

Chapter 5

CONTENT IS NOT CONTEXT: RADICAL TRANSPARENCY AND THE ACKNOWLEDGEMENT OF INFORMATIONAL PALIMPSESTS IN ONLINE DISPLAY

MATTHEW EVAN DAVIS

WHETHER FOR PRINT or for the internet, dividing structure and content—the layer approach used in modern web development—has influenced our modern notions of textual presentation. Conscious of it or not, popular conceptions of “content” treat the text as a Platonic ideal floating in the cloud, divorced from any mechanisms of production or display. Since the presentation and display layers are handled separately in most modern web and publishing tools, the underlying assumption is that content can fluidly fit any container it is placed into, like water poured into beakers of differing shape, but similar volume. As scholars of medieval manuscript and early print culture can attest, however, this is ultimately a dangerous misconception. For example, in this very volume Timothy Stinson has pointed out that the act of “translating” a medieval scribal text to printed works has “profoundly shaped conceptions of medieval authorship and textuality and coloured the way we understand, read, and teach medieval literature.”¹ How much more, then, does the separation of presentation and display alter our understanding? Likewise, Tamsyn Mahoney-Steel’s chapter notes that, even when a single manuscript exists “the loss of information in the translation from parchment to page or screen, is still great.”² If the philosophy behind the modern notion of “content” is true—that it fluidly fits whatever space we wish it to in whatever manner we want—then surely the medieval manuscript and its print editions should be able to do so as well. As Mahoney-Steel’s cogent statement on the loss of information points out, however, this is not the case.

The reality is that any action taken to inscribe text—whether the initial act of creation, an act of interpretation, or an act of presentation in a manuscript, printed book, or on an online display—is inherently an act of editorial interpretation at best and intervention at worst. The tools, infrastructures, and methods we use—and, increasingly, the standards we attempt to enfold all texts within under the banner of interoperability—have certain expectations and goals in mind, often built around the metadata ontologies used to allow text to be read by a machine and the needs of the software development cycle. Those goals may or may not correspond to the researcher’s goals in developing a virtual archive or those of the original authors, scribes, and editors of the manuscripts the tool is working with. Instead, these tools and methods are largely a black box, defined here as anything that receives input and generates output but does not allow the observer to discern its underlying workings.

1 See Stinson’s chapter in this volume.

2 See Mahoney-Steel’s chapter in this volume.

The existence of such black boxes in scholarship, especially digital scholarship, are known and worked against.³ However, as more scholars are encouraged by institutional direction and funding opportunities to pursue the development of tools and methods for the digitization and display of medieval manuscripts it is worthwhile to state starkly that the development of a tool or methodology is every bit as much of a theoretical action as the use of theory in writing.⁴ Moreover, the more we digitize and make available medieval texts online the more likely it is that undergraduates, masters and doctoral students, and our colleagues from financially strapped institutions will first encounter manuscripts through these virtual facsimiles—with consequences for their scholarship and understanding of the material object that the virtual facsimile adapts for display on the web. Thus, the choices we make now—often imposed upon us by programming infrastructures, prior example, institutional fiat, or the exigencies of the funding cycle—have very real consequences that may become baked into our thinking.

Beginning with a brief description of the history of the commonly understood file/folder computing metaphor, this chapter will describe the author's thinking about how to display the digital object online. It draws largely from his own consideration of the intersection between Actor-Network Theory and Peircean Semiotics, taken broadly from Carl Knappett's work in material culture and archaeology and interpreted alongside the necessities of religious performance and adaptation as a mediating network of ideas and methods in which texts are read, interpreted, and re-inscribed.⁵ Because readers tend to ignore this background of ideas and methods, the network appears as a ~~single~~, unitary thing that a reader treats as a ~~single~~, unitary "text": a process called punctualization. However, when errors arise this illusion breaks down and the tensions between the various aspects of the network that made up that punctualized "text" are often unproductively and haphazardly revealed. If we purposely create channels by which a reader or viewer naturally experiences the collapse of this mediating network and the tensions it produces—a process I call "radical transparency"—both the digital or virtual facsimile as an adaptation of the analogue original and that analogue original itself are no longer treated as exactly the same thing. Instead they are connected, but unique artefacts, and the paratexts of those artefacts are therefore foregrounded.

The chapter will then situate the mediating network and possible avenues of intended collapse and radical transparency within the bounds of methodologies and tools for digital presentation of text and image online. It does so chiefly through describing the practical aspects of developing the author's primary digital project—the Minor Works of John Lydgate Virtual Archive. It is thus intended to articulate some of the theoretical

3 See, for example, Grant Glass's blog post on the black box, Gibbs and Owens "Building Better Digital Humanities Tools," and Nowviskie's call for the teaching of algorithmic thinking in the humanities "A Game Nonetheless."

4 Ramsay and Rockwell, "Developing Things."

5 Knappett, "Networks of Meaning." While my own interpretation of the relationship between material culture, religious performance, and adaptation largely begins with this chapter, the preceding four would also be worth reading as an introduction to concepts that Knappett discusses in depth here.

underpinnings of the author's work with fifteenth-century manuscripts of John Lydgate, but more importantly to speak to a larger concern with praxis in the development of digital humanities tools and the necessity to underscore what is an oft-ignored truism of digital humanities work: that digital humanities tools and methodologies, whether developed by a single author or collaboratively, are themselves theoretical actions that are incorporated into the mediating network. They must be explained and justified transparently, as one would any theoretical approach used in scholarship. To make the assumption that the tools used to build platforms for display and comparison are themselves theoretically agnostic abstracts the primary mechanism of mediation for the medieval manuscript on the web when that does not need to be the case. That abstraction, in turn, can cause decisions made on the spur of the moment or because of technical limitations of the tools and methods available to become entrenched modes of thinking, and from those entrenched modes ultimately to distort the primary or only interpretive model accessible to most scholars.

In articulating my concern about the ways in which our tools embody ideologies that, in turn, shape culture in unexpected ways I am certainly not alone. Langdon Winner, Peter Kropotkin, William Morris, and Lewis Mumford all wrote pieces either critiquing the ways that mass industrialization—the nineteenth-century version of interoperability—was shaping culture detrimentally or the ways in which architecture, urban planning, and the development of physical, analogue objects embed aspects of the cultural ethos of their producers for both good and ill. Environmental activists, in turn, often used these theories in the debates between the use of nuclear and solar power in the 1970s and 1980s, with the latter framed as the “soft,” democratic option and the former as the tool of a totalitarian state.⁶

Speaking more specifically to the ways in which the digital shapes our culture, Lisa Nakamura has written extensively on the democratizing nature of the internet and the ways in which it allows a separation between body and self, a separation that she speaks of utopianly in her earlier works but that seems to have never truly been realized with the ascendancy of social media.⁷ Likewise, Wendy Hui Kyong Chun has noted in her recent *Updating to Remain the Same* that much of the work of digital culture is really the result of habit. She states that “through habits users become their machines: they stream, update, capture, upload, share, grind, link, verify, map, save, trash, and troll. Repetition breeds expertise, even as it breeds boredom.”⁸ Moreover, in describing the connection between repetition and habit, she points out that “habit supports a worldview driven by automation and automatic codes, which reduces the future to the past, or more precisely, a past anticipating the future.”⁹ This repetition of habit—the process of

⁶ Winner, “Do Artifacts Have Politics,” 121.

⁷ Nakamura, *Digitizing Race*.

⁸ Chun, *Updating to Remain the Same*, 1.

⁹ Chun, *Updating*, 70. Chun's idea of habit has connections with the idea of ritual—although without the pejorative of “boredom”—as a marker of culture, as well, and her invocation of code as a reinforcement of habit invokes the ways that ritual can become encoded as memes to be

constant inscription and re-inscription—is what she considers a hallmark of digital culture. She describes it as flat, with the past, future, and now reduced to a single moment of “upgrade,” and the lack of history as anything beyond the eternal now means that the objects of our study are in constant danger of being swept up into a black box of simply being “content”—grist for the cycle of update, process, repeat that Chun speaks of.

What makes this danger starker is that while the nineteenth-century critics and even the environmental activists of the 1970s and 1980s wrote for a public or semi-public audience, critics like Chun or Nakamura are often writing—intentionally or not—for an audience of their fellow academics in either their own or adjacent and allied disciplines. The audience that is developing these tools, and thus shaping the culture, are not thinking about the ways that their tools embody habit or crisis as Chun discusses them—except, perhaps, in how habit and crisis can be easily monetized, as occurs in social media. They are certainly not thinking about the implications: as Sean Parker noted in a November, 2017 Axios.com event regarding the creation of Facebook “I don’t know if I really understood the consequences ... of a network when it grows to a billion or 2 billion people ... it literally changes your relationship with society, with each other.”¹⁰

Parker’s quote is telling, because the boundaries that separate both formal academic software engineering and, more importantly, the code mills and bootcamps that are replacing formal academic training as the means by which programmers understand digital tools and their role in their creation and promulgation from the humanities are stark. Assuming that both halves of the partnership to develop new tools, platforms, and methods have the same concerns in developing the tool is naïve at best and dangerous at worst. Parker has gone on to become “something of a conscientious objector” on social media platforms like Facebook,¹¹ but the tool—and the ideas embodied in the development of the tool—have become part of our overarching culture. If, as humanists, we lack the public audience of the environmental activists of the 1970s and 1980s or the nineteenth-century critics of industrialization, then our understanding of the material object must be encoded directly into the tools we use. Otherwise, the archival equivalent of Facebook—and the flat version of history and the object that it promotes—will do it for us.

User Design as Theory: the File/Folder Metaphor, the Entrenchment of Ideas, and Unintended Consequences

Because of their ubiquity in our daily lives, the technologies we work with are not often considered a theoretical apparatus, yet that is exactly what they are. Take, for example, the concept of a computer file. The mental shorthand referring to it as such first appears in a 1950 RCA vacuum tube advertisement, with the title “Tube with a memory keeps

repeated according to specific, set standards that must be referred back to and compared against for correctness. See Drout, *How Tradition Works* for further information.

10 Allen, “Sean Parker Unloads on Facebook.”

11 Allen, “Sean Parker Unloads on Facebook.”

answers on file.”¹² This made a degree of sense at the time as the physical hardware, rather than the information, was being referred to. The word “file” was used because the mechanism by which that information was kept was functionally akin to the familiar physical files that kept information in analogue filing cabinets.¹³ Thus, when the first iterations of the UNIX operating system were created in the early 1970s the computer programs and sets of information created for it were also called files. As were the computer systems and sets of information for the first personal computers to find mass usage in the home market in the late 1970s and early 1980s. This concept—the “file” as metaphor for a packet of connected information—has continued to the present day as an easily understood and arguably no longer necessary shorthand.¹⁴

Thinking beyond the concept of “file” and “folder” as shorthand, however, the reference to information stored on a computer as “files” has not just affected information storage, but also the development and design of operating systems as the means through which a user imposes their intent upon the machine. Most modern operating systems store information in a series of nested “folders,” in which each “file” sits. Although sometimes these larger sets are called “directories,” they are in fact functionally similar to a large file folder containing many smaller files and folders, arranged in drawers (directories), and accessed through a system that is similar to the finding systems of any large library or other analogue information repository.

There is no reason why information has to be stored in this manner anymore, and the idea of “files” is a mental conceit to allow users who were steeped in analogue file systems to get up to speed on the computer quickly. In fact, the earliest forms of the pre-OS X Macintosh File System were “flat”—that is to say, they had all of their information stored at what we would consider the root of the filesystem.¹⁵ Even this version of the operating system was a compromise. As Jaron Lanier notes:

The first iteration of the Macintosh, which never shipped, didn’t have files. Instead, the whole of a user’s productivity accumulated in one big structure,

12 Radio Corporation of America, Advertisement, 96.

13 In fact, the overarching standard for UNIX-based computer systems is called the Filesystem Hierarchy Standard—a reference to a piece of hardware intended to organize physical “disk files”: in essence, disk drives—as well as multiple virtual files on a single storage device in the early 1960s.

14 This use of metaphor to discuss the ways in which information is encoded, decoded, and understood is not unique to the digital age, obviously. In *The Book of Memory*, for example, Mary Carruthers notes that the concept of memory for much of history was analogous to the process of inscription, and that the recall of those images occurred in the same way that notes were often recorded onto wax tablets, to be retrieved later—a process that is very similar to the metaphor of computer data as files and folders that RCA invoked in their ad copy (17). She also goes on to point out that additional information—the network surrounding the actual item to be recalled—could be used as a means of situating memory in a way that evokes our own attempts to create a semantic web (61).

15 This concept has been revived by Apple in modified form as “stacks”—see Apple Support, “Mac Basics” for an example of how they work.

sort of like a singular personal web page. Steve Jobs took the Mac project over from the fellow who started it, the late Jef Raskin, and soon files appeared.¹⁶

There are folderless versions of operating systems that exist as experimental models, and the demise of the file/folder metaphor for the organization and storage of information is actively discussed on the internet today.

For example, in a post on the question and answer site Quora, a user named Michael Hopkins noted that:

The metaphor has served its purpose. It was absolutely necessary in the command-line-driven computer interface. Only so many file names could be displayed on-screen at once, and there was no ‘scrolling’ the screen as we’re used to now. So a convention was adopted to limit the number of files in each ‘location’ to make navigation easier. The graphic user interface changed this requirement, but still clung to the old metaphor. Some third-party developers tried to create workable 3D interfaces that used such different paradigms as mind-mapping and forest/tree/leaves, but none were particularly successful, mainly due to slow performance and buggy implementations.¹⁷

While not discussing the history of the file system directly, Hopkins’s answer does suggest that particularly savvy users are aware of the history of the file system within their own use of computers and are questioning the utility of it in the future, even if they are not considering the ways in which the file system model has affected their understanding of work or the passage of time. These conversations are essentially cultural outliers, however—in popular parlance as well as popular culture the idea of the file is alive and well.

So if the file/folder metaphor is functionally dead, companies are actively attempting to move users away from it, and users are both aware of the metaphor and of the fact that it no longer has utility, the question becomes why it continues to have such a hold on our collective consciousness—to the point that it is mentally challenging to write or speak about computer systems without using the terms. The reason for this challenge is that the file/folder metaphor encapsulates a theoretical model of storing information online so embedded in our modes of thought that it is a primary lens through which our information intake and output is mediated, and thus has become an abstraction that people do not often think about. However, several unintended modes of thinking come along with that abstracted theoretical model, selected first by IBM and AT&T engineers in the development of computers pre-1980s and then further reinforced by Steve Jobs over the original choices made by Jef Raskin. In fact, Lanier goes on to note that “the file is a set of philosophical ideas made into eternal flesh. The ideas expressed by the file include the notion that human expression comes in severable chunks that can be organized as

16 Lanier, *You are Not a Gadget*, 13.

17 Hopkins, “Dropbox.”

leaves on an abstract tree—and that the chunks have versions and need to be matched to compatible applications.”¹⁸

Such embedded modes of thinking, and the unintended consequences thereof, have their analogues in the non-digital world, perhaps best articulated through Ferdinand de Saussure’s now century-old examination of semiotics and language. For example, in describing the relationship between sound and thought (or more abstractly, between *significant* and *signifié*) in noting the differences between the English *sheep* and *mutton* and the French *mouton*, he states:

“Le français *mouton* peut avoir la même signification que l’anglais *sheep*, mais non la même valeur, et cela pour plusieurs raisons, en particulier parce qu’en parlant d’une pièce de viande apprêtée et servie sur la table, l’anglais dit *mutton* et non *sheep*. La différence de valeur entre *sheep* et *mouton* tient à ce que le premier a à côté de lui un second terme, ce qui n’est pas le cas pour le mot français.”¹⁹

[“the French word *mouton* may have the same meaning as the English word *sheep*; but it does not have the same value. There are various reasons for this, but in particular the fact that the English word for the meat of the animal as prepared and served for a meal, is not *sheep* but *mutton*. The difference in value between *sheep* and *mouton* hinges on the fact that in English there is also another word *mutton* for the meat, whereas *mouton* in French covers both”].²⁰

Although Saussure’s concern is primarily with language rather than larger questions of thought (his followers, such as Roland Barthes and Jacques Derrida, would be the ones to expand the metaphor to thought in general), this concept still has implications for the development of software platforms for the humanities, especially in grant-funded projects when day-to-day development is undertaken by those without specialist knowledge of the material items displayed and described by these selfsame platforms. When a collaborative team develops a tool, they communicate via the mechanism of language, and in that communication are subject to the split between *significant* and *signifié*. This means that the terminology used to articulate an idea is always understood only imperfectly. At times this imperfect understanding, while unavoidable, will become a hindrance because implicit concepts for the researcher or subject specialist may not be understood in the same way by a developer.

The implications of the division between the implicit understanding of the researcher versus that of the subject specialist can be seen in an anecdote recounted to me by a colleague working on a large scale, multi-person collaborative research project to digitize, transcribe, annotate, and describe medieval manuscript texts. One of the heads of the team on the computational side, when first exposed to the physical objects they had been working with, expressed surprise that they were not all the same size. To

¹⁸ Lanier, 13.

¹⁹ Saussure, *Cours de linguistique générale*, 160.

²⁰ Saussure, *Course in General Linguistics*, trans. Harris, 114.

those of us who come to the digital humanities through book history, and particularly through codicology, such differences in size are implicitly understood and do not require mention. Form follows function, and thus a Book of Hours will be small, the better to fit in a pocket or purse, while something like the “Codex Gigas,” the largest medieval manuscript in the world, is a presentation text nearly a metre tall intended to be read to an audience. Although supposedly only tangential to the actual “content”—the text of the item—such material aspects say things about their portability, their production, and their use. Yet because the process of digitization and its apparatus of colour bars and rulers was largely incidental to the programmer’s work, the image files created gave the implicit impression that the material objects they described were uniform in size. The materiality of the object, even one as large as the “Codex Gigas,” was abstracted into mere content to be inputted into a black box.

The programmer mentioned above is brilliant, an expert in his particular field, and yet because he experienced these manuscripts in one particular, narrowly focused way, that set of implicit assumptions became part of his modes of thought regarding them. As more and more students and researchers first experience medieval material culture through online media, combatting or counteracting those sets of implied assumptions will be paramount. As Saussure notes, the relationship between signs exists “comme une série de subdivisions contiguës dessinées à la fois sur le plan indéfini des idées confuses (A) et sur celui non moins indéterminé des sons (B)”²¹ [“as a series of adjoining subdivisions simultaneously imprinted both on the plane of vague, amorphous thought (A) and on the equally featureless plane of sound (B)”].²² In other words, how an idea is encoded and expressed to the world in speech or writing is every bit as important as the idea itself.

Of course, for the purposes of discussing the material object semiotics as Saussure describes it has a problem: it is primarily driven by a dyadic representation of language as a medium of communication and knowledge transference, and assumes the sorts of amorphous, fuzzy thinking associated with human beings. Computational analysis is limited by the bounds of what the computer can do, as are the mechanisms of online display—and neither of them are particularly good at the concept of so-called “fuzzy,” or multivalent thinking. Moreover, Saussure’s dyad presumes that the sign is “amorphous” or “featureless” and thus does not take into account the actual process of encoding or reception—something that must be considered when working on a digital platform. For this reason, it is worthwhile not to operate solely in the abstracted, linguistically centred world of Saussurean semiotics when thinking about the affordances and limitations of online platforms, but to consider the more cognitively oriented semiotic of Charles Sanders Peirce in conjunction with the framework articulated by John Law in his discussion of Actor-Network Theory.

Peirce’s semiotic theory states that a sign is “anything which is so determined by something else, called its Object, and so determines an effect upon a person, which

²¹ Saussure, *Cours de linguistique générale*, 155–156.

²² Saussure, *Course in General Linguistics*, 110.

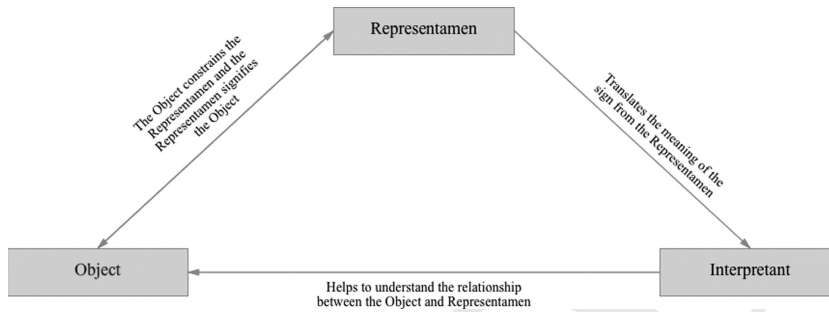


Figure 5.1. The triadic relationship of Peirce's semiotic theory. Note how the arrow between the Object and Representamen is reflective of the relationship between *significans* and *signifié*, but that the addition of the Interpretant provides additional contextual understanding of the sign.

effect I call its Interpretant, that the latter is thereby mediately determined by the former."²³ That is, a sign is composed of three parts—the representation of something (the Representamen), the restrictions placed on our understanding of that something (the Object), and the understanding that we gain from the connection between the two (the Interpretant). If we map Saussure's semiotics onto this Peircian model, the Representamen would equate to the signifier and the Object to the signified, and in diagram form the relationship between the three looks something like this:

Peirce never completed a definitive explanation of his theory of signs; what we have is a number of works in progress and correspondence, published after his death, which deal with the relationship between the three categories in slightly different ways. All of them have the same triadic structure, but each of them treats the relationship between the elements slightly differently.

In the earliest account, Peirce believes that the Interpretant acts as a more developed version of the relationship between the Representamen and the Object. The chain of connections this generates is similar to the two planes Saussure mentions, but handled dynamically instead of statically; as each link in the chain is generated by the one that came before it. In this early account Peirce makes a connection between the words "homme" and "man" that is reminiscent of Saussure's sheep/mouton/mutton example. In describing the Interpretant, he suggests that the reader

suppose we look out the word *homme* in a French dictionary; we shall find opposite to it the word *man*, which, so placed, represents *homme* as representing the same two-legged creature which *man* itself represents. By a further accumulation of instances, it would be found that every comparison requires, besides the related thing, the ground and the correlate, also a mediating representation which represents the relate to be a representation of the same correlate which this mediating representation itself represents. Such a

²³ Peirce, *The Essential Peirce*, 478.

mediating representation may be termed an interpretant, because it fulfills the office of an interpreter, who says that a foreigner says the same thing which he himself says.²⁴

Peirce considers a ground “a pure abstraction” that, when referred to, “constitutes a quality or general attribute ... reference to a ground cannot be prescinded from being, but being can be prescinded from it.” Likewise, a correlate is the quality that is only understood “by means of its contrast with or similarity to another.”²⁵ Rather than suggesting that the two linguistic environments are separate planes, Peirce is suggesting that in translating “homme” to “man” the Interpretant does the work of connecting whatever is expressed by the relationship between the two to our understanding. Moreover, in doing so it makes it clear what exactly is being expressed by that relationship. Similarly, a visual sign, such as the universal signs for man and woman found on bathroom doors, can be seen as a separate environment from the real, lived reality of gender in our daily lives. It is our ability to generate a correlate between the abstracted icon and the real people around us—informed in turn by socialization and cultural expectations—that lets us immediately assume that the man and woman icons relate to those individuals who identify in turn as men or women themselves. Likewise, our ability to translate what is essentially a stack of unrelated image files into a mental representation of a manuscript or printed codex relies on our ability to create such correlates as mediating representations between the images and the physical object.

Thus, the Interpretant acts as a lens for the recipient of that sign, as the Interpretant of the Representamen/Object dyad will be different for each individual. This means that there are effectively at least two layers of abstraction—the “natural” layer of abstraction that is the result of the reader interacting with the material artefact (the reader acting as Interpretant of the Representamen/Object dyad) and the imposed, mediating layer of abstraction generated by the online platform and the decisions made in rendering the material object online. The choices made in presentation for that online platform could differ greatly from the information expressed by the materiality of the manuscript itself, depending on the developer or development team’s understanding of what is being expressed—in the anecdotal example, the understanding of the size of medieval codices as a function of the presentation of information within them.

Because a virtual representation of a material artefact—even one which is collecting currently divided pieces and reconstituting the “original”—is always a mediated work it should not be considered a facsimile as we typically understand it, but rather as an adaptation of that work—a link in an infinite semiotic chain. Infinite semiosis, as Peirce describes it, means that “anything which determines something else (its Interpretant) to refer an object to which itself refers (its object) in the same way, the Interpretant becoming in turn a sign, and so on ad infinitum.”²⁶ Sign here being taken to be equivalent

²⁴ Peirce, *Writings of Charles Sanders Peirce: A Chronological Edition*. vol. 2., 53–54.

²⁵ Peirce, *Writings of Charles Sanders Peirce*, 53.

²⁶ Peirce, *Collected Papers*, vol. 2., 169.

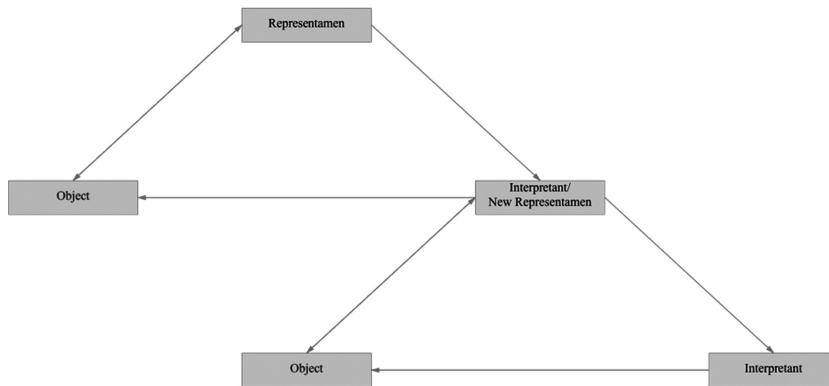


Figure 5.2. Infinite Semiosis—the Interpretant of the first sign becomes the Representamen of the next sign in the chain.

to Representamen, it becomes a part of a new triad, and the Interpretant of that triad is itself a more fully developed version of that original sign.

The major problem with the concept of a chain of signs, of course, is that when it ends, there is no further Interpretant generated. Once that occurs, the result cannot be considered a sign anymore. Peirce suggests as much when he states that “if the series of successive interpretants comes to an end, the sign is thereby rendered imperfect, at least.”²⁷ However, even if this ending were to occur, it is only possible if we assume that ideas exist in a closed system. Since ideas continue to evolve over time, the system is never truly closed and ideas regarding the sign—or in this case, the interpretation of the manuscript either in its material or digital instantiations—continues to evolve as well.

Peirce’s supposition that signs are “imperfect” originates out of the idea that infinite semiosis occurs within a single individual’s mind. In that model, only the output is available to the audience. This has similarities to the technological black box already discussed: something that receives input and generates output, but whose operations are opaque to the viewer. However, when dealing with inscribed works, the output is not simply the product of thinking, but is part of a process of inscription, reception, and re-inscription that is continually occurring. Instead, even if we assume an individual’s thinking about the “content” of the material object is the output of the black box, expressed through the mechanism of a technological platform, that output itself becomes new input for other semiotic chains. As such the chain of infinite semiosis operates between individuals as well as within each individual’s mind, and might better be considered as a *network* of competing and cooperating interpretations; rather than as a linear chain. Actor-Network Theory can thus help to explain some of the features of this network and how the ideas encoded in the material artefact both mediate and are mediated by the means of its production and reception.


²⁷ Peirce, *Collected Papers*, vol. 2., 169–70.


Actor-Network Theory and the Platform


As John Law envisions it,

Actor network theory is a ruthless application of *semiotics*. It tells that entities take their form and acquire their attributes as a result of their relations with other entities. In this scheme of things entities have no inherent qualities: essentialist divisions are thrown on the bonfire of the dualisms. ... it is not, in this semiotic world-view, that there are no divisions. It is rather that such division or distinctions are understood as effects or outcomes. They are not given in the order of things.²⁸

This emphasis he makes on effects or outcomes, rather than essentialist divisions, means that what we see as singular actors are really the action of “patterned networks of diverse (not simply human) materials.”²⁹ To explain this, he begins from the standpoint of sociology of science, where it is argued that “knowledge is a social product rather than something generated by through [*sic*] the operation of a privileged scientific method.”³⁰ Knowledge, in this case, is not knowledge as we generally conceive of it, as a purely Platonic set of concepts, facts, and intuitions. Rather, knowledge is embodied in material forms, as the product of work wherein the materials and ideas that are used to produce that knowledge are organized into a network that overcomes the natural desire of these individual pieces to “make off on their own,” or become disassociated from each other.³¹ This network extends out into the world through the tools and ideas the researcher is exposed to, and that conceptual “footprint” serves as the means of mediation between the researcher and the world at large. In effect, the researcher is not just a single individual with a mind divorced from the concerns of the body, but a part of a network of overlapping materials and ideas receiving, processing, and encoding ideas—a single link in a grand semiotic chain.

The effect of tools on how information is received and processed, and how easily such a network of materials and ideas can be obscured if one is not careful in articulating them, can be shown in the example of  image from the “Queen Mary Psalter” (Royal MS 2 B VII, Fol. 300v–301r).³²

The image as presented [here](#), looks as though it is two facing pages of the physical codex book. However, the British Library presents the two pages [thus](#) when you look at it in a web browser: 

Several steps are  necessary to make the pages appear as they do in the first image. I am required to capture each page as a separate image file, then merge the image files in a way that places them next to each other, which produces the effect of the particular

²⁸ Law, “After ANT,” 3.

²⁹ Law, “Notes,” 2.

³⁰ Law, “Notes,” 2.

³¹ Law, “Notes,” 2.

³² British Library, Royal MS 2 B. [vii](#)


 British Library, Royal MS 2 B. [vii](#)



Figure 5.3. A constructed image intended to represent the opening showing Fol. 300v–300r of the “Queen Mary Psalter.”

opening in the book. In doing so, I utilize my computer, a web browser, a piece of graphics software, and the ability of my computer to take an image and insert it into the document I am working on. This does not even take into account the network of camera equipment, servers, and skilled workers that were necessary to digitize and store the successive pages in the first place. Or, for that matter, the political network that resulted in the acquisition of the manuscript by Queen Mary, thus allowing for its eventual deposit in the British Library from the royal household, the economic network that allowed for the acquisition of the text, or in networks of scribal production, manuscript acquisition, and bindery that went into the development of the original psalter. All of the work, from the point at which the first piece of parchment was written upon to the point that the image was placed in this chapter, is functionally invisible. Instead, we perceive the placement of the images from the “Queen Mary Psalter” as a single, unitary thing—a single block, as Law puts it. And, as Law notes, “if a network acts as a single block, then it disappears, to be replaced by the action itself and the seemingly simple author of that action.”³⁴

When a researcher does not consider a tool for presentation part of their theoretical process, they are in effect doing the same work that I have done when putting the two

³⁴ Law, “Notes,” 380.



Figure 5.4. Fol. 300v and 301r as they appear on the British Library's Digitised Manuscript site.

images together—rendering the entire apparatus necessary to put the virtual facsimile of the text online, with all of the decisions made in doing so, to a single block with a single author which, in turn, is dedicated to a single action—the conveyance of “content” to the waiting user. In effect, the adaptation is being presented as more than functionally similar to the original—it is being presented as though it *is* the original, with only the medium of presentation changed. If we stop and think about it, this is an impossibility, yet it is something we cognitively do on a daily basis when approaching these large-scale, mediating networks. And, as the anecdote about my colleague's team member shows, making those assumptions about material artefacts can at times result in errors in judgement. In the case of the programmer, the error was relatively mild, but as our use of digital technologies in the use of humanities scholarship grows—especially with the use of distant reading and other “Big Data” methodologies becoming more and more common—such an error can have grave consequences that could go unnoticed because the actual objects have been abstracted beyond our ability to return to them for a needed corrective. Instead of assuming that the technology exists independent of the content driven by that technology, we must as part of our scholarly approach remain aware of the network and the assumptions made by it. Rather than such collapse of the illusion of a singular object occurring by happenstance, however, I believe that “conscious,” or

careful and reasoned, collapse can be achieved through a constant questioning of the network and the pieces that comprise it. This action I refer to as “radical transparency” in the development of tools and methodologies. Such questioned networks, and the transparency they generate, will allow us to both acknowledge that our work with digital and material tools is itself the result of our status as an Interpretant of the Object/Representamen dyad and to make our status as part of the semiotic network readily apparent to the scholars and interested individuals who will be the eventual audience for the products of our study.

The need for radical transparency as a methodology in the development of the platform as a theoretical abstraction—whether as the printed or manuscript book or as text on a computer screen—means we have to directly acknowledge that it takes its attributes from the tools that currently exist at the time of its composition. In the RCA advertisement the metaphor of the file and folder became an easy way to get the concept of computer storage across to the mass public, aided by the fact that the mechanism of storage is functionally akin to a file when placed into a filesystem. However, because the theoretical basis of that abstraction was not firmly articulated (who wants to read a manifesto in their ad copy, after all) its basis as a metaphor was lost. Instead, over time the concept of the file broadened its semantic scope, becoming synonymous not just with the physical place where the information is stored but with the information itself. The attendant loss of the quotation marks and the eventual broadening of semantic scope of the word “file” to include not just the physical means of storage but the information itself are thus markers of the increasing comfort users had with the file/folder metaphor and the underlying technology, but hidden within that comfort level are, as Lanier notes, serious choices about how we express and process information. Until the network surrounding the metaphor is itself considered, as the Quora poster is beginning to do, those choices influence our development of further tools and methods without our knowledge.

While I am aware that the brief examination of the history of the file/folder metaphor above may have seemed digressive at first, within the context of the theoretical apparatus of Infinite Semiosis and the Actor-Network the larger point must be understood that the decisions we make—even so innocuous a decision as the choice to call the information storage mechanism a “file” in a piece of ad copy—have both long and short-term implications for the life of a digital humanities project. Chief amongst these is the differences in the ways professional software developers and the academic community treat the presentation of information.

As one O'Reilly manual on software development, designed for the professional market, states “Software development is all about change, and moving to your next iteration is no exception You've got to ... adjust your stories and expectations based on what the customer wants *NOW*, not a month ago.”³⁵ Taking this logic at face value, it is clear that neither software development's iterative cycle, nor the books and bootcamps

35 Miles and Pilone, *Head First Software Development*. Also note how the language of Miles and Pilone reinforces, but does not really consider critically, the notion of “update” that Chun refers to in *Updating to Remain the Same*.

increasingly responsible for training programmers for the market, are concerned primarily with recording the process of development or the interaction between the material artefact and its virtual adaptation. Instead, the primary concern is with speed and profit. The responsibility of the software developer is to present the customer with a tool, application, or platform that meets the definitions of “what the customer wants,” usually articulated in the form of a Solution Design Document.

Such a document lays out the expectations of the client for the tool or platform and prevents what software engineers call “scope creep”: the slowly shifting sets of expectations that add time and expense to any software project. What they do not do, though, is suggest that the developer must have the sort of deep subject knowledge that scholars possess on the subject. Thus, the developer’s idea of “what the customer wants” is governed by their own sets of ideas and expectations, which as mentioned above privilege change and speed over articulation of the theoretical decisions made in presenting the material artefact online. In fact, it is a truism of the software development industry that developers hate to document how their code actually functions, relegating that to a group of skilled technical writers who do not necessarily have access to the thought process of the developer when writing the code and have no interest in articulating anything but how the software functions as a product. Moreover, due to the desire to complete the tool quickly, under budget, and in a way that works with other tools, solutions are often built as “one size fits all” models. Such models do not always take into account edge cases—the liminal spaces where so much productive work in scholarship is undertaken.

The language and models of software development are thus concerned primarily with the creation of the tool as an appliance to be used, rather than educating the user about the tool’s development in a way that makes them understand the theoretical and practical issues that went into its production. They are concerned with the short-term development cycle, intended to maximize profit, rather than with long-term consideration of the effect of those tools on cultural and scholarly development. And most scholars are ill-equipped to notice that these built-in assumptions on the part of technologists and programmers are occurring. Nevertheless, while it is unrealistic to ask most humanities scholars to become as well-versed in the tools and methods of software development as a professional programmer, it is our responsibility as scholars, researchers, and instructors of often unique medieval works to interrogate the assumptions programmers make, remain aware of the implications of these assumptions, and to push back against design choices when they might have negative, and costly, impacts on our understanding of the material artefact as cultural heritage item.

A Nod Towards “Radical Transparency”: Developing the Minor Works of John Lydgate Virtual Archive

One of the “strengths” of the digital humanities, as articulated in numerous articles, web posts, chapters, and conference presentations, is the fact that the work of producing digital projects is often collaborative in nature. It requires the work of both the individual researcher with deep subject knowledge and the work of programmers, metadata

librarians, and other specialists who are well-versed in their own areas of expertise, but may not have that same deep subject knowledge. However, I qualify “strength” in the initial sentence of this paragraph because while collaboration in itself is not an issue—it makes logical sense for the various parties involved in a project to work to their particular strengths—as the previous section notes, the strength of collaboration as a method of rapidly instantiating a digital platform can become an issue philosophically.³⁶ Often, and quite subtly, the needs of that platform begin to shape the direction of the scholarly enterprise, rather than the other way around—the user starts to become the machine, to use Chun’s formulation.

In some ways, this is an unavoidable result of the influence of the network on the process of re-inscription. Since the network doing the work of reading, interpretation, and re-inscription is always different to that which initially created the item, part of the work of developing a tool has to be articulation of the theoretical basis for the tool and the methodology planned to both do the work and to present the result. Until a viewer of an online platform has some sense of the network, it remains functionally equivalent to a black box, and thus cannot be fully taken into account when using the tool in the process of scholarship.

For example, the terms “database” and “spreadsheet” are often used interchangeably by academics who have project-related data they want to incorporate into a finished product. Functionally, they even *appear* to be the same at first glance—a table of cells that information is placed into. A database, however, has further information relating multiple tables to each other via one or more indices and is thus designed to be rapidly searchable along many axes, while a spreadsheet is often limited to a smaller number of sheets, searchable only along a few axes. This lack of understanding of the difference can cause problems and delays when a developer asks for a record not only of all the information in the database, but of its structure, and the researcher provides the spreadsheets they have been using. To a human being, these are functionally similar, because a human being can do the process of evaluation and comparison without explicit instructions. A computer, on the other hand, cannot.

For these reasons, taking a look at the larger issues at play in the development of a simple tool can help us to understand the intersection between the technical, the theoretical, and the methodological, and how they all work together in the presentation of cultural heritage items online. Understanding that intersection, in turn, helps to avoid the obfuscation or elimination of *context* and *paratext* when presenting these items online.

“Context” and “paratext,” here, are set against the term “content,” referred to above, rather than to “text” as they are in most relationships between the words. As I use the term, the “content” of an item is the information it contains divorced from its method of presentation, and is largely analogous to the “text” as articulated by scholars but not exactly representative of it. The paratext, conversely, consists of all of those “extra” bits

36 Indeed, as of November 16, 2017 a simple Google Search for “Digital Humanities Collaboration” provides over four million results. Limiting it by “strengths” returns approximately 350,000 results, while limiting it by “weaknesses” provides 289,000 results.

that make the notion of a truly fluid text difficult—introductions, illustrations, notes written in the margins, and so forth. Finally, the “context” is all of the ancillary elements, such as the historical situation it was written within, the limitations of the tools used, the mindset of the original author or subsequent scribes, and the understanding of the reader in approaching the material. Within a digital cultural heritage project one element, typically the content, is usually foregrounded, but even when not recognized, all of these elements exist as palimpsests that are only imperfectly erased from or elided in the digital adaptation. Part of my thinking in developing the Minor Works of John Lydgate (hereafter, in the spirit of most digital humanities projects, referred to as MWJL) is to point out these easily overlooked elements.

MWJL has, as its goal, the collection and presentation of works by the fifteenth-century English poet John Lydgate. Lydgate was an important figure in Plantagenet court culture and politics between the first decade of the fifteenth century and his death in 1449 or 1450, and in literary circles 150 years thereafter. These works thus inform our understanding of religious and dramatic practice in the period just prior to the English Reformation, but are not often anthologized or discussed outside of academic circles. The primary goal of the website is to help correct this by presenting transcriptions of the Lydgate works alongside images taken from the manuscripts that contain them. However, a secondary goal of the site is to use three-dimensional and other models to articulate the relationship between the text, paratext, and context of the poems, an aspect currently missing from digital archives of most medieval English works.

Although a writer of both dramatic and poetic works, Lydgate is often most remembered for the former. As Claire Sponsler has pointed out, this is an artefact of the association between the poetic form and “literature,” which has significant impacts on our understanding of English culture in the Middle Ages, and is itself an artefact of the inscription and re-inscription of ideas about literary worth by contextual networks over time.³⁷ It has also worked to the detriment of our understanding of medieval poetry and drama in general and Lydgate’s works in particular. Additionally, the manuscript object provides material contexts that can provide clues to its intended audience, the historical and social situations at the time of its production, and its original as well as later purposes. For these reasons, displaying both the text of the object and its contexts is paramount in presenting the object as a virtual facsimile online.

Besides the commentary on the relationship between the network and the material and digital texts that the site provides, it is also necessary because without such work, aspects of English culture are in danger of being lost. For example, unique versions of Lydgate’s *Testament* and “*Quis Dabit Capiti Meo Fontem Lacrimarum*” (also known as “*The Lamentation of Our Lady Maria*”) exist in the chantry chapel of the Clopton family at the parish church of the Holy Trinity in Long Melford, Suffolk. These texts are not pages in a manuscript, but instead rendered in carved wood and flaking paint. The poems at Long Melford are not the versions found in academic and student editions, however. Instead, they are versions altered specifically to fit the purpose and space for

37 Sponsler, *The Queen’s Dumbshows*, 1–12.

which they were produced in the chapel, and must be read through interacting with that space.³⁸ They are unique cultural items, as are all of the manuscripts of the 185 known or suspected poems by Lydgate. Yet they are not treated as viable items for study in their own right. This causes that unique nature, and what it says about the cultural history of England, to be subsumed under a single, standard version, with implications for future study of the poet and the semiotic network of understanding surrounding him. In short, the process of inscription, reception, and re-inscription that is constantly ongoing as part of the network is being influenced, however unintentionally, by traditional editorial practice, and one of the goals of the site is to open up this black box and make scholars and students aware not only of alternate versions of Lydgate's works but of the ways in which the various witnesses are presented.

I began work on the site by doing an environmental scan of the items either definitely or purportedly written by Lydgate in the Digital Index of Middle English Verse, organizing them into a Structured Query Language (or SQL) database based on the connection between particular works and particular manuscript witnesses.

After placing all the items in the database, I was able to quickly determine that, of the original manuscripts and editions of Lydgate in ~~the Digital Index of Middle English Verse (DIMEV)~~:

- 43% of the works are unavailable in print or online editions.
- 63% of the unique versions of these poems are unavailable in print or online editions.
- 59% were produced over 100 years ago.
- 91% were produced over 50 years ago.
- Only 1% were produced since the year 2000.

Thus, the majority of scholars working with Lydgate's poems are only working with a few witnesses that were largely produced in the first decades of the twentieth century. While these printed texts are obviously still useful, they often rely on methodologies and assumptions uninformed by recent technological innovation, and thus make assumptions (or have assumptions made about them) that may no longer be valid because they only imperfectly fit into the network of tools and ideas currently at play in medieval scholarship and manuscript studies. MWJL is an attempt to rectify this by increasing the availability of transcriptions alongside manuscript images in a way that is free, open to the public, and in keeping with the best practices for manuscript transcription and description.

If we consider the distinction between the network as I have articulated it earlier and the popular notion of "content" as ideas Platonically divorced from their presentation, the need for this rectification becomes evident. In reality no single text—whether print, manuscript, or digital—exists in an ideal version, as the notion of the semiotic network and infinite semiosis underscores. Each iteration of that text includes shifts in presentation, editorial or reader notes, and in some cases omissions or additions. The version of

38 For more on the particular versions of Lydgate's works at Long Melford in relationship to the architectural space, see Davis, "Lydgate at Long Melford."

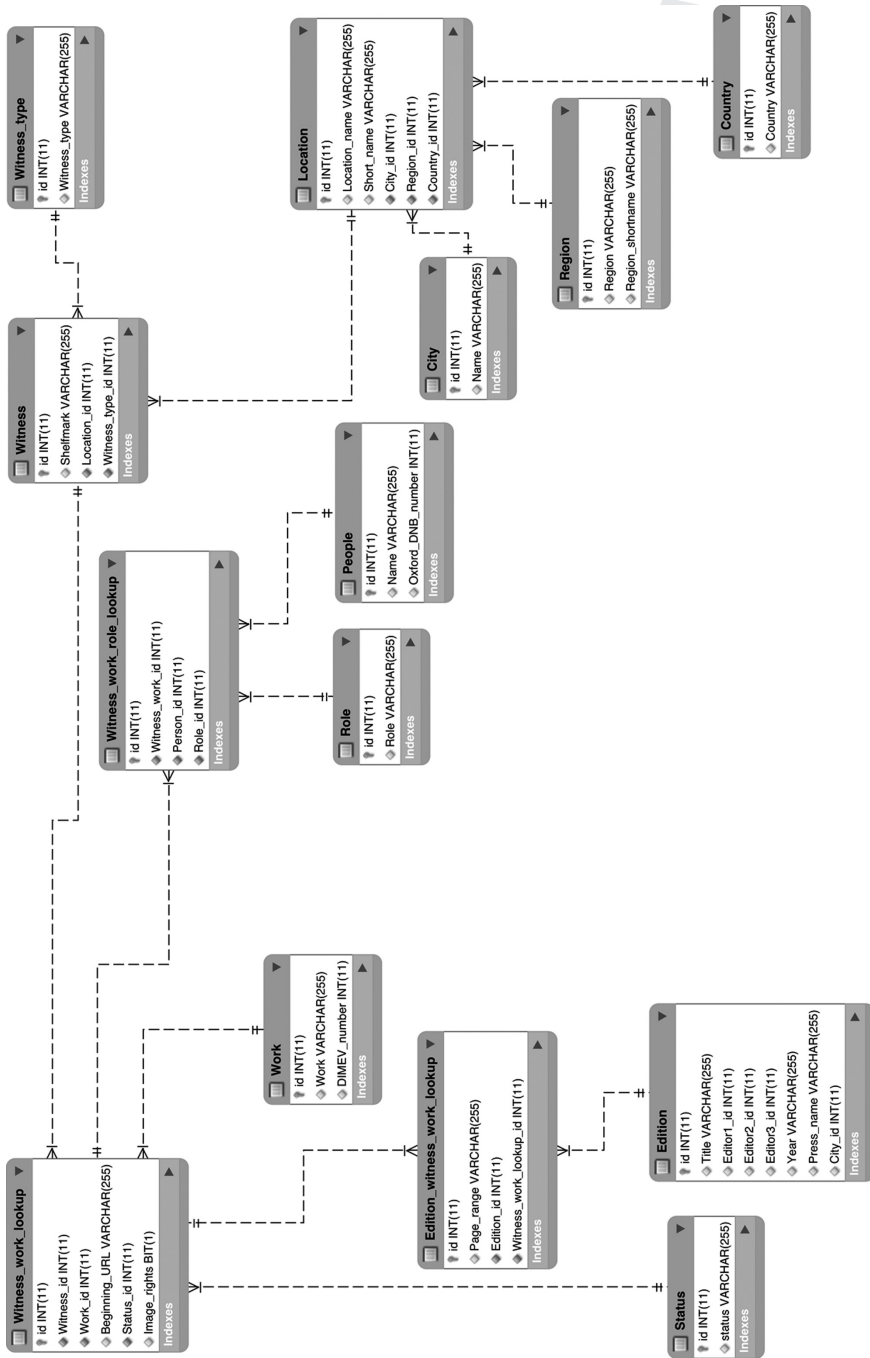


Figure 5.5. SQL Schema for the Minor Works of Lydgate website.³⁹

³⁹ The full schema and data for this database is available at www.minorworksoflydgate.net/witness_lookup.sql

a particular moment, then, is really just one of a number that compete with each other for our attention, a notion obscured by the prioritization of content in the development of the authoritative edition for mass consumption. Such editions foreground a scholar or scholars' conception of the idealized text, both in form and presentation, over any other versions available, and when presented digitally are also informed by the work of the technical staff that help to make the online site a reality. As a means of rectifying this conceptual bottleneck, a touchstone of development for MWJL is to examine the full process of production and reception of several of Lydgate's poems that are unavailable to most of the public except in single, authoritative texts along with careful delineation of the decision-making process involved in presenting them online.

After completing my scan of the various witnesses of Lydgate, and realizing how much of his work exists in largely unavailable forms, I wrote down a set of design principles to work from while developing the site:⁴⁰

1. Defer to the material object whenever possible. Undue abstraction will be avoided.
2. Follow coding standards, but do not allow the technical standards to obscure the material item and its own unique narrative. When it is necessary to deviate from those standards, explain it by providing guideposts whenever possible.
3. Use the most efficient tools possible. Do not choose a platform simply because it is newer.
4. Visualizations or texts should not be displayed without the underlying data and an explanation of what exactly it means. Someone who does not have a technical background needs to be able to follow both the scholarly and technical explanations. Examples are to be used whenever possible.
5. Respect the audience. Act as a bridge between them and the work, so that what came before is not lost in chasing what is to come.

While not expressed in formal theoretical jargon, when combined with my own personal network of influences they provide a much-needed reference for both the more formal elements of the site—the transcriptions, descriptions, and ancillary elements we would consider paratext in a more formal edition—and the more colloquial elements intended for a mixed audience of scholars, students, and the general public. Any site interested in presenting both the process and the product of their work should make available a similar set of principles, based on the intentions of the site and the theoretical and methodological preferences of the development team.

From this set of overarching principles, I then approached methodology, breaking down the process of development into six concrete steps that would be undertaken at least once for each poem I intended to work with:

1. Acquisition of appropriate image files from the holding institutions.
2. Transcription of each witness of the poem.

40 The original, more colloquially written set of guidelines can be seen at Davis, "About the Archive," under the "What are your editorial principles" header.

3. Complete codicological description of each manuscript.
4. Encoding of the transcription and description of each manuscript.
5. Display of the resulting files online.
6. Development of ancillary features that expand on what is possible in a print edition.

These broad steps were broken down still further into manageable pieces, and the site itself was used both as a way to inform an audience where exactly in the process each witness was and as a way to discuss what still needed to be developed in terms of the ancillary features not already on the site.⁴¹ Thus, while it would be reductive to go into detail over every single step in the process, it might be worthwhile to discuss in brief two aspects of the site in greater detail: the philosophy behind the particular version of data encoding used on the site and the process of transcription, as well as a visualization designed to quickly access the corpus of Lydgate texts in an easily understood manner.

Transcription Philosophy and Method

As is evident from the theoretical overlay at the beginning of this chapter and the section outlining my design principles I am interested in presenting the material artefact as I best can in a digital platform, while remaining cognizant that there are going to be elements both gained and lost in doing so. The standard for digital transcription in my field is a particular schema for the eXtensible Markup Language created by the Text Encoding Initiative (XML and TEI, respectively).⁴² That schema offers two methods for the transcription of texts. The first, most common, method places all the textual information and its associated tags under a single `<text>` element within a hierarchical tree structure.⁴³ Note that the very process of creating the framework for displaying the text online makes assumptions privileging the content of the item over its physical characteristics. In fact, these characteristics are only imperfectly captured under the `<physDesc>` element and the elements that exist underneath it. Those elements, in turn, presume that the object being described will be a paper or parchment page in a codex book, which will not work for an example such as the Clopton chapel I referenced earlier in this [paper](#).⁴⁴ Thus, design decisions made by the TEI Consortium in the development of a single, overarching standard for the display of both manuscript and printed text already leaves out important elements of Lydgate's textual output.

There is a solution, however. The most recent revision of the TEI standard introduces a new head element, `<sourceDoc>`, which is intended to capture both the transcription and the physical aspects of a single document.⁴⁴ Rather than separating out text

⁴¹ Davis, "Works."

⁴² The two terms are often used interchangeably, but really the TEI schema is a "namespace," or organizational framework, that uses XML as its platform of choice. See further "Extensible Markup Language (XML)" and "Namespaces in XML 1.0," respectively.

⁴³ TEI: Text Encoding Initiative. "4. Default Text Structure"

⁴⁴ TEI: Text Encoding Initiative. "TEI element sourceDoc."


```

18 <sourceDoc>
19
20 <listGroup>
21 <listItem>
22 <ol>
23 <ol>
24 <ol>
25 <ol>
26 <ol>
27 <ol>
28 <ol>
29 <ol>
30 <ol>
31 <ol>
32 <ol>
33 <ol>
34 <ol>
35 <ol>
36 <ol>
37 <ol>
38 <ol>
39 <ol>
40 <ol>
41 <ol>
42 <ol>
43 <ol>
44 <ol>
45 <ol>
46 <ol>
47 <ol>
48 <ol>
49 <ol>
50 <ol>
51 <ol>
52 <ol>
53 <ol>
54 <ol>
55 <ol>
56 <ol>
57 <ol>
58 <ol>
59 <ol>
60 <ol>
61 <ol>
62 <ol>
63 <ol>
64 <ol>
65 <ol>
66 <ol>
67 <ol>
68 <ol>
69 <ol>
70 <ol>
71 <ol>
72 <ol>
73 <ol>
74 <ol>
75 <ol>
76 <ol>
77 <ol>
78 <ol>
79 <ol>
80 <ol>
81 <ol>
82 <ol>
83 <ol>
84 <ol>
85 <ol>
86 <ol>
87 <ol>
88 <ol>
89 <ol>
90 <ol>
91 <ol>
92 <ol>
93 <ol>
94 <ol>
95 <ol>
96 <ol>
97 <ol>
98 <ol>
99 <ol>
100 <ol>
101 <ol>
102 <ol>
103 <ol>
104 <ol>
105 <ol>
106 <ol>
107 <ol>
108 <ol>
109 <ol>
110 <ol>
111 <ol>
112 <ol>
113 <ol>
114 <ol>
115 <ol>
116 <ol>
117 <ol>
118 <ol>
119 <ol>
120 <ol>
121 <ol>
122 <ol>
123 <ol>
124 <ol>
125 <ol>
126 <ol>
127 <ol>
128 <ol>
129 <ol>
130 <ol>
131 <ol>
132 <ol>
133 <ol>
134 <ol>
135 <ol>
136 <ol>
137 <ol>
138 <ol>
139 <ol>
140 <ol>
141 <ol>
142 <ol>
143 <ol>
144 <ol>
145 <ol>
146 <ol>
147 <ol>
148 <ol>
149 <ol>
150 <ol>
151 <ol>
152 <ol>
153 <ol>
154 <ol>
155 <ol>
156 <ol>
157 <ol>
158 <ol>
159 <ol>
160 <ol>
161 <ol>
162 <ol>
163 <ol>
164 <ol>
165 <ol>
166 <ol>
167 <ol>
168 <ol>
169 <ol>
170 <ol>
171 <ol>
172 <ol>
173 <ol>
174 <ol>
175 <ol>
176 <ol>
177 <ol>
178 <ol>
179 <ol>
180 <ol>
181 <ol>
182 <ol>
183 <ol>
184 <ol>
185 <ol>
186 <ol>
187 <ol>
188 <ol>
189 <ol>
190 <ol>
191 <ol>
192 <ol>
193 <ol>
194 <ol>
195 <ol>
196 <ol>
197 <ol>
198 <ol>
199 <ol>
200 <ol>
201 <ol>
202 <ol>
203 <ol>
204 <ol>
205 <ol>
206 <ol>
207 <ol>
208 <ol>
209 <ol>
210 <ol>
211 <ol>
212 <ol>
213 <ol>
214 <ol>
215 <ol>
216 <ol>
217 <ol>
218 <ol>
219 <ol>
220 <ol>
221 <ol>
222 <ol>
223 <ol>
224 <ol>
225 <ol>
226 <ol>
227 <ol>
228 <ol>
229 <ol>
230 <ol>
231 <ol>
232 <ol>
233 <ol>
234 <ol>
235 <ol>
236 <ol>
237 <ol>
238 <ol>
239 <ol>
240 <ol>
241 <ol>
242 <ol>
243 <ol>
244 <ol>
245 <ol>
246 <ol>
247 <ol>
248 <ol>
249 <ol>
250 <ol>
251 <ol>
252 <ol>
253 <ol>
254 <ol>
255 <ol>
256 <ol>
257 <ol>
258 <ol>
259 <ol>
260 <ol>
261 <ol>
262 <ol>
263 <ol>
264 <ol>
265 <ol>
266 <ol>
267 <ol>
268 <ol>
269 <ol>
270 <ol>
271 <ol>
272 <ol>
273 <ol>
274 <ol>
275 <ol>
276 <ol>
277 <ol>
278 <ol>
279 <ol>
280 <ol>
281 <ol>
282 <ol>
283 <ol>
284 <ol>
285 <ol>
286 <ol>
287 <ol>
288 <ol>
289 <ol>
290 <ol>
291 <ol>
292 <ol>
293 <ol>
294 <ol>
295 <ol>
296 <ol>
297 <ol>
298 <ol>
299 <ol>
300 <ol>
301 <ol>
302 <ol>
303 <ol>
304 <ol>
305 <ol>
306 <ol>
307 <ol>
308 <ol>
309 <ol>
310 <ol>
311 <ol>
312 <ol>
313 <ol>
314 <ol>
315 <ol>
316 <ol>
317 <ol>
318 <ol>
319 <ol>
320 <ol>
321 <ol>
322 <ol>
323 <ol>
324 <ol>
325 <ol>
326 <ol>
327 <ol>
328 <ol>
329 <ol>
330 <ol>
331 <ol>
332 <ol>
333 <ol>
334 <ol>
335 <ol>
336 <ol>
337 <ol>
338 <ol>
339 <ol>
340 <ol>
341 <ol>
342 <ol>
343 <ol>
344 <ol>
345 <ol>
346 <ol>
347 <ol>
348 <ol>
349 <ol>
350 <ol>
351 <ol>
352 <ol>
353 <ol>
354 <ol>
355 <ol>
356 <ol>
357 <ol>
358 <ol>
359 <ol>
360 <ol>
361 <ol>
362 <ol>
363 <ol>
364 <ol>
365 <ol>
366 <ol>
367 <ol>
368 <ol>
369 <ol>
370 <ol>
371 <ol>
372 <ol>
373 <ol>
374 <ol>
375 <ol>
376 <ol>
377 <ol>
378 <ol>
379 <ol>
380 <ol>
381 <ol>
382 <ol>
383 <ol>
384 <ol>
385 <ol>
386 <ol>
387 <ol>
388 <ol>
389 <ol>
390 <ol>
391 <ol>
392 <ol>
393 <ol>
394 <ol>
395 <ol>
396 <ol>
397 <ol>
398 <ol>
399 <ol>
400 <ol>
401 <ol>
402 <ol>
403 <ol>
404 <ol>
405 <ol>
406 <ol>
407 <ol>
408 <ol>
409 <ol>
410 <ol>
411 <ol>
412 <ol>
413 <ol>
414 <ol>
415 <ol>
416 <ol>
417 <ol>
418 <ol>
419 <ol>
420 <ol>
421 <ol>
422 <ol>
423 <ol>
424 <ol>
425 <ol>
426 <ol>
427 <ol>
428 <ol>
429 <ol>
430 <ol>
431 <ol>
432 <ol>
433 <ol>
434 <ol>
435 <ol>
436 <ol>
437 <ol>
438 <ol>
439 <ol>
440 <ol>
441 <ol>
442 <ol>
443 <ol>
444 <ol>
445 <ol>
446 <ol>
447 <ol>
448 <ol>
449 <ol>
450 <ol>
451 <ol>
452 <ol>
453 <ol>
454 <ol>
455 <ol>
456 <ol>
457 <ol>
458 <ol>
459 <ol>
460 <ol>
461 <ol>
462 <ol>
463 <ol>
464 <ol>
465 <ol>
466 <ol>
467 <ol>
468 <ol>
469 <ol>
470 <ol>
471 <ol>
472 <ol>
473 <ol>
474 <ol>
475 <ol>
476 <ol>
477 <ol>
478 <ol>
479 <ol>
480 <ol>
481 <ol>
482 <ol>
483 <ol>
484 <ol>
485 <ol>
486 <ol>
487 <ol>
488 <ol>
489 <ol>
490 <ol>
491 <ol>
492 <ol>
493 <ol>
494 <ol>
495 <ol>
496 <ol>
497 <ol>
498 <ol>
499 <ol>
500 <ol>
501 <ol>
502 <ol>
503 <ol>
504 <ol>
505 <ol>
506 <ol>
507 <ol>
508 <ol>
509 <ol>
510 <ol>
511 <ol>
512 <ol>
513 <ol>
514 <ol>
515 <ol>
516 <ol>
517 <ol>
518 <ol>
519 <ol>
520 <ol>
521 <ol>
522 <ol>
523 <ol>
524 <ol>
525 <ol>
526 <ol>
527 <ol>
528 <ol>
529 <ol>
530 <ol>
531 <ol>
532 <ol>
533 <ol>
534 <ol>
535 <ol>
536 <ol>
537 <ol>
538 <ol>
539 <ol>
540 <ol>
541 <ol>
542 <ol>
543 <ol>
544 <ol>
545 <ol>
546 <ol>
547 <ol>
548 <ol>
549 <ol>
550 <ol>
551 <ol>
552 <ol>
553 <ol>
554 <ol>
555 <ol>
556 <ol>
557 <ol>
558 <ol>
559 <ol>
560 <ol>
561 <ol>
562 <ol>
563 <ol>
564 <ol>
565 <ol>
566 <ol>
567 <ol>
568 <ol>
569 <ol>
570 <ol>
571 <ol>
572 <ol>
573 <ol>
574 <ol>
575 <ol>
576 <ol>
577 <ol>
578 <ol>
579 <ol>
580 <ol>
581 <ol>
582 <ol>
583 <ol>
584 <ol>
585 <ol>
586 <ol>
587 <ol>
588 <ol>
589 <ol>
590 <ol>
591 <ol>
592 <ol>
593 <ol>
594 <ol>
595 <ol>
596 <ol>
597 <ol>
598 <ol>
599 <ol>
600 <ol>
601 <ol>
602 <ol>
603 <ol>
604 <ol>
605 <ol>
606 <ol>
607 <ol>
608 <ol>
609 <ol>
610 <ol>
611 <ol>
612 <ol>
613 <ol>
614 <ol>
615 <ol>
616 <ol>
617 <ol>
618 <ol>
619 <ol>
620 <ol>
621 <ol>
622 <ol>
623 <ol>
624 <ol>
625 <ol>
626 <ol>
627 <ol>
628 <ol>
629 <ol>
630 <ol>
631 <ol>
632 <ol>
633 <ol>
634 <ol>
635 <ol>
636 <ol>
637 <ol>
638 <ol>
639 <ol>
640 <ol>
641 <ol>
642 <ol>
643 <ol>
644 <ol>
645 <ol>
646 <ol>
647 <ol>
648 <ol>
649 <ol>
650 <ol>
651 <ol>
652 <ol>
653 <ol>
654 <ol>
655 <ol>
656 <ol>
657 <ol>
658 <ol>
659 <ol>
660 <ol>
661 <ol>
662 <ol>
663 <ol>
664 <ol>
665 <ol>
666 <ol>
667 <ol>
668 <ol>
669 <ol>
670 <ol>
671 <ol>
672 <ol>
673 <ol>
674 <ol>
675 <ol>
676 <ol>
677 <ol>
678 <ol>
679 <ol>
680 <ol>
681 <ol>
682 <ol>
683 <ol>
684 <ol>
685 <ol>
686 <ol>
687 <ol>
688 <ol>
689 <ol>
690 <ol>
691 <ol>
692 <ol>
693 <ol>
694 <ol>
695 <ol>
696 <ol>
697 <ol>
698 <ol>
699 <ol>
700 <ol>
701 <ol>
702 <ol>
703 <ol>
704 <ol>
705 <ol>
706 <ol>
707 <ol>
708 <ol>
709 <ol>
710 <ol>
711 <ol>
712 <ol>
713 <ol>
714 <ol>
715 <ol>
716 <ol>
717 <ol>
718 <ol>
719 <ol>
720 <ol>
721 <ol>
722 <ol>
723 <ol>
724 <ol>
725 <ol>
726 <ol>
727 <ol>
728 <ol>
729 <ol>
730 <ol>
731 <ol>
732 <ol>
733 <ol>
734 <ol>
735 <ol>
736 <ol>
737 <ol>
738 <ol>
739 <ol>
740 <ol>
741 <ol>
742 <ol>
743 <ol>
744 <ol>
745 <ol>
746 <ol>
747 <ol>
748 <ol>
749 <ol>
750 <ol>
751 <ol>
752 <ol>
753 <ol>
754 <ol>
755 <ol>
756 <ol>
757 <ol>
758 <ol>
759 <ol>
760 <ol>
761 <ol>
762 <ol>
763 <ol>
764 <ol>
765 <ol>
766 <ol>
767 <ol>
768 <ol>
769 <ol>
770 <ol>
771 <ol>
772 <ol>
773 <ol>
774 <ol>
775 <ol>
776 <ol>
777 <ol>
778 <ol>
779 <ol>
780 <ol>
781 <ol>
782 <ol>
783 <ol>
784 <ol>
785 <ol>
786 <ol>
787 <ol>
788 <ol>
789 <ol>
790 <ol>
791 <ol>
792 <ol>
793 <ol>
794 <ol>
795 <ol>
796 <ol>
797 <ol>
798 <ol>
799 <ol>
800 <ol>
801 <ol>
802 <ol>
803 <ol>
804 <ol>
805 <ol>
806 <ol>
807 <ol>
808 <ol>
809 <ol>
810 <ol>
811 <ol>
812 <ol>
813 <ol>
814 <ol>
815 <ol>
816 <ol>
817 <ol>
818 <ol>
819 <ol>
820 <ol>
821 <ol>
822 <ol>
823 <ol>
824 <ol>
825 <ol>
826 <ol>
827 <ol>
828 <ol>
829 <ol>
830 <ol>
831 <ol>
832 <ol>
833 <ol>
834 <ol>
835 <ol>
836 <ol>
837 <ol>
838 <ol>
839 <ol>
840 <ol>
841 <ol>
842 <ol>
843 <ol>
844 <ol>
845 <ol>
846 <ol>
847 <ol>
848 <ol>
849 <ol>
850 <ol>
851 <ol>
852 <ol>
853 <ol>
854 <ol>
855 <ol>
856 <ol>
857 <ol>
858 <ol>
859 <ol>
860 <ol>
861 <ol>
862 <ol>
863 <ol>
864 <ol>
865 <ol>
866 <ol>
867 <ol>
868 <ol>
869 <ol>
870 <ol>
871 <ol>
872 <ol>
873 <ol>
874 <ol>
875 <ol>
876 <ol>
877 <ol>
878 <ol>
879 <ol>
880 <ol>
881 <ol>
882 <ol>
883 <ol>
884 <ol>
885 <ol>
886 <ol>
887 <ol>
888 <ol>
889 <ol>
890 <ol>
891 <ol>
892 <ol>
893 <ol>
894 <ol>
895 <ol>
896 <ol>
897 <ol>
898 <ol>
899 <ol>
900 <ol>
901 <ol>
902 <ol>
903 <ol>
904 <ol>
905 <ol>
906 <ol>
907 <ol>
908 <ol>
909 <ol>
910 <ol>
911 <ol>
912 <ol>
913 <ol>
914 <ol>
915 <ol>
916 <ol>
917 <ol>
918 <ol>
919 <ol>
920 <ol>
921 <ol>
922 <ol>
923 <ol>
924 <ol>
925 <ol>
926 <ol>
927 <ol>
928 <ol>
929 <ol>
930 <ol>
931 <ol>
932 <ol>
933 <ol>
934 <ol>
935 <ol>
936 <ol>
937 <ol>
938 <ol>
939 <ol>
940 <ol>
941 <ol>
942 <ol>
943 <ol>
944 <ol>
945 <ol>
946 <ol>
947 <ol>
948 <ol>
949 <ol>
950 <ol>
951 <ol>
952 <ol>
953 <ol>
954 <ol>
955 <ol>
956 <ol>
957 <ol>
958 <ol>
959 <ol>
960 <ol>
961 <ol>
962 <ol>
963 <ol>
964 <ol>
965 <ol>
966 <ol>
967 <ol>
968 <ol>
969 <ol>
970 <ol>
971 <ol>
972 <ol>
973 <ol>
974 <ol>
975 <ol>
976 <ol>
977 <ol>
978 <ol>
979 <ol>
980 <ol>
981 <ol>
982 <ol>
983 <ol>
984 <ol>
985 <ol>
986 <ol>
987 <ol>
988 <ol>
989 <ol>
990 <ol>
991 <ol>
992 <ol>
993 <ol>
994 <ol>
995 <ol>
996 <ol>
997 <ol>
998 <ol>
999 <ol>
1000 <ol>

```

Figure 5.6. The <sourceDoc>-based encoding for the version of Lydgate’s “Quis Dabit Meo Capiti Fontem Lacrimarum” in Jesuit College Q.G.8, Jesuit College, Cambridge, as rendered via the oXygen XML Editor.

and paratext <sourceDoc> provides the option to create what the consortium calls an *embedded transcription*, which they describe as “one in which words and other written traces are encoded as subcomponents of elements representing the physical surfaces carrying them rather than independently of them.”⁴⁵ Thus, the <sourceDoc>-based transcription model more accurately captures the physical aspects of the object, allowing even someone not versed in XML to understand the encoded transcription at a glance.

Armed with the affordances created by this new head element in TEI, I begin each transcription by writing the characters, as I see them, into a word processing document.

While this differs from the method usually taught, based on writing each of the characters into a notebook by hand so as to capture the nuances of scribal hand, the increasing likelihood that an archive will allow researchers to take their own digital photographs of a manuscript for reference makes it easier to type the characters out and then refer to the reference shots in cases where there are scribal oddities.⁴⁶ This also alleviates any chance of a malformed character as a result of imperfect copying.

Because both Microsoft Word and Libre/OpenOffice store their documents as wrapped XML files, I then unzip the file and utilize an XSL transformation to render the underlying XML code—WordProcessingML for Microsoft Word and OpenDocument for Libre/OpenOffice—into a format that is compliant with TEI’s schema.⁴⁷ From there, the resulting information is manually wrapped with the header information for a TEI file and those elements that cannot automatically be transformed—the notes and other ancillary features captured via the word processor’s commenting feature—are added to the resulting file

45 TEI: Text Encoding Initiative. “11.2.2 Embedded Transcription.”

46 For a description of the more traditional method, see Brown, *A Guide to Western Historical Scripts from Antiquity to 1600* as well as Clemens and Graham, *Introduction to Manuscript Studies*.

47 On .docx files as wrapped XML, see Jones, “Intro to Word XML Part 1.”

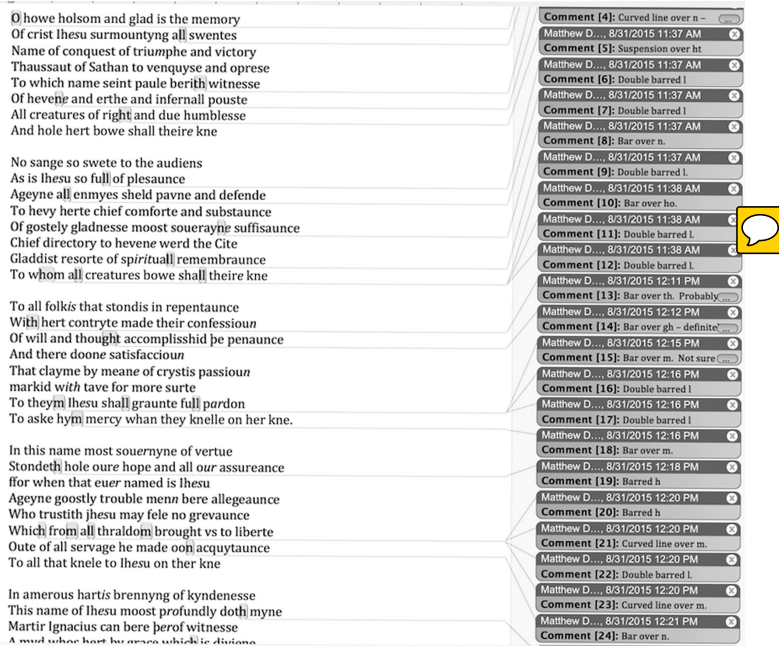


Figure 5.7. The author's master transcription file for the witness of the *Testament of John Lydgate* in Huntington HM140.

manually.⁴⁸ During this time the file is also checked against the images, and if everything is correct, a second XSL transformation is run to render the file into static HTML.

Note that this process, especially the rendering of the files into static forms whenever possible, harkens back to the basic design philosophy outlined above. HTML is ubiquitous, and as such rendering the file into HTML makes it much more likely that any future web browsers will be able to understand and process the files without further development work. Those features that cannot be handled statically, such as line comparisons or the three-dimensional model of the Clopton chapel that augments the existing image/transcription display on the pages, are handled via JavaScript. Moreover, that model is presented on the site in a way that deliberately makes it clear that it is incomplete, and so forces a viewer to recognize that their experience of the chapel space is in fact mediated. This, in turn, forces recognition of the network underlying the development of the text for display online and makes a viewer consider the physicality of the space in a way that might not otherwise occur.

⁴⁸ The XSL file used to do the initial transformation of the Word XML can be found at www.minorworksoflydgate.net/XML/XQuery/xsl_word_sourceDoc.xsl. The document that does the work of final transformation for upload to the site can be found at www.minorworksoflydgate.net/XML/XQuery/chunker.xsl.



Figure 5.8. Model of the Clopton chantry chapel, Holy Trinity, Long Melford. Note the use of empty space in the doorway, for example, to remind a viewer that this is a model of a real, physical space.⁴⁹

JavaScript is also used to display the relationships between aspects of these texts as they are defined in the database created as part of the initial work on the site. This gives users of the site access to the underlying network surrounding these texts as they exist today and makes them aware of holes that may exist in current scholarship. Furthermore, it allows them to, at a glance, see what texts exist alongside each other in the manuscript witnesses, where those manuscripts are located currently, and who was involved in their production and distribution.

Both the three-dimensional model and the force-directed graph are admittedly crude approximations of the physical space at Long Melford and the relational network associated with existing Lydgate holdings, respectively. However, they serve their purpose: to remind readers of the physicality of these material artefacts and the fact that they do not exist as simple images on a website or Google Image Search, but instead have a real and ongoing life that the digital version can only approximate.

Conclusion

While by no means a comprehensive discussion of the theoretical and methodological decisions made in the development of MWJL, I hope that the discussion of my transcription method and the development of two aspects of the site illustrate how clear, careful,

⁴⁹ www.minorworksoflydgate.net/Model/three/examples/chantry_chapel.html. The model developed used photogrammetry and is displayed using the Three.js JavaScript library.

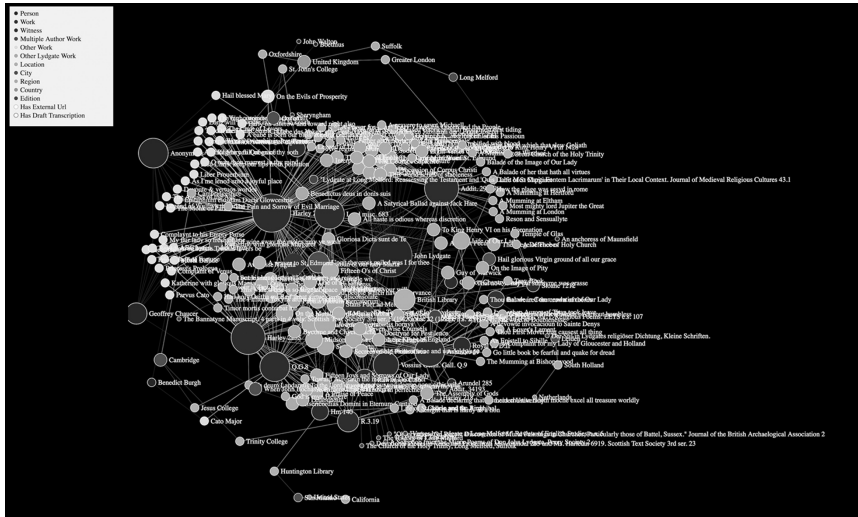


Figure 5.9. Force-directed model indicating the relationship between the three texts at Holy Trinity, Long Melford, in all witnesses.⁵⁰

and transparent articulation of the methodological as well as theoretical approach to a project can help to illuminate the resulting virtual product and counteract the sort of digital presentism Chun notes and Parker’s commentary reinforces. More importantly, the examination of the issues surrounding the semiotic network, as illustrated by the “Queen Mary Psalter” and the file/folder metaphor, indicate that requiring transparency and a continual awareness, repeatedly articulated, of the network surrounding any digital or analogue tool or underlying idea is paramount. Doing otherwise obscures much of the work of building and revealing culture, and furthermore skews our understanding of what we are actually experiencing when we use that tool or re-inscribe that idea in our own work.

To explain how, why, and with what method a text is transcribed, for example, is important, but equally important are the decisions made in the development of encoding standards. The TEI’s decision to base their architecture on the codex book, while sound in most cases, would have had grave consequences for our understanding of the Clopton chapel, and it is only with the recent revision of the TEI standard that it is possible to even approximately display the chapel as it is *in situ* while staying compliant with the standard as written. The ability to solve that problem through a combination of the <sourceDoc>-based encoding methodology and ancillary tools such as the three-dimensional model and force-directed chart underscores that the transcribed

⁵⁰ Davis, “Force-Directed Graph.” A version of this model with all the works of Lydgate in the database can also be seen if you click on the “Clear Limits” button. It was created using the d3.js JavaScript library.

text in both its encoded form and its virtual presentation is an adaptation of what came before. That adaptation is profoundly reliant on networks of production and influence that are largely obscured, but which have the potential to fundamentally change our understanding of these cultural heritage items. Scholars must be diligent in making clear the decisions they have made in preparing these items for display online and how those decisions both support and detract from the affordances of the material original.

Since all editions and facsimiles are ultimately adaptations of a changing and mutable set of ideas, a virtual adaptation of a unique cultural object should attempt to accurately model the material original, but acknowledge that it is not itself an adequate substitution for that material original. Rather than claim a fidelity that does not exist, scholars should firmly and transparently articulate both the theoretical and methodological stakes of the project and the ways in which they approach the text and its presentation online. This work is already largely done when it comes to transcription methods and the display of content, but falls woefully behind when it comes to context and paratext. In articulating the decisions made in choosing or developing a platform and the methods used in presentation of content a reader is at least made aware of the infrastructural palimpsests incorporated in the online presentation of that content. In describing my work with MWJL I have only articulated one method of doing this work, and there are obviously others, but ultimately both theory and praxis must be articulated for a digital tool to have its greatest use.

Bibliography

- Allen, Mike. "Sean Parker unloads on Facebook 'exploiting' human psychology." Axios.com. www.axios.com/sean-parker-unloads-on-facebook-2508036343.html
- Apple Support. "Mac Basics: Stacks are your shortcut in the Dock." March 23, 2016. <https://support.apple.com/en-us/HT201955>.
- Brown, Michelle. *A Guide to Western Historical Scripts from Antiquity to 1600*. Toronto: University of Toronto Press, 1990.
- Carruthers, Mary J. *The Book of Memory: A Study in Memory in Medieval Culture*. Cambridge: Cambridge University Press, 1990.
- Chun, Wendy Hui Kyung. *Updating to Remain the Same: Habitual New Media*. Cambridge, MA: The MIT Press, 2016.
- Clemens, Raymond, and Timothy Graham. *Introduction to Manuscript Studies*. Ithaca: Cornell University Press, 2007.
- Davis, Matthew Evan. "Lydgate at Long Melford: Reassessing the *Testament* and "Quis Dabit Meo Capiti Fontem Lacrimarum" in Their Local Context." *The Journal of Medieval Religious Cultures*, 43 (2017): 77–114.
- . *The Minor Works of John Lydgate*. www.minorworksoflydgate.net
- . "About the Archive." www.minorworksoflydgate.net/archive.html
- . "Force-Directed Graph." www.minorworksoflydgate.net/forcedirect.php?select%5B%5D=4&select%5B%5D=83&select%5B%5D=163
- . "Clopton Chantry Chapel." www.minorworksoflydgate.net/Model/three/examples/chantry_chapel.html

- . “Works.” www.minorworksoflydgate.net/works.html
- Drout, Michael D. C. *How Tradition Works*. Tempe: Arizona Center for Medieval and Renaissance Studies, 2006.
- “Extensible Markup Language (XML).” W3C. www.w3.org/XML/.
- Gibbs, Fred, and Trevor Owens. “Building Better Digital Humanities Tools: Toward Broader Audiences and User-centered Designs.” *DHQ: Digital Humanities Quarterly* 6:2. www.digitalhumanities.org/dhq/vol/6/2/000136/000136.html.
- Glass, Grant. “The Black Box.” HASTAC. www.hastac.org/blogs/grantglass/2015/10/14/black-box.
- Hopkins, Michael. Comment, “Dropbox (product): Will the metaphor of files and folders become obsolete?” October 23, 2011. www.quora.com/Dropbox-product-Will-the-metaphor-of-files-and-folders-become-obsolete
- Jones, Brian. “Intro to Word XML Part 1: Simple Word Document” in *Brian Jones: Office Solutions*. https://blogs.msdn.microsoft.com/brian_jones/2005/07/05/intro-to-word-xml-part-1-simple-word-document/.
- Knappett, Carl. “Networks of Meaning: A Sociosemiotics of Material Culture.” In *Thinking Through Material Culture: An Interdisciplinary Perspective*. Philadelphia: University of Pennsylvania Press, 2005.
- Lanier, Jaron. *You are Not a Gadget: A Manifesto*. New York: Knopf, 2010.
- Law, John. “After ANT: Complexity, Naming, and Topology.” In *Actor Network Theory and After*, edited by John Law and John Hassard. Oxford: Blackwell, 1999.
- . “Notes on the Theory of the Actor-Network: Ordering, Strategy and Heterogeneity.” *Systems Practice* 5 (1992).
- Miles, Russ, and Dan Pilone. “The Next Iteration: If it ain’t broke ... you still better fix it” in *Head First Software Development*. www.safaribooksonline.com/library/view/head-first-software/9780596527358/ch11.html.
- Nakamura, Lisa. *Digitizing Race*. Minneapolis: University of Minnesota Press, 2008.
- “Namespaces in XML 1.0 (Third Edition).” W3C. www.w3.org/TR/REC-xml-names/.
- Nowvickie, Bethany. “A Game Nonetheless.” March 16, 2015. <http://nowvickie.org/2015/a-game-nonetheless/#more-2719>.
- “P5: Guidelines for Electronic Text Encoding and Interchange.” The TEI Guidelines. www.tei-c.org/release/doc/tei-p5-doc/en/html/.
- Peirce, Charles Sanders. *Collected Papers of Charles Sanders Peirce*. Volume 2. Edited by Charles Hawthorne and Paul Weiss. Cambridge, MA: Harvard University Press, 1960.
- . *The Essential Peirce*. Volume 2. Edited by the Peirce Edition Project. Bloomington: Indiana University Press, 1998.
- . *Writings of Charles Sanders Peirce: A Chronological Edition*. Volume 2. Edited by the Peirce Edition Project. Bloomington: Indiana University Press, 1984.
- Ramsay, Stephen, and Geoffrey Rockwell. “Developing Things: Notes toward an Epistemology of Building in the Digital Humanities.” *Debates in the Digital Humanities*, 2012, 75–84.
- Radio Corporation of America, Advertisement, *Popular Science* (Feb 1950): 96.
- Saussure, Ferdinand de. *Cours de linguistique generale*. Edited by Tuillio de Mauro. Paris: Payot, 1986.

- . *Course in General Linguistics*. Translated by Roy Harris. London: Duckworth & Co., 1983.
- Sponsler, Claire. *The Queen's Dumbshows: John Lydgate and the Making of Early Theater*. Philadelphia: University of Pennsylvania Press, 2014.
- Text Encoding Initiative Consortium. "4. Default Text Structure—The TEI Guidelines." www.tei-c.org/release/doc/tei-p5-doc/en/html/DS.html.
- . "11.2.2 Embedded Transcription." www.tei-c.org/release/doc/tei-p5-doc/en/html/PH.html#PHZLAB.
- . "TEI element sourceDoc." www.tei-c.org/release/doc/tei-p5-doc/en/html/ref-sourceDoc.html.
- Winner, Langdon. "Do Artifacts Have Politics?" *Daedalus* 109 (1980): 121–36.

PROOF