

Hollis Peirce

Dr Shawn Graham

HIST 4910 - A

April 8, 2015

**Entangled With Books:
Two Moments In the Evolution of Accessibility
and the Notion of Universal Design**

Table of Contents

Abstract	2
Prologue	4
Technology, Change, and Entanglements	9
<i>Accessibility</i>	10
History of the Incunabula	18
Early Digitization Period: Digital Incunabula	25
Books, Bindings, 1s and 0s	34
<i>Embodied Experience of the Disabled Scholar</i>	39
Conclusion	42
Bibliography	46

Abstract

Digital media are often framed as offering better opportunities for accessibility.¹ The statement that the ‘medium is the message’² has grown trite, but its implications for accessibility are both profound and little considered. By taking an explicitly materialistic approach, informed by archaeologists such as Ian Hodder and Chris Godsen, as well as the media theorist Janet Murray’s design ideas concerning digital affordances, this study explores the implications of ‘accessibility’ in terms of the materiality of the development of the incunabula contrasted with the development of the ebook. The incunabula, (sing., *incunabulum*) is a label applied to early books produced before the year 1501 with moveable type.³ Thus incunabula are defined not by what they contain, but how they are produced; they are defined in terms of their affordances. Ebooks are similarly defined: not by what they contain, but how they are rendered. They both represent a similar moment: when the technology of the ‘book’ is undergoing a fundamental change.

At the heart of this technological change is the ability to copy (or be copied). Advances in copying technology brings with it ethical, moral and legal concerns for all.⁴ Copying can be thought of as a kind of translation; no translation is ever a perfect replica but rather the result of art and decisions on what is important. In this study, I consider the constellation of issues surrounding the act of translation, the act of copying, which enabled the emergence of incunabula and ebooks. The physicality of these incunabula and their affordances as media as a means of

¹ Matt Enis, “Accessibility Upgrade,” *Library Journal* 138, no. 7 (April 15, 2013): 31.

² Marshall McLuhan, *Medium Is the Message* (United Kingdom: Penguin Books).

³ “Incunabula Collections,” British Library, accessed March 10, 2015, <http://www.bl.uk/reshelp/findhelprestype/incunab/incunabulacoll/>.

⁴ Cf. Harold A. Innis, “The Bias of Communication,” in *Staples, markets and cultural change: selected essays*, ed. Harold A. Innis and Daniel Drache (Montreal: McGill-Queen’s University Press, 1995), 386.

shedding light on our current period of *digital* incunabula will be explored. Further, both technologies will be looked at from a perspective of universal design, a term that was coined by Ronald L. Mace, a professor of architecture at the University of North Carolina State in 1985.⁵

The history of incunabula will be contrasted with early digital representations of ‘books’. Notably, my own embodied experiences of working with digital media will be a strong element from which I will draw. As a physically disabled individual my engagement with digital media affords me a unique relationship, complete with both difficulties and opportunities. Both sides of this relationship will be analyzed in this paper.

⁵ “What Is Universal Design?,” UniversalDesign.com, last modified 2015, <http://www.universaldesign.com/about-universal-design.html>.

Prologue

I live with Congenital Muscular Dystrophy. This has affected my educational career in several ways. By way of explanation, when I arrived at Carleton University to pursue my undergraduate degree, I found myself filled with mixed emotions. I immediately felt a great deal of pressure because for the first time in my life I was embarking upon an educational experience without the benefit of having an assistant by my side at all times. As a physically disabled individual who is dependent upon others for the simplest of tasks, even lifting books off the shelf or turning pages, the idea of being alone without that assistance was extremely challenging.

A saving grace was that I was attending Carleton University which is known as one of the most physically accessible post-secondary institutions in Canada.⁶ Suffice to say I became comfortable with life outside the classroom and navigating my way around campus far more quickly than navigating my way *inside* the classroom.

At the outset of my studies, the classroom experience was a very difficult one. For the first time I found myself taking my own notes rather than sitting and listening to the lesson while my assistant took notes. The university was quick to notify me of the note-taker program they offered students that depended on other students from the class sharing their notes. This approach did not appeal to me however, since I would not have any power over what my note-taker took note of. In other words, I would have to start studying how and what another individual thought was important along with learning the actual course material. The combination did not appeal to me.

⁶ Elizabeth Payne, "Carleton University is spreading its 'culture of accessibility'," *Ottawa Citizen* (Ottawa, ON), February 15, 2015, <http://ottawacitizen.com/news/local-news/carleton-university-is-spreading-its-culture-of-accessibility>.

Consequently, I found myself sitting in class trying my best to keep up with the lecture while rapidly typing away in Microsoft Word on my MacBook. Typing though is more challenging for me because although I can move my fingers around the keyboard I cannot lift my hands. Because of this, the first few weeks of class were a struggle. My mind kept forgetting that it was also responsible for note-taking and so I would get caught up in simply listening to the lecture. I had to develop the ability to write and listen at the same time.

All of my notes were in the word processing program Microsoft Word, which made it very difficult to sift through them. The experience was similar to dealing with an ancient, if digital, scroll. One could only see the notes one was scrolling past. This forces any reader to constantly go up and down the pages with no ability to maneuver them in any way for comparison's sake. For the first few years of my studies this approach was my only strategy (albeit inefficient and ineffective) for working with my notes, which along with other similar accessibility issues (see below) nearly cost me my post-secondary career at Carleton University.

As John Lutz memorably put it, this skeuomorphic infinite scroll approach to my notes was rather like riding in a digital horseless carriage.⁷ The makers of Microsoft Word were merely replicating in a computer an ancient technology, the infinitely long blank page of paper. The fact is digitization was being used to replicate a previous technological solution to note taking, rather than enabling a transformation to a new way of taking notes.

On the other hand, early forms of incunabula evolved to allow new possibilities for the 'book' to emerge (see below), we were moving beyond 'horseless carriages' to 'automobiles'. These new paradigms that include the ebook are born-digital and do not merely replicate what we

⁷ John Lutz. "Riding the Horseless Carriage to the Computer Revolution: Teaching History In the Twenty-First Century." *Social History* 34, no. 68 (2001): 427, <http://pi.library.yorku.ca/ojs/index.php/hssh/article/download/4518/3713>, accessed September 25, 2014.

have traditionally done on paper. One that has been personally transformational for me has been a program called ‘Notational Velocity’ which I began using in the course of this present research. The great innovation embedded in Notational Velocity is that it can read all of the users notes with the ability to bring up other relevant notes the user has already taken relating to that given subject. However, if none are there then it simply makes a new note.

Notational Velocity is a 21st Century technology that is similar to ‘Memex’ that never came to be but was imagined in 1945 by Dr Vannevar Bush.⁸ The way in which he envisioned a ‘Memex’ to work was as a mechanical private library and index for an individual user. Dr Vannevar had it in mind that if one wanted to consult something inside it, the user would just write out the title and it would be brought to the front.⁹

The first time that I used ‘Notational Velocity’ I was swept away by the powerful sense that I could overcome many of the barriers confronting a physically disabled student. To clarify this idea we should refer to George H. Williams’ article, “Disability, Universal Design, and the Digital Humanities. In it Williams refers to Dr Rosemarie Garland-Thomson’s (Disabilities Studies professor at Emory College of Arts and Sciences) argument that often it is the tool that creates disability rather than our body.¹⁰ In my case I would argue that Microsoft Word was disabling me by poorly imitating an old technology. As Dr Garland Thomson argues, “digital knowledge tools that assume everyone approaches information with the same abilities and using the same methods risk excluding a large percentage of people”.¹¹ Watching the program pull up other notes that it thought may be related to what was being written astounded me. It reminded

⁸ Vannevar Bush, “As We May Think,” *The Atlantic Monthly* (July, 1945): <http://web.mit.edu/sts.035/www/PDFs/think.pdf>, accessed March 24, 2015.

⁹ Ibid.

¹⁰ George H. Williams, “Disability, Universal Design, and the Digital Humanities,” *Debates In the Digital Humanities*, 2012, <http://dhdebates.gc.cuny.edu/debates/text/44>, accessed March 19, 2015.

¹¹ Ibid.

me of an able-bodied individual sitting on the floor with their notes laid out in front of them so they could find what they were looking for more easily. Recreating that experience on such a different platform requires not only a great invention but a shift in a paradigm of thinking.

John Lutz exemplifies this idea by describing how the Internet can be thought of as an open, disorganized encyclopedia.¹² To illustrate this more explicitly, one must look at the internet from an outsiders perspective. The Internet has no set format that an individual can follow from the outside. Unlike Microsoft Word for instance, the format of the Internet is not laid out in a scroll like fashion where the user must read it from beginning to end. Instead, it allows for a path to be chosen by the user.¹³

Using Microsoft Word for so long channels our thinking; it can become difficult to see other ways of doing things. The user becomes stuck in the same pattern that is expected by the program. The jolt of switching to Notational Velocity, which forces other patterns of thought, pushed me to a new level of creativity in my academic work.

Creativity is generally thought of as the ability to produce original ideas that are realistic to accomplish.¹⁴ Guilford's famous nine-dot puzzle puts this definition to the test. It asks the individual to connect nine dots using four straight lines without lifting their pencils off of the paper.¹⁵ Cheng, Burke, and Lee bring up this puzzle when discussing the psychological way of

¹² Lutz, 430.

¹³ Bush.

¹⁴ Chi-Ying Cheng, Jeffrey Sanchez Burke and Fiona Lee. "Connecting The Dots Within: Creative Performance and Identity Integration," *Psychological Science* 19 no. 11 (November, 2008): 1178, <http://www.jstor.org.proxy.library.carleton.ca/stable/40064906>, accessed April 5, 2015.

¹⁵ Drew Boyed. "Thinking Outside the Box: A Misguided Idea - The truth behind the universal, but flawed, catchphrase for creativity," *Psychology Today* (February 06, 2014). <https://www.psychologytoday.com/blog/inside-the-box/201402/thinking-outside-the-box-misguided-idea>, accessed April 5, 2015.

thinking regarding creativity. They do so by discussing how realizing the relationship between sets of knowledge that otherwise seem unrelated is a great measure of creativity.¹⁶

¹⁶ Cheng, Burke and Lee, 1178, accessed April 5, 2015.

Technology, Change, and Entanglements

eBooks haven't had their 'Notational Velocity' moment yet. But my embodied experience of traversing the boundary between two digital technologies, one rooted in the past and the other pointing the way to the future, gives me a theoretical perspective to consider similar transitions in the era of incunabula. In this section I consider theoretical tools, drawing on archaeology, media studies, communication studies, and disability studies, to provide the intellectual framework for this study.

The creation of Notational Velocity is surely outside-the-box. Such thinking might not happen unless someone was sufficiently frustrated by the experience of using standard word processing programs such as Microsoft Word to take notes. The real issue is that I was trying to use the wrong tool; or rather, to repurpose what I had at hand to my own needs. Word was made for an audience in the corporate world; thus it was made to recreate the look and feel with which the corporate world was familiar – the typewriter. It wasn't built to make and study notes. It was built to write memos.

Word made the process of editing far simpler and (comparatively, when judged against typewriting) user friendly. Eventually though as with all things that are used over and over, flaws are uncovered which inevitably lead to new ideas intended to overcome them. For example, the word processing program was invented decades after the invention of the typewriter.

To even arrive at this point in evolutionary development, two separate paradigm shifts of needed to occur. The first was the typewriter. A London engineer named Henry Mill patented this machine that used the same concept of a movable type printing press in a smaller form.¹⁷ This

¹⁷ Ann Cothran and George E. Mason, "The Typewriter: Time-Tested Tool for Teaching Reading and Writing," *The Elementary School Journal* 78 no. 3 (January, 1978), 170, <http://www.jstor.org.proxy.library.carleton.ca/stable/1001415>, accessed April 5, 2015.

invention came from a paradigm shift of thinking a different, more efficient way of writing over handwriting. The other shift came much later in the 1960's when the world was introduced to the Xerox 914. This machine (which will be looked at in further detail later in the paper) was created from a large shift in thinking that there could be a machine that created identical copies. A paradigm shift then took place to combine the two to create another better state of the art program, Microsoft Word.

Fundamentally, what drove this evolution could be labeled 'accessibility'.

Accessibility

It is important to understand what is meant by accessibility. When speaking of physical accessibility, accessibility for all is assumed, but it is accessibility for the disabled that will be studied most in this particular analysis. In this context, accessibility has not often included or even imagined the physically disabled. How did books first take shape? Why did they come to the physical structure they embody today? Accessibility provides the key. If a book and its information is accessible to us, it follows that we are accessible to it. In short, we are entangled with our books.

Increased accessibility for the average person to the written word is at the heart of any complete answer to these questions. But what of accessibility for the disabled? At the time of the incunabula there were clearly many societal as well as technological reasons for the isolation of the disabled. Technological developments were not often if ever thought of in terms of the physically disabled but nevertheless would lead to applications of great assistance for that community. The disabled as a group would not have been able to come together had it not been for such revolutionary technology (see below). Electricity is but one example of another

technology that had not yet been invented but would among other things significantly aid the life of the disabled.

One innovation that became possible after the invention of electricity for instance, was the electric wheelchair. This advancement alone improved the lives of millions of disabled individuals who suddenly had the ability to act independently if they did not have the strength to push their own manual wheelchair. The blind also benefited greatly from electricity with the development of screen readers or audiobooks, both of which depend on electricity for power. Without technologies such as these to help provide access to a disabled user, it would have been impossible to create what came to be termed a ‘universal design’.

In terms of our entanglement with books, the availability for the physically disabled to new advances in technology have been crucial to facilitating the necessary physical access to books that had been otherwise impossible. As a young child, when digital technology was only in its infancy I was unable to lift let alone look inside the books that were towering over me on the shelf. As I progressed in my education though, I became more able to interact with these ‘things’ than I had been during childhood. From a young age I knew that I had a desire to read. Nature’s cruel trick was, as previously mentioned, that I was born with Congenital Muscular Dystrophy. Therefore, I could not become entangled with the book until there was the available high technology to aid me in doing so.

It is for this reason that physical accessibility of the incunabula and the ebook will be looked at most in particular. Current digital technology and its constant development continues to push boundaries and force an evolution, one might say a revolution, towards a more accessible experience for all, whether able-bodied or disabled. This accessible experience can come in many different ways to accommodate many different people. Physical boundaries can as discussed, limit some from utilizing even what we think of as being a simple physical device like a book.

Digital technology is actually eliminating those barriers and consequently enabling in this example, such individuals to truly experience history.

When something is physically accessible to us we become entangled with it. Hodder argues for entanglement because of humanity's dependence on things for survival.¹⁸ Such an understanding of the relationship between humanity and things points to the fact that our evolution has been aided and advanced by our interaction with things.¹⁹ Early humans would have never been able to write on cave walls for example had they not managed to create the tools to do so.

So to begin, we shall draw upon Lutz to help explain how ideas are created. Historically speaking of course, it is the natural human instinct to automatically think of the invention of the final product as the major step forward in history. However, Lutz puts forward the idea in his article, "Riding the Horseless Carriage to the Computer Revolution: Teaching History in the Twenty-first Century", that what is often more important is the evolution of the change. What Lutz means by this is that it is the new way of thinking that something can be used or used for, that leads to the actual change rather than the change itself.²⁰ For example Lutz alludes to the invention of the automobile to prove his point. The "horseless carriage" was not invented with one original thought by someone (Henry Ford for instance). Instead it was the idea of how to use gasoline in an efficient way, the atomizing carburetor that led to this invention.²¹ If we look further into any invention, a similar timeline of sequential events will be found that leads to the actual invention of a given product or thing.

¹⁸ Ian Hodder, *Entangled : An Archaeology of the Relationships between Humans and Things* (United Kingdom: John Wiley & Sons), 17.

¹⁹ Ibid, 16.

²⁰ Lutz, 427.

²¹ Peter J. Hugill, "Good Roads and the Automobile in the United States 1880-1929," *Geographical Review* 72, no. 3 (Jul. 1982): 327.

In this case we are examining the transformation of the book. Lutz discusses exactly this topic in his article. According to Lutz, currently we are going through a complete alteration in the way in which we store and transfer information. Lutz refers to the fact that as historians we are in constant admiration of printed materials and how to study them.²² As historians we clearly admire print because it is so inherent to the study of historical fields. Now, in the 21st Century, we are in the middle of a paradigm shift toward new technologies that will help us study history more accurately.

Technological advances constantly occur as well due to our dependence on things. In his book *Entangled*, Ian Hodder theorizes that humans depend on things for survival and vice versa. He divides this dependence into two categories. The first being how our connection to things as a species enables our lives. Doing so by stating that it is these ‘things’ that allow us to “be, live, socialize, eat and drink”.²³ All other forms of dependency he describes as the things with which our connection is contingent.²⁴ That is to say, that our dependency on it is necessary to sustain ourselves.

It is from these forms of interaction that our entanglement with things is born. From a very young age we are constantly wanting to prove that we are not connected to or dependent upon anything, a young child trying to escape the stroller for instance. The peculiarity of this is that despite never wanting to admit our vulnerability, we are constantly claiming ownership to things. For example, I sometimes take pride in bragging that I have the newest version of something be it a new model of car or video game console. We do so to allow ourselves to feel

²² Lutz, 429.

²³ Hodder, 17.

²⁴ Ibid.

more powerful, when in reality we are just as equally a part of this world as every other thing that calls Earth its home.²⁵

The entanglement, or dependence, of humans to things and vice versa has become so strong today due to the fact that we require these things to remain living, which forces us to invest our time into their upkeep. The idea itself though is not new. Charles Darwin referenced this same theory in his book *On The Origin of Species* when he argued that the human species is just as dependent upon its surrounding environment, as the environment is dependent upon the human species for its upkeep.²⁶

However, the ‘thing’ in itself is not always what is applying pressure to maintain its presence or youth. As a case in point, when speaking about buildings with historical significance, it is not the buildings themselves, the ‘thing’, but rather their historical context that is more significant. The same could be said of original volumes of books. Therefore it is not only the thing that entangles us to its maintenance, but our emotional connection to the thing as well.²⁷

What is amazing is that we often forget that we are entangled with things. Hodder utilizes the fact that we are dependent upon the invention of the wheel every day when traveling around in our car.²⁸ We must remember though that dependence does not only go back in time. A disabled individual with Muscular Dystrophy such as myself is dependent upon the same invention of the wheel every day for their wheelchair, but also dependent on its development as a technology. The same can be said for my needs as a student. The development of the ebook increases my ability to be a successful and independent scholar.

²⁵ Ibid, 23.

²⁶ Ibid, 89.

²⁷ Ibid, 96.

²⁸ Ibid, 100.

The talented inventors of the past could have never imagined what impact their invention would have on the future. The inventor of the wheel never could have imagined it being used to aid a disabled individual circulate during their everyday lives. They were most likely just thinking of how it would help them move things around more easily. Just as Gutenberg never could have envisioned the ebook when he invented the printing press for the modern world.

Such entanglement between humans and things has not only been recognized by Hodder but by many other scholars including Tim Ingold. He, like Hodder, agrees that both humans and things interact and are entangled with one another. Ingold though, contends that without material things to bond with, humans would simply be “large lumps of matter”.²⁹ From Ingold’s perspective, things are items that we as a species have created to allow ourselves to be active and have agency.

Similarly to Hodder, Ingold insists that things not only give agency to their operators but actually maintain agency of their own.³⁰ The agency that is seen from this perspective is an interesting one as Ingold tries to express the reasoning that it is not the object or person creating the activity, but rather they are the host of the activity. If we are to look at the manner in which we articulate agency in language it is easier to understand.³¹ Ocean currents are not material things for example, but rather are the cause of much activity and indeed weather patterns of the planet. Ocean currents are agents of change for weather patterns.

Ingold’s perspectives though are much more focused around anthropological materiality, for instance our interactions with everyday things such as the leather boot or upholstered chair. As Ingold sees it, the boot has agency in the sense that its physicality allows us to interact less

²⁹ Tim Ingold, *Being Alive: Essays on movement, knowledge and description*, 16.

³⁰ Ibid.

³¹ Ibid, 17.

with the Earth directly.³² In other words the boot has agency in the sense that it allows our brain to focus more on other things and accomplish a desired task rather than be worried about stepping on something sharp or slippery that could harm the body.

Ingold's idea that things have agency of their own merges well with Lisa Gitelman's opinion on human interaction with things. According to Gitelman, when things interact with their user their agency changes.³³ Therefore, she would agree with Ingold's perspective that the boot allows the person to go about without minding their step. However it could be also used to complete other tasks such as noise making. Either way, the person and the thing, in this case the boot, are entangled together in a co-dependent relationship. This co-dependence is explored in more detail below when considering both the incunabula and the ebook.

Hodder and Ingold teach us two lessons about how humans are connected with things. Looking from the perspective of Ingold, this relationship is one that is focused around agency. For Hodder it is more about survival. What then is our entangled relationship with the book, whether at the time of the incunabula or now with our digital incunabula?

This question can be looked at in many different ways. From Ingold's viewpoint for instance, books have given us a great deal of agency. After all they are the original form of technology that allowed for the spread of mass information. Ingold might allege that if it were not for books and moveable print the human species would be not much more advanced than other animals of this world. Hodder though, would say that our relationship with the book like all other things has been centred on survival.

³² Ibid, 39.

³³ Lisa Gitelman, *Paper Knowledge: Toward a Media History of Documents* (Durham: Duke University Press, 2014), 84.

Out of the two, Hodder's appears to be most accurate. It is thanks to the spread of information on a global scale that the desire of knowing what is going on around us has been engrained in our instincts for centuries. For example, in the later 16th Century Italians learned a great deal about what they considered to be unknown parts of the world from three particular books. These books are, Olaus Magnus's *Historia de gentibus septentrionalibus* (1555), Nicolàs Monardes' *Historia medicinal de las cosas que se traen de nuestras Indias Occidentales que sirven en medicina* (1565–1569), and Giambattista della Porta's *Magia naturalis* (1558). Global accessibility to information has become a reality of our everyday world and why Johannes Gutenberg was named Man of the Millennium in the year 2000.³⁴

I now turn to the history of the incunabula, considered through the lens of a disabled scholar.

³⁴ Paul Walker, *Gutenberg Mysteries*, 4.

History of the Incunabula

The development of the printing press led to the next stage in the evolution of writing and would eventually lead to the creation of the incunabula in the 15th Century. An incunabula is defined as any book produced during the 15th Century using moveable type.³⁵ The next stage that it helped to develop was mass publishing for authors.

Despite the fact that the incunabula represented a simplistic object, we must still consider it to be a technology as it is a tool that solved a problem. The problem being that we were in need of a simpler method of reading than the scroll. It has been argued that the book (beginning with the incunabula) is far too strong a technology to be threatened by any other.³⁶ In today's world it is difficult to comprehend that having a number of pages bound together is a technology. In fact many today would see an incunabula as being an example of a non-technological object. Such thinking ignores however, the fact that an accurate definition of technology is of necessity a relative one.

In today's modern world we think of technology as being a digital or computerized object that is either battery powered or electric, or high technology. The term technology though existed well before the invention of electricity or batteries. In his article, "Is Technology Independent of Science? A Study in Statistical Historiography", Derek J. de Solla Price quotes the late Arnold J.

³⁵ "Incunabula Collections," *British Library*, accessed March 10, 2015, <http://www.bl.uk/reshelp/findhelpprestyle/incanab/incunabulacoll/>.

³⁶ "From To Pixels." *The Economist* [online]. (October, 2014), <http://www.economist.com/news/essays/21623373-which-something-old-and-powerful-encountered-vault>, accessed October 2014.

Toynbee's description of technology as being a dancer moving hand in hand with science.³⁷ In other words, technology moves forward with science to provide the solution to a problem.

The book for instance, was a technological solution to the problem of successfully transferring information through scrolls made of papyri. These difficulties arose from exigent political and economic circumstances. For instance, the availability of papyri was limited mainly to the regions surrounding the Nile River, giving Egypt a virtual monopoly on the product.³⁸ Because they could control the availability of the papyrus, the Egyptians would often use it as a political bargaining chip when having issues with foreign relations. Because of this, foreigners of Egypt needed to develop an alternative to scrolls made of papyrus.

From this problem arose a shift in thinking. This change in thinking led to the development of the product known as 'parchment', meaning from Pergamum in Latin.³⁹ Parchment was created as a result of innovative thinking of individuals who were in need of a technology that allowed them to accomplish a desired task. The unavailability of the former technology led to a paradigm shift.

The same analysis can be applied to the creation of the more compact and durable codex which in turn would lead to the development of the incunabula and the book.⁴⁰ This major paradigm shift arose from a rethinking of the physicality of the scroll to enable it to be more

³⁷ Derek J. de Solla Price, "Is Technology Independent of Science? A Study in Statistical Historiography" *Technology and Cultures* 6, no. 4 (Autumn, 1965): 554, <http://www.jstor.org.proxy.library.carleton.ca/stable/3101749>, accessed April 5, 2015.

³⁸ Nicholas A. Basbanes, *On Paper* (Toronto, ON: Random House of Canada Limited, 2013), 9.

³⁹ Ibid.

⁴⁰ Edwin Yamauchi. "The Birth of Codex by Colin H. Roberts; T. C. Skeat Review" *The Journal of Library History* (1974-1987) 20, no. 2 (Spring, 1985): 203, <http://www.jstor.org/discover/10.2307/25541600?sid=21106372109073&uid=3739448&uid=3737720&uid=2&uid=4>. Accessed April 7, 2015.

physically accessible. The reasons behind the shift occurring may have been different but still originated from a specific need.

The transformation of physical characteristics from the scroll to the codex is arguably the most notable evolution in the history of the book other than the invention of Gutenberg's printing press.⁴¹ Such an argument can be made for five reasons. First, the codex is far superior to the scroll economically because a codex could hold vastly more information than a scroll enabling an individual to replace multiple scrolls with far fewer codices to address their writing needs. Second, a codex was much more compact than a scroll, making it easier to carry on longer travels. Third, a codex was the most comprehensive piece of literature in its time, holding far more than the scroll thanks to its double-sided pages. Fourth, unlike a scroll, a codex did not need to be rewound, making it much easier to use. Finally, it was easier to find a reference inside a codex as one could simply turn the pages rather than having to wind and unwind a scroll that did not possess page numbers.⁴² While not yet at the level of being a universal design, the incunabula was a positive step forward from the codex that in the present day can be seen as ultimately enabling such a design.

In addition to possessing these qualities the incunabula also increased the availability of information in a more accessible manner. For example, before the invention of Gutenberg's Printing Press the number of books in Europe numbered in the thousands. Within fifty years of its invention though there were close to ten million.⁴³ Such a dramatic increase in availability led to a need for laws that would protect the rights of the authors. In January 1710 a bill was placed

⁴¹ Ibid, 202.

⁴² Ibid, 202-203.

⁴³ "History of Copyright: What are copyrights?," *History of Copyright*, accessed March 3, 2015, <http://www.historyofcopyright.org/index.html>.

before the House of Commons and in April 1710 the British Government finally gave into the demands of the public by passing the Statute of Anne.⁴⁴

This law was aimed at balancing the needs of competing authors, publishers and the public rather than protecting their rights from a property standpoint as these parties would have preferred.⁴⁵ Since the 18th Century however, copyright laws have been affiliated with property laws. To wit, most copyright laws that focus on protecting the rights of creators centre their metaphors on language such as “theft” or “appropriation”.⁴⁶

Of course the existence of a technology does not ensure accessibility thereto for all of society. A modern example of this gap flows from an analysis of the availability of broadband Internet. As Shawn Graham, Guy Massie and Nadine Feuerherm argue in their article, “The Heritage Crowd Project: A Case Study In Crowdsourcing Public History”, despite the fact that broadband Internet is an available technology, it is still difficult to gain access to in rural areas.⁴⁷ The question then arises, what good is the technology if an individual cannot access it.

In addition Graham, Massie and Feuerherm contemplate the impact on communities that are not provided with access to a given technology. Due to their relatively remote location for example, residents of rural communities struggle to navigate such resources independently as they have had little exposure to said technology.⁴⁸ In other words, the mere presence of a new

⁴⁴ Ibid.

⁴⁵ Simon Stern, “From author’s right to property right,” *University of Toronto Law Journal* 62, no. 1 (Winter 2012): 29.

⁴⁶ Ibid, 30.

⁴⁷ Shawn Graham, Guy Massie and Nadine Feuerherm. “The Heritage Crowd Project: A Case Study In Crowdsourcing Public History,” in *Writing History In the Digital Age*, ed. Kristen Nawrotzki and Jack Dougherty (Ann Arbor, MI: University of Michigan Press, 2013), <http://quod.lib.umich.edu/d/dh/12230987.0001.001/1:9/--writing-history-in-the-digital-age?g=dculture;rgn=div1;view=fulltext;xc=1#9.3>, accessed April 5, 2015.

⁴⁸ Ibid.

technology will not be sufficient to empower all potential users without affirmative actions to provide equal accessibility for all.

The same has been true over the entire history of the book whether one is discussing the early days of the book, the incunabula or the ebook of this century. Gutenberg's printing press was a phenomenal advancement in information and literature technology but society still needed to find a way to access the information that it produced. Research has shown that humanity faced both physical and cultural barriers to doing so. Graham, Massie and Feuerherm support this thought when they argue that by digitizing history, we are indirectly restricting certain groups from access.⁴⁹

It is always the idea of a new possibility, rather than the invention itself that leads to the next evolutionary stage.⁵⁰ In the case of the early book, the new possibility was the thought that perhaps society could create a technology that would aid us in maintaining knowledge of our past for a greater period than our lifetime.⁵¹ The invention of the codex as evidenced earlier, addressed this societal need. Scrolls, made of either papyri or Parchment, were thin and exposed to their environment making them extremely vulnerable. The leather covers of the codex alleviated this problem as when closed much less of the papyri or parchment were exposed, aside from the outer edges.

While the codex did possess many similar physical qualities to the incunabula, the defining difference was the means of production. For example, both had pages bound together at the back but the incunabula was made by a moveable type printing press rather than handwritten. An incunabulum is defined as any book or pamphlet in Europe that was printed using moveable

⁴⁹ Ibid.

⁵⁰ Lutz, 427.

⁵¹ Adrian Johns, *The Nature of the Book: Print and Knowledge In the Making* (Chicago, IL: University of Chicago Press, 1998), 6.

type before the year 1501.⁵² One of the earliest examples of the incunabula is the Gutenberg Bible.

The Gutenberg Bible, otherwise recognized as the forty-two line Bible, was printed in the mid 15th Century and was the first major printed book in the Western world to employ moveable type. Gutenberg printed it in order to enable the Roman Catholic Church to possess a uniform copy of the Bible.⁵³

Now for the most part when Lutz is discussing paradigm shifts he is generally referring to the Internet and other new technologies in the education system. However, this idea can be equally applied to the development of the incunabula.

For instance, when looking at the two developments (incunabula and ebook) in relative terms, one can understand that the incunabula resulted from just as significant a paradigm shift as that leading to the ebook. For example, equally great imagination was clearly required to successfully evolve from the scroll to a bound, durable and more portable incunabula made of wooden blocks. Such a remarkable evolution results from a great deal of both successful and unsuccessful experimentation.

"Successive transition from one paradigm to another via revolution is the usual developmental pattern of mature science."⁵⁴ The paradigm shift in this case involved the transition from having large awkward objects from which society would read its information, such as the scroll, to a much more accessible object, the incunabula. With this development individuals were suddenly able to sift through larger pieces of information. What allowed for this

⁵² C.T. Lewis and C. Short, *A Latin Dictionary* (Oxford, UK: Oxford University Press, 1879), 930.

⁵³ Fran Rees, *Johannes Gutenberg: Inventor of the Printing Press* (Minneapolis, MN: Compass Point Books, 2006), 70, <https://books.google.ca/books?isbn=0756509890>.

⁵⁴ Thomas S. Kuhn, *The Structure of Scientific Revolutions* (United States: University of Chicago Press, 1962) 12.

leap forward in accessibility were the physical characteristics of the incunabula. Ease of use in particular aided in humanity's sense of entanglement to the incunabula/book.

This sense of entanglement in particular would become an enduring reality especially when accessibility of the incunabula began to spread in Europe. Accessibility grew dramatically in the second half of the 15th Century as presses could print between four hundred to five hundred copies per edition.⁵⁵ Given that there were an estimated total of thirty thousand editions in Europe during this part of the incunabula era, there would have been close to twenty million of these early books.⁵⁶ With these 'Things' (as Hodder would refer to them) becoming more easily accessible to the public, it was a natural evolution that they would become so entangled in our regular every day lives.

⁵⁵ Konrad Haebler and Lucy Eugenia. *The Study of Incunabula* (New York City, NY: Kraus Reprint, 1957), <https://books.google.ca/books?id=mk08AQAAIAAJ>.

⁵⁶ Ibid.

Early Digitization Period: Digital Incunabula

"To know where we are today, and indeed, where we are going, we need to understand where we as a discipline came from."⁵⁷ *The Historians's Macroscopic: Big Digital History*, introduces us to the background of Computational History as well as attempts to show where the field of study has the potential to go.

One of the fathers of digitization was an Italian Jesuit. Born in 1913, Father Busa went on to study his doctorate in Philosophy. When he went about defending his doctoral dissertation though he discovered a practical problem. He had envisioned making a digitized index of the works of St. Thomas Aquinas but had no way of doing so that would be practical. Thus, he began to look into ways of accomplishing this goal in 1946.⁵⁸ The scale of this project was such that Father Busa believed he would need approximately thirteen million punch cards completed to be successful.⁵⁹

"It was clear to me, however, that to process texts containing more than ten million words, I had to look for some kind of machinery."⁶⁰ To begin Busa contacted IBM (International Business Machines) Corporation who had a virtual monopoly on the technology.⁶¹ Fortunately for Busa, IBM was ready to match his high standards of expectations. In the end the index project

⁵⁷ Shawn Graham, Ian Milligan, and Scott Weingart, *The Historians's Macroscopic: Big Digital History*, (Imperial College Press): 2, http://www.themacroscopic.org/?page_id=381, accessed April 5, 2015.

⁵⁸ Ibid.

⁵⁹ Ibid.

⁶⁰ Stephen Ramsay, "Fr. Roberto Busa, S.J. (1913–2011)," Stephen Ramsay (blog), August 11, 2011, <http://stephenramsay.us/2011/08/11/father-robotto-busa/>.

⁶¹ Shawn Graham, Ian Milligan, and Scott Weingart, *The Historians's Macroscopic: Big Digital History*, (Imperial College Press): 3, http://www.themacroscopic.org/?page_id=381

was completed in printed format in 1957. With great patience it would then be completed in digital format online in 2005.⁶²

As Busa was taking on this project, the creators of xerography were trying to solve a similar problem.

Busa's work paved the way for digital indexes across academia. Similarly, development of the technology required for xerography spurred a demand in the academic world for widespread use of photocopies.⁶³

Xerox 914 machines emerged in the academic world during the early 1960's. In fact Harvard University was the first in 1960 to have one in their Medical School Library.⁶⁴ In 1964 the Baker Library at Harvard University installed its own Xerox 914. Within its first three months of installation it promptly produced over twenty thousand copies⁶⁵

Xerography found immediate success in the academic world. This success was due to a need for every student to be reading together simultaneously. Suddenly students, and the public were given access to exact copies of mass amounts of information. As news of the new technology's capabilities spread, more universities moved to take advantage of the technology and install their own Xerox machine.

Having such open access and technology to reproduce information freely though could be dangerous when put to more provocative uses.

Take the actions of United States military analyst Daniel Ellsberg for instance. In 1969 he copied what are now known as the Pentagon Papers, which detailed elements of United States involvement in the Vietnam War. Ellsberg then leaked these same papers to the *New York Times*

⁶² Ibid.

⁶³ Gitelman, 84.

⁶⁴ Ibid, 91.

⁶⁵ Ibid, 92.

in 1971.⁶⁶ Ellsberg had realized that xerography had given the public a new found ability to spread information at will. His purpose was to expose the corruption of his government and his means of doing so was unprecedented. Enabled by xerography, Ellsberg's actions were extremely controversial. Also, in the eyes of many, these actions were improper if not illegal. At the same time the event and new usage of the technology starkly demonstrated the broad implications for the empowerment of public action.

Having the ability to spread information independently through this new technology came to inspire young people as when for instance, the ability to copy became a building block towards a stronger punk movement through the use of what were known as zines. Zines were made up of a collection of “original and appropriated images and text from a variety of sources”.⁶⁷

The term ‘Zines’ can be traced back to the 1930s when science fiction fans created a club known as the Science Fiction Fanzines.⁶⁸ ‘Zines’ flourished in the 1970s. This is a direct result of the ability afforded to them by the emergence of the photocopier. They covered a number of topics from comic books to literature. Followers could collect their favourite zines through word of mouth, mail order, music and comic book stores or pubs..⁶⁹ Zines were a great way for youth to share ideas and make social critiques of their own,⁷⁰ which is how they became linked to the punk movement.

⁶⁶ Ibid, 84.

⁶⁷ Kristin G. Congdon and Doug Blandy, “Zinesters in the Classroom: Using Zines to Teach about Postmodernism and the Communication of Ideas,” *Art Education* 56 no. 3 (May, 2003), 45, <http://www.jstor.org.proxy.library.carleton.ca/stable/3194053>, accessed April 5, 2015.

⁶⁸ Ibid.

⁶⁹ Ibid.

⁷⁰ Ibid.

The photocopier as a ‘thing’ is interesting when observed from a theoretical perspective. Yes, its design originated with the sole purpose of facilitating the creation of an identical copy of a document. This perspective would fit well into Hodder’s view of a survival style relationship.⁷¹

Hodder’s survival theory relating to our relationships with things is two tiered. Things help humans maintain their physical existence, while aiding the survival of our social life.⁷² “Human beings depend on things, both in the sense of relying on things and in the sense of being contingent on the particular things relied upon.”⁷³

From this perspective our relationship with the photocopier falls into both the first and the second tiers of our relationship with things that Hodder has defined. It does so by accomplishing the original desired task of its design; to make copies. The Xerox 914 machine was made specifically to fill this need and we have been contingent upon it ever since. That being said, the photocopier is able to complete this task so efficiently that it enables us to maintain our social life with the time that it saves.

Comparatively, Ingold’s anthropologically rooted idea of how ‘things’ possess agency of their own can also be related to the photocopier. What this means is that if we are to look at the relationship from the perspective of the ‘thing’, or tool, we will discover that the tool itself is active.⁷⁴ There are smaller active materials making the one tool be what it is.⁷⁵ Ingold argues, “If you were to lift the lid off, you would find something more like a compost heap than the kind of architectural structure that anatomists and psychologists like to imagine”.⁷⁶ But as Ingold

⁷¹ Hodder, 17.

⁷² Ibid, 16.

⁷³ Ibid, 17.

⁷⁴ Ingold, *Being Alive: Essays on movement, knowledge and description*, 16.

⁷⁵ Ibid, 17.

⁷⁶ Ibid.

theorizes, it aids us to become active and breaks us away from being what he refers to as “mere lumps of matter”.⁷⁷

The photocopier upon first analysis appears to be inanimate. But when studying what goes into making it the entity that it is activity is found. Ingold looks at what a ‘thing’ is made up of and it is from here that we see his argument.

His concept revolves around following the path to the formation of the tool itself. For instance, in order to create a Xerox 914 or any photocopier, the component materials must socialize with each other. Once they do so they are able to come together to form a new tool apart from themselves. From this perspective, we are able to interpret Ingold’s view that materials have agency of their own.

The emergence of zines as a cultural movement growing out of user interaction with the photocopier is comparable to Gitelman’s belief that the agency of any given ‘thing’ changes when it interacts with its user.⁷⁸ Just as it became so closely related to revealing evidence of corruption, the copier also became a part of the punk movement thanks to the creators of zines.

As mentioned earlier the photocopier as a tool was made to fill a void in the office to have multiple identical copies of a single document. This would allow for meetings to be much easier to organize and for colleagues to follow along with one another. When released to the public however, many people took advantage of the new technology’s capabilities to accomplish different tasks. When the idea of a ‘Zine’ materialized into the minds of its creators for instance, these individuals went about changing the agency of the photocopier and xerography as a technology.

⁷⁷ Ibid, 16.

⁷⁸ Gitelman, 86.

Ellsberg, whether he knew or not, was contributing to the growth of the punk movement when the Pentagon Papers were leaked to the *New York Times*. Doing so demonstrated the power the public now had. Gitelman argues that xerography became associated with uncovering corruption as a result of its connection to the Pentagon Papers.⁷⁹

Suddenly, governments had to be much more careful and precise in their handling of official policy papers and documents. The emergence of photocopying technology helped focus the existing lack of trust between the public and governments. This is especially true of authoritarian governments. Indeed, the threat to those in power represented by xerography caused the technology to remain illegal in Soviet Union until its collapse.⁸⁰

The treatment of copying as a criminal act is not isolated to the political world. In 2011 for example, Massachusetts Institute of Technology police arrested student Aaron Swartz. He was accused of downloading a mass amount of information off of the academic database, JSTOR.⁸¹ The subscription based database accused Swartz of over using their sources without subscribing.⁸² Swartz faced four federal felony charges back in 2011 as well as two state felony charges for “breaking into a “depository” and breaking & entering in the daytime, according to local prosecutors”.⁸³ As evidenced by this case, xerographic technology is not only a concern of governments dealing with printed files, but downloadable PDF files as well.

These examples demonstrate that the ultimate impact of any and all technological advancement is determined by the new user community. Users thereby become entangled with

⁷⁹ Ibid.

⁸⁰ Ibid.

⁸¹ Josh Gerstein, “MIT also pressing charges against hacking suspect,” *Politico*. July 22, 2011, http://www.politico.com/blogs/joshgerstein/0711/MIT_also_pressing_charges_against_hacking_suspect.html, accessed February 23, 2015.

⁸² Ibid.

⁸³ Ibid.

the thing itself. Applying Hodder's analysis of new enablement and contingency in relation to new technologies and our survival, the photocopier would best be described as being enabling for its user. I say this because this 'thing' enables us to work together simultaneously on a given project.⁸⁴ Ingold though would put forward the idea that the photocopier possesses agency of its own that impacts its user.⁸⁵ Whether it be xeroxing governmental papers or downloading academic sources online, there will always be room for negative impacts. This idea goes back to Gitelman's theory about how the agency of a technology or a 'thing' can change when it interacts with its user.⁸⁶

In fact according to Descartes, inanimate objects are merely tools of human intention.⁸⁷ Gosden goes on to argue that some objects immediately have an effect on human life just by being present in our environment.⁸⁸ The Xerox 914 had a different effect on people depending on their environment and purpose. This paper argues that the incunabula did the same in its time.

The environment that we are referring to, of course, is the user and their surroundings. The idea that the environment has an influence on the object is similar to Lisa Gitelman's thought that the user has influence over the tool.⁸⁹ While Gosden argues more plainly in favour of the environment, it is hard to imagine an environment devoid of its user.

When discussing the early digitization of technology though, it is useful to consider the study of new media at different levels.⁹⁰ The examination is conceptually more easily managed

⁸⁴ Hodder, 17.

⁸⁵ Ingold, *Being Alive: Essays on movement, knowledge and description*, 16.

⁸⁶ Gitelman, 84.

⁸⁷ Chris Gosden, "Making Sense: Archaeology and Aesthetics," *World Archaeology* 33, no. 2 (October 2001): 163, <http://www.jstor.org.proxy.library.carleton.ca/stable/827896>, accessed April 5, 2015.

⁸⁸ *Ibid.*, 164.

⁸⁹ Gitelman, 84.

⁹⁰ Ian Bogust and Nick Montford, *Platform Studies* (MIT Press,) <http://platformstudies.com/levels.html>, accessed April 5, 2015.

when broken down into smaller, simpler stages. For example it is difficult to compare the incunabula directly to the Xerox 914. It is much more easily comprehended when we compare each of them at different levels.

Bogust and Montford believe that there are five levels to look at. These are, Reception/Operation, Interface, Form/Function, Code, and Platform. What is most important to this study is the platform level.

According to the authors, the Platform is not something physical that we can isolate on any given subject. Instead, it is the tool that we are utilizing to accomplish a certain goal.⁹¹ In the digital world the Platform refers to a “perspective on parts of a computing system, not an inherent quality of some system or parts of it”.⁹² For example, if you were writing a program on Mac OS X Yosemite, Mac OS X Yosemite would be the platform.⁹³

This approach offers a much simpler manner in which to compare the digital to the non-digital world. In the non-digital world we could use the printing press and an incunabula. If you are printing an incunabula via a printing press, than the printing press is the platform. Then again the incunabula can also be considered a platform if one is discussing the act of reading information. Objects or ‘things’ can be defined as a platform, depending on the subject or context in both the digital and non-digital world.

We can also use this theory to see how entangled we are with things. Hodder would describe this type of entanglement as one based on dependency.⁹⁴ In other words, our

⁹¹ Ibid, <http://platformstudies.com/questions.html>, accessed April 5, 2015.

⁹² Ibid.

⁹³ Ibid.

⁹⁴ Hodder, 17.

entanglements to such platforms are so important to us because we depend on them to, “be, live, socialize, eat and drink”⁹⁵.

⁹⁵

Ibid.

Books, Bindings, 1s and 0s

The incunabula brought with it more accessibility to information and literature through ergonomic usefulness. It was useful in every way, for both reading and storage. The scroll on the other hand was mainly most useful when it came to storage. This fact was helpful for many cultures. The Japanese culture in particular found this to be the case.⁹⁶

Japanese cultural practice was such that the normal state of a painting was in fact a stored state. A painting would be protected by being rolled up and stored in a box. It would then only be brought out for short periods of time during which the work would be at much higher risk of deterioration.⁹⁷ Europeans however, did not store art work in the same fashion. More generally they felt a desire to evolve to a more efficient, and long-lasting technology.

A need for a technology that met both needs met both needs of reading and storage provoked the creation of the incunabula; new technologies are never created without a demand or need for one.⁹⁸ Just as in the case of the incunabula, when Gitelman analyses the evolution of xerography, or photocopy technology she points to the fact that these machines were not born in their final form by virtue of a singular smart design. In other words the technology did not stem from one thought. Instead, to quote Gitelman, “the concept of xerography came together unexpectedly, emerging in the 1960s”.⁹⁹ The technology emerged from a number of different needs by a number of different people.

⁹⁶ Kenzō Toishi, “The Scroll Painting,” *Ars Orientalis* 11 (1979): 15, www.jstor.org/stable/4629294, accessed April 6, 2015.

⁹⁷ *Ibid.*

⁹⁸ Gitelman, 84.

⁹⁹ *Ibid.*

When designing Model 914, the Haloid Xerox Corporation, was expecting it to fill a specific need and role in every office.¹⁰⁰ However, their roles would not only be chosen by the makers of the technology but by their users as well. An excellent example of a user filling his or her own need occurred in 1969. This particular case, that of Daniel Ellsberg, led to the association of Xerox machines with exposing conspiracies. As mentioned earlier, he used a Xerox 914 to leak the “Pentagon Papers”. Causing the United States Government policies regarding the Vietnam War to be exposed.¹⁰¹ Therefore, it is apparent that while all inventions and developments originate from the needs of its creators. The users also play a large role.

This logical approach can be applied when discussing the incunabula and the ebook. With the incunabula it was a need of the writers and publishers to find a more efficient manner in which to spread their work. For example, the printing press was invented by Johannes Gutenberg in approximately 1450.¹⁰² The Catholic Church as the first significant user of this new technology saw in commissioning the creation of a series of Bibles the possibility of ensuring the greater unity of the Church. For Gutenberg as the creator, publishing what we now call the Gutenberg bibles represented an excellent means to first spread knowledge of his invention.¹⁰³

In the case of the ebook on the other hand, technology had already entered the digital age at the time of its conception. Ergonomics in other words was no longer the primary concern. Having hand held touch screens solved this issue. What the ebook inventors were concerned with was bringing books into the digital age. Such a development would provide even greater

¹⁰⁰ Ibid, 83.

¹⁰¹ Ibid, 84.

¹⁰² Nicole Howard, *The Book: The Life Story of a Technology* (Baltimore, USA: The Johns Hopkins University Press, 2009), 29.

¹⁰³ Ibid, 30-31,

accessibility of information. In the case of both the printing press and the ebook, the creators saw the possibility of commercial success through the enhancement of accessibility.

Another modern example of user based influence can be observed in the case of digital book devices such as the Kindle and the iPad. Inventors of these devices were not directly motivated by an intention for their software to be beneficial for individuals with disabilities but in fact, making books virtual and lighter to hold has made them and indeed other forms of printed information such as newspapers much more accessible. Consequently, a whole new community of users has been empowered; those individuals with neuromuscular disabilities representing a case in point. The ability to customize reading material to ones own visual preferences has also been of great benefit for individuals with ocular disabilities. Consequently, many charities, medical associations, and schools (Carleton University for example) promote the use of these technologies.

With the development of the book, as the incunabula came to be known, another paradigm shift was taking place. Humans became so entangled with this thing that it grew to play a central role in many of our lives. Most children for example remember the first book they ever read, and every adult has a favourite book that they may indeed read multiple times. Our entire education system is built upon students being able to read books. We could not be more entangled than we are with the book. Indeed, we have grown so attached to the act of reading that we are also intimately attached to the physical platform that is the book. So much so that modern inventors are fearful of the consequences of sacrificing our access as users, to this monumentally important thing.

Accordingly, many ebooks such as the Kindle, the Kobo, and the iPad application iBooks attempt to recreate the physicality of the book. For example, when the reader ‘turns’ the page on

their Kindle, Kobo, or iPad, the screen emulates turning the page visually.¹⁰⁴ As the reader drags their finger across the screen, they discover the following pages come out from hiding behind the shadows. User based influence could not be more poignantly demonstrated.

These most recent developments followed upon a series of other paradigm shifts. First, the invention of the PDF file was inspired by the thought that perhaps there could be a digital image of the printed page. This is exactly what a PDF (Portable Document Format) file is.¹⁰⁵ The technology aimed to eliminate the platform of the page but maintain the image of the page digitally on all different electronic readers. The EPUB in turn, represented a further improvement as it could be read on many different platforms. The EPUB was also intended to be a platform that is easy to manipulate for ease of use.¹⁰⁶ eBooks effectively combined these two platforms.

Designs such as these are signs that the book has made itself so firmly at home in our lives that it is impossible for us to abandon it. For centuries now, the book has been instrumental to so much that we do including notably, education and scholarship at every level.

The development of the book was a major step forward for accessibility and the study of history. These hand held incunabula's would lead to entire circulating libraries being established during the 18th century.¹⁰⁷ Thereafter universities around the globe began to build their own individual libraries. Before this, individual libraries would only have been found in the more

¹⁰⁴ Steve Paris, "iBooks Author Review," *Techradar*, February 13, 2012, accessed March 1, 2015, <http://www.techradar.com/reviews/pc-mac/software/graphics-and-media-software/desktop-publishing-dtp-software/ibooks-author-1062792/review>.

¹⁰⁵ Margaret Rouse, "Portable Document Format (PDF)," *WhatIs.com*, May 2010, accessed March 17, 2015, <http://whatis.techtarget.com/definition/Portable-Document-Format-PDF>.

¹⁰⁶ "About EPUB Format," EPUB File Reader, <http://www.epubfilereader.com>.

¹⁰⁷ "From To Pixels." *The Economist* [online]. (October, 2014), <http://www.economist.com/news/essays/21623373-which-something-old-and-powerful-encountered-vault>, accessed October 2014.

historic universities of Europe such as, the universities of Bologna, Oxford and Cambridge. Each of these were established before the invention of the printing press.¹⁰⁸

Students could then go to these newly established libraries and research a given topic for their work. All that was needed was for them to physically take the book off of the shelf and read. No longer was that information stored away in archives where only certain individuals had the right to view their contents.

While circulating libraries and the new physicality of books made them more ergonomically friendly, these were just the first steps in making scholarship more accessible. Libraries were making it so easy for the student that they could look for a subject, and or look for an author alphabetically. The development of libraries and the continued enablement of individuals to experience a book was so significant as to even change the way books themselves were published. Publishers began producing books in multiple volumes, which often led to cliff hangers (in the case of fictional work).¹⁰⁹

During the 19th Century publishing houses began to focus their sales around three volume novel sets.¹¹⁰ This would create higher demand by leaving readers wanting more at the end of the first and second books. Demand was so great for these new book sets that publishers could make use of their monopoly on production to charge higher prices.¹¹¹ This is an example of how the reading public reacted to information being available to them at their fingertips.

¹⁰⁸ Ejaz Khan, "Top 10 Oldest Universities In the World," wonderslist.com, last modified 2015, <http://www.wonderslist.com/top-10-oldest-universities-around-the-world/>.

¹⁰⁹ "From To Pixels." The Economist [online]. (October, 2014), <http://www.economist.com/news/essays/21623373-which-something-old-and-powerful-encountered-vault>, accessed October 2014.

¹¹⁰ Troy J. Bassett, "The Production of Three-Volume Novels in Britain, 1863-97," The Bibliographical Society of America 102, no. 1 (March 2008): 61, <http://users.ipfw.edu/bassett/docs/bassett3volume.pdf>, accessed April 5, 2015.

¹¹¹ Ibid.

Embodied Experience of the Disabled Scholar

As events would tell, the incunabula was not a final solution to the issue of accessibility, but it was certainly a major step forward. That said, the physicality of the incunabula solved few problems for the disabled. While it may have been an easier product to carry for an able bodied person, it was not for someone with a disability. Only with recent developments in the modern wheelchair has the carrying or reading of a book in a relatively independent manner been possible for some of the physically disabled. For centuries, the wheelchair had only one purpose. It was a chair with wheels that could not do much other than allowing its user to move from point A to B with relative simplicity.¹¹² While it may have helped some individuals in wheelchairs, the majority of that population does not have sufficient strength to manage books. Further, the incunabula did not offer much in the way of accessibility to those suffering from other disabilities. The blind for instance, were offered no assistance in accessing information as a result of the incunabula.

During the 15th Century there was little focus on the disabled audience for a reason. It would not be until much later, in the second half of the 20th Century, before the disabled were able to form a movement to press for greater accessibility.¹¹³ Before this the term ‘universal design’ had never been heard of because the technology was not present to accommodate for the needs of everyone, including the disabled. The disorganization of this group of individuals was not for lack of effort but rather a lack of resources.¹¹⁴ It was the arrival of new mediums of communication technology that enabled change. These technologies have only been developed

¹¹² Herman L. Kamenetz, “A Brief History of the Wheelchair,” *Journal of the History of Medicine* 24, no. 2 (April 1969): 205, <http://jhmas.oxfordjournals.org/content/XXIV/2/205.extract>, accessed April 6, 2015.

¹¹³ Jane Cambell and Mike Oliver, *Disability Politics: understanding our past, changing our future* (New York: Routledge, 1996): 17, <https://books.google.ca/books?isbn=113508839X>.

¹¹⁴ Ibid.

and increasingly available over the past forty years but have in a greater and greater way, allowed individuals with disabilities to become entangled with the world of reading.

The most dramatic step forward in the realm of accessibility came with the next shift in the paradigm of reading from books to ebooks. This shift took place in the 20th Century when Peter James published a thriller novel on to two floppy disks.¹¹⁵ It was not until early in the 21st Century though, with the creation of hand held tablets that the ebook came to life.

Many expected that the development of this sort of technology would create greater freedom for all disabled individuals. For instance, the design of an ebook reader at first glance appears to solve many problems. It can hold an entire library of books in a portable hand held device, and one can even turn the pages with the lightest touch of the finger. George Kersher and Jim Fruchterman's article, "The Soundproof Book: Exploration of Rights, Conflict and Access to Commercial Ebooks for People With Disabilities" is quick to point out though that accessibility for all is far from reality.

From their perspective the ebook has far greater possibilities as a tool for the disabled, but these possibilities are yet to be realized.¹¹⁶ The corporations that have created these new devices have in fact fallen short when it comes to accommodating multiple types of disabilities, particularly the blind.¹¹⁷ George H. Williams makes a similar argument that despite having technologies such as the ebook that preserve knowledge for future generations digitally,

¹¹⁵ Alison Flood, "Where Did the Story of Ebooks Begin?," *The Guardian*, March 12, 2014, <http://www.theguardian.com/books/2014/mar/12/ebooks-begin-medium-reading-peter-james>, accessed April 6, 2015.

¹¹⁶ George Kersher and Jim Fruchterman, "The Soundproof Book: Exploration of Rights, Conflict and Access to Commercial Ebooks for People With Disabilities," *First Monday* 7, no. 6 (June 3, 2002), <http://firstmonday.org/ojs/index.php/fm/article/view/959/880>, accessed April 6, 2015.

¹¹⁷ *Ibid.*

accessibility for the disabled in the present has generally been an ignored concern.¹¹⁸ While the ebook has made dramatic improvements to accessibility from a physical standpoint for many, it is still far from being able to fall into the category of ‘universal design’.

¹¹⁸

Williams.

Conclusion

The fundamental themes explored within ‘Two Moments’ are our entanglements with ‘things’, specifically books, as well as the advancement in copy technology. The purpose of these themes is to exemplify how the book became a central part of our life. 'Two Moments' accomplishes this by comparing the development of the incunabula and the ebook. Accessibility to information has been observed as a fundamental goal and benefit inherent in the development of both. Accessibility for the disabled, a primary concern of this paper, has progressed but has lagged accessibility for the able-bodied and has not been a direct influence on the development of either the incunabula or the ebook.

With every advancement in copy technology the book became further entangled in our lives. This process began with greater accessibility to information. This process was spurred by a desire for greater accessibility to information. These two moments, the development of the incunabula and the ebook, are quite similar in development. Their similarities derive from their respective evolutionary processes. When looked at closely the two are combinations of paradigm shifts from previous technologies.

The incunabula for instance was a combination of the scroll and codex. The scroll was the first major technology that allowed for the spread of information. It also allowed storage of important historical artifacts. The codex though, came about as an alternative to the scroll as it proved to be more economically secure with its hard cover and portability. It also, and more central to this paper, was an improvement in terms of physical accessibility. No longer did one need to take the time to scroll back and forth to find a desired location. Instead all that was necessary was the quick flick of the wrist involved in turning of the page.

The incunabula combined these two technologies as it took an even greater step forward when it came to production. It was able to do so by utilizing the newest advancement in literary

technology of its time, the printing press. With this new technology authors could suddenly mass produce their work. No longer was it necessary to handwrite every copy. Availability of the incunabula to millions of Europeans in the 15th Century was the most significant step in ensuring our entanglement with the book.

When looking at the development of the ebook an analogous history is found. This advanced digital technology is also a combination of other paradigm shifting inventions. First off is the PDF. PDF files are electronic images of the printed page. PDF files were a paradigm shift in their own right as they made it possible to make digital photocopies of a page. The other is the EPUB, a format that improved readability of files.

The ebook then combined these two technologies and created a new way of entangling the book in our everyday lives. In addition, it attempted to emulate the physical characteristics of the book in a digital format, doing so by recreating the feeling of turning the page with a single touch: a virtual flick of the wrist. Some ebooks even go a step further by returning the book to the digitally recreated bookshelf on the screen.

These two moments brought with them dramatic improvement in physical accessibility for all. During the 15th Century though technology was not advanced enough yet to focus on the disabled. The simple ergonomic improvement though, eventually led to a movement towards a truly ‘Universal Design’, that is a design that is usable by all individuals.

For a disabled scholar such as myself, studying in the 21st Century has been of great advantage. Thanks to digital technology, I have become entangled with the book and indeed have been able to study it thoroughly in this thesis. No longer do I need to sit on the sideline in a library. The library now has the ability to transcribe a book right off the unreachable physical bookshelf into a format that is suitable to my disability.

The comparison of Microsoft Word versus Notational Velocity is an excellent comparison to the incunabula versus the ebook. Microsoft Word is a great tool for writing, but not optimal for accessibility to your notes when studying. This program would relate closely to the incunabula as it was a great improvement for reading but did not solve all problems. Notational Velocity though is much more universal in its design and is therefore much more user friendly. This of course is more closely related to the ebook that can be used by a much broader audience.

As we have seen through an examination of these ‘two moments’, the disabled are rarely considered. For a technology as seemingly simple as the book, we have observed a complex evolutionary process. The distance between scrolling a whole book on a sheet of papyri to a digital format book is truly remarkable. Considering how far the book has come the possibilities are endless. While it may seem improbable that a platform could be suitable for all, a truly universal design, the remarkable paradigm shifts that have occurred to date offer evidence that a scholar of any ability will be able to read a book without assistance at some future point in history. Ultimately, we have learned, the user will not be denied as we continue our singular entanglement with the evolving book.

It is also thanks to this continuous evolution that a disabled scholar such as myself can pursue a post-secondary education so freely. While it may have been startling at first instance, today’s technologies have enabled my abilities to a point where I can be a more independent scholar. This is a concept that would never occur to the able bodied scholar. That is one of the great things about digital technology; it offers enablement to more individuals than ever before. As the notion and importance of universal design grows this only becomes the more so.

Those involved in the digitization of history should the concept of universal design as well. Applying a universal design to more historical practices such as archiving will be advantageous for all historians. Having information that is accessible to anyone with any ability

will help to preserve information and historical knowledge for present and future generations. A focus on a universal design will be more effective in the present and yield longer lasting technologies for the future.

Bibliography

- “About EPUB Format.” *EPUBFileReader.com*. <http://www.epubfilereader.com>.
- Basbanes, Nicholas A. *On Paper*. Toronto, ON: Random House of Canada Limited, 2013.
- Bassett, Troy J. “The Production of Three-Volume Novels in Britain, 1863-97.” *Bibliographical Society of America* 102, no. 1 (March 2008): 61–75.
<http://users.ipfw.edu/bassett/docs/bassett3volume.pdf>. Accessed April 5, 2015.
- Bogust, Ian and Nick Montford. *Platform Studies*. MIT Press.
<http://platformstudies.com/levels.html>. Accessed April 5, 2015.
- Boyed, Drew. “Thinking Outside the Box: A Misguided Idea - The truth behind the universal, but flawed, catchphrase for creativity.” *Psychology Today* (February 06, 2014). <https://www.psychologytoday.com/blog/inside-the-box/201402/thinking-outside-the-box-misguided-idea>. Accessed April 5, 2015.
- Bush, Vannevar. “As We May Think.” *The Atlantic Monthly* (July, 1945):
<http://web.mit.edu/sts.035/www/PDFs/think.pdf>. Accessed March 24, 2015.
- Cambell, Jane and Mike Oliver. *Disability Politics: understanding our past, changing our future*. New York: Routledge, 1996.
<https://books.google.ca/books?hl=en&lr=&id=fQjs1qM98e8C>.
- Cheng, Chi-Yeng, Jeffrey Sanchez Burke and Fiona Lee. “Connecting The Dots Within: Creative Performance and Identity Integration.” *Psychological Science* 19 no. 11 (November, 2008): 1178-1184.
<http://www.jstor.org.proxy.library.carleton.ca/stable/40064906>. Accessed April 5, 2015.
- Congdon, Kristen G. and Doug Blandy. “Zinesters in the Classroom: Using Zines to Teach about Postmodernism and the Communication of Ideas.” *Art Education* 56 no. 3 (May, 2003): 44-52. <http://www.jstor.org.proxy.library.carleton.ca/stable/3194053>. Accessed April 5, 2015.
- Cothran, Ann and George E. Mason. “The Typewriter: Time Tested Tool for Teaching Reading and Writing.” *The Elementary School Journal* 78 no. 3 (January, 1978): 170-173. <http://www.jstor.org.proxy.library.carleton.ca/stable/1001415>. Accessed April 5, 2015.
- de Solla Price, Derek J. “Is Technology Independent of Science? A Study in Statistical Historiography.” *Technology and Culture* 6, no. 4 (Autumn, 1965): 553-568.
<http://www.jstor.org.proxy.library.carleton.ca/stable/3101749>. Accessed April 5, 2015.

- Flood, Alison. "Where Did the Story of Ebooks Begin?" *The Guardian*, March 12, 2014. <http://www.theguardian.com/books/2014/mar/12/ebooks-begin-medium-reading-peter-james>. Accessed April 5, 2015.
- Gerstein, Josh. "MIT also pressing charges against hacking suspect." *Politico*. Published July 22, 2011. http://www.politico.com/blogs/joshgerstein/0711/MIT_also_pressing_charges_against_hacking_suspect.html. Accessed February 23, 2015.
- Gitelman, Lisa. *Paper Knowledge: Toward a Media History of Documents*. Durham: Duke University Press, 2014.
- Gosden, Chris. "Making Sense: Archaeology and Aesthetics." *World Archaeology* 33, no. 2 (October 2001): 163–67. <http://www.jstor.org.proxy.library.carleton.ca/stable/827896>. Accessed April 5, 2015.
- Graham, Shawn, Guy Massie and Nadine Feuerherm. "The Heritage Crowd Project: A Case Study In Crowdsourcing Public History." in *Writing History In the Digital Age*, edited by Kristen Nawrotzki and Jack Dougherty, <http://quod.lib.umich.edu/d/dh/12230987.0001.001/1:9/--writing-history-in-the-digital-age?g=dculture;rgn=div1;view=fulltext;xc=1#9.3>. Ann Arbor, MI: University of Michigan Press, 2013. Accessed April 5, 2015.
- Graham, Shawn, Ian Milligan and Scott Weingart. *The Historians's Macroscopic: Big Digital History*. Imperial College Press, April 2014. http://www.themacroscopic.org/?page_id=381. Accessed April 5, 2015.
- Haebler, Konrad and Lucy Eugenia. *The Study of Incunabula*. New York City, NY: Kraus Reprint, 1957. <https://books.google.ca/books?id=mk08AQAAIAAJ>.
- "History of Copyright: What are copyrights?." *Doteasy.com*. Last modified 2005. <http://www.historyofcopyright.org/index.html>.
- Hodder, Ian. *Entangled: An Archaeology of the Relationships between Humans and Things*. John Wiley and Sons, Inc., 2012.
- Howard, Nicole. *The Book: The Life Story of a Technology*. Baltimore, USA: The Johns Hopkins University Press. 2009.
- "Incunabula Collections." *British Library*. <http://www.bl.uk/reshelp/indhelppretype/incanab/incunabulacoll/>.
- Ingold, Tim. *Being Alive: Essays on movement, knowledge and description*. New York: Routledge, 2011. http://books.google.it/books/about/Being_Alive.html?id=40yxRsE0OQUC.
- Ingold, Tim, ed. *Key Debates in Anthropology*. New York: Routledge, 1996.

- Innis, Harold A. "The Bias of Communication." in *Staples, markets and cultural change: selected essays*, edited by Harold A. Innis and Daniel Drache, 386-410. Montreal: McGill-Queen's University Press, 1995.
<http://books.google.ca/books?id=EdKLtYm0XAAC&printsec=frontcover#v=onepage&q&f=false>.
- Johns, Adrian. *The Nature of the Book: Print and Knowledge In the Making*. Chicago, IL: University of Chicago Press, 1998.
- Kamenetz, Herman L. "A Brief History of the Wheelchair." *Journal of the History of Medicine* 24, no. 2 (April 1969): 205-210.
<http://jhmas.oxfordjournals.org/content/XXIV/2/205.extract>. Accessed April 6, 2015.
- Kersher, George, and Jim Fruchterman. "The Soundproof Book: Exploration of Rights, Conflict and Access to Commercial Ebooks for People With Disabilities." *First Monday* 7, no. 6 (June 3, 2002).
<http://firstmonday.org/ojs/index.php/fm/article/view/959/880>. Accessed April 6, 2015.
- Khan, Ejaz. "Top 10 Oldest Universities Around the World." *WondersList.com*. Last modified 2015. <http://www.wonderslist.com/top-10-oldest-universities-around-the-world/>.
- Kuhn, Thomas S. *The Structure of Scientific Revolutions*. United States: University of Chicago Press, 1962. <https://books.google.ca/books?isbn=0226458148>.
- Lewis, C.T. and C. Short, *A Latin Dictionary*. Oxford, UK: Oxford University Press, 1879.
- Lutz, John. "Riding the Horseless Carriage to the Computer Revolution: Teaching History in the Twenty-First Century." *Social History* 34, no. 68 (2001): 427-35.
<http://pi.library.yorku.ca/ojs/index.php/hssh/article/download/4518/3713>. Accessed September 25, 2014.
- Paris, Steve. "iBooks Author Review." *Techradar.com*. February 13, 2012.
<http://www.techradar.com/reviews/pc-mac/software/graphics-and-media-software/desktop-publishing-dtp-software/ibooks-author-1062792/review>.
- Payne, Elizabeth. "Carleton University is spreading its 'culture of accessibility'." *Ottawa Citizen* (Ottawa, ON), February 15, 2015. <http://ottawacitizen.com/news/local-news/carleton-university-is-spreading-its-culture-of-accessibility>.
- Rees, Fran. *Johannes Gutenberg: Inventor of the Printing Press*. Minneapolis, MN: Compass Point Books, 2006. <https://books.google.ca/books?isbn=0756509890>.
- Rouse, Margaret. "Portable Document Format (PDF)." *WhatIs.com*. Last modified May 2010.
<http://whatis.techtarget.com/definition/Portable-Document-Format-PDF>.

- Stern, Simon. "From author's right to property right." *University of Toronto Law Journal* 62, no. 1 (Winter 2012): 29-91. http://www.law.utoronto.ca/utfl_file/count/documents/stern/Stern%20-%20Authors%20-%20UTLJ.pdf. Accessed April 6, 2015.
- "From To Pixels." *The Economist* [online]. (October, 2014). <http://www.economist.com/news/essays/21623373-which-something-old-and-powerful-encountered-vault>. Accessed October 2014.
- Toishi, Kenzō. "The Scroll Painting." *Ars Orientalis* 11 (1979): 15-25. www.jstor.org/stable/4629294. Accessed April 6, 2015.
- "What Is Universal Design?" *UniversalDesign.com*. Last modified 2015. <http://www.universaldesign.com/about-universal-design.html>.
- Williams, George H. "Disability, Universal Design, and the Digital Humanities." *Debates In the Digital Humanities*. 2012. <http://dhdebates.gc.cuny.edu/debates/text/44>. Accessed March 19, 2015.
- Yamauchi, Edwin. "The Birth of Codex by Colin H. Roberts; T. C. Skeat Review." *The Journal of Library History (1974-1987)* 20, no. 2 (Spring, 1985): 202-204. <http://www.jstor.org/discover/10.2307/25541600?sid=21106372109073&uid=3739448&uid=3737720&uid=2&uid=4>. Accessed April 7, 2015.