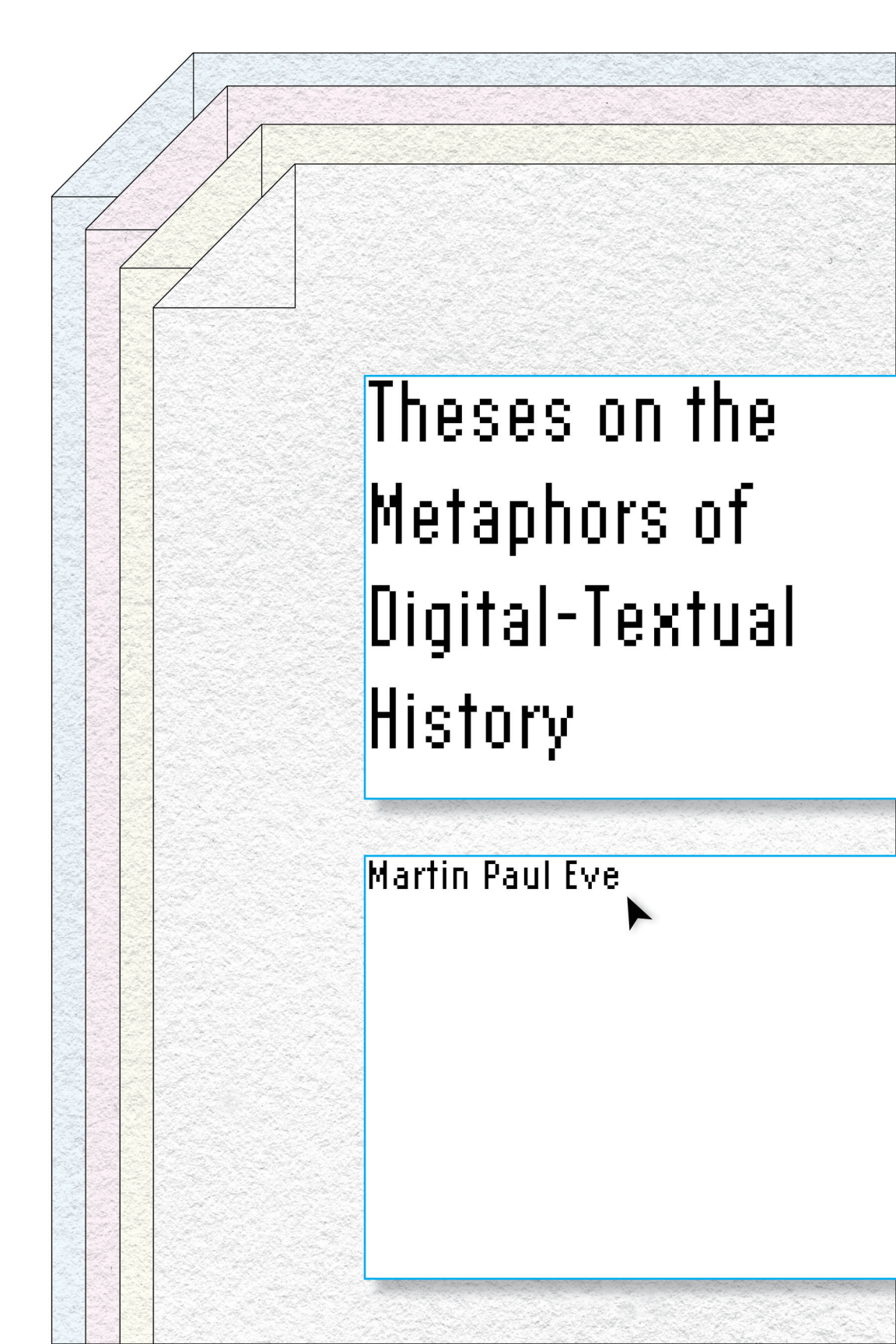




Theses on the Metaphors of Digital-Textual History

Martin Paul Eve



THESES ON THE METAPHORS OF
DIGITAL-TEXTUAL HISTORY





T

STANFORD
TEXT TECHNOLOGIES

Series Editors

Ruth Ahnert

Roopika Risam

Elaine Treharne

Editorial Board

Benjamin Albritton

Caroline Bassett

Lori Emerson

Alan Liu

Elena Pierazzo

Andrew Prescott

Matthew Rubery

Kate Sweetapple

Heather Wolfe

THESES ON
THE METAPHORS
OF
DIGITAL-TEXTUAL
HISTORY

MARTIN PAUL EVE

Stanford University Press
Stanford, California

Stanford University Press
Stanford, California

© 2024 by the Board of Trustees of the Leland Stanford Jr. University.
This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 license. To view a copy of the license, visit <https://creativecommons.org/licenses/by-nc-sa/4.0>. Suggested citation: Eve, Martin Paul. *Theses on the Metaphors of Digital-Textual History*. Stanford, CA: Stanford University Press, 2024. DOI: 10.11126/9781503639393; <https://doi.org/10.11126/9781503639393>

Portions of chapter 2 are derived from Martin Paul Eve, “New Leaves: Riffing the History of Digital Pagination,” *Book History* 25.2 (2022), 479–502, <https://doi.org/10.1353/bh.2022.0017>. This material is reused under the terms of the Creative Commons Attribution 4.0 International License.

Printed in the United States of America on acid-free, archival-quality paper

Library of Congress Cataloging-in-Publication Data

Names: Eve, Martin Paul, 1986– author.

Title: *Theses on the metaphors of digital-textual history* / Martin Paul Eve.

Other titles: Text technologies.

Description: Stanford, California : Stanford University Press, 2024.

| Series: Stanford text technologies | Includes bibliographical references and index.

Identifiers: LCCN 2024003650 (print) | LCCN 2024003651 (ebook) |

ISBN 9781503614888 (paperback) | ISBN 9781503639393 (ebook)

Subjects: LCSH: Metaphor. | Word processing. | Text processing

(Computer science) | Computer science—Language. |

Technology—Language.

Classification: LCC P325.5.M47 E94 2024 (print) | LCC P325.5.M47

(ebook) | DDC 401.43—dc23/eng/20240205

LC record available at <https://lcn.loc.gov/2024003650>

LC ebook record available at <https://lcn.loc.gov/2024003651>

Cover design: Aufuldish & Warinner

To my wife, Helen Eve, with all my love

This page intentionally left blank

CONTENTS

	<i>Acknowledgments</i>	ix
One	Theses on the Metaphors of Digital-Textual History	1
Two	The Virtual Page Almost Never Existed	28
Three	Digital Whitespace Is the Seriality of Musical Silence	50
Four	Digital Text Is Geopolitically Structured	99
Five	Digital Text Is Multidimensional	140
Six	Windows Are Allegories of Political Liberalism	174
Seven	Libraries Are Assemblages of Recombinable Anxiety Fragments	212
Eight	Everything Not Saved Will Be Lost	251
Nine	Conclusion	294
	<i>Notes</i>	297
	<i>Works Cited</i>	359
	<i>Index</i>	409

This page intentionally left blank

ACKNOWLEDGMENTS

This work was made possible through the award of a Philip Leverhulme Prize by the Leverhulme Trust, grant number PLP-2019-023. I would like to thank Erica Wetter, Caroline McKusick, and Chris Peterson at Stanford University Press for all their help in getting the manuscript this far. My gratitude goes to Adriana Smith for her most excellent effort copyediting this work and to Simon Davies for the index. My thanks also to the series editors, Elaine Treharne, Ruth Ahnert, and Roopika Risam for their interest in and encouragement of this work.

My thanks to John E. Warnock for insights into the early resistance to the PDF format; to Steven Bagley, David Brailsford, and Jeanine Finn for sources for early criticisms of PDF pagination and transmedia constraint; and to Nelson H. F. Beebe and Karl Berry for documentation of TEX and pagination standards therein. David McKitterick and Richard Fisher helped with my inquiries on the rise to prominence of white paper and made suggestions about the title. My thanks also to the readers and editors at *Book History*, and particularly Beth le Roux

and Thomas Todarello, for their incisive and helpful comments during peer review and editing. I owe thanks to Roopika Risam and Alex Gil for my section on shadow libraries and digital preservation and for the special issue of *Digital Humanities Quarterly* that they edited, in which some of the ideas in this book have previously appeared. Thanks also to Melissa Terras and Paul Gooding for the invitation to speak at the University of Cambridge on digital legal deposit, the text of which talk grew into the final chapter of this book.

I am grateful to Catherine Grant, Rose Harris-Birtill, Sam Moore, and Jane Winters for their comments on the draft manuscript of the chapter on the virtual page. Bronač Ferran provided me with links to recent copyright rulings around machine-generated artforms. I am grateful for the work of Matthew Kirschenbaum, to whom much of this book is indebted and who helped me think through the title, and for the work of Alan Liu and Kathleen Fitzpatrick.

A number of friends and colleagues have sustained me in personal ways throughout this project, which was written in the isolation of ongoing Covid shielding over a four-year period owing to my continued vulnerability, immunocompromised status, and total kidney failure. Greetings to all at A Love From Outer Space. My special thanks to Janneke Adema, Siân Adiseshiah, Juan Pablo Alperin, Tina Atlagić, James Baker, Anthony Bale, Caroline Bassett, Heike Bauer, Kaveh Bazargan, David Berry, Geoff Bilder, Mark Blacklock, Brett Bobley, Josh Bolick, Mark Bould, Peter Boxall, Peter Brennan, Nikola Brigden, Joe Brooker, Carolyn Burdett, Jack Butters, Andy Byers, Luisa Calè, Jamie Campbell, Jane Campbell, Ruth Charnock, Bryan Cheyette, Peter Christian, Roland Clare, Linda Clare, Paula Clemente Vega, Poppy Corbett, Ryan Cordell, Julian Cottee, Holly Crow, James Crow, Adam Crymble, Helen Cullyer, James Cummings, Stephen Curry, Isabel Davis, Lianne de Mello, Joe Deville, Sarah Dillon, Bob Eaglestone, Caroline Edwards, Simon Everett, Alison Finlay, Hilary Fraser, Jo Freer, Jon Fugler, Melonie Fullick, Brian Gallagher, Rupert Gatti, Matt Gold, Alex Goy, Hilary Goy, Tom Grady, Duncan Gray, Jonathan Gray, Bas Groes, Richard Hall, Clare Hankey, Anna Hartnell, Jane Harvell, Doug Haynes, Alastair

Horne, Alyson Jakes, Ben Johnson, Sean Johnston, Lloyd Jones, Alexa Joubin, Helen Karamallakis, Micki Kaufman, Wendy Kettle, Erik Ketzan, Caroline King, Sharla Lair, Rich Lane, Stuart Lawson, Doireann Laylor, Mark Leach, Lennard Lee, Esther Leslie, Liz Lightstone, Melanie Lockett, Roger Luckhurst, Al Mackenzie, Caroline Magennis, John Matthews, Caroline Matthews, Phil Mays, Zena Mays, Shamira Meghani, Kay Mendlson, Lucy Montgomery, Will Morton, Ross Mounce, Mpalive-Hangson Msiska, Joe Muller, Yvonne Nobis, Mark Oakley, Amy Pajewski, Katherine Parker-Hay, Lee Perry, Mark Pimm, Frances Pinter, Sascha Pöhlmann, Ernesto Priego, Joshua Pugh, Mark Ratcliff, Andrée Rathemacher, Jennifer Richards, Albert Rolls, Johan Rooryck, Rick Rylance, Bob Salmond, Mauro Sanchez, Melanie Selfe, Iain Robert Smith, Julie-Ann Smith, Ronald Snijder, Graham Stone, Joe Street, Duncan Stringer, Helen Stringer, Claire Sugden, Simon Tanner, Sam Thomas, Ted Underwood, Hazel Vanderhoeven, Michael Vanderhoeven, Don Waters, Charles Watkinson, Angela Waugh, Stewart Waugh, Peter Webster, Scott Weingart, John Willinsky, Jake Wilson, Jo Winning, Agnes Woolley, and Warren Young.

My sincere thanks to the medical teams at the Royal Free Hospital and the Kent and Canterbury Hospital who have saved my life, especially Dr. Chiara Giacomassi, Professor Richard Stratton, Dr. Katie Townsend, Dr. Simon Black, Professor Chris Farmer, Dr. Alex Riding, Dr. Nasir Abbas, Dr. Rupert Beale, and the entire staff of the Thomas Becket Haemodialysis Unit.

With thanks to my family, Gill Hinks, Rich Gray, Alyce Magritte, Nova Gray, Mina Gray, Sue Eve, Sam Jones, Carin Eve, Anthony Eve, Julia Eve, Juliet Eve, and Lisa Holloway. Thinking fondly, always, of the memory of Nan and John. Thanks also to Toby and Luka, our boys, for the welcome distractions.

This book is dedicated to my lifelong love, Helen Eve.

This page intentionally left blank

THESES ON THE METAPHORS OF
DIGITAL-TEXTUAL HISTORY



This page intentionally left blank

ONE

THESES ON THE METAPHORS OF DIGITAL-TEXTUAL HISTORY

ONE OF THE MOST CELEBRATED, and therefore over-remarked upon, of Jorge Luis Borges's short stories is his 1941 "The Library of Babel."¹ In this tale, there is, perhaps unsurprisingly given the title, a library. However, the library is extraordinary. The library is the entirety of the universe. Composed of an infinite number of hexagonal pillars, each of which contains five shelves of thirty-two books, each of which is 410 pages in length, the library contains every work ever written and every work that could possibly exist. When the library is discovered, it triggers celebration and joy. Everything that could be known is now possible to know!

Nevertheless, notably and problematically, the library contains much that is useless rubbish. Most books contain arbitrary strings that are neither words nor mathematical formulas.² Certainly, actual knowledge and wisdom are within the library. The problem is how to sort it

out. Borges's library appears, then, as a model of reality, narrated by an unreliable figure who embodies these paradoxes of totality.³ Everything we could know is, of course, presented to us in the form of the totality of existence. The "only" challenge is sifting the wheat from the chaff, sorting illusion from actuality, and separating idealism from the material.⁴ Without curated metadata and discoverability, knowledge and noise can be difficult to tell apart.

Readers assume, as I just have, that the Library of Babel is the universe, the one-to-one map of reality about which Borges quipped elsewhere.⁵ However, what if the library did exist in a form that was not just the sum of all existence? In computing systems, we use numeric representations to create digital sound files, movies, pictures, and text. Indeed, all computer files are, at heart, vast numbers. For example, let us say that we represent the letters *a*, *b*, and *c* by the familiar childish gamelike code of the numbers 1, 2, and 3. In this case, in binary, *a* would be "01," *b* would be "10," and *c* would be "11." A system that puts these together might write "1110" for *cb*. Clearly, computer file formats are more complex than this extremely basic cipher. However, it demonstrates the point: "1110" is the binary for the number 14. Any computer file, then, can be expressed as a number.

Irrational numbers such as π , which expresses the ratio of a circle's circumference to its diameter, contain every possible number that could ever exist within their infinitely long sequences. In formal terms, this is because mathematicians conjecture that π is normally distributed, which means that it is a *disjunctive sequence*. This distribution means that every digital file that could ever possibly exist—and, hence, every textual document that has been written, that has not been written, and that could be written—can be found at some point within π 's unending string of numbers. Our *cb* number, 14, is relatively trivial to find, occurring immediately after the first decimal place: 3.14. However, even if one wanted to find *abc* in our code, one would not have to look far. Under our system, "011011" comes to 27. One only has to search twenty-eight digits after the decimal place to come across the digit that one needs: 3.14159265358979323846264338327. Irrational numbers, in digital contexts, are the real-world Library of Babel.

This may all sound very hypothetical. However, Philip Langdale has created a (satirical) computing filesystem—dubbed π fs—that uses π to store (or, really, to compute) its data. Indeed, when one wishes to save or retrieve a file, the π fs filesystem calculates and searches through π until it finds the numbers that express the data in question. “ π fs is a revolutionary new file system,” claims Langdale jokingly, “that, instead of wasting space storing your data on your hard drive, stores your data in π ! You’ll never run out of space again— π holds every file that could possibly exist! They said 100% compression was impossible? You’re looking at it!”⁶

Of course, π fs is pragmatically useless and not a serious undertaking; it is geek humor.⁷ To calculate π to enough digits to find extremely long binary numbers, equivalent to files, would take a very long time. π fs works by substituting space and storage for time, in essence recomputing files every time a user wishes to access them. The π fs filesystem derives from a joke made around 2001 by Keith F. Lynch. As Lynch noted, if one calculates and stores π in binary, in addition to all of the benefits of the Library of Babel, one would be guilty of the following:

Copyright infringement (of all books, all short stories, all
newspapers, all magazines, all web sites, all music, all
movies, and all software, including the complete Windows
source code)
Trademark infringement
Possession of child pornography
Espionage (unauthorized possession of top secret information)
Possession of DVD-cracking software
Possession of threats to the president
Possession of everyone’s SSN, everyone’s credit card numbers,
everyone’s PIN numbers, everyone’s unlisted phone
numbers, and everyone’s passwords
Defaming Islam. Not technically illegal, but you’d have to go
into hiding along with Salman Rushdie.⁸

As Lynch went on to joke, “Also, your computer will contain all of the nastiest known computer viruses. In fact, all of the nastiest POSSIBLE

computer viruses.”⁹ Indeed, the Library of Babel also contains every piece of malicious computer code and all dangerous knowledge and wisdom that could ever exist, assuming that one believes that we can represent all epistemic artifacts in digital form. In addition to being the font of all wisdom, it is also a dark archive that contains humanity’s (and every other possible species in the universe’s) worst.

I have chosen to open this volume with remarks on π fs and the Library of Babel because this book is about digital-textual histories and metaphors. What π fs shows us is a more basic premise of digital textuality: that text and numbers are indistinguishable from one another in the computational era and that to study electronic text implies a need to examine the numerical, digital, and computerized contexts and environments within which they are fashioned.¹⁰ In the contemporary period, the “history of text” we are writing is also the “history of computers” and the “history of numbers” because, in the present day, everything written can be represented numerically. Hence, while it is tempting, given the small Venn-diagrammatical overlap between brilliant writers and brilliant mathematicians, to think that the space of writerly quality and the arena of mathematical/computational quantity must sit at opposite poles, this is not true. No matter how many liberal humanist defenses we make of writing, π fs reminds us that all text can be refactored to numbers and some numbers contain all text that can ever possibly be written, if we only choose to calculate them. To understand contemporary digital textuality and its metaphors, we must also work to understand the technical components that sit beneath them and the computer-scientific principles that have conditioned their development.

Digital Book History

By now, the study of the history of books and their materialities is so old that the field of the history of books has its own history.¹¹ Ever since Robert Darnton famously asked, “What is the history of books?” so the mythology goes, the field has burgeoned.¹² In our digital and globalized era, though, the recent trajectory of material-textual studies has had an outward, planetary focus. As Dennis Duncan and Adam Smyth note,

we have moved “away from bibliography’s historical focus on the Western codex, towards a global study of the materials and practices of reading and writing from scrolls and tablets to inscriptions on shells and bones.”¹³ This world-literary focus has diffused the scholarly practices marching triumphantly under the banner of “bibliography.” Indeed, at this point in their life cycles, textual scholarship and the study of material texts have become highly diverse fields of endeavor. Researchers in these fields focus on various global media over an extended period, covering the prehistory of the printing press to the resurgent orality of the digital audiobook.¹⁴ Such disparity has led Wim van Mierlo to ask whether any continuity even “exists in the methodological, conceptual and theoretical underpinnings of the discipline,” positing that we might speak instead of “discontinuity and diversification or fragmentation of methods and frameworks.”¹⁵ The histories of the histories of books proliferate.

This book, the product of a decade of thinking about critical approaches to text technology, continues this proliferation and dispersion by focusing on metaphor’s role in digital-textual production history.¹⁶ The book is wide-ranging in its subject and approaches. Some chapters of this book examine the historical evolution of digital-textual metaphorical concepts (such as “whitespace”), while other parts conduct sociological readings and interpretations of the metaphors that we use (such as “home” in computing contexts). Sometimes, the remarks are simply about technological and computing environments—all of which have a relevance for digitally consumed contemporary text. However, as a unifying feature, this is a book about the messy *digital-linguistic* frames that condition our current reading and writing practices in an era when virtually all texts are “born-digital” and most are disseminated via the web. As of the early 2020s, the vast majority of the world’s novelists, poets, dramatists, and even MFA students begin their writing days by settling down not with a pen in their hand but instead in front of the familiar blinking vertical line of a computer cursor and the latest version of Microsoft Word. There are exceptions. Don DeLillo and Jennifer Egan claim to resist the lure of the digital machine and conduct their initial drafting using pens, paper, and typewriters.¹⁷ George R.

R. Martin sticks to the earlier, but nonetheless digital, technology of WordStar.¹⁸ In general, though, it is not possible comprehensively to understand the environment from which contemporary literature and text emerges without heed to the digital sites of their production, commodification, dissemination, and reception. In turn, paying attention to the environment entails a focus on cognitive metaphor, which tells us how to understand an aspect of a concept.¹⁹

Specifically, I hypothesize that digital-textual (and other computational) metaphors often move through three phases: they are initially descriptive, then they encounter a moment of fracture or rupture, and finally they go on to have a prescriptive life of their own that conditions future possibilities, even though they no longer seem to function as we might expect. This book looks for the moments when digital-textual metaphors *break*, because these instances show us how the possibilities for our future text environments have become constrained by metaphors that are untethered from their original intent. This book focuses on the ways that digital-textual metaphors do *not* work in order to uncover how our textual softwares become locked into paradigms that no longer make sense. This is important because, as Stuart Hall showed us, “metaphors are serious things. They affect one’s practice.”²⁰ In a different context, but also stressing the importance of metaphor, Jacques Derrida writes that “metaphor is never innocent. It orients research and fixes results.”²¹ We are, therefore, right to pay heed to such digital metaphors. This degradation of digital-textual metaphor has also been noted by Jeff Jarvis, who charts it as part of the so-called Gutenberg Parenthesis theory, which posits that the age of print was merely a bracket of history from which we are now departing in the internet age. For, “in the simplest expression,” writes Jarvis, “it will become progressively less meaningful to say that we ‘turn a page’ in our lives, that our transparent selves are ‘open books,’ even that we have the ‘complete story’ when we read on screens in scrolls that never end.”²²

This book also marks the first time I have written about textuality without *reading* a set of texts, instead focusing on the surrounding apparatuses that are the conditions of possibility for digital text. This book is an attempt to interpret the environments of digital textuality

and text editing through their metaphors and histories. If it is true that paratexts in the physical space can be read, examined, and analyzed, then it is also true that the same can be said for the “metadata”—as we might term such para-apparatuses—of digital-textual objects.²³ Indeed, other projects have also been invested in such work and have led the way. The legacy MONK project even stood for “Metadata Offer New Knowledge.” Yet when I talk about the analysis of “metadata” here, I am not referring to the traditional elements that might be bracketed under such an approach. I do not mean the titles of works, their ISBNs, and their DOIs, for example. Instead, I analyze a broadened scope of “metadata” that includes the digital paratextual contexts that condition electronic text production. These range from actual technologies and their implementations, such as Unicode or the history of white paper, to metaphors of “vision” in our operating systems. Language and technology become hybrid forms of metadata that influence how we understand text in the twenty-first century.

This attention to metaphor has been the focus of other studies, most notably Marianne van den Boomen’s 2014 *Transcoding the Digital: How Metaphors Matter in New Media*. Crucially, for van den Boomen, building on Lev Manovich’s idea of “transcoding” as a process of “‘conceptual transfer’ from the computer world to culture at large,” metaphor saturates all of our interactions with contemporary computation.²⁴ As she points out, “we barely realize” the extent to which most of our digital terms “are metaphorical.”²⁵ This idea of “transfer” or “transport” has long been central to our understanding of metaphor. Indeed, the etymology of the term is what allows Marshall McLuhan to state that all media are metaphors. As he put it: “The word ‘metaphor’ is from the Greek *meta* plus *pherein*, to carry across or transport.”²⁶ Whether it is “mailing,” “chatting,” or “searching,” whenever we describe the things we do on computers, we usually use metaphors that “carry over” from other domains. (Although, as I will go on to discuss, this may, in fact, be the case with *all* language.) Reading such metaphors, as I do in this book, requires a delicate balancing act. On the one hand, in a point to which I will return, we must be able to recognize what van den Boomen calls the “compressed metaphoricity that stands in for a com-

plex dynamic machinery” while seeing, on the other, that metaphor is grounded in real “things in itself.”²⁷ The balance is between how we do still understand metaphors, even when they do not wholly “work” and have gone past the “break” point, while pointing out the limitations of just how literally we can take them.

In focusing on language and metaphor, I do not mean to understate these digital spaces’ crucial materiality. Computer systems are distinguished, argues Matthew G. Kirschenbaum, “not by virtue of their supposed immateriality but by virtue of their being material machines conceived and built to sustain an *illusion* of immateriality.”²⁸ In Friedrich Kittler’s extreme formulation, all computing systems—all digital spaces—boil down to just “signifiers of voltage differences” within hardware circuits.²⁹ Hence, despite our investment in the idea of the virtual as “unreal,” we are also finely attuned to the interplay of the real and the virtual. For example, the most significant contemporary spokesperson of internet retail, Amazon, is dedicated to the process of making something tangible from seemingly nothing. That is, perhaps the most prominent emblem of the virtual space would mean far less if, when one clicked “Buy now,” nothing physical turned up on one’s doorstep (although in recent years, the sales of virtual servers through Amazon’s AWS business have been a major boon for the company). As we will see over the next few years as artificial intelligence (AI) language models gain access to real-world systems and become fully-fledged “agents,” the interplay between virtuality and materiality is where computational power resides.

However, the metaphors that we use to describe digital environments (as this sentence demonstrates, there is no way of not doing it) impute a materiality to the simulated interaction with the machine. Even to refer to the digital “realm” or “environment” as a virtual “space” of sorts is already falsely to hypostatize its existence as an immaterial other-*place* (perhaps the hideously overused Foucauldian concept of “the heterotopia”).³⁰ Virtual reality becomes, in such language, at once a reality and only *virtual*, a word that—aptly, given Kirschenbaum’s repetition of “virtue”—comes to us from the late fourteenth-century Medieval Latin *virtualis* and *virtus*, meaning “excellence, potency, effi-

cacy” but also, literally, “manliness” and “manhood.” We arrive at the contemporary meaning of “virtual” in the sense of having a true essence (nonreality) that is separate from a surface effect (solidity/reality) around the middle of the fifteenth century, probably from the meaning of “capable of producing a certain effect.”³¹ However, to understand the impact of the disjunct between the virtual’s surface effect and its true nature on contemporary textual production, we must examine the masking effects of the metaphorical language we use to speak of “the digital” and its implications.

In this book I rewrite a set of our digital-textual histories around the following seven theses—theses on the metaphors of digital-textual history, if you will—which correlate to each of its chapters:

1. The virtual page almost never existed.
2. The history of digital whitespace is the seriality of musical silence.
3. Digital text is geopolitically structured.
4. Digital text is multidimensional.
5. Windows are allegories of political liberalism.
6. Libraries are assemblages of recombinable anxiety fragments.
7. Everything not saved will be lost.

Each of these theses focuses on a metaphorical grounding: the idea of the “page” or “whitespace,” for instance, using these concepts as earthing points to reappraise the concrete historical unfolding—and breakage—that resulted. Some of the chapters are very much historically rooted. In the chapter on the history of the virtual page, I interview the creators of the PDF format to rewrite this format’s story. In other chapters, the debate is much more conceptual or focused on language. For example, I examine the history of the term “safety” in text processing and argue for the multiple axes across which this metaphor operates. In these senses, while some portions of this book concern new histories of digital text, other parts aim more simply to fracture and pull apart—or read and interpret—the metaphors that underpin our digital text processing.

But is “metaphor” even the correct term? A great deal of this book shows how and why our computational metaphors fall short (and analyzes the implications of this). It unpicks how we can explain particular metaphors to new users. (For instance, I ask at one point why a “menu” is called a menu, given that no food is involved, and why a “window” is called a window, given that you cannot see “through” it, although it is “framed.”) However, this problem has plagued computer designers since the 1960s; it is not a new challenge. Indeed, as Thierry Bardini put it, as just one example, “The virtual desktop was not a mere metaphor, since the user did not identify the false residual of the metaphor.”³² In other words: users took only the parts that held, ignoring the points where the metaphor fell short. We can best see this challenge when software designers do not know which metaphors they should use. Take, for example, the well-known metaphor that interface design is a “conversation” between the designer and the user. John Walker, of Autodesk Inc., poured scorn on this approach: “I believe that conversation is the wrong model for dealing with a computer—a model that misleads inexperienced users and invites even experienced software designers to build hard-to-use systems. When you’re interacting with a computer, you are not interacting with another person”—an interface-to-face—“you are exploring another world.”³³ However, “exploring another world” is another metaphor that does not wholly hold. Computational metaphors involve selecting and judging parts that work and parts that do not. There are good and bad computational metaphors, but no metaphor is a direct one-to-one correlation with reality because, at that point, the metaphor would not be a substitution for the thing but the thing itself.

Perhaps the best indication of the contested status of “metaphor” in computer interface design was set out by Alan Kay, the noted computer scientist who worked at Xerox PARC in the 1970s and within several prestigious university computer science departments. For Kay, “One of the most compelling snares is the use of the word *metaphor* to describe a correspondence between what the users see on the screen and how they should think about what they are manipulating. My main complaint is that *metaphor* is a poor metaphor for what needs to be done. At PARC,

we coined the word *user illusion* to describe what we were about when designing user interface.”³⁴ Contrary to metaphor, which provides a substitutive context on which users can base their operational premises, illusions, of course, are meant to trick the viewer, although they are usually done, like fiction, with the consent of a willing and disbelief-suspending audience. For Kay, though, this illusory context is how we end up with supercharged analogous digital objects. There is no point, in his view, in creating digital paper that is “as hard as paper to erase and change.” Instead, we take the parts of the metaphor that we like and imbue the digital copy with magical (or “illusory”) powers: “But it is the magic—understandable magic—that really counts. . . . If it is to be like magical paper, then it is the *magical* part that is all-important and that must be most strongly attended to in the user interface design.”³⁵ In reality, though, even using such terms as “interface” or speaking of the “boundary” between humans and machines operates, as does all language, through metaphor.³⁶

The type of metaphor to which this book specifically refers is conceptual metaphor, stemming from the work of George Lakoff and Mark Johnson in the early 1980s. The fundamental premise behind their research is that “our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature.”³⁷ For Lakoff and Johnson, “the essence of metaphor is understanding and experiencing one kind of thing in terms of another,” and, at its heart, almost all of what we do, say, and understand uses a relational approach to definition.³⁸ Importantly for this early work on conceptual metaphor, “metaphorical entailments can characterize a coherent system of metaphorical concepts and a corresponding coherent system of metaphorical expressions for those concepts.”³⁹ Put otherwise, metaphors must remain coherent and consistent in their usage. Lakoff and Johnson postulated that, in most cases, even where there are overlapping metaphorical referents, such language systems do retain consistency and coherence.

Metaphors are also, though, only ever partial. “If,” write Lakoff and Johnson, “it were total, one concept would actually *be* the other, not merely be understood in terms of it.”⁴⁰ For instance, the metaphors of

“the mind is a machine” and “the mind is a brittle object” give us “different metaphorical models for what the mind is and thereby allow us to focus on different aspects of mental experience.”⁴¹ In more recent parlance, different metaphors “afford” us different comprehensive capabilities for understanding an object’s workings. These metaphors become “stacked” atop one another, usually because “two purposes cannot both be served at once by a single metaphor.”⁴² Each separate metaphor then “allows us to get a handle on one aspect of the concept.”⁴³ This means that there can be a temptation, when designing a new environment from scratch, to multiply the number of metaphorical referents used to explain a system. As Douglas Kellner puts it, “Dominant [digital] metaphors draw from the human body, everyday life, home and business, nature, travel, technology, and the military and space travel.”⁴⁴ As a result, we are furnished with windows, menus, status bars, pointers, sites, homes, wallpapers, desktops, check boxes, text boxes, spreadsheets, pages, icons, shortcuts, notepads, files, folders, trash cans, hourglasses, pings, dragging, dropping, clicking, right-clicking, scrolling, deleting, writing, redacting, signing, zooming, calling, playing, working, mailing, cutting, copying, pasting, snipping, screenshotting, saving, archiving, backing up, powering on, shutting down, spooling, buffering, loading, and downloading.⁴⁵ And what sort of coherence or consistency do we imagine might sit at the intersection of the overlap of these terms?

Indeed, Jingfang Wu and Rong Chen have partially set out how cognitive metaphors operate across a set of nonconsistent metaphorical contexts in the computational domain.⁴⁶ For instance, “a computer is a person” is a common framework in which the “CPU [Central Processing Unit] is the brain.” At the same time, a “computer is a factory” in which the operating system must “schedule computational activities to ensure good performance.” Concurrently, “a computer is an office” in which there are “notepads” that are “dropped” into “folders.” But our computers are also “containers” of “folders” that can be “emptied” from the “recycle bin.” Wu and Chen further detail the terminologies we use to describe the internet: We have “highways” carrying cyber “tourists” and “digital natives” even while the internet is also personified as “born in America.” Even as the internet is a “cyberspace,” it is a “sea”

on which we “surf,” and it is a “community,” although this community space is also a “library” and a “market.”⁴⁷

However, as I will detail in the section below on cultural phenomenology, an essential part of comprehending metaphor is that it cannot be divorced from the experiential encounter with contextualized language. Hence, “no metaphor can ever be comprehended or even adequately represented independently of its experiential basis.”⁴⁸ This experiential encounter is broken down into ideas of prototypical primitives that exemplify the difference between definition and metaphorical explanation. While such prototypes remain contextually grounded and their properties are hardly inherent—the prototypical “chair” will depend on the context, say whether it is a formal dinner or a more casual affair—the metaphor must be understood in terms of the chairness of the chair in specific contexts.⁴⁹

One of the core objections that a skeptical reader might mount to much of this book is anticipated by Lakoff and Johnson. Namely, that “it is easy to find apparent incoherences in everyday metaphorical expressions.”⁵⁰ In other words, the accusation (especially by those with a disdain for analytical/language philosophy) will be that such needling is more nit-picking than new knowledge. However, as Lakoff and Johnson showed, most metaphors they examined “turned out not to be incoherent at all.”⁵¹ Yet the question remains: Are the metaphorical aspects that I am extracting and here tormenting incoherent, inconsistent, or merely partially focused? Or is it, in fact, the case that we do not “understand concepts of one kind in terms or concepts of another kind at all” but instead “only that we can perceive similarities between various concepts and that such similarities will account for the use of the same words for the concepts”?⁵² For example, as I will discuss, the “window” of a computer system is neither transparent nor fixed, but it is openable and framed. These windows also appear, apparently, on a “desktop” which, paradoxically, has been “wallpapered.” As Theodor Holm Nelson memorably put it as far back as 1990, “I have never personally seen a desktop where pointing at a lower piece of paper makes it jump to the top, or where placing a sheet of paper on top of a file folder causes the folder to gobble it up.”⁵³

Indeed, computational metaphors usually “form no single image,” but they do somehow, within their own logics, rather than the logics to which they refer, “fit together” with a type of coherence until they hit the “break” point.⁵⁴ The consequence of this “metaphoric ideology,” as Nelson terms it, is that “first, these mnemonic gimmicks are not very useful for presenting the ideas in the first place; second, their resemblance to any real objects in the world is so tenuous that it gets in the way more than it helps; and third . . . *the metaphor becomes a dead weight*” in which “once the metaphor is instituted, *every related function has to become a part of it*.”⁵⁵ The question then becomes one of transference: What is carried across in the sharing of metaphorical terms between real-world and prototypical objects and the computational environment that we aim to make hospitable? Moreover, how might it become possible to stem the harmful proliferation of functional association to which Nelson gestures? The investigation of broken metaphor gives us scope to investigate the histories of digital-textual interfaces and whence they originate in material circumstances.

This partiality of metaphor returns us to Kay’s points about illusion and to note that “only *part of* [a metaphor] is used to structure our normal concepts . . . they go beyond the realm of the literal.”⁵⁶ Yet, when metaphors are extended in ways that go beyond our regular, day-to-day comprehension of the referents to which they gesture, they become “idiosyncratic, unsystematic, and isolated.”⁵⁷ At least part of my contention in this book is that this adjectival trinity serves as a good description of much of our computational metaphor. We have, in many ways, built entirely separate systems of language and domains of practice that do little but reenforce idiosyncratic, unsystematic, and isolated rituals of digital reperformance. Importantly, these rituals of reperformance in the computational domain reflect the original metaphorical contexts and their points of divergence. As a result, as we shall go on to see, older technologies begin retroactively to be described in terms of the digital. We say that old printed papers are “like the scrolling computer screen,” when really the likeness travels the other way.⁵⁸ Indeed, as Lakoff and Johnson claim, “new metaphors have the power to define reality”; and that includes past realities and history.⁵⁹ Alternatively, as Susan Leigh

Star has put it, these battles about metaphor matter, because “power is about *whose* metaphor brings worlds together, and holds them here.”⁶⁰ New computational metaphors end up being how we conceptualize extant and past technologies. At the same time, these metaphors often end up being a long way from any correlated reality.

One way we can comprehend this independence from reality is through the lens of structural metaphor. Ontological metaphors are those that impute a state of being to noninstantiated concepts. For example, in Lakoff and Johnson’s example, “Time is a substance” and “Labor is a substance” are ontological metaphors that denote both time and labor as sharing a material state. Because the shared object state is the same, the two conceptual domains are made commensurate. By contrast, structural metaphor asks us to “induce similarities” between areas. Lakoff and Johnson’s example is that “ideas are food” so you can digest, swallow, and devour both of these terms. Notably, while “the concept of swallowing food is independent of the metaphor,” by contrast, “the concept of swallowing ideas arises only under the metaphor.”⁶¹

Similar probings might well be applied to our experience of computational interface elements. For example, the framed rectangles that contain (another metaphor) our user interfaces are windows that can be “opened” and “closed” purely because we think of the ingrained “window” metaphor, even though, in reality, such virtual windows might more accurately be said to appear and disappear. The “frame” of the window may constitute the content-surface that allows for cross-domain substitutability. However, the structural-comparative metaphorical elements allow us to transfer function between these areas. They “arise out of orientational and ontological metaphors,” as Lakoff and Johnson put it.⁶² Yet again, though, the substitution of function is idiosyncratic, unsystematic, and isolated.

Whether metaphor or magically augmented illusion, user interface design fought in the battle between two competing cultures in the 1960s and 1970s. On the one hand, some developers felt that digital technologies should be “user friendly” and easy to learn. This group included Larry Tesler, who would go on to be responsible for our “copy and paste” metaphorical paradigm, and Jeff Rulifson, who worked on

ARPANET, the precursor to the internet. On the other hand, though, was the paradigm pioneered by Douglas Engelbart, one of the inventors of the computer mouse. For Engelbart, user interface design was a way to *modify users* rather than being something that should fit users' expectations. Engelbart saw, in computer interface design, a way to improve humanity by training it afresh. Tesler and Rulifson, by contrast, planned, from humanity, how to improve their user interfaces.⁶³

This conflict came to a head under the leadership of Butler Lampson at PARC in the 1970s, who insisted on a “new ethic” where every product had to be “engineered for a hundred users” to give a broadly applicable design paradigm.⁶⁴ Such a paradigm was about “tailoring the user interface to what designers could find out about or imagine about how people actually do their work” instead of using the interface to “force people to learn to do it in a new and better way.”⁶⁵ This approach sounds the most obvious of methods; we should make our technologies easy to grasp and use. However, it was by no means a sure thing at the outset of computational design history. Instead, the battle was between one ideology that thought computers might improve the way we do things and another that thought we do things pretty well already and should make computers conform to existing practices.

“Practice” is an apt term to explore at this point. Talk of metaphor often moves us into conceptual and cognitive arenas. Metaphor is how we translate between an observed practice (what people do) and a cognitive frame (how they think about and understand it). However, the aforementioned debate about the role of metaphor and the place of interface design in shaping or being shaped by the user shows us the value of N. Katherine Hayles's notion of an “incorporating practice.” Hayles sets out a system in which “inscription” is the opposite of “incorporation.” In this model, abstract signs, when written down, are given an independent existence from the writer. Written forms exist independently, but with traces, of the incorporated form that produced them. On the other hand, an incorporated gesture “such as a good-bye wave cannot be separated from its embodied medium, for it exists as such only when it is instantiated in a particular hand making a particular kind of gesture.”⁶⁶

Computer user interfaces straddle this inscription-versus-incorporation boundary and must consider the interplay between cognitive and bodily actions. As Hayles defines it:

I mean by an incorporating practice an action that is encoded into bodily memory by repeated performances until it becomes habitual. Learning to type is an incorporating practice, as both Connerton and Merleau-Ponty observe. When we say that someone knows how to type, we do not mean that the person can cognitively map the location of the keys or can understand the mechanism producing the marks. Rather, we mean that this person has repeatedly performed certain actions until the keys seem to be extensions of his or her fingers. Someone can know how to type but not know how to read the words produced, such as when a typist reproduces script in a language that the typist does not speak; conversely, just as someone can be able to read a typescript without knowing how to type.⁶⁷

Hence, the argument above is a debate about the *site* of inscription and the inscribability of the body. Those who wanted user interfaces to be easy to use saw the body as an inscribing agent, etching its incorporated practices onto machine interfaces. By contrast, the second school of thought saw the human body as inscribable, as quarried rock awaiting the sculpting influence of the interface designer. It is convenient for the subject of this book—writing with computers—that our comprehension of interface metaphor has been couched, previously, in terms of inscription. Because the question then becomes: Do we write with computer interfaces, or do computer interfaces write on us?

Given the aforementioned remarks on the maturation of this disciplinary area, it is unsurprising that I am hardly the first to explore such terrain. Indeed, this book is perhaps most indebted to the work of Matthew G. Kirschenbaum, whose *Mechanisms: New Media and the Forensic Imagination* (2008) and *Bitstreams: The Future of Digital Literary Heritage* (2021) inspired the mode of formal and forensic material thought that informs my analyses. In particular, this work takes a cue from Kirschenbaum's consistent attention to specifics: specific technol-

ogies, specific authors, specific actants.⁶⁸ I also bring to the table a work that is interested in computationally specific technicalities refracted through a cultural-studies (or cultural-phenomenological) lens.

As were Kirschenbaum's, this book is also an attempt to move away from the phenomenon that Nick Montfort has dubbed "screen essentialism," the tendency that we have to privilege only the final stage in the translation of digital texts into photonic forms.⁶⁹ Certainly, in this work, I examine the role of visual display units. Such an angle enables my query of why whitespace is white in chapter 3. We cannot overlook the ways in which many digital technologies continue to privilege the visual mode, an aspect to which I turn in chapter 6. However, I am also concerned by the extent to which screen essentialism obscures the underpinning historical and other-material realities, which often work in contradiction to the metaphors on our screen. Whitespace, for instance, wasn't white in the earliest forms of papermaking or in early display technologies. Further, I show, on the one hand, how the development of specific screen ideologies and metaphors—such as the virtual page—have been historically conditioned by unexpected material correlates. On the other hand, I also show how material correlates are often less predeterminate than we might expect.

What will this book examine? Many branches of literary criticism focus on narrative, style, and interpretative effect.⁷⁰ Material-textual studies further abstract this, inquiring about the enframing conditioning textual-materialities that alter our understanding of a work. For example, how and why does it matter that a scribe was left-handed and left a different mark down the left side of a manuscript? What does the particular degradation of paper tell us about the historical worth accorded to a particular text and its preservation economics? Digital-material textual studies move one step further in this dialectic and ask similar questions of computerized objects. The questions I ask include: How does the term "whitespace" relate to the fact that early computer monitors were black? How and when was the virtual "page" born? What relation does that page have to the history of print pages? Are they the same histories? Should we preserve computer viruses when storing digital text, and how are they like real viruses? How did

the concept of a “code library” emerge from real-world library (that is, text-lending) systems? These metaphors condition how we think of the pasts and futures of digital text technologies.

A final reflection for this section: Many of the observations about digital *text* in this book could be said to apply to computational systems more broadly. Indeed, text is so central to “what we do” with digital systems that you can find it in almost all corners of the virtual world. However, by using the frame of digital text, we gain a narrower entry point for such investigations while refraining from overly broad claims. I believe, though, that the wider arguments herein about computational metaphor are transapplicable beyond the limits of digital text.

Cultural Phenomenology

In addition to interacting with book history, this work deploys some of the methods that Steven Connor has grouped under the name “cultural phenomenology.” Connor has, on several occasions, articulated what this model means for his work. Perhaps most notably, in 1999, he wrote:

Cultural phenomenology would aim to enlarge, diversify and particularise the study of culture. Instead of readings of abstract structures, functions and dynamics, it would be interested in substances, habits, organs, rituals, obsessions, pathologies, processes and patterns of feeling. Such interests would be at once philosophical and poetic, explanatory and exploratory, analytic and evocative. Above all, whatever interpreting and explication cultural phenomenology managed to pull out would be achieved by the manner in which it got amid a given subject or problem, not by the degree to which it got on top of it.⁷¹

Cultural phenomenology is the same as neither cultural studies nor cultural materialism. It instead has several characteristics that make it useful for a study of digital textuality:

1. Phenomenology is a useful starting point as it “begins and renews itself in the resolve to resist abstraction, reduction and ideal simplification.” At the same time, Connor’s approach asks us to reject

the “mystical or neo-religious cast of some of the work practised in its name.” It is a rigorously materially and experientially grounded approach to the “shared conditions of making” that constitute culture.⁷² This point guides my exploration of computational environments, with a promise never to make sweeping gestures to “the algorithm” or other nonspecific technological bogeymen.

2. Cultural phenomenology is interested in how lived and embodied practices reflect back on representations, not just on how representations refract life. That is to say that “modes of life—collective as well as individual modes—are more important and interesting . . . than styles, texts, images, discourses, and other modes of collective representation.”⁷³ In digital-textual studies such as this, this means returning to the dialectic of design versus incorporated practice and how computers “write back” upon their users. It also involves the interchange of real-world and digital forms, bound together in metaphor.
3. Histories of technology are explicitly among those that Connor lists as potential beneficiaries of such a model and may already, albeit implicitly, be using cultural-phenomenological tactics. Tracing this back to Walter Ong’s 1967 *The Presence of the Word*, Connor writes that “contemporary work on the history of technology, spurred clearly by our own curiosity, concern and intoxication with the fate of the body in the world of information technology, probably also belongs to a historicising mood concerning the body, which in itself may instance a kind of unconscious turn to the phenomenological disposition.”⁷⁴
4. Cultural phenomenologies weave together disparate areas within “a series of inveiglings” rather than “following a series of methods or frameworks.”⁷⁵ Indeed, while this can lead, not least in Connor’s own works, to a sometimes-meandering structure, it allows for the emergence of patterned webs of interrelation, often taking the form of unusual parataxis generated by etymological conjunction. In this book, for example, I move swiftly from analyzing the geopolitical structures of digital text and the internet to exam-

ining the political metaphors of vision and “windows.” These areas may seem far removed from one another, or at a challenging distance. However, they are all linked by the overarching theme of digital textuality and a metaphor of political liberalism. This sometimes-jarring movement can force us to see new connections that were not, before, obvious.

5. Cultural phenomenology seeks a “lexical vigilance” that avoids the routinized phrasings of critique. As controversial as Rita Felski’s recent interventions on postcritique may be, in which she tells us that many of the political formulations of literary criticism are predictable and ineffectual, Connor appears to agree, exhorting us to avoid the now-clichéd terminological terrains of critical theory.⁷⁶ So no “performance-enhancing terms and metaphors: boundaries, sites (as in ‘site of struggle’), transgression, discourse, hybridity, subject-position, the gaze, identity, alterity, subversion, dominance, marginality, diaspora, decentring, totalising, foreclosure, undecidability (especially ‘radical undecidability’),” and perhaps, challengingly for my introduction already: “inscription.”⁷⁷ Indeed, given the strictures of disciplinary norms, such freedom from the regularized language of literary studies and book history can be difficult to purchase. Hence, while I do not always succeed in this domain, I here aspire to such lexical vigilance.
6. Cultural phenomenology is careful about its political claims. Connor was anxious articulating this in 1999 and it is perhaps even more difficult now, but he contentiously asks: “What in measurable terms . . . has critical theory, however ‘radical,’ contributed to the problems of poverty, ignorance, starvation, racism, Third World debt, enforced displacement of peoples, environmental poisoning and genocide?”⁷⁸ While not disregarding the importance of politics and of seeking radical theoretical perspectives that begin from the perspectives of injustice, there is also space for cultural-phenomenological investigations that begin from a different point than the issues of “distributive justice” that lurk below the surface of almost all of our contemporary political iniquities. This book,

then, does not *begin* with questions of intersectional politics, such as Safiya Umoja Noble's important "Why are search engines racist and how can we make them less so?" or Mar Hicks's crucial "Why were women eradicated from the industry of computer science?"⁷⁹ But this does not mean that there are no political implications to this work (it is not possible to discuss the history of public libraries without the history of the British Empire, as just one example, and it is not possible to write about whiteness without considering its links to racial discourses).

Each of these elements informs the analysis in this book, even when I do not adopt the mode in totality, and provides a framework for thinking about the histories of digital-textual metaphor.

The "So What?" Question

Finally, for this introduction: the relationship between structuration and digitality is unclear (i.e., it is not obvious that studying the digital production of text is just a further abstraction of conditioning possibilities). It would be convenient, but perhaps wrong, to be able to claim that somehow the design of word processing software or the texture of computer mice influences the types of literatures and texts that we produce and consume. Perhaps these elements may have some bearing, but it is subtle and far from straightforward. In chapter 3, I explore this variant of what is known in linguistics as the Sapir-Whorf hypothesis (or the "hypothesis of linguistic relativity") and its translation into technological determinism. In the world of language, the Sapir-Whorf hypothesis proposes that our language determines what we can think. In material-textual studies and its digital correlate, the thesis would insist that our digital systems determine what we can write. Indeed, were this the case, it would make the arguments in this book and the rationale for its existence more compelling. This is also the basic premise of Eric Chown and Fernandes Nascimento's recent work, in which they posit that technology and its metaphors "are changing how we think," and that "technological metaphors fundamentally alter cognitive models and meaning."⁸⁰

However, the relationship between our word processors and the text we produce on them is more complex than this. Kirschenbaum traces it elsewhere in the works of George R. R. Martin:

But knowing [which word processor Martin uses], even knowing something about its particular features and affordances as a word processing program, is at best a dim pretense for any real illumination of his fiction. . . . It would take a lot of convincing for me to believe that Martin's sentence structures (for example) are tied in any significant degree to the specifics of WordStar's keyboard commands.⁸¹

However, Kirschenbaum goes on to redeem such idiosyncratic knowledge: "Any analysis that imagines a single technological artifact in a position of authority over something as complex and multifaceted as the production of a literary text is suspect. . . . [Hence,] we don't know why it is important to know these things, but we would rather know them than not."⁸² The situation is akin to a famous question posed in Shakespearean studies, when W. W. Greg rhetorically asked, and answered, of his own findings of the falsification of several dates of a quarto: "What is the literary bearing of these new facts? . . . Practically none."⁸³ Yet we would rather know them than not.

That said, these investigations into metaphor do have a concrete purpose and outcome. In asking where metaphors decompose, we pinpoint moments, or periods, of historical rupture and epistemic break. The transition that digital-textual metaphors make from partial mimesis to disconnected symbolism yields a way of understanding seemingly discontinuous historical change within a continuous framework. As a type of Foucauldian genealogy, such an approach works alongside the many other scholars in this domain who toil to ensure that we do not lose sight of the histories of technology that constitute our present.

This is all to say that, like much history, there is a type of nonutility to the knowledge imparted by this book, even while it enriches our understanding of histories of technology. Knowing, for instance, that Adobe almost canceled the virtual pagination of the PDF will not tell us anything directly about how people write or about the impact that

the virtual page has had on the reception of texts disseminated in this form. I do not doubt that this internal argument had effects. But those effects are diffuse, multidimensional, and nearly impossible to tease apart. This evolution of the digital page is nonetheless part of contemporary digital-textual history. Further, investigating this change allows us to examine past imaginations of the future and to understand how material correlates interact with the development of new digital tech. Science fictions of the past can become histories of the present.

What, then, is the overall argument of this book? Do these theses on the metaphors of digital-textual history add up to a coherent whole? Each chapter in this work contributes a new understanding of its topic on the principle of metaphorical movement from description, through a “break,” to a prescriptive stance. In chapter 2, I turn to the history of the digital page, demonstrating how our metaphors of print are by no means guaranteed a digital afterlife. While we like to think that metaphors of print directly condition digital-textual interface design, the illusory imagination that imbues interfaces with magic properties is stronger. In this chapter, I argue for the hybridity of metaphors in our understanding of digital pagination.

Chapter 3 extends this thinking further to examine the history of the term “whitespace” (a word used to mean empty space in text processing.) This chapter sprang from a straightforward historical question to which I wanted an answer: Why is whitespace called whitespace when most early computer monitors contained a black background with green text? The obvious answer that one might expect is: because paper is white. But this answer is wrong. The earliest surviving paper fragments are not white; they are stained due to insecticides. The story of how white paper came to be valued is linked to periods of iconoclasm and issues of religious virtue. However, it is also tied to ideas of “nothingness” and what constitutes emptiness. As such, there is not only a parallel racial politics of paper coloration but also a curious link between the earliest punched cards and whether white background paper represents a positive or negative binary sign. As a result, the whiteness of whitespace can be traced back to player pianos and ideas of serial processing in computing systems. To mix a hybrid metaphor that will

become clear in the chapter itself, whitespace's whiteness becomes the seriality of musical silence.

If the first of these two content chapters deals with such mixed models, chapter 4 handles the international character of digital-textual systems and the ways that metaphors and practices have to traverse national boundaries. In this chapter, I draw on the historical operation of the Unicode consortium to show how the demands of international representation have placed strains on the organizational tenets of digital-textual organizations. This includes the introduction of the *kokuji* (a Japanese kanji character) *taito*, the most graphically complex character in the Han system. Writing this character by hand requires eighty-four separate strokes, and hence one would expect it to be an early candidate for computational representation. However, it took until 2020 for this character to be introduced, demonstrating a strong Anglocentric bias in the main operations of the Unicode consortium. By contrast, there is also a character in the Unicode specification for which nobody knows the use: 𐤮. In a sense, “𐤮” serves as a metonym for this book's theme: a character that at one time must have had meaning but whose meaning is now lost to time. In this case, the documentation of a single, unified character code specification has left much to be desired, and, in an international environment, digital history is seeping away before our eyes, even as it appears fresh and new.

Drawing on the work in chapter 4 on Unicode, chapter 5 extends this thinking further by examining how digital text can be considered multidimensional. It is, of course, evident that all writing has depth. The complex inscription of graphical marks on a substrate that translates into meaningful, ambiguous, polysemous communication and mental representation contains multitudes. Digital representations of text multiply the layers of dimensionality but also ask us to consider what we mean by the metaphor of “reading” in this space. The software that transforms digital numbers into textual representations is a standardized “reader” that must “interpret” the underlying bitstream. As such, in some ways, a web browser is a type of “reader” that we should consider within the various paradigms of literary interpretation. Web browsers, though, can be good or bad readers, and there are differ-

ent commercial and software reasons why they may “behave” within a particular readerly paradigm. This chapter then examines how we moved from the ideals of standards-based “good” readers to corporate-influenced misreading systems.

As chapter 5 ends with political remarks on why some companies design software to read badly on purpose, chapter 6 opens by inviting the reader to consider the politics of digital-textual interface design. Most notably, this chapter asks and addresses the questions, What is the tension between standardization and idiosyncrasy, and how does this map onto a politics of individualism? The complexities of these questions lie in their entanglement with the history of digital accessibility and the relatively late emergence of legislative and social demands for standardization for disability access to web texts. However, then questions arise as to where “freedom” sits. What “freedom” have designers to implement new models for digital text versus the need for standardization so as not to disadvantage users with disabilities/disabled users? As a quite seriously disabled individual myself, with multiple complex long-standing chronic health problems that impede my day-to-day activities, I struggle, personally, with the tensions inherent in viewing digital windows as allegories of political liberalism.

Yet political liberalism also conditions how we think of “libraries” in a computing sense, as I go on to detail in chapter 7. It is curious that we should “borrow”—to use another library term—this metaphorical terminology for the way that code is reused between applications (“dynamic link *libraries*,” “shared object *libraries*,” and “static *libraries*”). The reason this is important is that the originary functions and states of libraries have been sculpted into a false cultural imaginary that obscures a great deal of their actual political history. Libraries have not always been *public* libraries from which anyone could borrow. Some are, indeed, not even lending libraries. As such, this chapter explores how this metaphor has influenced our programming and writing practices to the present day and how the library metaphor is influenced by the wrongly imagined history.

Finally, to conclude this book, I close in chapter 8 with remarks on the preservation, access, and use of our digital-textual resources.

Following on from chapter 7's notes on the role and functions of libraries, I note how international legal statute is not keeping pace with the requirements of access for preserved digital-textual material. Indeed, in the space of digital preservation and digital archives we encounter the strangeness of digital time (how curiously quickly unused digital artifacts become unpreserved) but also the oddness of the digital archival genre. For, in preserving malware alongside text, we can see how the archive serves multiple audiences across multiple axes. This poses questions for the intermedia-ness of the material stored in such digital archives in a way that is not seen in conventional archives. For instance, nobody would suggest that a book containing smallpox virions should be stored in the British Library and that it is essential for historians to see the lethal virus spreading over the text, reliving the process of dying by reading it. However, the equivalent formulation is made for the preservation of computer viruses in digital-textual contexts, albeit with less severe biosecurity consequences. Again, the argument here is about how the metaphor of "virus" accurately (or otherwise) captures the same malign agents across spaces and becomes decoupled from real-world pathogens. Some computer viruses are, after all, lethal if they infect hospital equipment. However, in calls for their preservation, we see a strong divergence from print-preservation paradigms.

Throughout its eight chapters, this book asks the reader to question the metaphors that partially condition our digital-textual interfaces. It is easy to be (overly) pedantic about where metaphor fails. But metaphor is simply a tool for understanding one domain in terms of another. To pick holes in metaphor endlessly is to ignore the fact that, as (ir)rational animals, we *are* capable of (arbitrarily) simply discarding parts of the metaphor that do not work. There does not have to be a guiding logic behind this process of picking and choosing. However, by asking such questions of these metaphorical constructs, we better understand the conditions under which all contemporary writing is produced, erased, and edited. By examining how, where, and why these metaphors "break" from their original contexts, we gain a historical understanding of how we become tied to digital-textual metaphors that no longer seem to work.

TWO

THE VIRTUAL PAGE ALMOST NEVER EXISTED

“Page space isn’t a given, an a priori static entity.”

—JOHANNA DRUCKER, “Graphesis”

“NLS files were described as early as 1962 as ‘scrolls.’”

—THIERRY BARDINI, *Bootstrapping*

CONTEMPORARY COMPUTING TEEMS WITH PHYSICAL metaphors and analogies.¹ It is a virtual *space* of websites, windows, menus, icons, and *pointers*. Our internet resources, though, are *pages*. Our word processors open onto A4 *sheets*. Our scholarly articles are rectangular to mirror the common-book form of the *Philosophical Transactions*.² The metaphor of the page, in particular, proliferates. There is an apparent reason for such prevalence of pagination metaphors in digital-textual production and reception. Even while we may smile as first-time users of a computer mouse are confused about why lateral should translate to vertical motion, it is too easy to assume that digital interfaces are transparent and obvious.³ Such assumptions lead to the well-known paradigm of supposedly intuitive interface designs, when really what is meant by “intuitive” (or, more correctly, “intuitable”) is learned behavioral pat-

terns. As Jeff Raskin puts it, “intuitive” means “familiar.”⁴ This is why computer interfaces become “*more* intuitive” as we use them more—for metaphor pertains to a familiar relationship that grows stronger through repetitious encounters.⁵ This trope of relation provides a way for new users to imagine how a digital interface might work compared to its physical correlate.⁶ Hence, through digital metaphor, we have virtual pages. Digital pages serve, then, in this mythology, as tokens of familiarity, habituating users to the electronic reading environment through analogy with known material forms.

However, the digital page has found many detractors. When thinking in the digital realm, commentators imagine that the page’s visual metaphor is damaging and that we must overcome its domination. Digital formats, writes Johanna Drucker, have a persistent yet frustrating “need to acknowledge the historical priority of books and to invoke a link with their established cultural identity.” At the same time, critics assume that “electronic ‘books’ will ‘supersede the limitations’ and overcome the ‘drawbacks’ of their paper-based forebears,” as Drucker again puts it.⁷ The metaphor, thinkers tell us, has become a constraint that limits computational potential. The “Beyond the PDF” conference and subsequent series of events are evidence that there is frustration in some quarters at how physical pagination is “artificially” sustained in the digital realm.⁸ (As though anything in the digital space is *not* artificial . . .)

Indeed, there is a prevalent antipagination discourse that sees pages as domineering, even in the physical world of print. Pages, asserts Alberto Manguel, exert a “tyranny” of format over the text they contain, a tyranny that we must resist: “The shape of a page,” he writes, “seems to cry out for counter-action.”⁹ Despite the very “idea of the book” being “the presentation of material in relation to a fixed sequence that provides access to its contents (or ideas) through some stable arrangement,” Henry Burton wrote, in 1636, to his readers of his frustration with ordered pagination.¹⁰ For him, pages created a situation where “the foregoing Examples are not orderly placed. Indeed it was the authors minde that they should have beene otherwise.”¹¹ For Shane Butler, the page is “conspicuous for the impertinence and arbitrariness with