it differed from the memory of professional practice taught in library schools. Stormer, "Recursivity."

30. Taylor, "Orienting the Library"; Taylor and Trueswell, "Study of the Impact of Hampshire College"; Taylor, *Making of a Library*, 33.

31. *The Making of a Library* describes the transition of a traditional library into an "information institution" that would raise "the probability of effective use of data, infor-

mation, knowledge, and artistic form in all media in support of education (both formal and serendipitous), leisure enjoyment, research, and decision-making." Taylor, *Making of a Library*.

32. Taylor, vii.
33. Taylor, vii.
34. Taylor, 35.
35. Taylor, 35.
36. Taylor, 34.
37. Taylor, 35.
38. Taylor, 36.
39. Stormer, "Recursivity."
40. Taylor, *Making of a Library*, 33.
41. Taylor, 33.
42. Taylor, 57.
43. Taylor, 61–65.
44. Taylor, 214.
45. Taylor, 84.
46. Taylor, 233.
47. Taylor, 220.
48. Taylor, 227.
49. Taylor, "Areas of the Information Science Curriculum," 18.
50. Taylor, "Voice from a Past President," 52.
51. Taylor, *Making of a Library*, 200.
52. Taylor, 233.
53. Taylor, 232.
54. Taylor, 231.
55. Taylor, 231.
56. Taylor, 231.
57. Taylor, 2.
58. Taylor and Trueswell, "Study of the Impact of Hampshire College," 6–7.
59. Taylor, *Making of a Library*, 46.
60. ASIS started in 1939 at the American Documentation Institute (ADI), a group that was interested in using microfilm. ADI's early leader was Watson Davis, who had been developing ideas much like Bernal's. ADI would find its purpose during the postwar information explosion, when its membership grew fivefold. ADI member involvement in the postwar conferences on science information transformed the organization. They came to think of microfilm as one approach among many for documenting science information. ADI's council had considered changing the name in 1963, the year after Crosland's conference, but the change would not become official until 1968, the year Taylor was elected president. ASIS was the revamped version of the ADI, but ASIS would not have existed without the documentalists' involvement in the "vague and poorly understood" information science. Like Crosland, ADI was the recipient of NSF grants aimed at solving the science information problem. Farkas-Conn, *From Documentation to Information Science*; R. Williams, "Changed and Changing ADI/ASIS/ASIS&T," 35.

61. Greer and Atherton, "Professional Aspects," 329.

62. J. Greene, *Eggers Years*, 5:200.

63. Greene, 5:200.

64. Taylor and Van der Veer, "Syracuse University School of Information," 391.

65. Taylor and Van der Veer, 391.

66. Taylor and Van der Veer, 391.

67. Taylor and Van der Veer, 392.

68. Bobinski, "Golden Age," 342.

69. Bobinski, *Libraries and Librarianship*, 90–91.

70. Bobinski, 90–91.

71. Bobinski, 92.

72. Bates, "Information Science," 685.

73. Aspray, "Command and Control."

74. Greer had actually returned to teaching a year before Taylor's arrival, and Allan Hershfield was serving as a temporary dean in the interim. Taylor and Van der Veer, "Syracuse University School of Information."

75. Hershfield, "Effecting Change in Library Education"; Taylor and Van der Veer, "Syracuse University School of Information," 393.

76. Syracuse University School of Library Science, "Syracuse School of Library Science Bulletin," 7.

77. Syracuse University School of Information Studies, "Syracuse School of Information Studies Bulletin."

78. Syracuse University School of Information Studies.

79. Ivory pages listed administrative information. Gold pages provided information about faculty, students, and alumni. Green pages listed course information. Orange pages discussed career possibilities.

80. Syracuse University School of Information Studies, "Syracuse School of Information Studies Bulletin."

81. Taylor, "Information Studies at Syracuse," 16.

82. Syracuse University School of Information Studies, "Syracuse School of Information Studies Bulletin."

83. Hershfield, "Effecting Change in Library Education," 22–23.

84. Newmyer, "Image Problem of the Librarian," 44.

85. Men in the library profession still benefited overwhelmingly from gender privilege and occupied the majority of well-paid administrative positions. Newmyer, 45–46.

86. O'Brien, "Recruitment of Men into Librarianship," 63.

87. Taylor, *Curriculum Design*, 83.

88. Taylor, 82–83.

89. Syracuse University School of Information Studies, "Syracuse School of Information Studies Bulletin."

90. Settel and Marchand, "Syracuse University," 331.

91. This change had actually taken place a few years before Taylor arrived. I am not suggesting that all these ideas were Taylor's but that he was particularly good at systemizing change that he had support for.

92. Taylor and Van der Veer, "Syracuse University School of Information," 393; Settel and Marchand, "Syracuse University," 331.

93. Florence Van Hoesen, who was teaching the Bibliography of the Sciences course, had been at the school for decades. She had received her library degree from Dewey's school in Albany in 1926 and then had completed a PhD from the GLS at the University of Chicago with the dissertation "An Analysis of Adult Reference Work in Public Libraries as an Approach to the Content of a Reference Course." Librarianship was, and remains, a tightly connected world.

94. Syracuse University School of Library Science, *Syracuse University Bulletin*.

95. Syracuse University School of Information Studies, "Syracuse School of Information Studies Bulletin."

96. These metaphors also peppered Taylor's scholarship: "A beginning toward this can be made by examining information environments and developing a structure by which they can be described." Taylor, "Value-Added Processes," 343.

97. Syracuse University School of Information Studies, "Syracuse School of Information Studies Bulletin."

98. Plenty of scholarship from rhetorical scholars has discussed the embodiment of professional vision. Fountain provides a good review and book-length example. For his review, see Fountain, *Rhetoric in the Flesh*, 3–5.

99. Syracuse University School of Information Studies, "Syracuse School of Information Studies Bulletin."

100. Syracuse University School of Library Science, *Syracuse University Bulletin School of Library Science 1965*.

101. Morse and Kimball, *Methods of Operations Research*, 2.

102. Fletcher, "Presidential Address," 152.

103. Taylor, *Information Environment*.

104. Taylor, 6.

105. Taylor, 7. Taylor repeatedly used the Copernican/Ptolemaic metaphor throughout this time period to describe the relationship between libraries and information.

106. Realigning information as a natural part of the world is a repeating motif in the construction of information infrastructures. Information myths provide the raw materials that eventually are turned into the environment that supports the proposed "natural" information. Bowker, "Information Mythology."

107. Taylor, *Information Environment*, 15.

108. Taylor, "On Education."

109. Taylor, *Information Environment*, 19.

110. Taylor, 19.

111. Taylor, "Organizational Information Environments," 311.

112. Taylor's lists resembled what Ian Bogost has called ontographical litanies, "a group of items loosely joined not by logic or power or use but by the gentle knot of the comma." Bogost, *Alien Phenomenology*, 38.

113. Taylor, *Information Environment*, 19.

114. Taylor, 19.

115. Taylor, 15.

116. Taylor, 13.

117. Taylor, 14.

118. Shera, *Introduction to Library Science*; White, *Historical Introduction to Library Education*.

119. Shera, *Introduction to Library Science*, 9.

120. Wiegand, "Development of Librarianship in the United States," 103.

121. Syracuse University School of Library Science, *Syracuse University Bulletin School of Library Science,* 27.

122. Taylor, *Information Environment*, 8.

123. Taylor.

124. Taylor, 14.

125. Taylor, *Curriculum Design*, 60–61.

126. Syracuse University School of Information Studies, "Syracuse School of Information Studies Bulletin."

127. Syracuse University School of Information Studies.

128. This narrative is still popular among some today, both in public discourse about obsolete libraries and in professional discourse about education. Still, for every story about library extinction, there is usually an alternative about thriving libraries. Van House and Sutton, "Panda Syndrome"; Sutton, "Panda Syndrome II"; Wiegand, *Part of Our Lives*; Zickuhr et al., "How Americans Value Public Libraries."

129. Taylor, "Intelligence Work," 12.

130. Taylor, 12.

131. Liddy, "iSchools," 34; Larsen, "iSchools," 3021.

132. Bobinski, *Libraries and Librarianship*, 95.

133. Zickuhr et al., "How Americans Value Public Libraries."

134. Ricœur uses the phrase "tradition of inwardness" to describe the psychological models of memory that are associated with rhetoric. Reasons for memory's demise also include changed legal contexts and new approaches to arrangement. Ricœur, *Memory, History, Forgetting*, 96–97; Reynolds, *Rhetorical Memory and Delivery*, 3.

135. Stormer, "Recursivity," 32.

136. ALA still retains this mission. American Library Association, "Mission & Priorities."

137. Pawley, "'Missionaries of the Book.'"

138. Pawley, "Gorman's Gauntlet."

139. Stephen Paling describes a fundamentally similar theory of the classificatory horizon. Referencing Gadamer, he writes that the classificatory horizon is "the material and social context within which classificatory decisions are made and in which they have efficacy in shaping discourse." "Classification, Rhetoric, and the Classificatory Horizon," 596.

140. Derrida defines archives similarly. They provide access to the past through a "nomological principle" that decides what can enter and leave the public record. Derrida, *Archive Fever*.

141. Edbauer, "Unframing Models of Public Distribution," 9.

142. Bradford Vivian says much of modern memory studies "reflects preoccupations

with archiving, documenting, or otherwise preserving traces of an ostensibly organic past threatened by the allegedly increasing fragmentation of post–World War II culture." Vivian, *Public Forgetting*, 3–4.

Intermezzo

1. Book cart is often used synonymously with book truck. Because the early patents described in this intermezzo use the term *truck*, I adopt that term here.
2. Bain, *Helen Walzer*.
3. Blair, Dickinson, and Ott, introduction to *Places of Public Memory*, 10.
4. Blair, Dickinson, and Ott, 27–28.
5. Blair, Dickinson, and Ott, 13.
6. Zerubavel, *Time Maps*.
7. Blair, Dickinson, and Ott, introduction to *Places of Public Memory*, 14.
8. Blair, Dickinson, and Ott, 7.
9. Library Bureau, *Classified Illustrated Catalog*.
10. Flanzraich, "Library Bureau and Office Technology."
11. J. Yates, *Control through Communication*.
12. Hunter, Base for Traveling Bookcases.
13. Wiegand, *Irrepressible Reformer*, 84.
14. Rider, Library Book Truck.
15. Rider, *And Master of None*, 18–20.
16. Rider, *Scholar and the Future*.
17. Rider, 93.
18. Garrison, *Apostles of Culture*; Pawley, "'Missionaries of the Book.'"
19. Bain, *Helen Walzer*.

Chapter 5

1. F. Yates, *Art of Memory*, 2.
2. Rawles, *Simonides the Poet*, 187.
3. Jarratt, "Sappho's Memory," 28–29.
4. Castor and Pollux were also known in Roman mythology as the Gemini. Rawles, *Simonides the Poet*, 109.
5. Rawles, 190.
6. Quintilian, *Institutio Oratoria*, 11.2.12.
7. Quintilian, 11.2.13.
8. Quintilian, 11.2.16.
9. F. Yates, *Art of Memory*, 5.
10. Aristotle, *Art of Rhetoric*, 192.
11. Cicero, *De Oratore*, 2.87.357.
12. Cicero, 2.87.357.
13. Quintilian, *Institutio Oratoria*, 11.2.21.
14. Cicero, *Rhetorica ad Herennium*, 3.22.
15. Many versions of the memory palaces *do* neglect this part of the myth. Spence, *Memory Palace of Matteo Ricci*.

16. F. Yates, *Art of Memory*, 24.

17. Aristotle, *Art of Rhetoric*, 1403a.

18. Cicero, *De Oratore*, 2.87.353.

19. Quintilian wrote, "The story is well known." Cicero called Simonides famous and repeatedly used the word *story* to describe his recollection of the event, implying that the narrative had achieved a mythic status. He also wrote that Simonides "is said to have first invented the science of mnemonics," using a passive voice that indicates the story belonged to the cultural milieu. Quintilian, *Institutio Oratoria*, 11.2.11; Cicero, *De Oratore*, 2.86.352.

20. Rawles, *Simonides the Poet*, 15.

21. Rawles, 134.

22. Rawles, 138–39.

23. Aristophanes, *Peace*, 690.

24. Aristotle, *Art of Rhetoric*, 1391a.

25. Meadows and Williams, "Moneta and the Monuments," 38.

26. Meadows and Williams, 38.

27. It is fortunate for Simonides that no one was able to identify or question the two horsemen that called for him.

28. Quintilian wrote, "But the technique will be less useful for learning by heart what is to be a continuous speech." Quintilian, *Institutio Oratoria*, 11.2.24.

29. The families of the dead may not have even expected it possible for Simonides to name the dead precisely, instead hoping the poet could name who had likely been at the event and mourning on the assumption that there may not be another chance. Premodern perspectives on memory did not value precise detail as "true memory." Carruthers notes that before book buying was common, the canon of memory was more "memorial" than "documentary," meaning that the broad outlines of historical narratives were more important than any specific details. In spaces where access to books was rare, there was little opportunity to ensure exact accuracy, and so the art of memory was a process of recalling the broad outlines of the past to make sense of the present. As such, it may have been the case that the families of the victims were hoping for Simonides to tell them who would have *likely* been at the banquet to support the celebration of the boxer. Carruthers, *Book of Memory*, 23.

30. Vernant, "Mythic Aspects of Memory," 118.

31. Vernant, 118.

32. Schütrumpf, "Platonic Elements."

33. Cicero, *De Oratore*, 2.1.6.

34. Wolfe, "Cicero's 'De Oratore.'"

35. Cicero, *De Oratore*, 2.1.4–5.

36. Cape, "Cicero," 40–41.

37. Antonius noted, "A speaker is bound to possess, as an indispensable means for the construction of a panegyric, a knowledge of all the virtues. Then, it is clear that the rules for assigning blame have to be developed out of the vices that are the opposites of these virtues; at the same time it is obvious that it is impossible either to praise a good man appropriately and fully without a knowledge of the virtues or to brand and blame

a wicked man in a sufficiently impressive and crushing manner without a knowledge of the vices. And these topics of praise and blame we shall frequently have occasion to employ in every class of law-suit." Cicero, *De Oratore*, 2.86.349.

38. Cicero, 2.86.354.

39. Hallett, "Sappho and Her Social Context," 447.

40. Jarratt, "Sappho's Memory," 32–36.

41. Jarratt; Rosenmeyer, "From Syracuse to Rome."

42. Jarratt, "Sappho's Memory," 20.

43. Jarratt, 16.

44. Pruchnic and Lacey note the relationship between affect and memory as well and argue that the connection is more significant in the digital age of forgetting. Pruchnic and Lacey, "Future of Forgetting."

45. Jarratt, "Sappho's Memory," 25.

46. Jarratt, 20.

47. This view of memory also resonates with modern psychology theory. See Reisberg and Hertel, *Memory and Emotion*; McGaugh, "Making Lasting Memories"; Kensinger, "Remembering the Details"; Bargh and Chartrand, "Unbearable Automaticity of Being."

48. Massey, *For Space*, 9.

49. Leff, "Commonplaces and Argumentation," 450.

50. Carruthers, *Book of Memory*, 28–29.

51. Carruthers, 28–29.

52. Jarratt, "Sappho's Memory," 36.

53. This perspective of memory also resonates with Aristotelian and Platonic views that describe memory as impressions on the wax block of the human soul. Neither Aristotle nor Plato describes memory as a short-term project. See Bostock, *Plato's Theaetetus*, 180; Aristotle, "On Memory and Recollection."

54. Sappho's view of memory resonates with what Reyes has described as an analytic of difference. Reyes approaches memory as a project of difference and repetition. Subjects construct themselves and others anew through each performative rendering of memory—a never-ending process of transition and change. Sappho induces a memory space that seeks to sustain aspects of itself across difference and repetition. Sappho recognizes the fragility of memory but seeks to preserve an atmosphere of remembering, even though the atmosphere is subject to variations and changing in its performance. As Reyes says, "Thus, to attend to performative difference in mnemonic practice is to attend to the appearance of identity and alterity as well as their circulation, polysemy, and dissemblance." This problem of memory is not lost on Cicero, whose *De Oratore* is a philosophical treatise describing how to theorize memory. It is not a handbook of rhetorical tricks. I am not sure why the memory sections of *De Oratore* have been interpreted that way.

55. Quintilian, *Institutio Oratoria*, 11.2.19.

56. Rawles, *Simonides the Poet*, 138.

57. Rawles, 138–39.

58. Quintilian, *Institutio Oratoria*, 11.2.11–12.

59. Quintilian, 11.2.12.

60. Quintilian, 11.2.13.

61. Quintilian, 11.2.17.

62. Cicero, *De Oratore*, 2.86.354.

63. Quintilian writes that the boxer could have been "Glaucus of Carystus, Leocrates, Agatharchus, or Scopas" and that the house could have been "at Pharsalus (as Simonides himself seems to indicate in one passage, and as Apollodorus, Eratosthenes, Euphorion, and Eurypylus of Larissa all say) or at Crannon, as according to Apollas [and] Callimachus, whom Cicero followed when he popularized the story." Quintilian, *Institutio Oratoria*, 11.2.14–15.

64. Quintilian, 2.15.35.

65. This version of memory resonates with Plato's metaphor of memory as a block of wax. Each memory leaves an imprint that cannot be undone but only remolded with new material. Fowler, *Plato's Theaetetus*, 191a–196c.

66. Reyes, "Memory and Alterity," 237.

67. There has been writing on materiality, money, and rhetoric. See for example, R. Greene, "Rhetorical Capital"; Aune, *Rhetoric and Marxism*. Because memory has been less studied in contemporary rhetoric, less scholarship on rhetoric, money, and materialism has touched on it.

68. Meadows and Williams, "Moneta and the Monuments."

69. Mnemosyne makes an appearance frequently at the beginning of Greek poetry, summoned as part of the artistic act, for instance appearing in the *Iliad* and *Odyssey* to summon the epics. She acted as a reminder to the poet. Moneta rarely appears in Roman literature.

70. Moneta was an amalgam of the Greek's Hera, sister-wife of Zeus, and Mnemosyne, goddess of memory.

71. Tucci, "'Where High Moneta Leads.'"

72. Tucci.

73. Meadows and Williams, "Moneta and the Monuments."

74. Meadows and Williams, 48.

75. Meadows and Williams, 38.

76. Meadows and Williams, 39–40.

77. Haines, "Decline and Fall."

78. Latour, *Science in Action*, 219–32.

79. Tucci, "'Where High Moneta Leads.'"

80. Richard McKeon described his architectonic rhetoric as the arrangement of technologies and tools along with discourse as part of the rhetorical arts. McKeon, "Uses of Rhetoric."

81. Lévi-Strauss, *Raw and the Cooked*.

82. Pender, *Techne, from Neoclassicism to Postmodernism*, 16.

83. The use of monumentum increased as different parties vied for control, creating a "culture of competitive aristocratic monumentality." Meadows and Williams, "Moneta and the Monuments," 42.

84. The resources of spoken language made it possible for the poets to compose and recall long verses on command. Hutton, *History as an Art of Memory*, 33–34.

85. This can be inferred because Cicero noted the participants were reclining at a table after a feast, which was the position customary of the Greek dinner parties. Cicero, *De Oratore*, 2.87.353.

86. Spaces would be intentionally designed to aid memory for the next several centuries. F. Yates, *Art of Memory*.

87. Crossley, "Music Worlds and Body Techniques."

88. This could be the reason that it is primarily currently only used as a parlor trick. Foer, *Moonwalking with Einstein*.

89. Quintilian writes, "I do not wish to deny that these processes are useful for some purposes, for example if we have to recall many names of things in the same order as we have heard them. Our experts then set them in the Sites they have learned: a table (for example) in the vestibule, a platform in the atrium, and so on; then, retracing their steps, they find them where they have put them. This may well have been an aid to those who, at the end of a sale, repeated what they had sold to each buyer, precisely as the cashiers' records testified. Quintus Hortensius is said to have performed this feat. But the technique will be less useful for learning by heart what is to be a continuous speech." *Institutio Oratoria*, 11.2.23–24.

90. F. Yates, *Art of Memory*, 129–59.

91. Paul Connerton calls this type of forgetting "structural amnesia," where what is remembered consists of what is available to be remembered. "Seven Types of Forgetting," 64.

92. Taylor, "Intelligence Work," 12.

Chapter 6

1. Simone, "People as Infrastructure."

2. For a review of cognitive science approaches to memory and brain plasticity, see Fuster, *Memory in the Cerebral Cortex*.

3. See Barad's theory of agential cuts. Barad, "Posthumanist Performativity."

4. Garrison, *Apostles of Culture*, 73.

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