

Copyright  
by  
Jane Laurance Gruning  
2018

**The Dissertation Committee for Jane Laurance Gruning Certifies that this is the  
approved version of the following dissertation:**

Using Physical and Digital Artifacts to Make Us Who We Are:  
The Case of Paper and E-Books

**Committee:**

---

Ciaran Trace, Supervisor

---

Andrew Dillon

---

Amelia Acker

---

Siân Lindley

---

Clay Spinuzzi

**Using Physical and Digital Artifacts to Make Us Who We Are:  
The Case of Paper and E-Books**

**by**

**Jane Laurance Gruning**

**Dissertation**

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

**Doctor of Philosophy**

**The University of Texas at Austin**

**May 2018**

## **Dedication**

To my family, whose love and support has made this work possible.



## Acknowledgements

First I thank my dissertation chair and committee. I am especially grateful to my chair, Ciaran Trace, who always pushed me to do more and worked hard to help me bring this work to its full potential; and to Andrew Dillon for his unflagging supportiveness and positivity—and for always having time to talk about research. Siân Lindley, Clay Spinuzzi, and Amelia Acker each shared their knowledge and insights as well, helping to shape this project and improve it. I am thankful for their support. I also want to thank several others who contributed to this work as committee members earlier in my PhD and dissertation process: Melanie Feinberg, Sharon Strover, and Nathan Ensmenger. Thanks also to Patricia Galloway, who sparked my interests in why artifacts are important to people and why digital artifacts are just a bit different from physical ones.

I am also grateful to Lecia Barker for providing me with an invaluable introduction to the real world of doing research as well as to thinking critically and reflectively about the research process, and to the School of Information and the Graduate School for providing financial support for the dissertation research.

Finally, I am grateful to the people who participated in this study for their incredible generosity and openness. Thank you for sharing your books with me.

Material from Chapters Six and Seven has been published as J. Gruning (2017), “Models for Ownership: Implications for Long-term Relationships to Objects,” in *Proceedings of the 35th Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems*, and material from Chapters Five, Six, and Seven has been published as J. Gruning (2018), “Displaying Invisible Objects: Why People Rarely Re-

read E-books,” in *Proceedings of the 36th Annual ACM Conference on Human Factors in Computing Systems*.

# **Using Physical and Digital Artifacts to Make Us Who We Are: The Case of Paper and E-Books**

Jane Laurance Gruning, PhD

The University of Texas at Austin, 2018

Supervisor: Ciaran Trace

Material culture research has demonstrated how relationships to physical artifacts are central to human lives, and that people use artifacts in processes of constructing their own identities and representing those identities to other people—and that the display of artifacts is central to these practices (Douglas & Isherwood, 1979; Miller, 1987; 2010). Recent human-computer interaction (HCI) research has suggested that digital artifacts do not function in the same ways as physical artifacts for these (and other) purposes (Kirk & Sellen, 2010; Odom et al. 2014). Research on human interactions with physical and digital artifacts over the past decade has revealed that people see digital artifacts as less reliable, less “real,” and therefore less valuable than their physical counterparts (Golsteijn et al., 2012; Kirk & Sellen, 2010; Odom et al., 2012; 2014; Petrelli & Whittaker, 2010). Although we increasingly rely on digital technologies, we tend to see them (and the digital artifacts that they support) as “throwaway” things—exciting and even essential for a time, but quickly outdated and replaced with new versions. This has serious ramifications for the roles that digital artifacts and the technologies that support them can play in human lives more generally.

This dissertation investigates interactions with physical and digital artifacts through an in-depth examination of two types of artifacts: paper and e-books. It examines

readers' everyday and long-term book-related practices through a multi-method approach consisting of a month-long diary study, home tours, and interviews with twenty-seven participants. This investigation revealed new nuances in the complexities of interactions with physical artifacts in home settings, and additionally found that participants valued digital artifacts differently depending on the rules for interaction with artifacts that applied within the digital system that supported access to those artifacts. This finding revealed, then, that it is possible to create digital systems that promote the value of the artifacts within them through supporting the visibility of digital artifacts, and supporting people in taking maintenance and collection management actions with those artifacts—that is, it is a combination of artifacts' visibility and having reliable control over them (through ownership) that allows artifacts to become valuable for their owners.

## Table of Contents

Table of Contents .....	ix
List of Tables .....	xiii
List of Figures .....	xiv
Chapter One .....	1
Introduction: Human Relationships to Artifacts .....	1
Chapter Two: Review of the Literature .....	7
Interacting with Physical and Digital Artifacts .....	10
Effort, Craft, and Accomplishment .....	12
Representing Connections Between People .....	13
Visibility and Display .....	15
Display of Digital Artifacts .....	17
Concerns About Digital Artifacts: Stability, Control, and Physical	
Location .....	20
Reliability and Stability .....	21
Control and Physical Location .....	22
Renegotiating Materiality .....	25
Physical and Digital Books .....	28
Why Books? .....	28
Current Reading Practices in the United States .....	29
Utilitarian Interactions with E-Books .....	33
Beyond Utilitarian Purposes: The Home Context and Personal	
Reading .....	36
Paper and E-books as Physical Artifacts and Digital Artifacts .....	41
Gaps in the Research Literature .....	43
Chapter Three: Theoretical Frameworks: Activity Theory and Material Culture .....	46
Activity Theory: Purposeful Human Uses of Tools .....	47
History of Activity Theory .....	51
Hierarchical Structure of Activities .....	53
Mediation: How Tools Shape Activities .....	56

Books as Mediating Tools .....	57
Material Culture: Using Artifacts to Create Identity and Culture .....	59
Depth Ontology and Display .....	61
Humility of Things .....	63
Human Agency in Activity Theory and Material Culture Studies .....	65
Chapter Four: Research Design: Studying How People Use Books .....	67
Research Questions .....	68
Recruitment and Participant Selection .....	70
Participant Profile .....	74
Privacy and Ethical Considerations in Participant Recruitment.....	79
Data Collection .....	80
Diary Study Methods.....	82
Diary Study Implementation .....	84
Diary Period Length .....	85
Incorporating Photo-Elicitation into the Diary Study .....	87
Diary Protocol .....	89
Maintaining Contact with Participants throughout the Diary Period.....	90
Participant Retention .....	91
Compensation .....	93
Home Tours .....	93
Semi-Structured Interviews .....	96
Incorporating Home Tours with Semi-Structured Interviews ..	100
Data Analysis.....	101
Interview Transcripts .....	103
Summary .....	106
Chapter Five: Purposes of Reading: Self-Care and Self-Improvement	
Activities.....	107
The “What” of Reading Practices: Data Describing Participants’ Reading Habits.....	114
Identifying Purposes of Reading Actions.....	119
Leisure Reading as Self-Care: “Reading for reading’s sake”.....	120

Reading to Learn: Skill Development and Self-Improvement .....	125
Leisure Reading Actions: Contributing to Self-Care .....	129
Vignette: P17's Late-Night Reading .....	130
Intensive Reading Experiences .....	130
Navigation and Materiality .....	131
Reading-to-Learn Actions: Contributing to Self-Improvement .....	134
Navigation .....	135
Annotation and Note-Taking .....	137
Re-uses of Books Over Time .....	139
Referencing .....	140
"Coming Home" and Seeing With New Eyes: Functions of	
Re-reading Books .....	141
Re-reading E-books .....	144
Summary .....	146
How People Use Books to Change Themselves .....	148
Chapter Six: Human Relationships to Artifacts: Acquisition and Ownership ....	151
Taking Actions With Artifacts .....	155
Participants' Book Acquisition Practices: Descriptive Statistics From the	
Diary Study Data .....	159
Ownership and Paper Books: The Home as a Context for	
Relationships to Artifacts .....	162
Vignette: A Library's Personal and Social Purposes (P1) .....	162
Paper Books At Home: Personal and Social Displays .....	165
Borrowing E-books From the Library: Conflicting Mental Models .....	172
Contexts of E-book Ownership .....	178
Strange Gifts: Gift-giving and E-books .....	185
Divestment and E-books .....	187
Visibility and Maintenance for E-books .....	191
Goodreads: An Online System for Book Display .....	198
Summary .....	202

Chapter Seven: Discussion and Conclusions: Systems for Living with	
Artifacts .....	204
Methodological Contributions .....	205
The Home as a System .....	207
Visibility and Control .....	210
Implications for Design: Dwelling with Digital Artifacts .....	212
Conclusions .....	217
Appendix A: Recruitment Flyer .....	220
Appendix B: Informed Consent.....	221
Appendix C: Requirements for Participation Email.....	224
Appendix D: Diary Study Protocol .....	225
Appendix E: Base Interview Protocol .....	227
Appendix F: Sample Individualized Protocol .....	231
References .....	236



## List of Tables

Table 1: Number of participants per recruitment method. ....	73
Table 2: Participant demographics and usage of e-books and libraries. ....	75
Table 3: Differences between leisure reading and reading to learn. ....	113
Table 4: Reading events (total, and by book type) for all participants throughout the entire diary period.....	115
Table 5: Reading events (total, and by book type) for e-book reading participants throughout the entire diary period. ....	116
Table 6: Number of participants who read each book type, both during the diary study and in their reading practices generally. ....	117
Table 7: Number of participants who used each type of e-book. ....	118
Table 8: Number of participants who read e-books on each kind of device. ....	118
Table 9: Differences between leisure reading and reading to learn (reproduction of Table 3). ....	129
Table 10: Primary and secondary actions associated with ownership of an artifact. .....	156
Table 11: Acquisition events and book types for all participants throughout the entire diary period.....	159
Table 12: Acquisition events and books types among e-book readers throughout the entire diary period.....	160
Table 13: Number of participants who used each type of e-book (reproduced from Chapter Five). ....	178
Table 14: Number of participants who read e-books on each kind of device (reproduced from Chapter Five). ....	179
Table 15: Paper books compared against e-book systems by possible actions...	181

## List of Figures

Figure 1: Kaptelinin and Nardi's depiction of the hierarchical structure of activities (2006, p. 64). .....	48
Figure 2: Kaptelinin and Nardi's depiction of the hierarchical structure of activities (2006, p. 64) (reproduction of Figure 1). .....	54
Figure 3: Readers in the United States (Pew Research Center, 2016) .....	78
Figure 4: Examples of participants' photos documenting reading events .....	88
Figure 5: Map and portion of field notes from P1's home tour. ....	96
Figure 7: High-level activity hierarchies for reading to learn as part of self-improvement and leisure reading as part of self-care. ....	109
Figure 8: An example hierarchy for leisure reading .....	112
Figure 9: An example hierarchy for reading to learn. ....	112
Figure 10: P8 reading a novel while on a break at work. ....	123
Figure 11: An example hierarchy for leisure reading (reproduction of Figure 8). ....	128
Figure 12: An example hierarchy for reading to learn (reproduction of Figure 9). ....	128
Figure 13: P20 flipping through one of his books. ....	132
Figure 14: A screenshot from P9 reading The Best American Short Stories on her iPad .....	133
Figure 15: An activity hierarchy showing the place of lending in contributing to reinforcing a friendship. ....	156
Figure 16: P1's library shelves and uncluttered arrangements of books. ....	163
Figure 17: P11's living room bookshelves and reading chair. ....	168
Figure 18: The role of visibility and display in lending paper books. ....	170

Figure 19: Kindle home screen (2016).....	192
Figure 20: The influence of the visibility affordance on the use of artifacts in identity-related activities. ....	194
Figure 21: Although P8 acquired many of the books she read from the library, she also maintained a personal library of paper books.....	200

## Chapter One

### Introduction: Human Relationships to Artifacts

Artifacts are silent but ever-present partners in shaping and improving human lives. Human uses of artifacts may be utilitarian and immediate (e.g., using a hammer to drive a nail into a board), they may be socially and symbolically meaningful (e.g., flying a flag), or they may contribute to both of these kinds of purposes concurrently (e.g., a car is useful for transportation, while the particular make and model of the car also conveys information about social and economic status). Artifacts can shape our interactions with other people, as when a police uniform demands obedience and deference through the power and legal authority it implies. Family traditions and history can be maintained and reinforced through a bride's decision to wear a wedding veil passed down over generations, or they can be subverted through her decision to wear a suit rather than a dress—decisions about uses of artifacts that are meaningful both to her personally and to others who witness their outcomes. In other words, human interactions with artifacts can shape how we choose to see ourselves and how we choose to show ourselves to others, in addition to more “practical” outcomes. Indeed, we might view artifacts as tools for these cultural purposes, just as a hammer is a tool for driving in a nail or galoshes are tools for keeping feet dry. The characteristics of these artifacts—their material constructions and the things we are able to do with them, based on their affordances—shape both our practices in using them and the outcomes of these practices.

The examples of the hammer, the car, the police uniform, the wedding veil, and the woman's suit all fall into the category of what I refer to in this dissertation as *physical artifacts*. These kinds of artifacts are the focus of material culture studies: artifacts that

are “portable and perceptible by touch and therefore [have] a physical, material existence that is one component of human cultural practice;” additionally, “material culture also includes things perceptible by sight” (Woodward, 2014, p.14). Scholars who engage in material culture research—which is primarily associated with anthropology—undertake the task of investigating how people use artifacts as tools for cultural purposes, examining the contexts and complexities of those practices. Findings from material culture studies generally apply to these portable, touchable, and visible physical artifacts. With the advent of computing technology, however, a new kind of artifact has become pervasive in everyday life: digital artifacts.<sup>1</sup> Communication between people is more often accomplished through emails and texts instead of letters. Writing is done on a computer instead of a typewriter or handwritten on paper, with the effect that completed written products may be finalized as digital files. These can in many instances be considered the version of record without ever being printed to paper form. Watching a movie entails only accessing it from a website on an Internet-connected computer or TV, rather than physically traveling to a video rental store for a VHS tape or DVD.

In many ways, the affordances of digital artifacts make everyday tasks faster and more convenient (as in the case of streaming a movie online). However, digital artifacts also disrupt many of the typical practices that support human relationships to artifacts, because these practices have developed around physical artifacts and rely on the affordances of those artifacts. Findings from the HCI literature on human interactions with physical and digital artifacts reflect this predicament, revealing that people typically viewed digital artifacts as less valuable than their physical counterparts because digital things are seen as ephemeral and unstable. These perceptions reflected participants’

---

<sup>1</sup> While I use the term “physical artifacts” to denote a category of artifacts distinct from “digital artifacts,” digital artifacts do necessarily have a physical component. However, the human experience of their

relative inability or unwillingness to use digital artifacts for the cultural, identity-related practices for which individuals used physical artifacts. What, then, are the potential effects of an increasing reliance on artifacts that we see as unstable and only tenuously “real?” If, as the material culture literature argues, we “make ourselves” (Miller, 2010) in part through our uses of artifacts, how do those processes and their outcomes change if the artifacts we use to “make ourselves” are digital in form?

This dissertation advances human knowledge through exploring these questions as they relate to two comparable subsets of the categories of physical and digital artifacts: paper and e-books. I chose to examine subsets of these broad categories because, while the previous HCI research has provided valuable insights about the topic at hand, the breadth of this research has precluded its ability to explore human uses of particular artifacts in depth. I chose to focus on book artifacts specifically because they are a commonly used artifact in the United States (roughly half of the population are book readers), they are culturally meaningful artifacts, and they exist in comparable physical and digital forms. Additionally, recent survey research reveals that these artifacts are often used in a complementary fashion: people who adopt e-reading technology also continue to read paper books. This parallel usage suggests that, while paper and e-books are purportedly similar in function, people may use them in different ways. Therefore, an examination of people’s practices surrounding these artifacts promises to shed new light on differences in human interactions with physical and digital artifacts. In my investigation of how people use these two types of artifacts, I focus on four research questions. The first two questions address uses of paper and e-books broadly, examining the contexts and activities for which paper and e-books are preferable, and the affordances and limitations of these artifacts that influence people’s uses of them in these contexts and for these activities. The second two research questions investigate more

specific aspects of people's uses of these artifacts, focusing on interactions with paper and e-books over the long term; and on practices of book collection and display, as well as the personal and social implications of these practices.<sup>2</sup>

To provide the basis for investigation of this issue, the next chapter reviews literature regarding two relevant topics. First, I provide an overview of the primary body of literature that this dissertation builds upon and extends: the HCI literature on human interactions with physical and digital artifacts. This literature is characterized by small, qualitative, exploratory studies that endeavor to identify key issues surrounding how people perceive and interact with physical and digital artifacts. These studies typically examine how individuals use artifacts within the contexts of personal life and the home. I then turn to reviewing research from multiple fields to shed light on human interactions with the particular categories of artifacts that are the focus of this research: paper and e-books. This review includes research not only on the topic of reading (from the fields of library and information studies [LIS] and education), but also research that takes a more expansive approach to exploring human interactions with books from HCI and consumer studies. While the LIS literature is more narrowly focused on how people interact with e-book artifacts in the process of reading, the HCI and consumer studies literature additionally considers the broader roles that books play in human lives.

Following this discussion of the literature, I introduce the two theoretical approaches that I employ in my approach to the phenomenon of paper and e-book interactions: activity theory and material culture studies. While not often paired, these perspectives provide complementary strengths that are particularly advantageous for the purposes of studying how people use different kinds of artifacts: Activity theory provides a framework for approaching human interactions with artifacts as tools that are employed

---

<sup>2</sup> The full research questions can be found in Chapter Four on page 68.

in pursuit of certain goals or outcomes, and the material culture perspective broadens my conceptualization of the types of goals and outcomes that might be considered in understanding people's uses of artifacts.

Having described the theoretical perspectives that I bring to this study, I outline my approach to gathering data, which serves to increase our understanding of human interactions with physical and digital artifacts. The research design chapter describes how I investigated people's uses of paper and e-books through several integrated methods, combining diary studies with interviews and tours of participants' home libraries. The use of a diary study supported the ecological validity of data about participants' book reading and acquisition practices by documenting these practices as they occurred, providing a valuable grounding for discussing those practices in interviews. Including tours of participants' home libraries provided insight into their book acquisition and maintenance practices over the longer-term, with book collections providing additional evidence for participants to draw on during interviews. These methods produced a wealth of various types of data, which I analyzed to identify findings that are described in two findings chapters. The first focuses on findings that relate specifically to textual artifacts such as books, and the second describes findings that apply to artifacts more broadly.

The first of these, Chapter Five, investigates the two most common purposes of participants' reading: leisure and reading to learn. It then establishes connections between these and two broader activities: self-care and self-improvement. The chapter also shows how paper and e-books were only perceived to be "equally useful" (by participants who used both) for purposes of leisure reading, and identifies the non-linear nature of reading to learn as requiring more complex actions and operations that were less supported by e-books than by paper books. Finally, the chapter examines uses of books over time, showing that participants preferred paper books for any long-term uses—and identified



how practices of re-reading for leisure purposes had the potential to perform especially meaningful functions that supported participants in understanding their own changing identities over time.

Chapter Six provides insights about human relationships to artifacts that are more widely applicable—and are therefore potentially more broadly transferable to other artifacts. This chapter describes how the visibility of artifacts functions to make maintenance practices meaningful and to support continued awareness of owned artifacts, promoting re-use over time as well as allowing artifacts to contribute to identity maintenance through their “peripheral visibility” (Miller, 2010). Chapter Six makes another important contribution by showing how participants’ perceptions of the value and utility of e-books differed depending on the digital system through which they accessed those artifacts. Differences in actions allowed by systems and the visibility of artifacts within systems were key to participants’ perceptions of these artifacts as being useful within various activities. Finally, Chapter Six describes how some participants used the website Goodreads to replicate some of the organization and display functionalities provided by the home.

In the Discussion chapter, I turn to a consideration of the home as a system that supported the affordances of physical artifacts and the actions that depended on them, while digital systems for artifact interaction often failed to support these affordances. I then describe potential solutions for this problem that emerge from the implications of participants’ uses of Goodreads as described in Chapter Six, describing how the findings from this dissertation reveal the importance of maintaining a connection between ownership of artifacts and their visibility. The dissertation closes with a review of the major findings and their implications for increasing both the perceived value of digital artifacts and those artifacts’ utility in supporting human activities.

## **Chapter Two**

### **Review of the Literature**

This study explores human interactions with two broad groups of artifacts (physical and digital) through the approach of closely investigating interactions with two subsets of those broad groups: paper and e-books. Therefore, this review of the literature addresses two bodies of research; one that explore differences in interactions<sup>3</sup> with physical and digital artifacts broadly, and one that focuses specifically on interactions with paper and e-books. The chapter first reviews literature that addresses interactions with physical and digital artifacts, and thus explores the general motivating question for this research: what do people see as the primary differences between physical and digital artifacts, and which affordances<sup>4</sup> and limitations of digital artifacts are most central in contributing to people's perceptions of them as different from physical artifacts? For this topic, I rely primarily on HCI research, which investigates the differences in how people think about and interact with physical and digital artifacts. I supplement this body of work with research from consumer studies, information science, and personal information management (PIM) to include perspectives on uses of artifacts within additional contexts such as the workplace and online gaming. My purpose in reviewing this additional literature is to ensure that I take into account a variety of perspectives and contexts on this topic—to consider what we might be missing by focusing entirely on the home context. For instance, the literature on digital virtual consumption (a sub-field of consumer studies) explores interactions with digital artifacts in online gaming contexts (Denegri-Knott, Watkins, & Wood, 2012; Lehdonvirta, Wilska, & Johnson, 2009), in

---

<sup>3</sup> I use the term “interaction” here to refer to any instance of human use of or engagement with an artifact.

<sup>4</sup> I rely on Norman's definition of affordances: “The perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used” (Norman, 2002, p. 9).

contrast to the HCI and information science literature's focus on considerations of social media as artifact<sup>5</sup> (Cushing, 2013; Odom, Zimmerman, & Forlizzi, 2011). The important difference here was that while participants were often unsure whether social media was in fact an artifact or object, participants in studies of online gaming did not have trouble identifying in-game artifacts (e.g., clothing, characters, and furniture). The PIM literature contributes an alternate perspective in the form of revealing interactions with digital artifacts across a larger spectrum of technologies due to a focus on the workplace context. This focus on the workplace resulted in a consideration of how people interacted with digital artifacts across various systems and storage media, in contrast to much of the home-focused HCI literature in which a participant (or family's) personal computer was often the primary or sole location of digital artifacts. This context therefore supported comparisons of interactions with digital artifacts across multiple systems. A review of this literature shows that while physical and digital artifacts may at times function for similar purposes, their contrasting affordances support these purposes in different ways and with different effects.

The review begins with a brief outline the history of HCI research and place of the research on human interactions with physical and digital artifacts within that narrative. My review of the latter is then organized into three broad sections, examining reasons why people valued artifacts, the affordance of visibility, and participants' concerns about control of digital artifacts. Because these studies examined interactions with any and all types of artifacts, the reasons for value delineated here tend not to be utilitarian in nature. Instead, the reasons for valuing artifacts discussed in the first portion of this review focus primarily on more broadly applicable reasons for valuing artifacts:

---

<sup>5</sup> The topic of social media as artifact was of less interest within this dissertation, as my intention was to study physical and digital artifacts that were readily comparable, and social media does not have an obvious physical counterpart.

the effort, craft, and accomplishment associated with them, or their representation of a connection between their owner and other people.

After describing the studies' findings as they relate to these reasons, I then focus on a particular affordance that proved to be central to that discussion of the value of artifacts: visibility. These studies reveal that where physical artifacts are concerned, the affordance of visibility allowed artifacts to function in ways that made them valuable to participants. Visibility of digital artifacts, in contrast, was markedly different—with the outcome that the affordances of digital artifacts did not support identity-related activities in the same way as did physical artifacts, as described in detail in a subsequent section. I close the discussion of the literature on human interactions with physical and digital artifacts with an examination of people's perceptions of digital artifacts as deficient in comparison to physical artifacts. This review of the literature on interactions with physical and digital artifacts is structured such that it initially describes how findings from the literature reveal why people value artifacts (therefore implicitly showing how people use artifacts), and then shows how people's use of digital artifacts differs from that of physical artifacts.

The research on human interactions with physical and digital artifacts provides a lens through which I view the findings of the second area of literature covered in this chapter: literature on differences in interactions with paper and e-books. This literature emerges from many fields including library science, consumer studies, education, and HCI. Unlike the HCI literature described in the first portion of this chapter, the literature that compares uses of paper and e-books instead produces findings related to people's uses of artifacts for such utilitarian purposes alongside broader purposes within their daily lives. I begin my review of this literature by providing justification for my decision to focus on book artifacts in this study. I then give a brief review of current reading and

e-reading practices in the United States, accompanied by a short history of e-reading technology. Following this overview, I delve into literature that specifically investigates reading practices, followed by literature that takes a broader view of book usage. I close the chapter by reviewing the ways in which the literature, to date, has not fully addressed the questions on which I focus in this dissertation.

## **INTERACTING WITH PHYSICAL AND DIGITAL ARTIFACTS**

HCI is a broad, interdisciplinary research area, which incorporates perspectives from computer science, design, and the social sciences (particularly anthropology and psychology) all aimed at developing improved human experiences with technology. Researchers in HCI approach the subjects of human relationships with digital objects from the perspective of technology design. Early human-computer interaction research was based in the field of engineering, or more specifically, human factors and ergonomics. This research focused on hardware—on the machine rather than the human user—and primarily took task-based approaches that focused on the optimization and efficiency of the machines. As Grudin argued, the focus of the field shifted over time to software and then to human interaction with machines (in the form of the user interface) (Grudin, 1990). This shift began with an incorporation of cognitive science (e.g. Card, Moran, & Newell, 1983), which was heavily influenced by a metaphorical comparison between the computer and the human brain. This perspective emphasized an understanding of human information processing as “analogous to computational signal processing,” and focused on enabling “communication between the machine and the person” (Harrison, Sengers, & Tatar, n.d., p. 2). More recently, theoretical and methodological approaches such as actor-network theory, activity theory, ethnography, ethnomethodology, and participatory design have risen in prominence within the field.

Kaptelinin frames these perspectives as part of a general trend in HCI in which researchers seek a contextual understanding of computer usage. He argues that the perspectives within this contextual approach to HCI research share an understanding that humans and computers “develop in the process of cultural history and can be understood only within a social context” (1996, p. 46).

The HCI research examined in this review takes this contextual approach in its examinations of how people interact with digital objects in the social contexts of their homes and personal lives. This thread of research has, over the past decade, focused on human interactions with physical and digital artifacts in the context of how individuals use these artifacts in their everyday lives, leading to a focus on the “user” as a consumer and on the home as a context for use (Golsteijn et al., 2012; Kirk & Sellen, 2010; Odom, Sellen, Harper, & Thereska, 2012; Odom, Zimmerman, & Forlizzi, 2014; Petrelli & Whittaker, 2010). Researchers working in this area have primarily been interested in understanding the functions that digital artifacts fulfill in people’s lives, to better support those functions through the design of new technologies, and often draws on qualitative methods as a means for understanding the complex web of concerns that shape a user’s decisions about and interactions with technology. These studies have uniformly found that participants had difficulty identifying cherished or treasured digital artifacts, and that they viewed digital artifacts as overall less valuable than physical artifacts—as “throwaway” things—convenient but not worth maintaining. A central goal of the HCI research in this area, then, has been to investigate possibilities for transforming digital artifacts from throwaway, ephemeral things into meaningful and valuable possessions.

The focus on cherished possessions in these comparisons of interactions with physical and digital artifacts has led many researchers in this area to examine how artifacts become cherished: or, in other words, what leads people to value some artifacts

over others? Winner notes that the term “value,” while it has become complicated in recent usage, previously “...was taken to be *an attribute of something*. A person wanted, sought, used, or preserved a thing because it had worth or value” (Winner, 1986, p. 157). This is the sense in which the term is used in the HCI literature reviewed here, and Winner’s definition highlights the notion that artifacts become valuable to people because of the things that artifacts do for people: the functions they perform—or, considered from another perspective, the purposes (and activities) that they serve. Some of these purposes are related to utilitarian and practical uses (e.g., a book is for reading) and others are less immediately apparent. For participants in the HCI literature reviewed here, these less apparent uses of artifacts were often connected to how participants saw artifacts as related to or representing their own identities, as revealed by their descriptions of why the artifacts were valuable to them. The reasons for which participants valued artifacts were, then, central to how they used those artifacts, whether for practical, utilitarian purposes or for more complex and abstruse—but no less important—purposes such as the representation of one’s identity.

To begin, however, I turn to findings from the HCI literature regarding the reasons for which people valued both physical and digital artifacts—despite the broad trend across these studies of participants viewing physical artifacts as more valuable than digital artifacts.

### **Effort, Craft, and Accomplishment**

One such use of physical artifacts is their representation of people’s past accomplishments. Consider, for instance, a trophy for winning a sports competition. The artifact serves both to remind the owner (and others) of that person’s past athletic accomplishments, to reaffirm their identity as an athlete, and to represent the effort and

time that they devoted to training, as well as their skill in that particular sport. Digital artifacts were able to represent participants' accomplishments as well. Studies found that participants were more likely to value digital artifacts when they had invested time, skill, and attention in those digital artifacts through processes of creating or modifying them (Denegri-Knott et al., 2012; Golsteijn, van den Hoven, Frohlich, & Sellen, 2012b). In a study by Golsteijn et al., skill or crafting abilities represented in a participant-created artifact, and the accompanying "sense of pride in the creation" (Golsteijn et al. 2012, p. 6) of these artifacts, were among the most common reasons that participants gave for valuing a digital artifact. Examples of artifacts that participants across these studies considered valuable for such reasons included: one participant's old coding projects from his undergraduate studies, which he took pride in creating and saw as "as a marker of his achievement" (Kirk & Sellen, 2010, p. 17); a personal website created by a participant ("I made it and it is a great focus for my creativity") (Golsteijn et al., 2012, p. 5); a character developed over time in a computer game (Denegri-Knott, Watkins, & Wood, 2012); and a digital music collection that provided a backdrop for one woman's writing activities over many years (Golsteijn et al., 2012). However, participants sometimes expressed frustration that these digital artifacts were not readily visible. This limited their usefulness for these purposes of displaying accomplishments, an issue that will be addressed in more detail in the discussion of visibility, below.

### **Representing Connections Between People**

Another prevalent purpose for artifacts, which emerged from these studies, was their role in supporting connections and relationships between people (Golsteijn et al., 2012; Gruning & Lindley, 2016; Kirk & Sellen, 2010). This was reflected in Kirk and Sellen's study in which they examined participants' processes of "gather[ing] a collection



of objects for which they [felt] sentimental attachment” (2010, p. 2), referred to as “home archiving.”<sup>6</sup> Kirk and Sellen found that participants’ home archiving practices were motivated by six values. Two of these were focused around the participant’s relationship to other people: “honoring those we care about” and “framing the family” (Kirk and Sellen 2010, p. 16), thus demonstrating artifacts’ capabilities of reinforcing connections between their owners and others. Participants in Golsteijn et al.’s (2012) study discussed how some artifacts were important because they were reminders of family and friends, or were used to maintain relationships with those people (e.g. a smart phone) (2012). Gruning and Lindley (2016) found that shared physical artifacts functioned to strengthen trust between sharers and that sharing was “a powerful way that people establish and maintain relationships with one another” (p. 1176). Sharing digital artifacts, however, did not strengthen relationships in the same way. For example, because digital artifacts could be easily replicated and duplicate copies then passed to others without impinging on the owners’ use of the original, sharing digital artifacts did not require the level of trust that was involved in physical artifact sharing (Gruning & Lindley, 2016).

This study also identified a key difference in access to physical and digital artifacts based on their locations. While physical artifacts could be designated as “shared” (open to use by others) simply by placing them in public areas of a home, the same was not true of digital artifacts. This revealed an important distinction between the presence of a digital artifact within a physical location (e.g. saved on a desktop computer’s hard drive in a home office) and access to that artifact:

Because digital objects are not necessarily accessible even when present in a house (due to password protection and social norms about accessing other

---

<sup>6</sup> While the term “home archiving” is not explicitly defined in this work, the authors refer to their study of home archiving practices as investigating “things that people choose to keep rather than simply accumulate” (Kirk and Sellen 2010, p. 1).

people's devices and personal accounts), their accessibility for non-primary<sup>7</sup> owners often relies on the primary owner in a way that is not necessary for physical objects (2016, p. 1183).

This is similar, in a sense, to the issues of visibility of digital artifacts in that they can be present in a space without being visible or accessible; whereas, in the case of physical artifacts, access to a space is equivalent to access to the artifacts within it. Physical artifacts are displayed simply through their presence in a room (unless they are purposefully removed from sight) and this display reminds their owners of their availability.

### **Visibility and Display**

Cherished physical artifacts, which often became precious to participants for the reasons described in the previous two sections, were frequently displayed in participants' homes. The display of artifacts can be important for expressing a person's identity to others (and reinforcing it for themselves), as described in the literature from material culture studies (discussed in depth in Chapter Three). Csikszentmihalyi and Rochberg-Halton's work on physical artifacts in the home (Csikszentmihalyi & Rochberg-Halton, 1981), which many of the HCI studies drew on, also argued for the importance of the visibility and potential for display of valued physical artifacts.

While the issue of the visibility of artifacts was touched on in many of the HCI studies, two in particular focused on how the visibility of physical artifacts played a part in participants' determinations of their value, and the corresponding depreciation of digital artifacts that were comparatively less visible within the home context. Petrelli and Whittaker (2010) argued that the lack of visibility of digital artifacts led participants to perceive them as less important than physical artifacts because "...digital objects are stored away and people are not reminded about them on a daily basis. Unlike everyday

---

<sup>7</sup> Gruning and Lindley defined primary ownership of an object as a situation where the object "is considered to be primarily owned by an individual who allows others to use it" (2016, p. 1178).

physical objects, photos or artworks, digital objects are not in places where people persistently encounter them” (p. 60). Petrelli and Whittaker did not directly connect the affordance of visibility to its support of identity construction, only noting that their lack of visibility made digital artifacts less valuable. Kirk and Sellen (2010), however, noted a direct connection between the visibility of artifacts and their functionality in supporting participants in defining their own identities. An exemplar of this argument was one participant who kept all of his old computer programming projects from school on a laptop, but was unsure of the value of preserving these projects because (as he described it) he could not publicly display them in the way that an artist would display a painting; they were not visible to other people (2010, p. 17). Although he cherished the programming projects, the fact that they could not be displayed as physical artifacts could be—due to differences in the visibility affordances of physical and digital artifacts—frustrated him, and he questioned the utility of maintaining these projects. Both of these studies argued that because personal computers displayed artifacts “...in a very private context specific to one user” (Kirk & Sellen 2010, p. 18), these artifacts’ visibility was limited. Because digital artifacts stored on a computer were visible only to those people who used the computer (rather than anyone who entered the home), these authors argued that they restricted possibilities for attaching social significance to those artifacts. Petrelli and Whittaker noted that interacting with a digital artifact on a computer requires a deliberate effort (Petrelli & Whittaker 2010, p. 162), whereas participants’ awareness of physical artifacts in their homes required no effort on their parts.

In summary, visibility is important for displaying artifacts that represent one’s identity to others (and oneself). This research suggests that digital artifacts may be viewed as less valuable because they are not easily serendipitously encountered; there is less opportunity for passive awareness of these artifacts. This issue of visibility may also

explain why participants in other studies (e.g., Golsteijn et al. 2012, Denegri-Knott et al. 2012) reported valuing digital artifacts that they interacted with regularly; these were artifacts that they remembered, as opposed to others that were not in regular use. It is difficult, though, to be certain of the directionality in this issue. Were these artifacts valuable to people because they regularly encountered them, or did people regularly encounter these artifacts because they saw them as valuable?

### **Display of Digital Artifacts**

The visibility of physical artifacts clearly supported their value for their owners; if digital artifacts were visible only to the owner of the device on which they resided, they could be inherently less valuable than physical artifacts because of their limited display functions. However, several other studies discussed practices of display online, where it *is* possible for people to make digital artifacts visible to others. Cushing (2013) and Odom et al. (2011) both found that participants used digital possessions to represent their identity both to themselves and others, and that they managed identity representation by purposefully displaying and choosing not to display particular digital artifacts in online social environments, such as one teen avoiding posting photos of herself with a new boyfriend on Facebook where they would be visible to an ex-boyfriend.<sup>8</sup> Odom et al. describe how teens in their study used social media to “fluidly craft a targeted presentation of self” (Odom et al., 2011, p. 1495) to different audiences through privacy settings. Odom and colleagues built on this work to develop prototypes for display of online digital artifacts in the context of teenagers’ bedrooms (Odom, Zimmerman, et al.

---

<sup>8</sup> Certainly, this example highlights privacy issues, however, privacy is only *at* issue because of the visibility of the artifact in the online space of Facebook.

2012, p. 327). Although participants in this study were not interacting with their own digital possessions, they had positive reactions to this idea of displaying digital possessions within a home. The research found that it was important to participants to be able to control which digital possessions would be displayed. That kind of control was necessary in order for teens to edit their presentation of their identity for various audiences as they desired.

The study that focused most closely on online display of digital artifacts was an investigation of digital virtual consumption in Habbo Hotel, a massively multi-user online environment (Lehdonvirta et al., 2009). This study is unusual in comparison to the others included here in that it focused on digital artifacts within the context of one online game, providing a contrasting example of online display practices to the examples of social media usage described above. In Habbo Hotel, users can socialize and buy virtual clothing and artifacts for their avatars in “a giant contemporary Western indoor space, presented in isometric ‘retro style’ three-dimensional graphics” (Lehdonvirta et al., 2009, p. 1065). Through interviews, gameplay, and examination of fan sites, researchers in this study found that players’ consumption of virtual goods was motivated by what the authors called “aesthetic self-expression” (Lehdonvirta et al., 2009, p. 1073), noting how players of Habbo Hotel endeavored to arrange digital artifacts in “aesthetically pleasing or even ‘artistic’” ways (2009, p. 1067). Virtual goods were used as markers of social status as well: rarity of artifacts and their “...association with particular individuals or groups” (Lehdonvirta et al., 2009, p. 1073) were the primary reasons that participants valued these artifacts. Owning artifacts that are associated with well-known individuals

or groups establishes a connection, reinforcing the owner's affiliation with or admiration for with those entities. For artifacts to function properly in supporting an individual's claim to this kind of connection, they must be visible to others. It is a social process. Lehdonvirta et al.'s (2009) study provides evidence that such functions are possible in online social spaces.

The participants in Lehdonvirta et al.'s (2009) study displayed digital artifacts online through social media and online games, as opposed to within their homes, making the possibilities for displaying digital artifacts less limited than they appeared to be in Kirk and Sellen (2010) and Petrelli and Whittaker's (2010) studies. However, it is important to note that not all kinds of digital artifacts lend themselves equally to online display, and this may limit the kinds of social functions that particular kinds of digital artifacts can perform. For instance, digital photographs are easy to display to (potentially) wide audiences online, but displaying a virtual possession created in an offline game would require more effort. Additionally, digital artifacts displayed online are visible only to other people who are active in the space where those artifacts are displayed. This limited audience could be a disadvantage for someone who wanted to display artifacts they owned to a wide audience, or it could be an advantage in controlling who sees particular identity-related displays, as with the teenagers in Odom et al.'s 2011 study.

Visibility of artifacts is necessary for allowing them to convey social meanings, a function that is central to the activity of identity construction. But possibilities for display, while important for both physical and digital artifacts, do not work in the same way for the two types of artifacts. While display is inherent to physical artifacts, which

are displayed unless they are purposefully removed from sight, digital artifacts must generally be purposefully and intentionally exhibited in online settings to be viewed by anyone other than their owner. This issue is mirrored in another limitation of digital artifacts, that of broad access to the artifact based on its physical location—digital artifacts may exist in a home and be both invisible and inaccessible to some members of that household (Gruning & Lindley, 2016). This and other differences in possibilities for interaction with physical and digital artifacts sparked participants’ concerns about the stability of digital artifacts, which is a focus of the following section.

### **Concerns About Digital Artifacts: Stability, Control, and Physical Location**

Both physical and digital artifacts were able to function in service of representing the identities of participants—specifically their personal accomplishments and their relationships to other people. The visibility of artifacts was central in supporting these functionalities and therefore allowing artifacts to support identity-related activities. Visibility, however, was only one way in which the two types of artifacts were distinct from each other, according to participants. While many participants often had difficulty precisely defining their concerns about digital artifacts, or relating their concerns to particular aspects of these artifacts, an overarching theme of these studies was participants’ uncertainty about the stability of their digital artifacts and their sense that digital artifacts were not “real” in quite the same way as physical artifacts (Cushing, 2013; Denegri-Knott et al., 2012; Golsteijn et al., 2012; Odom, Sellen, et al., 2012; Petrelli & Whittaker, 2010). Participants saw digital artifacts as both not stable and not reliable: not stable in the sense that they were seen as “changing or fluctuating” and lacking the quality of being “permanent, enduring” (Merriam-Webster, 2018) and not

reliable in the sense of failing the criteria of being “able to be trusted to do or provide what is needed” (Merriam-Webster, 2018). Participants tended to frame their concerns about digital artifacts in terms of trust, saying that they were not certain that those artifacts were reliable and would continue to be accessible. Because of this perceived instability of digital artifacts, participants focused on maintaining control of them in a way that was not common for physical artifacts. This focus on control often manifested in discussions of the physical location (or perceived lack thereof) of digital artifacts. These concerns are centered on two related perceptions that participants had of digital artifacts: that they are changeable (i.e., unstable and unreliable), and that they do not physically exist in the same way that physical artifacts do. These perceptions led to the conclusion that digital artifacts are not lasting artifacts.

### ***Reliability and Stability***

Participants in these studies frequently talked about digital artifacts as being unreliable and unstable (Golsteijn et al., 2012; Odom, Sellen, et al., 2012; Petrelli & Whittaker, 2010). For instance, Petrelli and Whittaker (2010) characterized participants’ attitudes towards digital artifacts in terms of their “perceived instability and transience,” quoting statements such as: “[email] is quick and spontaneous, for me that doesn’t warrant preserving,” and “digital feels sort of unstable it feels like it’s not always going to work, sorry,” (p. 160). A central issue here is time and the perceived longevity of artifacts; participants did not see digital artifacts as things that would necessarily continue to be accessible to them from one day to the next. This seemed to be related to participants’ perceptions of these artifacts as not having a tangible, physical presence. As a participant in one study put it, “From the start they are not objects...Even though most things are ephemeral, these are even more...I mean there’s no solid” (Golsteijn et al.,



2012, p. 4). These perceptions of digital artifacts as changeable and unstable were related to participants' perceptions of these artifacts as not physically existing. The authors argued that "...for some participants the term 'object' implies a concrete, often physical, thing..." and that digital artifacts did not qualify as "objects" on this basis (2012, p. 4). Although digital artifacts were accessed through tangible devices, in participants' experiences they were not tangible themselves.

### ***Control and Physical Location***

This feeling that digital artifacts did not have physical locations was connected, in participants' discussions of that topic, to their concerns about maintaining control of those artifacts (Barreau, 1995; Boardman & Sasse, 2004; Cushing, 2013; Odom, Sellen, et al., 2012). This focus on control intensified in contexts where participants noted that their access to digital artifacts depended on external services such as cloud storage services and social media platforms such as Facebook (Cushing, 2013; Odom, Sellen, et al., 2012). Concerns about control were closely intertwined with participants' uncertainty about their ownership of digital artifacts. While ownership of physical artifacts was uncomplicated in participants' eyes, ownership of digital artifacts was less clear. Control over access, or "the right to control use" (Cushing, 2013, p. 9), was an important factor for participants in determining their ownership of an artifact. For example, many interviewees in Cushing's 2013 study initially said that their Facebook account was a digital possession, but upon reflection they questioned this conclusion because Facebook (the company) had access to their accounts and they depended on the company for support of those accounts. Because this artifact was not under their sole control, participants were unsure that they owned it.

...Facebook could suddenly say well we're going out of business, not that they are going to but ya know what I mean they can say we're shutting down, sorry and you'd lose all your photos and things you have there (Cushing, 2013, p. 10).

Similarly, in Odom et al.'s (2012) study of cloud storage, participants "expressed concerns about not knowing 'where' their data lives, what it means for something to reside online, and not really knowing where the entirety of their valued things might actually exist" (p. 785). When participants were unfamiliar with the intricacies of digital storage, the authors suggested that "possession becomes a difficult concept," because "the thing possessed has no geographic locale" in the experience of the user (2012, p. 788).

However, there were also cases in which participants were more secure in their conceptions of digital storage processes. Participants' knowledge about this issue, combined with studies' explicit comparisons of how participants interacted with digital artifacts across different types of storage, revealed more nuance in determinations of digital artifacts as reliable or unreliable. Determinations in these cases were frequently based on the storage location of the digital artifact. Two workplace studies from personal information management (PIM) reveal some of the details of these determinations about stability. In a study of managers and their retention of work documents, Barreau (1995) described one participant's,

...Difficulty in accepting that things stored in a place that was beyond the person's reach and grasp were safe. She felt more comfortable having files stored on diskettes and put in a box on her desk than trusting security to a LAN server that was distant and unseen (p. 338).

Boardman and Sasse's (2004) study of the use of email, filing systems, and web browser bookmarks found that participants considered some types of digital artifacts to be more stable than others. While "file collections were highly prized" (2004, p. 585) (documents used in work practices), websites were not considered stable (making bookmarks the least valuable). In the words of one participant, "I don't trust the stability of web URLs, I

would rather download the actual document” (2004, p. 585). This interviewee’s statement emphasizes the importance of having personal control of a digital artifact rather than just access to the artifact. Files are under the control of the user, whereas websites are not.

These concerns were echoed in Odom et al.’s (2012) more recent study in which they interviewed a diverse group of people who used cloud-based services about their experiences with those services, focusing especially on valued digital possessions that depended on cloud storage and participants’ “strategies for holding onto these things” (Odom, Sellen, et al., 2012, p. 783). Their participants expressed a preference for backing up their digital artifacts on storage media that were under their own control instead of solely on cloud services, citing control and personal responsibility as motivations. As one participant put it, “...I use the sentence ‘I’ve got some photos’, so I’ve said it, but I don’t know really if I possess them, not until they’re here [pointing at laptop], at least then I know where they are” (2012, p. 785). These studies reveal that when participants are aware that digital artifacts have a physical element, the location of that element is important to them. Participants’ comments in studies such as Cushing, 2013; Denegri-Knott et al., 2012; Golsteijn et al., 2012b; Odom, Sellen, et al., 2012; Petrelli & Whittaker, 2010 regarding the intangibility of digital artifacts (such as “there’s no solid” [Golsteijn et al., 2012, p. 4]) suggest that some participants did not see these artifacts as existing physically at all. However, any digital artifact that people interact with through a computing device is called up from some physical inscription on a storage medium; digital artifacts do have materiality and therefore a “physical location”:

The physical form of a digital object supports the object and is required for its existence, but is not the primary form of the object for computer users. For them, the object is instead what is on the screen, and that is not directly tangible (Gruning, Bullard, & Ocepek, 2015, p. 3436).

The distance between the physical element of digital artifacts and their primary representation on the screens of devices is central to understanding how people see physical and digital artifacts as different in kind, and therefore how they interact with them differently.

### ***Renegotiating Materiality***

Participants sometimes took steps to address or mitigate the perceived intransience of digital artifacts (Barreau, 1995; Denegri-Knott et al., 2012; Kaye et al., 2006; Odom et al., 2013; Odom, Sellen, et al., 2012; Odom et al., 2011). This happened in two ways: through creating physical versions of digital artifacts, and through replicating them digitally either as exact backup copies or in an alternate digital format. Denegri-Knott et al.'s participants took both of these routes (Denegri-Knott et al., 2012). They found that participants who saw digital artifacts as fragile and easily lost or destroyed made these artifacts more “materially real” through “print outs, saved screen shots, saved games in memory drives” (2012, p. 86). Researchers in this study reported that their participants saw digital artifacts as more material than the memories they represented, which participants wanted to preserve, but less material than was desirable for that preservation. Denegri-Knott et al.'s participants preserved digital artifacts not only by making physical versions of them, but also by storing them in multiple digital locations; a behavior also noted in another study in which participants asked trusted friends and family members to safeguard caches of participants' valued digital artifacts on their computers (Odom et al., 2013). Other studies found similar behavior in other contexts: Odom et al.'s (2011) report of teens printing out versions of various types of digital artifacts to put on their walls and downloading photographs posted to social media to personal computers (Odom, Sellen, et al., 2012); an academic in Kaye et al.'s (2006)

study who printed out “special” research papers; and Barreau’s (1995) participant who chose diskettes over server storage.

Denegri-Knott et al. (2012) argued that the additional work required to maintain digital artifacts may in fact increase their value for people who do the work to preserve them: “The preservation of digital virtual goods themselves, the copying and storing, or its re-materializing<sup>9</sup> become a form of curatorial practice through which meaning is cultivated” (p. 81). Digital artifacts can be preserved, but this preservation requires much more time and effort than the preservation of physical artifacts typically does. Odom et al. highlighted instead that these kinds of activities were a means of reasserting control of digital artifacts, saying “...having data in some physical form in one’s own possession appears to reinstate a sense of responsibility and control over it” (Odom, Sellen, et al., 2012). They argued that certainty in one’s control of digital artifacts—including the ability to destroy these artifacts and to control others’ use of them—was key to participants’ feelings of ownership and possession. Both of these interpretations make the link that these kinds of actions (re-materialization and control-related actions) were important for allowing digital artifacts to become imbued with value in participants’ eyes.

The findings described in this section emerged from a particular approach to research: small, exploratory, qualitative studies with relatively few participants (typically between 10 and 20). The aim of researchers in using these exploratory methods was to collect data from a diverse set of participants whom they hoped would exhibit a wide range of practices involving interactions with digital artifacts. The use of semi-structured interviews was common across all studies described in this section; HCI researchers typically accompanied these interviews with tours of participants’ homes and digital

---

<sup>9</sup> Here they refer to the practice of creating physical versions of digital artifacts (the most common example of this is printing a paper version).

devices to ground interviews in discussions of relevant artifacts. The goal in this type of study was to explore the edges of a phenomenon—to understand the entire range of relevant behaviors and practices—rather than to establish grounds for claims of generalizability. Many of my choices in designing the dissertation research are meant to both extend the body of knowledge produced by the HCI literature on interactions with physical and digital artifacts through new approaches to this topic while maintaining sufficient similarity to this body of research to allow comparisons between these studies and the one described here.

While the typically small sizes of these studies mean that individually they do not provide generalizable results, they provide convincing evidence regarding similarities and differences between digital and physical artifacts due to the consistency of findings across studies. Participants valued digital artifacts for similar reasons as they did physical artifacts (such as craft, time and effort invested in artifacts), and their reasons for valuing these artifacts were frequently related to the artifacts' functionalities for supporting identity-related activities. They were sometimes reluctant to see digital artifacts as valuable, however, due to their misgivings about the reliability and stability of these artifacts, and the limited possibilities for display of digital artifacts. These misgivings also manifested in various practices related to maintaining personal control of digital artifacts. Having a sense of control over artifacts was central to feeling ownership of them, as Odom et al. (2012) and Cushing (2013) established.

To build on the findings from the studies described in this section, I chose a different path for this project: examining two comparable subsets of the physical and digital artifact categories in depth. The following section of the chapter introduces the reasoning behind my choice of artifacts, paper and e-books, and relevant literature that focuses specifically on human interactions with those artifacts.

## PHYSICAL AND DIGITAL BOOKS

### Why Books?

Books are an optimal choice of focus for this study for several reasons. First, recent large-scale quantitative research on reading paper and e-books shows that most people who adopt e-reading technology continue to read paper books as well (Pew Research Center, 2014; Zhang & Kudva, 2014). This finding suggests that paper and e-books may have different functionalities (therefore potentially supporting different actions and activities), despite e-books having been designed to mimic the functions of paper books. In their reading practices, people who read both types of books must frequently make assessments regarding whether a paper or e-book is preferable for their purposes, and these points of assessment provide an opportunity for understanding differences in how people use these artifacts. Continued use of physical and digital artifacts, which are intended (in their design) to be functionally similar, implies that an examination of how people use paper and e-books might allow greater insight into the differences in human interactions with physical and digital artifacts.

Second, while the HCI literature has extensively investigated digital photography practices and has also considered digital music (Kirk, Sellen, Rother, & Wood, 2006; McMillan, Brown, Sellen, Lindley, & Martens, 2015; Whittaker, Bergman, & Clough, 2009), very little research in HCI or other fields has compared uses of paper and e-books more broadly than comparisons of *reading* paper and e-books.<sup>10</sup> Most of the research on this topic has examined the utilitarian purpose of these artifacts, rather than the more expansive purposes to which they may contribute. There is a need within HCI for

---

<sup>10</sup> The exceptions here are (Hupfeld & Rodden, 2014; Hupfeld, Sellen, O'Hara, & Rodden, 2013; Rouncefield & Tolmie, 2011), which are discussed in depth below.

additional research on the topic of how paper and e-books function broadly as artifacts within people's lives.

### **Current Reading Practices in the United States**

To preface this review of the literature on paper and e-books, I begin this section by providing some background on the current state of reading (as a proxy for interactions with books more broadly) in the United States and the history of e-reading technology. The American National Endowment for the Arts (NEA) has been conducting surveys to track reading habits in the US since 1982. Over the past decade, their reports have trended from very pessimistic about the state of reading in the US to marginally optimistic, revealing a slight increase in reading behavior. In 2004, the NEA report, titled "Reading at Risk,"<sup>11</sup> described its findings as a "bleak assessment of the decline of reading's role in the nation's culture" (2004, vii). This report showed a 10 percent decline in literary reading (defined as reading "any novels, short stories, poems, or plays in print or online") between 1982 and 2002, and book reading in total declined seven percent between 1992 and 2002 (National Endowment for the Arts, 2004). A follow-up report in 2008, however, found that literary reading among adults in the United States rose to 50.2 percent in 2008 (up from 46.7 percent in 2002), and that growth in the number of literary readers was greatest among the youngest group on the survey (18-24 year olds) who also reported the highest rates of reading online or reading material downloaded from the Internet (National Endowment for the Arts, 2009). The absolute number of people who read any book (outside of those for school or work) dropped slightly, from 56.6 percent to 54.3 percent (National Endowment for the Arts, 2009). While the stability of book

---

<sup>11</sup> Based on a survey of 17,000 adults.



reading as a cornerstone of American culture has been called into question by the NEA reports, roughly half of the United States population engages in this behavior.

It was in this environment of uncertainty about the state of reading that e-books and e-readers entered the reading landscape. Marshall notes that both Voyager and Eastgate Systems developed e-book software in the 1980s,<sup>12</sup> and they were soon followed by e-reading hardware: the Rocket eBook (Nuvomedia) and SoftBook (Book Press) (Marshall, 2010) were both available for purchase in 1998. Early e-reading technology, however, was plagued by issues such as the bulkiness of e-reading devices, short battery life, poor screen resolution, and a lack of available content (Marshall, 2010), as well as the ergonomic and manipulation issues documented in Dillon's literature review on e-reading technology (Dillon, 1992). It is perhaps because of these issues that the sea change in public acceptance of e-reading technology, which is often tracked to the introduction of the Amazon Kindle in 2007 (Baron, 2015), did not occur until almost a decade later. The Barnes & Noble NOOK (2009) and the Kobo (2010) followed, although they do not match the Kindle in popularity. And although they are not intended primarily as e-book readers, tablets (such as the Apple iPad, first introduced in 2010) and smart phones also support e-reading. In the midst of this wealth of new ways to access e-books, their sales increased 1,260 percent between 2008 and 2010 (Alter, 2015). A 2013 survey from the Pew Research Center revealed that 24 percent of Americans (aged 16 and older) own an e-reader and 35 percent own a tablet computer (Pew Research Center, 2013). These numbers have been steadily rising since 2010, when Pew first asked survey participants about e-reader and tablet ownership. 43 percent of respondents in the 2013 Pew survey owned either an e-reader or a tablet, and 55 percent owned a smart phone

---

<sup>12</sup> Although Marshall does not include names of specific software here (and therefore does not cite dates for its creation), Michael Joyce used Eastgate's Storyspace to write the experimental hypertext work of fiction *Afternoon, a story*, which was published in 1990.

(Pew Research Center, 2013). The number of Americans who read any kind of books is now roughly equal to the number who own a mobile device on which it is possible to read an e-book.

While many authors in the popular press regard e-books as the natural enemy of paper books<sup>13</sup> (Alter, 2015; Baggini, 2014; Grate, 2014), recent research shows that paper and e-books often coexist in the daily lives of readers (Zhang & Kudva, 2014). A survey conducted by the Pew Research Center (2,986 participants) in 2012 revealed that 88 percent of people who read e-books in the past year also read paper books during that time (Pew Research Center, 2012). The 2012 Pew survey shows that “people prefer e-books to printed books when they want speedy access and portability, but print wins out when people are reading to children and sharing books with others” (Pew Research Center, 2012). New data from the January 2014 Pew Research Center survey of 1,005 American adults confirms this pattern, showing that while 76 percent of respondents read a book (of any kind) in 2013, 28 percent of adults read an e-book in 2013 (including those who read both paper and e-books and those who solely read e-books), and only four percent of readers solely read e-books (Pew Research Center, 2014). Overall, while there is an increase in the number of readers who are reading e-books, e-book readers tend to continue to read paper books as well.

The results from these large-scale surveys establish the broad strokes of a picture of human behavior surrounding book artifacts in the United States. What they cannot reveal are the complexities and contexts that shape this behavior; for that purpose, I turn to qualitative research from several fields that compares uses of paper and e-books. Research on this topic has emerged in several disciplinary areas including consumer

---

<sup>13</sup> Marshall cites Coover’s 1992 *New York Times* article “The End of Books” as the beginning of the “electronic book backlash” (2010, p. 2).

studies, media studies, library science, and HCI, among others, seeking to answer questions such as: What purposes do books have in people's lives? What functions do books perform? In what activities do people use them?

Most obviously, books are created to be read by people, and much of the research involving books is therefore about reading (neither the NEA or Pew studies cited above asked about book ownership; they looked only at book reading). People read books for various reasons, but these generally fall into two (sometimes overlapping) categories: reading for obligatory purposes such as work or education, and reading for pleasure (Stebbins, 2013).<sup>14</sup> Previous work on reading in the digital environment has frequently focused on academic reading in higher education (Baron, 2015; Cassidy, Martinez, & Shen, 2012; Christianson & Aucoin, 2005; Clark, Goodwin, Samuelson, & Coker, 2008; Foasberg, 2011b; Keller, 2012), reading in primary and secondary educational settings (Kerr & Symons, 2006; Mangen, Walgermo, & Brønnick, 2013; Tveit & Mangen, 2014), and reading in the workplace (Adler et al., 1998; Sellen & Harper, 2002). Other studies extend beyond investigation of the immediate functions of books to include broader uses of books such as the identity-related functionalities discussed in the comparisons of interactions with physical and digital artifacts (Hupfeld & Rodden, 2014; Hupfeld, Sellen, O'Hara, & Rodden, 2013; Rouncefield & Tolmie, 2011). The following section reviews literature from these various approaches to studying paper and e-books, focusing on findings about participant preferences regarding the affordances and limitations of physical and digital books with the goal of gathering information about the purposes for which participants used books, and how their uses of paper and e-books differed.

---

<sup>14</sup> Stebbins also includes "reading for fulfillment" as a category, which the diary data from this study suggests makes up a much smaller percentage of reading behavior than do the two categories mentioned here.

## **Utilitarian Interactions with E-Books**

Many of the studies that investigate readers' initial encounters with e-books and e-readers come from the field of library and information science (LIS),<sup>15</sup> and this section addresses findings from both these studies and those from other fields such as HCI (e.g., Thayer et al., 2011) and education (e.g., Mangen et al., 2013) that also investigate paper and e-book usage. Researchers in LIS have employed small studies of e-book and e-reader usage in libraries to investigate the feasibility of and best practices for implementation of e-book and e-reader lending (Abdullah & Gibb, 2008; Cassidy et al., 2012; Christianson & Aucoin, 2005; Clark et al., 2008; Foasberg, 2011b; Keller, 2012; Shrimplin, Revelle, Hurst, & Messner, 2011). Despite their focus on the library context and educational uses of books, these studies are relevant to this research in that they aim to compare paper and e-book usage and provide a basic understanding of people's preferences regarding paper and e-books as they relate specifically to reading. The participants in these studies are typically academic library patrons (students and faculty), and the studies primarily investigate the use of e-books for educational purposes and do not typically include leisure reading. Two of the library science studies are exceptions to this rule in that although participants were academic library users, researchers questioned them about issues related to books outside of educational contexts (Foasberg, 2011b; Keller, 2012). Non-library related aspects of these studies will be discussed in the following section to streamline the discussion. Methodologically, these studies primarily rely on surveys of library users (Abdullah & Gibb, 2008; Cassidy et al., 2012; Clark et al., 2008; Foasberg, 2011b; Kemp, Lutz, & Nurnberger, 2012); others also draw on library patron data (Christianson & Aucoin, 2005), interviews (Keller, 2012; Shrimplin et al., 2011), diary studies (Keller, 2012), and focus groups (Clark et al., 2008). With the

---

<sup>15</sup> In many of these studies, the researchers are frequently librarians employed in university libraries, and their goals are to make recommendations for library policy regarding e-books.

exception of Keller's diary study and Christianson and Aucoin's use of patron data, these methods are not necessarily well-suited to capturing data on the topic of book usage. This is because book usage, as a habitual rather than unusual practice for readers, is a type of practice for which it is difficult to gather accurate and valid data after the fact (Marshall, 2010).

Taken as a whole, the findings of these studies reveal that convenience was an overarching theme of participants' perceptions of the advantages of e-books. The relative convenience of e-books as compared to paper books was reflected in participants' statements about the portability of e-readers and the ability to carry many books on one device (Clark et al., 2008; Foasberg, 2011b; Keller, 2012; Kemp et al., 2012; Shrimplin et al., 2011), the ease and speed of access for acquiring new e-books (Foasberg, 2011b; Keller, 2012; Kemp et al., 2012; Shrimplin et al., 2011), and the availability of technical functions such as full-text search and incorporated dictionary support (Keller, 2012; Shrimplin et al., 2011, Kemp, Lutz, and Nurnberger 2012). E-readers' portability was a commonly mentioned advantage throughout the studies. Portability refers to both the size and weight of the device itself and also the ability to carry many books on one device; while the former replicates the portability of paper books, the latter is an improvement. When participants read e-books on computers, e-books were criticized as not being portable enough (Abdullah & Gibb, 2008), but e-books read on e-readers were considered more portable than paper books (Kemp et al., 2012). As Marshall noted in her discussion of e-reader design, mobile reading devices should be at least as portable as paper books in order to be successful (Marshall, 2010). Participants enjoyed the ability to access a book essentially at any time and from any place (with an Internet connection). They appreciated having access to library materials at times when the library was closed and not having to physically go to the library to check out materials. Additional functionality,

particularly full-text search (Keller, 2012; Shrimplin et al., 2011) and built-in dictionaries (Kemp, Lutz, and Nurnberger 2012), made e-books easy for participants to use for academic purposes.

Participants frequently mentioned issues of navigation within the book itself as a disadvantage of e-books (Clark et al., 2008; Foasberg, 2011b; Keller, 2012; Shrimplin et al., 2011; Thayer et al., 2011), such as feeling that they did not have a good sense of “where they were in the book” when reading e-books, and that e-books made it difficult to skim or “flip through” a book. Keller summed up these issues and their implications nicely when discussing the importance of turning a page: “it marked progress, conveyed a sense of achievement, broke down texts into manageable ‘chunks’, and provided orientation” (2012, p. 11). E-books lacked the spatial cues that paper books provide, such as feeling the thickness of pages under one’s fingers (which gives a sense of the reader’s “location” in the book). Multiple studies identified these navigation issues as more troublesome for academic reading than leisure reading (Foasberg, 2011b; Mangen et al., 2013; Thayer et al., 2011). In Thayer et al.’s (2011) study of academic uses of e-books, researchers argued that e-readers did not support readers’ “ability to construct cognitive maps of texts,” which supports retention of information (p. 2917), and related this to the lack of a fixed structure for texts read on e-readers.

Some studies mentioned participants’ concerns about the relative lack of available content (Abdullah & Gibb, 2008; Foasberg, 2011b; Kemp et al., 2012). This issue was mentioned less often in later studies, suggesting that it may have been alleviated by growing e-book availability or may have been related to a particular service a library was using to provide e-books to patrons. Because e-books were associated with reading on Internet-capable devices, which participants could also use for non-reading activities, becoming distracted while reading e-books was also a concern for participants in several

studies (Keller, 2012; Liu, 2006). Participants mentioned problems with eye strain and reported that they disliked reading on a screen for extended periods of time.<sup>16</sup> Additionally, Clark noted that the limitations on e-book usage imposed by publishers through digital rights management (DRM) restricted interactions with e-books greatly in comparison to paper book interactions (without discussing the specifics of these limitations) (Clark et al., 2008).

These studies differ from those comparing digital and physical artifacts in the previous section in that they are often investigating new uses of a technology as opposed to technologies that have been in use for some time and have been incorporated into everyday practices. Therefore, the digital artifacts under discussion were often valued for the initially noticeable new affordances that increased the convenience of reading and access to books. These affordances supported participants' uses of e-books for short-term, immediate activities involved in both leisure and educational reading, such as reading a book one time and reading for reference purposes. These studies describe people's uses of books for the kinds of utilitarian or pragmatic purposes that are specific to books. But they did not address issues of book ownership and purchasing, or why people might value books as artifacts beyond their immediate uses for reading. These issues did arise, however, in studies that examined reading *in situ*, such as the home context frequently studied in HCI.

### **Beyond Utilitarian Purposes: The Home Context and Personal Reading**

Technology usage in home contexts is a topic of interest within HCI, and the literature includes several studies on books in home and personal use (Hupfeld & Rodden, 2014; Hupfeld et al., 2013; Massimi et al., 2013; Rouncefield & Tolmie, 2011),

---

<sup>16</sup> In contrast, participants in another study mentioned that the non-backlit e-reader screen was an advantage in terms of eye strain (Kemp et al., 2012).

as well as an investigation of how people share ownership of possessions which yielded insights on sharing of physical and digital books (Gruning & Lindley, 2016). Two papers from media and consumer studies similarly investigate people's uses of paper and e-books in their personal lives (Chen & Granitz, 2012; McNeish & Hazra, 2014). Much of the literature on reading and books discussed in previous sections follows typical assumptions about reading: that it is stationary, passive, and solitary (Marshall, 2010). By investigating reading *in situ*, the studies discussed in this section are able to reveal a more complex picture of reading that is more in line with what Marshall argues reading actually looks like: mobile, interactive, and social (Marshall 2010). In so doing, these studies do not generally contradict the previously discussed studies but instead contribute new information regarding contexts of book use and types of book use that are not discussed in the other literature.

With regards to advantages of e-books, issues of portability (Hupfeld et al., 2013), saving storage space (Chen & Granitz, 2012; Hupfeld & Rodden, 2014; Hupfeld et al., 2013), economics (availability of inexpensive e-books) (Hupfeld et al., 2013), and accessibility (in the sense of ease of acquiring books) (Chen & Granitz, 2012; Hupfeld et al., 2013) all echoed the previously discussed paper and e-book literature. In terms of disadvantages, these studies revealed issues with navigation within books (Hupfeld 2013); visibility (Hupfeld & Rodden, 2014; Hupfeld et al., 2013); emotional attachments to paper books (Hupfeld & Rodden, 2014); concerns about ownership (Hupfeld & Rodden, 2014) and, relatedly, about restrictions on the ability to share and give away books (which depend on ownership) (Gruning & Lindley, 2016; Hupfeld & Rodden, 2014; Hupfeld et al., 2013; Massimi et al., 2013; Rouncefield & Tolmie, 2011); and difficulties with DRM (Hupfeld & Rodden, 2014; Massimi et al., 2013), some of which were also discussed in the studies reviewed in the previous section. DRM and proprietary



file format issues affected not only participants' ability to share and give away books, but also their ability to access them at all (Massimi et al., 2013), echoing participants' complaints from the library-based studies.

In addition to reinforcing previous findings, the HCI studies of reading in context introduce a new layer of complexity in their discussions of reading practices and particularly in their depictions of how people interact with books beyond reading them. They do this through emphasizing social aspects of reading such as sharing books, reading in public, and reading to children<sup>17</sup> (Gruning & Lindley, 2016; Hupfeld & Rodden, 2014; Massimi et al., 2013; Rouncefield & Tolmie, 2011). While previous studies uncovered participants' concerns about being unable to share e-books, these studies extend our knowledge in describing how people manage to share e-books despite the barriers to sharing that have been built into e-reading technologies (by sharing accounts, sharing devices, and acquiring DRM-free versions of e-books, sometimes illegally) (Gruning & Lindley, 2016; Hupfeld & Rodden, 2014).

The topic of sharing books also shed new light on how visibility affordances affected social practices of book usage. Books are a type of artifact that people frequently share with others, which was not necessarily true of the artifacts discussed in the more broadly scoped HCI studies. Visibility of paper books encouraged social interaction around books, such as making book recommendations to friends, passing books between family members, and discussing books that multiple people had read (Hupfeld et al., 2013; Rouncefield & Tolmie, 2011). Even navigation issues can have social implications that change depending on visibility, as in Rouncefield and Tolmie's (2011) observation and interview-based study of reading practices in three households, when a husband

---

<sup>17</sup> Although the issue of reading to children did not come up in the LIS research, a 2011 Pew Research Center survey found that 81 percent of adult readers preferred paper books for reading to children.

pointed out that if he wished to talk with his wife about a book she was reading, he was able to gauge how much of the book she had read by looking at the location of her bookmark in the (paper) book. Although he could also feasibly turn on her e-reader to check where she was in an e-book, social taboos against interacting with others' personal devices can discourage such actions. On the other hand, keeping reading private could also be an advantage for the reader, as one participant noted: "...I like that privacy about it, you don't have to advertise to people in a public space what you're reading" (Hupfeld et al. 2013, p. 13). The issue of digital objects lacking the "reminding" function of physical objects (Barreau & Nardi, 1995) also arose, making it easier to put off finishing an e-book (which was effectively out of sight unless it was being actively read) as compared to a paper book (Hupfeld & Rodden, 2014).

These studies also expanded on understandings of long-term interactions with books, because of their consideration of ownership and storage in addition to the immediate uses of books. McNeish and Hazra mentioned that participants were unsure about whether or not they actually owned e-books (2014) (echoing participants in the HCI studies reviewed in the beginning of the chapter), and multiple studies found that participants tended to purchase paper books when the book was important to them (Chen & Granitz, 2012; Hupfeld et al., 2013; McNeish & Hazra, 2014),. Therefore in cases where ownership is seen as important, and ownership of e-books is uncertain, a choice to purchase a paper book is unsurprising. McNeish and Hazra (2014) found that for their participants, hardback books,

...Give permanence to their content and fulfill the purpose of ownership. They buy hardcover books when they want to keep and collect books, but put books they would have bought as paperback books into their e-readers (p. 384).

Similarly, Hupfeld et al. (2013) found that e-books were "less about keeping and more about using" (p. 15). Anticipated issues of technological obsolescence discouraged

participants from thinking about e-books as “something to invest in for the long term” (2013, 15). Paper books also helped to maintain a sense of self through ownership,<sup>18</sup> even if there was no intention to re-read them. McNeish and Hazra (2014) were also surprised to hear their participants speak of e-books as not being “real,” saying “...we did not expect a distinction between two forms in terms of ‘realness’ since the contents or the texts are exactly same in both formats” (p. 385). These findings make explicit the underlying connection to the literature on physical and digital artifacts, in which many participants spoke of their digital possessions as less “real” than their physical possessions and participants were more certain of their ownership of physical artifacts than digital ones.

There are some methodological concerns, however, with these studies’ approaches to investigating reading. As mentioned previously, gathering data regarding actual book usage is the central difficulty in conducting research on reading and books (Marshall, 2010). Interviews or focus groups alone (used in Chen and Granitz’s (2012) and McNeish and Hazra’s (2014) studies, respectively) are ill-suited to this task, due to the necessity of relying entirely on participants’ memories for the purposes of gaining knowledge of their book-related practices. And while combining interviews with a tour of a relevant location (such as the home, as in Hupfeld and Rodden’s (2014) study) can address this concern to a degree by relying on the presence of relevant artifacts to prompt participants’ memories, it is not able to provide direct data regarding reading events. Marshall also found throughout years of conducting this type of research that attempts to observe reading behaviors (a method which Rouncefield and Tolmie (2011), and Massimi et al. (2013) employed in addition to interviews), also tend to be unproductive at eliciting

---

<sup>18</sup> This aspect of identity construction through books was often connected to books that represented past periods of a participant’s life (Hupfeld 2014).

natural behavior from participants, due to social norms regarding reading as a “private” behavior (Marshall, 2010). This is not to say that these methods might not reveal a variety of useful information, such as participants’ attitudes towards e-reading, only that they are not ideal methods for learning about participants’ naturally occurring behaviors in the contexts of their daily lives. I argue (following Marshall’s advice) that diary methods are preferable for this, and one study reviewed here did take that approach. This study (Hupfeld et al., 2013), however, gathered data only on e-book reading through its’ diary methods, missing an opportunity to collect comparable data regarding participants’ usage of paper and e-books. The findings of these studies are nonetheless relevant and intriguing, but should be approached with these concerns in mind. In the following section, I draw out the connections between the literature that compares interactions with physical and digital artifacts and the literature that compares interactions with paper and e-books.

### **Paper and E-books as Physical Artifacts and Digital Artifacts**

Some of the advantages and disadvantages of e-books as compared to paper books concern issues that are specific to books and textual artifacts, such as the advantages of search capabilities and frustrations related to navigation within e-books. Many of the issues that participants focused on in evaluating the use of e-books for various purposes, however, are closely related to those that emerged in the HCI research on physical and digital artifacts. In studies that took contexts of book usage into account, such as the HCI studies that focused on the home, it was clear that issues of identity construction and display were at issue when participants made choices about book usage just as they are with uses of physical and digital objects. Books, like the range of the physical and digital artifacts discussed in the HCI studies, are easier to display, organize, and remember when

in physical forms. The use of proprietary file formats and DRM also have the effect of making many e-books more difficult to share than paper books.

By far the affordances of e-books that participants valued the most were those that fell under the heading of convenience, which I argue primarily support “utilitarian” interactions. These were affordances related to portability and accessibility of e-books. While there are not necessarily direct parallels to the themes from the physical and digital artifacts literature, these affordances of e-books are summed up in a phrase used by Odom et al. (2014) in a review of their work in this area: “placelessness, spacelessness, and formlessness” (p. 985). They noted that these characteristics of interactions with digital artifacts had conflicting effects in that they increased the values of virtual possessions in some ways but complicated that value in others. This seems likely to be the case for e-books as well, in that they are preferred to paper books in terms of ease of access and the ability to carry many books on one device (convenience affordances), but have corresponding limitations such as the lack of a visible physical presence associated with each artifact. It is worth noting that while convenience affordances are valuable in the short term, their corresponding limitations may decrease the value of e-books in the long term, as was expressed by the participant who said that e-books were “less about keeping and more about using” (Hupfeld et al., 2013, p. 15).

Perhaps most significantly, there were echoes in the paper and e-books literature of participants’ concerns about digital artifacts that arose in the physical and digital artifacts literature. This was reflected in the contention that e-books were not preferable for long-term use, which was associated with ownership—and that some participants were not sure if they did own the e-books they had purchased. The issue of visibility and its role in social practices (such as sharing) also arose in these studies. These issues,

however, have not been thoroughly explored with regards to paper and e-books and deserve further attention.

### **GAPS IN THE RESEARCH LITERATURE**

The literature on interactions with physical and digital artifacts revealed two topics as central to understanding differences in these interactions: visibility and display, and control and ownership. These were related; many participants saw digital artifacts, which were not visible except through a device, as not having a physical presence and therefore not being under their control. As noted in closing the previous section, these topics require more attention in the literature that focuses on paper and e-books specifically, one topical gap that this dissertation research addresses. The issue of ownership particularly suggests a need for more research on the topic of artifact acquisition.

This study's purpose is distinct in comparison to the literature investigating human interactions with physical and digital artifacts, due to my focus on in-depth investigations of specific types of artifacts. This shift in focus is in response to a perceived gap: that the breadth of these studies has precluded investigations of how particular affordances of artifacts, as well as contexts of use associated with specific types of artifacts, might inform our understanding of this topic. The aims of this study additionally diverge from those of the LIS and educational literature regarding paper and e-book usage, as its scope is much more expansive than an exploration of reading, investigating broader uses of books for purposes of identity construction and maintenance. Additionally, these studies focused heavily on academic uses of books, therefore giving short shrift to leisure reading (the most frequent type of reading), and

primarily captured data from student participants, who represent only a small subset of all book readers.

The literature on reading paper and e-books *in situ* is the most closely related to my dissertation research due to its focus on investigating reading activities *and* their contexts. But as I noted in the discussion of these studies above, their methods were geared towards gaining insights about people's perceptions of e-reading technologies and their general understandings of their own book practices (usually retrospectively), and were not grounded in detailed data that reflected participants' habits of both paper and e-book usage—as this study has done (described in detail in the Research Design chapter).

In this dissertation research, I take an innovative approach to the problem of understanding differences in interactions with physical and digital artifacts through examining many actual instances of uses of artifacts through a diary study, in combination with interviews and home tours. With this approach, I have collected data not only about participants' general and retrospective understandings of their book-related practices, but about their understandings of these practices based in a discussion of data that thoroughly depicts their book-related practices related to both paper and e-books: the diary data. The diary methods, then, aid in understanding participants' current interactions with books, and the home tours support both an understanding of the context of use for those books as well as insight into book collecting practices over time (long-term ownership). Supplementing these methods with interviews supports the accuracy of the researcher's understandings of these practices, as well as drawing out their richness and complexity. Prior to a full description of these methods and my motivation for designing the research in this way (which I do in Chapter Four), Chapter Three describes how the framework of activity theory shaped my approach to understanding human activity as a means for individuals' development over time, the ways that artifacts are

used as tools within these processes., and how the affordances of these artifacts can shape the ways in which humans engage in activities. Additionally, Chapter Three describes how theories that have emerged from material culture studies shape my understanding of how humans use artifacts as tools particularly within cultural activities, such as those that those that we engage in for the purposes of creating and maintaining our personal identities.



## Chapter Three

### Theoretical Frameworks: Activity Theory and Material Culture

The previous chapter revealed that the HCI literature on human interactions with physical and digital artifacts took the approach of examining a broad range of artifacts, therefore limiting its specificity with regards to how particular affordances of artifacts affected their use. In contrast, the majority of the literature on paper and e-books instead focused primarily on reading and therefore did not consider the broad variety of ways in which people use book artifacts.<sup>19</sup> This research addresses those gaps, combining specificity with regards to the kinds of artifacts examined with openness regarding considerations of how people might use those artifacts. To frame this investigation, I draw on two theoretical perspectives on how people use artifacts: activity theory and material culture studies.

Activity theory provides a structure for understanding how affordances of artifacts guide possibilities for their uses within distinct activities, while highlighting how humans develop through engaging in activities, and the key role of human agency in these processes. This theory approaches the examination of human behavior not only at a high conceptual level but also at the lower level of actual practice.<sup>20</sup> In this dissertation, I combine activity theory perspectives with findings from material culture studies that shed light on how artifacts play roles in purposive processes of identity construction and maintenance, which I view as high-level activities in activity theory terms. Activity theory and material culture studies share recognition of artifacts as important and

---

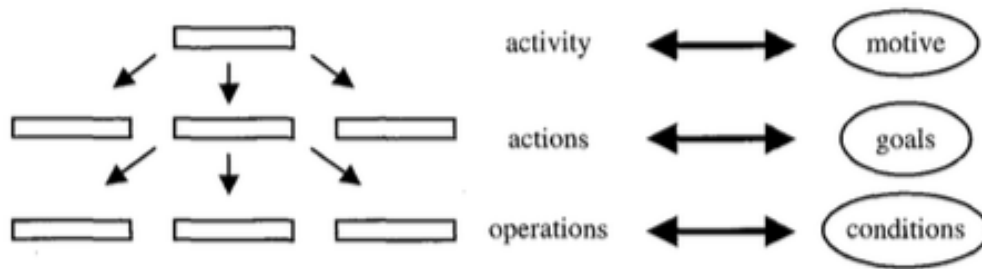
<sup>19</sup> While several exceptions to this statement exist (e.g., Hupfeld et al. 2013, Hupfeld & Rodden 2014, Keller 2012; Rouncefield & Tolmie 2011) none of this research collected comparative data on both paper and e-book usage in a thorough manner; instead examining either paper or e-books.

<sup>20</sup> In this dissertation, the terms “high” and “low” refer to the locations of actions and activities within activity hierarchies discussed in the Hierarchical Structure of Activities section below. Actions that are closer to the bottom of an activity hierarchy are easy to associate with concrete, simple uses of artifacts, whereas actions become more complex upon moving upwards in a hierarchy.

worthwhile objects of study, as well as an emphasis on recognizing the role that human agency plays in the processes that each approach examines. This chapter first describes activity theory, providing an overview of the theory, its history, and some key aspects that are central to my application of activity theory in the research at hand. Following this discussion, I describe current approaches to understanding human relationships to artifacts within material culture studies, focusing particularly on relevant concepts from Daniel Miller's work which represents the most extensive and thoroughly developed perspective within the "cultural" approach to material culture studies at this time. The chapter closes with a discussion of how I integrate these two theoretical perspectives in the dissertation.

#### **ACTIVITY THEORY: PURPOSEFUL HUMAN USES OF TOOLS**

Activity theory has emerged as a leading conceptual framework in HCI as research in the field has expanded from examining isolated tasks that people accomplish through using technology to include the investigation of how these tasks (and technologies) fit into larger patterns of daily life—that is, the parts they play in human activities more broadly (Kaptelinin & Nardi, 2006, p. 5). Activity theory frames activities within the motives or desires that inspire people to undertake them. As depicted in Figure 1 below, activity theory views activities as being comprised of subjects (humans), objects (goals), actions (conscious steps taken in support of an activity), and operations (unconscious steps taken in support of an action) (Nardi, 1996); the theory sheds light on the interrelationships between all of these contributors.



**Figure 3.4**  
The hierarchical structure of activity. Activities are composed of actions, which are, in turn, composed of operations (left). These three levels correspond, respectively, to the motive, goals, and conditions, as indicated by bidirectional arrows.

Figure 1: Kaptelinin and Nardi's depiction of the hierarchical structure of activities (2006, p. 64).

Additionally, activity theory emphasizes that activities are processes through which subjects and objects develop and change. Vygotsky, a Soviet psychologist who is generally credited with laying the groundwork for activity theory, was particularly interested in processes of learning through activity, and carried out research on how children of different ages learned (thus expanding their mental capacities) by using external and internal (mental) tools.<sup>21</sup> This was part of his broader interest in the development of psychological functions more generally—part of "the grand enterprise of accounting for the progress of human consciousness and intellect," as Cole and Scribner describe it in their introduction to Vygotsky's *Mind in Society* (Vygotsky, 1978, p. 14). An individual's consciousness is a product of these developments that occur through purposeful engagement in activities. That is, many (perhaps all) of the changes that a person makes to themselves through engaging in various activities are changes that affect their own individual consciousness. Some of these changes may be fleeting, but others

<sup>21</sup> See *Mind and Society*, particularly the first chapter "Tool and Symbol in Child Development" for an example of this work (Vygotsky, 1978).

can be enduring; therefore an individual's consciousness is the product of the various activities that they have chosen to carry out over their lives that have affected their consciousness in long-lasting ways.

These processes of individuals developing through their engagements with activities are not seen as occurring in isolation, however, as activity theory emphasizes the influences of cultural, social, and historical contexts on activities. As Kaptelinin and Nardi describe, "Human beings are shaped by culture, their minds are deeply influenced by language, and they are not alone when interacting with the world" (2006, p. 37). This perspective is integrated into activity theory through the understanding that the context of an activity is an integral part of the activity itself. The theory emphasizes that social and cultural factors strongly influence how people carry out activities. In the case of this project, an example of this is the inherently social aspects of displaying paper books. Although people may carry out activities in either an individual or a collaborative way, both of these approaches to activities occur within social contexts. In the example of book display, while the individual's decisions about how to organize their books (and therefore which books are displayed) may be made alone, they are influenced by imagined others who will view the books in the future. This emphasis on examining how cultural and historical forces influence activities also shapes activity theory's approach to understanding how people use tools as mediators within activities: in that this theory views tools as encapsulations of cultural knowledge about how an activity should be carried out that are constructed and refined over time (Kaptelinin & Nardi, 2006).

Activity theory provides a framework for examining how artifacts come to be used as tools for particular purposes, and how the affordances of those artifacts enable them to serve those purposes. This makes it an appropriate theoretical framework for this dissertation research, which focuses on understanding why people choose one type of

book as a tool over another type when they engage in particular activities. Vygotsky (1986), using the example of activity in the context of work, argued that an understanding of the tools used to accomplish an activity was essential to understanding the activity itself:

Work, for instance, is not sufficiently explained by saying that it is prompted by human needs. We must consider as well the use of tools, the mobilization of the appropriate means without which work could not be performed. To explain the higher forms of human behavior, we must uncover the means by which man learns to organize and direct his behavior (p. 102).

The tools a person uses to carry out an activity help shape that activity, and therefore any examination of an activity requires an understanding of the tools employed to accomplish that activity.

In this study, I view paper and e-books as tools that a person may use in activities. This includes high-level identity-related activities, which the review of literature in Chapter Two revealed were central to many human interactions with artifacts in the contexts of people's home and personal lives. The theoretical framework of activity theory facilitates an examination of how the affordances of different types of books affect readers' interactions with them, thus showing how those affordances enable (or limit) the possible ways in which a book can function as part of an activity. I use the term *interaction* here to refer to an instance of human use of or engagement with an artifact; an interaction then is typically an operation or action in activity theory terms, but is one that specifically makes use of an external tool or artifact. In the following sections I describe the basic history of the development of activity theory, followed by a discussion of two fundamental concepts of the theory that are especially relevant for this research: the hierarchical structure of activities and the role of tools as mediators in activities.

## History of Activity Theory

Activity theory is, at its core, a framework for understanding and interpreting human activities within their cultural and historical contexts. A key strength of this theory is its ability to connect the minutiae of people's practices to the larger goals that motivate them in carrying out those practices, "providing a clarifying framework for the bigger picture" (Kaptelinin & Nardi, 2006, p. 7). At least this much is common across the various interpretations of the theory. Differences in opinion about myriad aspects of activity theory, emerged early in its' history. While it is well known that activity theory was developed by Soviet researchers in the field of psychology, the literature that presents and interprets activity theory for a Western audience reveals conflicting arguments regarding its origins. Lev Vygotsky, a Soviet psychologist, developed the central concepts on which activity theory relies in the 1920s and 1930s (1981). Vygotsky's research career was cut short with his death at the age of 37, and he did not publish any works that presented activity theory as a coherent whole during his lifetime. Therefore the book *Activity, Consciousness, and Personality*, written by Vygotsky's student, Aleksey Leontiev, is typically considered the authoritative early written work on activity theory.

As Wertsch (1981) describes it, Leontiev was responsible "for consolidating the ideas of Vygotsky and others into what is now known as the theory of activity" (Wertsch, 1981, p. 15). Wertsch states that the idea of the levels of analysis for activities (operations, actions, and activities) and the relationships between those levels (the activity hierarchy) were Leontiev's primary contributions to the theory (1981, p. 20-21). Kaptelinin<sup>22</sup> and Nardi's (2006) version of this history differs from Wertsch's; they argue that although Leontiev was heavily influenced by Vygotsky, the two men had distinct

---

<sup>22</sup> A student of Leontiev's.

research agendas and that Leontiev's activity theory did not directly extend Vygotsky's cultural-historical psychology approach (2006, p. 173). Instead, they argue that Leontiev's work on activity theory extended not only from Vygotsky's work, but also that of Soviet psychologists Mikhail Basov and Sergey Rubenshtein (2006). Regardless of the origins of and influences on the ideas in *Activity, Consciousness, and Personality*, Leontiev's book stands as the foundational text for the theory and current developments and interpretations of activity theory stem from that work. But as Kaptelinin and Nardi note, *Activity, Consciousness, and Personality* is "...not an introduction to activity theory, but a collection of essays, each focusing on a limited set of fundamental theoretical concepts" (2006, p. 29). Therefore interpretations and applications of activity theory vary, and there are on occasion contradictions and confusions in Leontiev's work that researchers relying on activity theory have needed to reconcile.<sup>23</sup>

Vygotsky's and Leontiev's work is often referred to as the first and second generations of activity theory. Yrjö Engeström's further development of the theory, beginning in the 1980s, is widely recognized as the third generation. While Leontiev suggested that his approach might be expanded to examine not only the activities of individuals but also how groups of people collectively engaged in activities, his work "focused almost exclusively on individual activities" (Kaptelinin & Nardi, 2006, p. 99). Engeström's most visible contribution to activity theory was to carry out this expansion, examining the activities of groups rather than individuals. In his pursuit of understanding collective activities, Engeström extended the model of activity to include not only subject and object, but also community (Kaptelinin & Nardi, 2006). Because of Engeström's focus on the coordination of activities among groups of people, his work is often relied on in workplace studies of activity within HCI and the related field of computer-

---

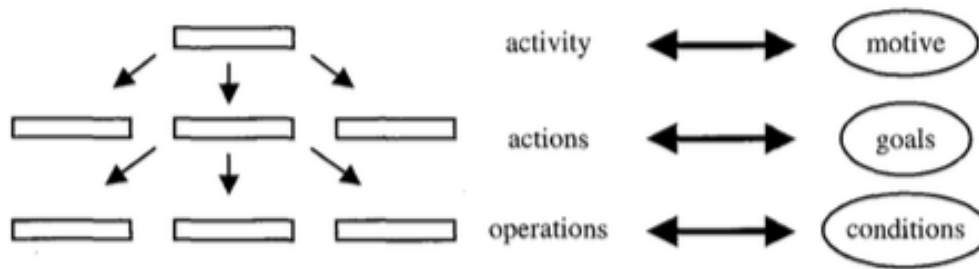
<sup>23</sup> See Chapter 6 of Kaptelinin and Nardi's book *Acting With Technology* (2006) for a discussion.

supported cooperative work (CSCW) (e.g. Baumer & Tomlinson, 2011; Bryant, Forte, & Bruckman, 2005). However, I mention his work here primarily to draw the distinction that this dissertation study has a different focus from Engeström's work (and research that extends from his work) in that it investigates how individuals, rather than groups, use books as tools within activities. Therefore my emphasis on particular aspects of activity theory differs from Engeström's, with its focus on collaborative workplace-based activities. I rely more heavily on the first and second generations of activity theory's development, particularly as represented in the works of Nardi and Kaptelinin, than do many researchers in HCI. The hierarchical structure of activities, however, applies equally to both collaborative activities and those carried out primarily by individuals (despite their social contexts).

### **Hierarchical Structure of Activities**

The socially influenced nature of activities and their goal-orientedness (i.e., that activities are motivated by pursuit of an object) are fundamental principles of activity theory in all of its interpretations. The goal-orientedness of activity is reflected in the representation of activities as hierarchically structured (as depicted in Figure 2 below), with low-level operations combining to form higher-level actions, a series of which make up an activity. Kaptelinin and Nardi note that "The top layer [of the hierarchy] is the activity itself, which is oriented toward a motive" (2006, p. 62).





**Figure 3.4**

The hierarchical structure of activity. Activities are composed of actions, which are, in turn, composed of operations (left). These three levels correspond, respectively, to the motive, goals, and conditions, as indicated by bidirectional arrows.

Figure 2: Kaptelinin and Nardi's depiction of the hierarchical structure of activities (2006, p. 64) (reproduction of Figure 1).

This motive is roughly equivalent to the object or the outcome that the person engaged in the activity hopes to achieve. Kaptelinin and Nardi (2006) clarify this point by stating that:

...An activity may be composed of a sequence of steps, each of which is not immediately related to the motive even though the sequence as a whole may eventually result in attaining the motive. In activity theory terminology, these components of activity are called *actions*. The objects at which they are directed are called *goals*" (p. 62).

In the context of this research, the purchase of an e-book from Amazon.com is an action that forms part of the larger activity of acquiring that book, combined with other actions such as downloading the book to an e-reader. Actions are made up of operations, which are "...routine processes providing an adjustment of an action to the ongoing situation. They are oriented toward the conditions under which the subject is trying to attain a goal" (Kaptelinin & Nardi, 2006, p. 63). When a person engages in an activity, "the actions are what he or she is consciously doing...whereas the operations are what he or she does to realize this [action]" (Bødker, 1989, p. 175). Operations are the unconsciously carried out steps that compose an action (i.e., we do not typically need to consciously think about

turning the pages of a book). In the case of reading, we might consider reading a book as an action, and picking up an e-reader, turning it on, and turning pages (perhaps by pressing navigational buttons or touching the screen of the device) as the operations that compose this action.

As Kaptelinin and Nardi (2006) note, however, activity theory incorporates an understanding of “the possibility of dynamic changes between levels” (p. 7); the hierarchy is not rigid and inflexible. That is, operations, actions, and activities are not necessarily permanently fixed at one level of the hierarchy. “Even though activity, actions, and operations appear to form a hierarchy, these levels are not fixed once and for all: Transformations between operations and actions and between actions and activity take place all the time in specific situations” (Bødker, 1989, p. 177). More specifically, Bødker notes that operations become actions when a user is forced to consciously shift their attention to that operation, making it no longer an unconsciously carried out task. For example, a user might be very familiar with the process of dog-earing a page of a paper book to return to it later (in which case it is an operation), but may have to investigate the process of doing so when using a new e-reader (in which case, dog-earing or bookmarking becomes an action). This adjustment, in which what was formerly an operation becomes an action (or when, what is an operation while using one artifact as a tool becomes an action in learning to use a new artifact with new affordances), marks a shift in the user’s attention. The user’s shift in attention at such points can support a shift in analysis on the part of the researcher; for instance, Bødker employs investigations of these kinds of shifts as a research tool for identifying breakdowns in user interfaces. I employ a similar analytical tactic in Chapter Five, in which I examine how reading activities become reading actions when the reader recognizes that their reading serves a larger goal.

Activity theory provides a framework for understanding how activities exist as a combination of actions, each of which is made possible through a combination of operations. When artifacts are used as tools within operations (and therefore within actions), the specific affordances of those artifacts create the conditions surrounding the operations. This theory therefore supports an understanding of how seemingly small differences in the affordances of paper and e-books can influence whether people perceive them as artifacts that are able to contribute to specific higher-level activities. The fact that readers tend to continue reading paper books even after adopting e-reader and e-book technologies (Zhang & Kudva, 2014) suggests that paper and e-books may have distinct functions for readers, that they may function differently as tools, and therefore support different actions and activities.

### **Mediation: How Tools Shape Activities**

Tools—physical or mental “artifacts” that humans employ in their pursuit of activities—are seen as having critical importance within activity theory. Although they do not explicitly appear within the hierarchy diagram in Figure 1 (and 2) above, tools are represented in that their affordances create the conditions under which people are then able to engage in particular operations. Tools that subjects (people) utilize in their pursuit of objects (outcomes of activities) mediate—or shape—interactions between subjects and objects. Wertsch (1981) notes that tools are central to activity theory’s conception of activity, arguing that tools do not “simply mediate some activity that would exist without them,” but that they “allow and even lead to the creation of types of activities that would not otherwise exist” (p. 23). As Kaptelinin and Nardi put it, “tools shape the way that human beings interact with reality” (2006, p. 70). This conception of tools as mediators that shape the way activities are carried out (and even which activities are possible), is

key for the goals of this research because the proposed study seeks to understand how different artifacts (paper or e-books) used as mediating tools may support different kinds of activities. As activity theory emphasizes that activities are means for human development and self-transformation through activity, tools play a central role in that they shape possibilities for development. Activity theory also emphasizes that tools are carriers of the knowledge of the people who design, create, and alter them over time, and are therefore embodiments of historical knowledge. In the case of e-readers, for instance, their design draws heavily from that of the paper book, imitating its size, the concept of pages, and the presentation of text on the screen. As embodiments of historical knowledge, tools (including artifacts when they are used as tools) have a “special status” in activity theory as “fundamental mediators of purposeful human actions that relate human beings to the immediately present objective world and to human culture and history” (Kaptelinin & Nardi, 2006, p. 71). In this project, I consider the various types of books as examples of tools in the activity theory sense; for instance, we might note how the design of e-books frequently draws on that of paper books in its’ conception, relying on the history and knowledge represented by the form of that established tool.

### ***Books as Mediating Tools***

Activity theory provides a framework for examining how artifacts come to be used as tools for the pursuit of particular objects, and how the affordances of those artifacts support them in that pursuit. When the artifacts are books, reasons for interacting with them may be as simple as the enjoyment derived from reading for pleasure, or as complex as defining one’s identity through building a personal book collection over time. These simple and complex motivations may also frequently overlap, for instance when personal preferences regarding what kind of books are enjoyable to read contribute to the

reader's personal identification as a fan of a particular genre such as science fiction or romance.

While paper and e-books were both designed as ways to allow a reader to access a text, the material constructions of the two kinds of books differ—with the effect that they have different affordances. For instance, an e-book can be downloaded immediately upon a decision to purchase, while acquiring a paper book is a lengthier process, due to the infrastructures (online shopping vs. physical bookstores) that support their acquisition. These infrastructures in turn rely on the material constructions of those artifacts, in that purchasing a paper book requires going to a bookstore or ordering it online (and waiting for it to be delivered). The digital construction of an e-book, on the other hand, allows for it to be downloaded by a user from the Internet. These affordances affect the conditions under which the operations occur that make up the action of buying a book. While these affordances do not affect what genre of novel a reader enjoys, they might affect that reader's choice of medium for accessing a book in that genre depending on the context of acquisition. A reader might choose to acquire a novel in e-book form that she would normally purchase as paperback because of upcoming travel—the e-book affordances of being accessible through the same device as other books and not adding extra weight to luggage are often mentioned as advantages within the context of travel.

Thus, activity theory enables me to investigate how the affordances of physical and digital books enable or limit how they can function in operations and actions. As Chapters Five and Six will demonstrate, these affordances affect how book artifacts can be used as tools within particular activities (that is, activities with distinct and differing objects).

While, as noted previously, most recent activity theory research within HCI has focused on collaborative activity within the context of the workplace, I am focused

instead on activities undertaken by individuals within their personal lives, which has also been the realm in which most of the relevant HCI research on interactions with physical and digital artifacts has taken place. As demonstrated in that work (e.g., Golsteijn et al., 2012b; D. S. Kirk & Sellen, 2010; Odom, Sellen, et al., 2012; Petrelli & Whittaker, 2010), an investigation of how people use artifacts in their personal lives tends to surface issues of personal identity and cultural uses of artifacts. This leads us to the second theoretical perspective that I draw on for this research: that of the “‘cultural’ approach to understanding material culture” (Woodward 2014, p. 85).

### **MATERIAL CULTURE: USING ARTIFACTS TO CREATE IDENTITY AND CULTURE**

Material culture is the study of the relationships between people and artifacts, and “[i]n particular, studies of material culture are concerned with what uses people put objects to and what objects<sup>24</sup> do for, and to, people” (Woodward 2014, p. 14). While material culture studies has gone through various theoretical transformations over time (see Woodward 2014 for a review), the dominant approach in the field currently is one that understands culture as being “...dynamically constituted through people-object interactions” (Woodward 2014, p. 98). Woodward notes that this wave of material culture studies is best represented by the work of anthropologists Mary Douglas (Douglas & Isherwood, 1979) and, later, Daniel Miller (Miller, 1987, 2001, 2010). This generation of material culture studies is distinct from previous generations in two ways. First, it espouses the belief that artifacts can perform positive social and cultural functions, i.e., it is not only “concerned with what industrial, consumer culture forces upon us, but [also] with what it allows us to be” (Woodward, 2014, p.99). Second, it asserts that humans are

---

<sup>24</sup> The use of the term “object” in the material culture literature is as a synonym for “artifact” rather than the meaning of “goal” that is typical to the activity theory context. Therefore, when the term “object” is included in quotations in this section, that is its meaning, although I continue to use the term “artifact” in the text outside of quotations.

active in these processes, not merely pawns whose labor is exploited to produce artifacts or who are caught in traps of “bogus developments of self which defy authentic human needs” (Woodward 2014, p. 85). That is, this perspective asserts that people are not necessarily exploited through processes of consumption, but are capable of creating meaning through their use of artifacts.

Douglas and Isherwood’s work *The World of Goods* marked the beginning of this approach to material culture within anthropology. In this book, they introduced the idea that “all material possessions carry social meanings,” and that goods “are needed for making visible and stable the categories of culture” (Douglas & Isherwood, 1979, p. 59). These social meanings allow other people to make determinations about the social status and lifestyle of the person displaying those artifacts. Their argument is that we can see “goods then as markers, the visible bit of the iceberg which is the whole social process” (1979, p. 74). In other words, the ways in which people use and display objects can make otherwise fleeting social distinctions visible. As Woodward describes it, Douglas and Isherwood revealed the human acquisition of consumer artifacts as a “continuous opportunity to perform, affirm, and manage the self” (Woodward, 2014, p.96).<sup>25</sup> This approach to material culture marks a shift to focusing on consumption rather than production of artifacts, and to understanding the consumer as an active and informed force in these processes. As Woodward (2014) describes it,

...Objects also carry personal and emotional meanings, they can facilitate interpersonal interactions and assist a person to act on him or herself... Objects, then can assist in forming or negating interpersonal and group attachments, mediating the formation of self-identity and esteem, and integrating and differentiating social groups... (p. 4)

---

<sup>25</sup> In taking the perspective of activity theory, I then view consumer artifacts as tools used in the activities of identity performance and management.

Material culture, then, establishes that artifacts have the capacity to afford meaning and construct selfhood. While Douglas and Isherwoods's (1979) work laid the foundation for this approach to understanding human relationships to artifacts, Miller has built on that foundation to become perhaps the most prolific and prominent contributor to current material culture research. I devote the remainder of this chapter to exploring two arguments from his book *Stuff* that have important implications for the current research and for understanding human interactions with artifacts more generally.

### **Depth Ontology and Display**

Miller (2010) characterizes the typical Western perspective regarding artifacts as espousing *depth ontology*. With this term, he refers to the assumption that "...*being*—what we truly are—is located deep inside ourselves and is in direct opposition to the surface" (Miller, 2010, p. 16). This assumption, he argues, encourages us to see external displays (such as displays of clothing and other artifacts), as shallow and superficial. Miller contends, however, that there is no logical reason to accept this understanding of the relationship between interior and exterior as accurate. He provides support for this assertion through discussion of Trinidadian culture, which he argues does not adhere to depth ontology but instead views the "surface" of an individual as the aspect of that person that truly represents who they are.

During ethnographic fieldwork in Trinidad, Miller (2010) witnessed the significance that his informants placed on personal appearance, clothing, and accessories in the impoverished squatter community in which he was embedded as a researcher. The Trinidadians he observed devoted much of their time and resources to activities that centered on creating, polishing, and exhibiting "looks." Miller recounted that, "a common leisure activity was to hold a fashion display, on a temporary catwalk, along one of the



open spaces within the squatters' encampment" (2010, p. 14), and that the Trinidadians he studied would often spend hours choosing the perfect outfit for a social event. The goals of these practices were not, Miller found, to display ownership of coveted brands or "on-trend" clothing items, but instead to combine articles of clothing in a unique way as a means of self-expression—not about fashion, but about personal style.

Through this and other examples drawn from his informants' practices, Miller builds an argument that Trinidadians believe that the aspects of a person that are freely chosen are the most indicative of the "true nature" of that person. For instance, he notes that Trinidadians did not ask about profession or employment when getting to know strangers, because this was seen as unimportant: "It is the things one chooses freely to do that should define you, not the things you have to do" (2010, p. 18). From this perspective, people's personal choices in crafting their external appearances are much more meaningful than their hidden interior lives:

...a person who spends time, money, taste, and attention in creating a look, where the final look is the direct result of all that activity and effort, can properly be discovered in their appearance. Because now one is judging what they have done, not what they happen to look like originally. (Miller, 2010, p. 21)

Miller does not, however, claim that the Trinidadian view is correct and the belief in depth ontology is mistaken; instead, his point is instead that neither view is *necessarily* true. And indeed, even in a Western culture that does generally accept the depth ontology perspective, displays of artifacts still function to create social meanings (as I will describe in Chapter Six); we are just more reluctant, perhaps, to recognize the significance of those displays and tend to regard them as trivial. Miller's work (Miller, 1987, 2001, 2010; Miller, Jackson, Thrift, Holbrook, & Rowlands, 1998), other research within in material culture (Appadurai, 1988; Csikszentmihalyi & Rochberg-Halton, 1981; Douglas & Isherwood, 1979; Gregson, 2011), and the HCI research on interactions with physical and

digital artifacts (e.g., Golsteijn et al., 2012b; D. S. Kirk & Sellen, 2010; Odom, Sellen, et al., 2012; Petrelli & Whittaker, 2010) all demonstrate that practices of using artifacts to create and maintain personal identity are also present in more Westernized cultures, although the significance of these practices may not be as widely recognized as it is in Trinidad.

### **Humility of Things**

Although the previous section relied on an example of relatively conspicuous practices of artifact display, Miller (2010) also contends that the ways in which artifacts can influence human behavior are often much more subtle. This is what he refers to as the “humility of things”—the argument that artifacts are important,

...Precisely because we do not see them. The less we are aware of them, the more powerfully they can determine our expectations, by setting the scene and ensuring appropriate behavior, without being open to challenge (2010, p. 50).

Drawing on Goffman’s *Frame Analysis*, Miller argues that artifacts provide a frame for human behavior and that the effects of this framing are powerful precisely because artifacts tend to fade into the background as people go about their daily lives. This perspective “...implies that much of what makes us what we are exists, not through our consciousness or body, but as an exterior environment that habituates and prompts us” (2010, p. 50-51). Miller illustrates this argument by recounting fieldwork he carried out as a student examining how people in an Indian village used pots of various shapes for different purposes such as carrying milk or water, cooking, as oil lamps, and for ceremonial purposes. Miller’s difficulty in conducting this research was, he says, “...the degree to which the Indian villagers I lived with thought I was completely bonkers to be spending so much time looking at pottery” (2010, p. 50). What sane person would spend all of their time at a wedding examining the decorative wedding pots rather than the

marriage ceremony itself? Eventually, he came to understand their perspective: “...the pots were not the point, they were the frame” (Miller 2010, p. 50). Miller’s argument is that, despite his eventual sympathy for the villagers’ point of view, the artifacts were able to influence human behavior—to “set a scene”—precisely because they were an expected and unchallenged aspect of the background.

The commonalities between Miller’s arguments about both the capability of artifacts to play powerful and conspicuous roles in identity formation and presentation, and to influence human behavior more subtly, are that these arguments rely on the properties of physical artifacts. Woodward (2014) notes that material culture studies have typically understood their focus as being “smaller objects that are portable” (p. 3), and that are perceptible both by touch and by sight (p. 14). This holds true in Miller’s research; in his claims about the humility of things, for instance, these claims explicitly rely on the fact that even if people are not paying direct attention to artifacts, the presence of the artifacts is peripherally visible and may therefore influence behavior. In contrast, this dissertation research and the previous HCI research on which it builds examines how our understanding of the processes of material culture might change when the artifacts in question are digital. How do people carry out practices of meaning-making with digital artifacts (which, for instance, are not “peripherally visible” in the same way as are physical artifacts)? How do the differing affordances of physical and digital artifacts influence the ways in which people are able to employ those artifacts in meaning-making processes? These questions return us to a commonality of activity theory and material culture which is central to allowing me to combine these perspectives in framing this research: their emphasis on the role of human agency in the processes they examine.

## **HUMAN AGENCY IN ACTIVITY THEORY AND MATERIAL CULTURE STUDIES**

Both activity theory and recent work in material culture studies emphasize human agency in their respective approaches to understanding human activity and development, and to understanding how people create meaning through artifacts. Vygotsky's foundational work on activity theory centered around the notion that humans use tools to organize and direct their behavior, and that an investigation of these processes of tool usage can provide insight into "the higher forms of human behavior" (Vygotsky, 1986, p. 102). Vygotsky viewed activity as being, in many cases, a means for self-transformation and self-mastery, emphasizing how people were able to change and develop themselves through engaging in activities—and how tools were central to these processes (Vygotsky, 1978). Scholars of material culture endeavor to show how people shape themselves, and shape their cultures, through interactions with artifacts (which I argue is a high-level activity in Vygotsky's sense), and in the process of this endeavor these scholars focus on the active role that consumers or owners of artifacts play in creating meaning through use of those artifacts. Both perspectives, then, focus on how people change themselves through their uses of artifacts.

These perspectives are also aligned in that they view the agency of the people they study as central to understanding their phenomenon of interest, which is also key to my approach in this study. My approach foregrounds participants' agency in that it focuses not only on their behavior but on their own understandings of that behavior. Participants' agency is additionally highlighted through my focus on participants' choices in using artifacts, which reflect how they see those artifacts are able (or unable) to support them in carrying out activities. In the next chapter, I describe my methodological approach to collecting data that describes both participants' interactions with book artifacts and how they interpreted those interactions. I rely on this data in Chapters Five

and Six to compare how paper and e-books function within various kinds of activities—perhaps most meaningfully, identity-related activities such as those described by the literature on material culture.

## **Chapter Four**

### **Research Design: Studying How People Use Books**

Material culture research has shown how artifacts play key roles in human lives. People use artifacts to represent personal relationships, to signify affiliation with social groups, and to construct and maintain personal identities—in an important sense, artifacts act as tools that support these kinds of activities. Recent HCI literature that examines differences in human interactions with physical and digital artifacts suggests that digital artifacts are not necessarily capable of supporting these activities in the same ways that physical artifacts do. This study endeavors to examine the implications of human use of digital artifacts as tools instead of or alongside physical artifacts. It seeks to examine the differences in the functions of physical and digital artifacts, and the larger implications of those differences, by examining human interactions with paper and e-books—i.e., examining how the differing material constructions of paper and e-books affect how people use them and, relatedly, their perceptions of the value of those artifacts.

As I outlined in the prior chapter, in seeking to understand the ways in which people use physical and digital artifacts differently, I employ the theoretical framework of activity theory. Activity theory's emphasis on human agency aligns with similar perspectives within current thinking in material culture and within HCI (where activity theory has many proponents), as shown in Chapter Three and reflected in the current emphasis on user-centered design within HCI. In drawing on these perspectives this study also centers on human agency, focusing on understanding how people choose artifacts for particular purposes and how the affordances and limitations of those artifacts relate to people's perceptions of them as being useful tools for those purposes. While activity theory provides a useful framework for understanding connections between affordances of artifacts and the activities that those artifacts can support, it also provides a broader

theoretical focus for the study in emphasizing how humans purposefully use artifacts as tools, and how those tools can powerfully shape the activities to which they contribute through opening up new possibilities for action. This emphasis ties in with the primary investigative goal of the study: to understand how people choose to use paper and e-books and the characteristics of these artifacts that make them suitable, in the eyes of participants, for these uses.

### **RESEARCH QUESTIONS**

With the goal of understanding and comparing interactions with paper and e-books, the dissertation is framed by the following research questions:

1. In what contexts and for what activities are paper books preferable to e-books (and vice versa), and why?
2. How are the affordances and limitations of each kind of artifact related to the activities that they can (or cannot) support for users?
3. Do expectations about ownership and long-term interactions with books differ between paper and e-books, as previous research suggests? If so, which affordances and limitations of paper and e-books contribute to these expectations, and how do participants' expectations affect their interactions with paper and e-books?
4. Previous research suggests that the personal and social implications of book collection and display may vary between paper and e-books. If they do, what are these differences, and how do they affect the uses of paper and e-books within activities?

Questions one and two are broad in scope, and consider any potential use of paper or e-books. These questions focus on the activities within which participants use books and how the affordances of different book artifacts might affect their uses in those activities.

Questions three and four focus on two aspects of human-artifact relationships that previous research in HCI suggested could be central in understanding differences in interactions with physical and digital artifacts: RQ3 considers the time spans of these relationships—anticipated long-term uses of artifacts—and RQ4 questions the ways in which artifact visibility might affect both inward-facing (personal) and outward-facing (social) uses of book artifacts.

Understanding people's interactions<sup>26</sup> with paper (physical artifacts) and e-books (digital artifacts) and making comparisons between those interactions required that I gather two kinds of data: data that described the interactions themselves (how book artifacts are used in the contexts of participants' daily lives—location, time, duration, type of book, etc.), and data on how participants felt about those interactions and the artifacts with which they interacted. This strategy ensured that my discussions with participants about their behaviors and feelings were grounded in an accurate understanding (on both our parts) of those behaviors and the activities to which they contributed. I collected these two types of data through three complementary and intertwined methods: diary studies, home tours, and semi-structured interviews. In the diary studies, participants recorded information about book reading and acquisition events as they occurred over a four-week period. In the initial development stages of the study, I tested the diary study method with a pilot study. The results of the pilot study led me to both refine the diary methods and to include the additional method of home tours to collect data that would provide an alternative perspective on participants' uses of books. Home tours provided insight into participants' long-term interactions with books within the context of the home, as well as revealing the immediate contexts of many of the reading events recorded in the diary study. Home tours also provided access to

---

<sup>26</sup> In the sense of “operations and actions in which people engage with artifacts as tools.”



participants' physical and digital book collections, supporting me in grounding our interviews in discussion of these collections as evidence of past, and ongoing, interactions with books. These methods provided concrete evidence of participants' interactions with, and feelings about, paper and e-books.

Through reviewing diary study data with participants as part of the semi-structured interviews and continuing those interviews during the home tours, I deepened my understanding of the diary data and of participants' own perceptions of their behaviors and practices. My use of interviews to supplement the diary studies and home tours therefore allowed me to gain an understanding not only of how participants interacted with books (and how this differed across paper and e-books), but also what those interactions meant to them.

This chapter describes in detail the research design—a combination of diary studies, home tours, and interviews—that I employed in pursuit of understanding participants' relationships to physical and digital book artifacts. I begin by discussing my approach to participant recruitment, including a description of the recruitment techniques I used and the basic demographic characteristics of the resulting group of participants. This discussion is followed by a review of diary study methods, an explanation of the design of the diary methods employed in this study, a discussion of the home tour method and my approach to it in this study, and my incorporation of the diary study and home tour data into semi-structured interviews with participants. Finally, I discuss my analysis of the data that resulted from these methods.

## **RECRUITMENT AND PARTICIPANT SELECTION**

I utilized purposive sampling in this study to recruit a group of participants who engaged in the behaviors that were the subject of study (Silverman, 2000), in this case,

interactions with book artifacts (paper and digital). The previous HCI studies on which this work builds aimed at understanding differences in human relationships to physical and digital artifacts defined broadly, and therefore typically placed few restrictions on recruiting beyond engaging a diverse sample of participants. However, the focus of this study required that I recruit participants who would be a good source of data for understanding interactions with books. Therefore, I focused my recruiting efforts on people who regularly interacted with those artifacts. Yet within that general requirement, I chose to define the book artifact broadly (including audiobooks and e-books read on any device, not limited to e-readers) and to include non-e-book readers (as well as people who do read e-books) to encourage participation by as diverse a set of book-using participants as possible.

As a phenomenon of interest, however, book usage presents particular difficulties that required multiple approaches to recruitment. As reading is a behavior that is typically solitary in nature, readers can be a difficult population from which to recruit.<sup>27</sup> When studying such privately conducted behaviors, purposive sampling methods of recruitment in which the researcher contacts potential participants using multiple approaches are often necessary (Blaikie, 2010). Therefore, I utilized several methods for participant recruitment, the first of which involved seeking out “groups, settings and individuals where... the processes being studied [were] most likely to occur” (Denzin & Lincoln, 1994, p. 202).<sup>28</sup> I initially recruited participants through flyers (see Appendix A) posted in public places associated with reading such as coffee shops and bookstores,<sup>29</sup> and

---

<sup>27</sup>The modern image of reading is of a silent, contemplative activity that is done primarily in private by an individual person (Littau, 2006; Marshall, 2010). Reading was not always a silent activity; as Littau notes, innovations such as word spacing and eventually the printing press contributed to a shift in reading practices from books being read out loud and publicly to being read silently and in private (2006, p. 15).

<sup>28</sup>As cited in Silverman 2000, p. 104.

<sup>29</sup> I was not able to post flyers in libraries, as public libraries have prohibitions against posting advertisements that offer payment.

through book groups (both publicly advertised groups and several private groups that were known to me). In the flyers, I suggested that participants should read books “at least several times a week,” ensuring that all of the participants would interact with books frequently during the study.

Previous research has also highlighted challenges in recruitment and retention of participants with diary studies (Baxter, Courage, & Caine, 2015; Carter & Mankoff, 2005; M. Iida, Shrout, Laurenceau, & Bolger, 2012; Palen & Salzman, 2002; Rieman, 1993; Sohn, Li, Griswold, & Hollan, 2008) and other types of longitudinal research methods (Abshire et al., 2017). Additionally, based on Hartel’s discussion of the challenges of recruitment for a study that involved visiting participants’ homes (Hartel, 2007), and my own previous experience conducting home tour research (Gruning & Lindley, 2016), I anticipated that some potential participants might not be initially comfortable with the idea of allowing a researcher into their homes. I addressed this concern in two ways: first, I initially met informally with potential participants in a public setting to give them an opportunity to become familiar (and hopefully comfortable) with me and with the requirements of the study.<sup>30</sup> Second, I offered compensation to participants (Church, 1993; Simmons & Wilmot, 2004) to signify my respect for their time and the effort required of them to participate. This offer of compensation, along with my incorporation of several participant retention strategies, was intended to mitigate the potential difficulties associated with the chosen methods. These mitigation efforts proved to be successful, and of 30 recruited participants only three left the study before completion. The compensation and retention strategies I employed are discussed in detail in the Participant Retention and Compensation sub-sections below.

---

<sup>30</sup> This meeting also served as an introduction to and preparation for the diary study, as described below.

One recruitment difficulty that I did not anticipate was that the majority of the people who initially volunteered to participate in the study were female. Because of this issue, once I had successfully recruited 19 participants,<sup>31</sup> I began to turn away female volunteers and to actively seek male participants to gain more of a balance of participant gender in the study. However because women are more likely than men to be readers (see Figure 3 on p. 78), I did not attempt to achieve an even balance of male and female participants (sixteen women and eleven men participated). To recruit additional male participants, I supplemented my initial methods to include recruitment through word-of-mouth and snowball sampling.<sup>32</sup> Recruiting participants through word-of-mouth can be a valuable tactic in cases of recruitment difficulties—in this case, correction of the initial extreme gender imbalance in the study justified using this approach. Table 1 shows the numbers of participants recruited through each tactic.

<b>Recruitment Method</b>	<b>Number of Participants</b>
Flyer	9
Snowball sampling	9
Word-of-mouth	6
Book groups	3

Table 1: Number of participants per recruitment method.

Word-of-mouth and snowball sampling as recruiting tactics have additional advantages in that they allow researchers to build trust with potential participants through third parties who are willing to provide recommendations on behalf of the researcher,

<sup>31</sup> Three participants left the study before completing the diary study.

<sup>32</sup> Snowball sampling is a sampling tactic in which current study participants recommend others who are known to them for participation in the study. Blaikie notes that this method is often used with difficult-to-identify populations (2010, p. 179).

“leverage[ing] the trust and goodwill within social networks” (Hartel, 2007, p. 63). When conducting research in an intimate and personal environment such as a home, gaining potential participants’ trust is essential. In this study, I asked current participants to act as third parties in recommending me to new potential participants, employing snowball sampling as a form of trust-building for recruitment purposes.

The use of word-of-mouth recruiting and snowball sampling in this project also proved to be advantageous in that it yielded participants who were regular readers but who would not have been reached through flyers. These were participants such as parents with busy schedules, heavy library borrowers who did not frequent bookstores or coffee shops (primary locations where I placed flyers), and e-book readers who did not often visit bookstores.

### **Participant Profile**

Table 2, below, describes basic demographic information regarding the participants, as well as information about the devices they used to read e-books and their library usage. I recruited thirty participants, twenty-seven of whom completed the study (sixteen women and eleven men). Participants’ ages ranged from 22 to 67 and at the time of the study they were in various stages of their lives: from a recent college graduate, to those in established careers, to one retiree. Participants lived in or near three large cities in the northeastern and southern United States. Five participants lived in suburban and rural areas, and the remaining 22 resided in urban areas.

<b>Participant Number</b>	<b>Gender</b>	<b>Age</b>	<b>Occupation</b>	<b>E-Book Reader</b>	<b>E-Book Device</b>	<b>Library Borrower</b>
P1	F	37	Playwright	Yes	iPad	No*
P2	F	48	Occupational therapist	No	N/A	Yes
P3	F	39	Social worker	Yes	iPad	Yes
P4	F	40	Marketing manager	Yes	Kindle	Yes
P5	F	67	Lawyer (retired)	Yes	Kindle, iPad, phone	Yes
P7	F	38	Project manager	Yes	iPad	Yes
P8	F	29	Manager at non-profit	Yes	Kindle	Yes
P9	F	34	Librarian	Yes	iPad, phone	Yes
P10	F	30	Client relations at non-profit	Yes	iPad	Yes
P11	M	45	Accountant	Yes	Kindle	Yes
P12	F	29	Content manager	Yes	Nook	Yes
P13	M	40	Construction manager	Yes	Kindle	Yes
P14	F	34	Science tutor	No	N/A	Yes
P17	M	22	Hotel clerk and Bartender	Yes	Kindle, Kindle Fire	Yes
P18	F	33	Content manager	No	N/A	No
P19	F	31	Designer	Former	Nook	Yes
P20	M	67	Sales representative	No	N/A	Yes
P21	F	34	Customer relations representative	Yes	Kindle	Yes
P22	F	64	Project manager	Former	iPad	Yes

Table 2: Participant demographics and usage of e-books and libraries.

<b>Participant Number</b>	<b>Gender</b>	<b>Age</b>	<b>Occupation</b>	<b>E-Book Reader</b>	<b>E-Book Device</b>	<b>Library Borrower</b>
P23	M	65	Lawyer	Yes	Kindle	No
P24	M	34	Financial analyst	Yes	Kindle	Yes
P25	M	29	Librarian	Yes	Kindle	Yes
P26	M	38	IT consultant	Yes	Kindle	No
P27	M	36	Fireman	Former	Nook	Yes
P28	F	24	Financial analyst	No	N/A	No
P29	M	25	Software developer	Yes	Phone	No
P30 <sup>33</sup>	M	33	PhD student in computer science	No	N/A	Yes

Table 2 (cont'd): Participant demographics and usage of e-books and libraries.

Qualitative research is often judged in terms of transferability and credibility (in the sense of research findings accurately reflecting reality (Shenton, 2004)) as opposed to the standard of generalizability that is at issue in large-scale quantitative research (Creswell & Miller, 2000; Lincoln & Guba, 1985; Shenton, 2004). Transferability refers to providing adequate information about the details of participant recruitment and data collection to support comparisons between the study under discussion and other research studies (Shenton, 2004); the purpose of this chapter is to provide such information. A detailed description of the approach to participant recruitment as well as relevant demographic information regarding the resulting group of participants is key to allowing judgments about transferability and credibility. Credibility, according to Merriam (as cited in Shenton, 2004), is concerned with answering the question, “How congruent are

---

<sup>33</sup> The participant numbers reflect the initial number of participants in the study; to avoid introducing confusion into the data set, I chose not to re-order participants numbers when P6, 15, and 16 left the study.

the findings with reality?” (1998). Shenton identifies 14 means of ensuring the credibility of qualitative research, some of which (e.g., random sampling and becoming familiar with relevant organizations) were not appropriate for this study. My adherence to other means of ensuring credibility are described elsewhere in this chapter, such as the use of established research methods (throughout), triangulation through the use of multiple methods (throughout), reflective commentary practices on the part of the researcher (Home Tours section), member checking (Semi-Structured Interviews section), and tactics to ensure honesty in participants (e.g., ensuring they are aware that they are not required to participate in the study, see Appendices B and E). Further evidence of the credibility of this research (according to Shenton’s [2004] 14 criteria), such as thick description of the phenomenon under investigation and comparisons of the findings of the study against those of prior relevant research, is provided in Chapters Five and Six. I also sought peer scrutiny of the research project (another of Shenton’s [2004] recommendations) through presentations of this work both within the School of Information and at international conferences.<sup>34</sup> As Silverman (2000) and Hammersly (1992) note, yet another means of estimating the credibility of a small-scale, in-depth qualitative study is to obtain “information about relevant aspects of the population of cases” (Silverman, 2000, p. 103) and compare the current case with them, thus providing some indication of how this study’s participants might compare the larger population of relevant cases or potential participants for this study.

The Pew Center regularly conducts surveys on reading habits and adoption of digital reading technology in the United States, which provide such a basis for comparison. While the participants in this study read more frequently than the population

---

<sup>34</sup> Such as the conferences of the Society for Social Studies of Science (4S) and Human Factors in Computing Systems (CHI).



included in the Pew Center's definition of "readers,"<sup>35</sup> overall they align with the Pew Center's demographic descriptions for the group of people in the United States who engage in the behavior of reading books. The Pew statistics, shown in Figure 3, show that women were more likely than men to have read a book in the past year (77 percent as opposed to 69 percent), and reported that reading rose with education level and income

**College graduates are especially likely to read books in both print and digital formats**

*% of U.S. adults who say they have \_\_\_\_ in the previous 12 months*

	Read a book in any format	Read a print book	Read an e-book	Listened to an audio book
Total	73%	65%	28%	14%
Men	68	61	27	14
Women	77	70	29	14
White, non-Hispanic	76	70	31	15
Black, non-Hispanic	69	63	23	11
Hispanic	58	48	18	12
18-29	80	72	35	16
30-49	73	65	32	15
50-64	70	64	24	15
65+	67	61	19	9
Less than high school	45	38	11	12
High school grad	62	55	19	9
Some college	81	74	32	14
College+	86	79	41	20
Below \$30,000	65	59	19	9
\$30,000-\$49,999	74	68	26	16
\$50,000-\$74,999	75	69	33	19
\$75,000+	81	73	40	16
Urban	75	69	29	17
Suburban	73	64	30	14
Rural	66	61	22	10

Source: Survey conducted March 7-April 4, 2016.  
"Book Reading 2016"

PEW RESEARCH CENTER

Figure 3: Readers in the United States (Pew Research Center, 2016)

<sup>35</sup> The Pew Research Center defines a reader as a person who has read at least one book within the past year, and they found that 73 percent of Americans fell into this category in 2016.

(Pew Research Center, 2016). City dwellers were more likely to read than those who lived in rural areas, and White respondents were more likely to have read in the past year than Black respondents, who were more likely to have done so than Hispanic respondents. Finally, younger respondents (ages 18 to 29) were the most likely to have read a book in the past year (at 80 percent), a statistic that dropped several percentage points with each age group to a level of 67 percent for survey participants aged 65 and older (Pew Research Center, 2016).

This study's participants reflect the groups identified by Pew as those more likely to be readers. That is, this study included more female than male participants (16 sixteen female, 11 eleven male), and participants were primarily White, although the study also included Black, Hispanic, and Asian participants. Participants' ages ranged from 22-67 (ages are listed in Table 2 above), and fell into the Pew-defined age ranges as such: six participants in the 18-29 age range, sixteen in the 30-49 range, two in the 50-64 range, and three in the 65 and older range. As a group that was more female, educated, white, young, and urban-dwelling than the majority of the population, they appear to parallel the typical reading population as described by the Pew Center's data.

### **Privacy and Ethical Considerations in Participant Recruitment**

Prior to conducting the pilot study for the diary method, I applied to the Institutional Review Board (IRB) at The University of Texas for approval of the pilot study design. This study was approved as exempt in January of 2015 (IRB protocol number 2014-12-0033). After completing the pilot study, I incorporated the home tour method into the research design and re-submitted the full study design for the dissertation project to the IRB in June of 2016, when it was again approved as exempt.

Although reading behavior may be considered private,<sup>36</sup> participants in this study did not express concerns to me about maintaining the confidentiality of their reading preferences and practices. Nonetheless, I explained to participants that their real names would not be associated with any publications from this research and that I would not discuss any details of their reading practices with other participants who knew their identities (i.e., who had recommended them for participation in the study). If there had been any aspect of their reading preferences and practices that participants wished to conceal, they could do so by not raising such topics during the study as I instructed them in the informed consent form (Appendix B):

...A possible risk [of participation] is if you perceive that a question asks you to reveal information you would prefer not to reveal about your book reading and acquisition practices. You can address this by declining to answer any question, with or without explanation to the researcher.

I would, of course, not necessarily have been aware if participants had chosen this option.

I maintained participants' confidentiality throughout the research by using participant numbers in place of names in both collected data (diary data, interview transcripts, and file-naming conventions) and publications from the study. While I did maintain a list correlating participant names and numbers for my own reference, this list was stored only on my personal computer (password-protected and not accessible to anyone but myself) and in secure cloud storage.

## **DATA COLLECTION**

In this section, I describe the methods I employed to collect data about participants' book reading and acquisition practices, as well as how they perceived and understood these practices. Throughout the process of designing the study, collecting data, and analyzing data, I used the activity theory framework to illuminate connections

---

<sup>36</sup> For instance, the public library system in the US has a long history of protecting the privacy of patrons' borrowing histories.

between affordances and activities. More explicitly, I relied on the framework for understanding how artifacts' affordances, which allow users to carry out operations, supported particular actions, and how actions then combined to make up the activities (see Chapter Three, p. 54-60). This framework foregrounded how particular artifacts were (or were not) able to support particular activities for participants, as well as the roles that artifacts' affordances played in supporting activities. I also relied on Bonnie Nardi's (1996) guidelines for activity theory research in the process of designing the study. Nardi notes four practical methodological implications for research that is carried out within an activity theory framework:

1. "A research time frame long enough to understand users' objects" (in the activity theory sense of the word 'objects' as aims or goals),
2. "Attention to broad patterns of activity,"
3. "The use of a varied set of data collection techniques," and
4. "A commitment to understanding things from users' points of view" (Nardi, 1996, p. 95).

These guidelines are centered around the activity theory emphasis on the agency of the individual and how that agency is visible through the organizing principle of activity, which is best observed broadly over time. These are the origins of Nardi's direction to researchers to attend to users' goals (or objects), which are visible in the "broad patterns of activity" that users create in working towards these goals, as well as her exhortation that users' own understandings of these goals are key in an activity theory approach (Nardi, 1996, P. 95). The third guideline is less directly centered on the prioritization of the user's perspective; however, its contribution to that goal is apparent in Nardi's criticism of other research approaches that rely entirely on observation and eschew interviewing. Nardi argues that this type of approach removes research

participants' own accounts of "what they think they are doing, and why" from the research data (Nardi, 1996, p. 81). The implication is that methods grounded both in observation of participants' activities *and* participants' own accounts of these activities are necessary for activity theory research, and this implication tends to result in the use of multiple methods. This understanding guided my approach to data collection in this study, and throughout the remainder of the chapter I refer back to these guidelines and how they influenced my research design choices. The following section provides an overview of diary methods prior to a more detailed explanation of how diary methods were used in this study.

### **Diary Study Methods**

Diary studies are common in many academic disciplines (particularly psychology and anthropology) and now feature as an integral part of HCI research (Palen & Salzman, 2002). Similar to other social science methods, which focus on the importance of context, diary studies are often used by researchers who aim to capture information about participants' behaviors as they occur within natural settings. In his early argument for the use of diary methods within HCI, Rieman argued that this approach is particularly suited to the needs of HCI research because of its combination of researcher control and ecological validity<sup>37</sup> (Rieman, 1993). In this study, I take a qualitative approach to diary methods, following other recent diary study research within HCI (Palen & Salzman, 2002; Rode, Toye, & Blackwell, 2005). In this approach, researchers aim to capture participants' feelings and reactions to technology usage in the moment of that usage, and often use diary entries as a starting point on which to base interviews (Palen & Salzman,

---

<sup>37</sup> Ecological validity is the extent to which the findings of a study accurately reflect participants' behaviors as they would occur in daily life.

2002; Rode et al., 2005). Here, Palen and Salzman (2002) describe their approach to incorporating diary methods as a supplement to other approaches:

...Our intention for the diary was not to collect rigorous, quantitative data; instead, we sought to learn about experiences that were significant to new users close to the time they occurred. We also wanted to develop a general understanding of the nature of use that could inform interview inquiry and the quantitative calling behavior data for each participant (p. 89).

In this study, I similarly grounded interviews in discussions of participants' diary data. This use of the diary data increased the validity of the interview data in that it allowed me to question participants about specific events that occurred in the course of their daily lives; this ecological validity is a key methodological advantage for which diary studies are known (Iida et al., 2012). Ecological validity refers to the data's accuracy in representing the events or behaviors it describes within their natural settings, i.e., "fidelity to context" in data collection (A. Dillon, personal communication, March 9, 2018).

For frequent readers such as the participants in this study, reading was a habitual practice in their daily lives, rather than an unusual event. Therefore, reading events were not noteworthy or unusual to participants, and it would have been difficult to obtain accurate and valid data on these events after the fact through interviews, as Marshall notes with regards to her experiences in researching reading behaviors (Marshall, 2010). Crucially, the diary data reflected how particular affordances of artifacts affected participants' decisions about which artifacts to use depending on the context of interaction (central to RQ1 and RQ2). Being able to rely on a record of actual events that occurred in participants' lives not only provided me with a concrete understanding of their reading and acquisition preferences and habits (i.e., the patterns in the ways that they used books), but also ensured that interviews were based in discussion of those actual events rather than, for instance, discussion of hypotheticals or vaguely remembered past events. This certainty is what Iida et al. (2012) and Rieman (1993) refer

to when they praise the validity of diary study data. This type of validity was particularly important for this study because of my focus on understanding how particular affordances of artifacts affected the ways that participants used them.

Two additional advantages of diary methods include their scalability and relative lack of intrusiveness, in that the researcher is not present during data collection (Carter & Mankoff, 2005). Directly observing book-related events in the daily lives of 27 people (the total number of participants who finished the study) would have been difficult, if not impossible. Relying instead on participants to collect data about their own behavior and provide that data to me made collection of this type of information feasible. These advantages both stem from diary methods' reliance on participants to collect data, however, this reliance is not only an advantage of diary studies but also their greatest drawback. The issue of participant burden is recognized as the major disadvantage of the diary study method (Baxter et al., 2015; Carter & Mankoff, 2005; M. Iida et al., 2012; Palen & Salzman, 2002; Rieman, 1993; Sohn et al., 2008). The aim of reducing participant burden was therefore a central motivator for many of the decisions I made in structuring the diary methods for in this study, which are described in the following section.

### **Diary Study Implementation**

The diary study I implemented in this research was an event-based photo-elicitation diary study in which 27 participants recorded and reported on book reading and acquisition events in their lives over a period of four weeks. This design was influenced by a small pilot study that I carried out in the spring of 2015, in which six participants tracked reading and acquisition events for six weeks. Throughout this section I refer to both the diary methods literature and the pilot study in justifying the rationale

for my research design. I also discuss the central design decisions that shaped this use of diary methods: the length of the diary period, incorporation of photo-elicitation into the diary study, composition of the diary protocol, my continued interaction with participants during the diary period, and the strategies I employed for participant retention.

### ***Diary Period Length***

One of the central decisions in designing a diary study is determining the length of the diary period. The two central concerns in determining the length of a diary study are ensuring collection of sufficient data and reducing participant burden (Iida et al., 2012). Because it was necessary to capture data on events that do not necessarily occur frequently—even people who are avid readers may have their reading practices interrupted by other life events—I tested the diary study length with a pilot study. I piloted a six-week diary study with six participants. Because I purposefully recruited individuals who estimated that they read books at least several times a week, I chose this length with the goal of yielding a minimum of 18 reading events (a minimum of three reading events per week) per participant; one purpose of the pilot study was to determine how many reading events were needed to gain an understanding of patterns in reading practices. My goal for the pilot study was to determine a length that would be sufficient to reveal patterns of reading practices, and would allow me to understand what “typical” interactions looked like, as well as identifying “unusual” interactions that did not align with a participant’s typical practices, and the factors that contributed to both typical and unusual interactions. The pilot participants averaged roughly 37 reading events per week, well over my initial goal. I did, however, notice a marked decline<sup>38</sup> in reported events across all participants during the last two weeks of the pilot study, which led me to

---

<sup>38</sup> During the first four weeks of the pilot study, participants averaged 17.25 more reading events than they did during the last two weeks of the six-week long pilot diary study.



conclude that a six-week diary period imposed too heavy a burden on participants. Narrowing my examination to the first four weeks of pilot data revealed that this length was sufficient to establish patterns in book usage, and I therefore decided to employ a four-week diary study in the dissertation research.

In determining the length of the diary period, I also took into consideration Nardi's first guideline for activity theory research: "A research time frame long enough to understand users' objects" (in the activity theory sense of the word "objects" as aims or goals) (Nardi, 1996, p. 95). Observing participants' behavior over time is important for activity theory research, because activities are composed of actions that do not necessarily take place concurrently but may be temporally discontinuous. Participants' practices unfold over time, and a single instance of a relevant event may not be sufficient to understand how that event or action fits into the larger picture of the activity or activities to which it contributes. The "attention to broad patterns of activity" (Nardi, 1996, p. 95) that Nardi includes as her second guideline is therefore also addressed through a research design in which participants' behaviors are tracked over time. In this study, this approach allowed me to observe how participants engaged in patterns of book-related actions that supported particular objects (in the sense of the aim of an activity). The diary study approach addresses this guideline by capturing data about many events in which participants interacted with books, allowing me to understand how the action taken in these events contributed to one or more activities within participants' lives.

The four week diary period I utilized is lengthy compared to many diary studies in HCI research, which may be as short as one day (Carter & Mankoff, 2005) but tend to range from five days (Adler et al., 1998; Rieman, 1993), to one (e.g., Brown, Sellen, & O'Hara, 2000; O'Hara & Perry, 2001) or two weeks (Chin, Herring, & Familant, 1992; Hayashi & Hong, 2011; Rode et al., 2005; Sohn et al., 2008). Palen and Salzman's (2002)

studies in which they implemented voicemail-based diaries are an exception to this rule at four and six weeks long. However, these studies employed multiple data collection methods and presented the diary study portions to participants as optional supplements to the main study. Consequently, participation in the diary portions of their study was relatively low, with participants submitting diary entries for fewer than half of the days of the study period (Palen & Salzman, 2002). One adverse effect of a lengthy diary study is that participants may not accurately recall events if they are not recorded immediately. To combat this potential issue, I incorporated the technique of photo-elicitation into the diary study.

### ***Incorporating Photo-Elicitation into the Diary Study***

Event-contingent diary studies often use a “feedback” approach, in which participants are asked to pause and answer diary questions at the time of an event. I chose instead to incorporate photo-elicitation methods into the diary study to lessen participant burden (Carter & Mankoff, 2005). When photo-elicitation is incorporated into a diary study, participants take a photograph to represent each event as it occurs instead of pausing to answer diary questions. Participants then used these photographs as prompts for answering the diary questions about the events at the end of each week when I contacted them with a reminder email.

In the diary study instructions provided to participants, I included an example photograph and suggested that they take pictures that would allow them to identify both the book they were reading and the context of the reading event, i.e., a photograph that showed some of their surroundings at the time of the event. For a reading event, photos typically showed the book in the participant’s hand as they read or placed in the location where the participant was reading, such as a table at work, an exercise machine, a park

bench, or on the bus (see Figure 4 for examples). Alternately, for a book acquisition event, a participant might (for instance) take a photograph of a stack of paper books that they had checked out from the library or a screenshot of the purchase page for a book on a website.

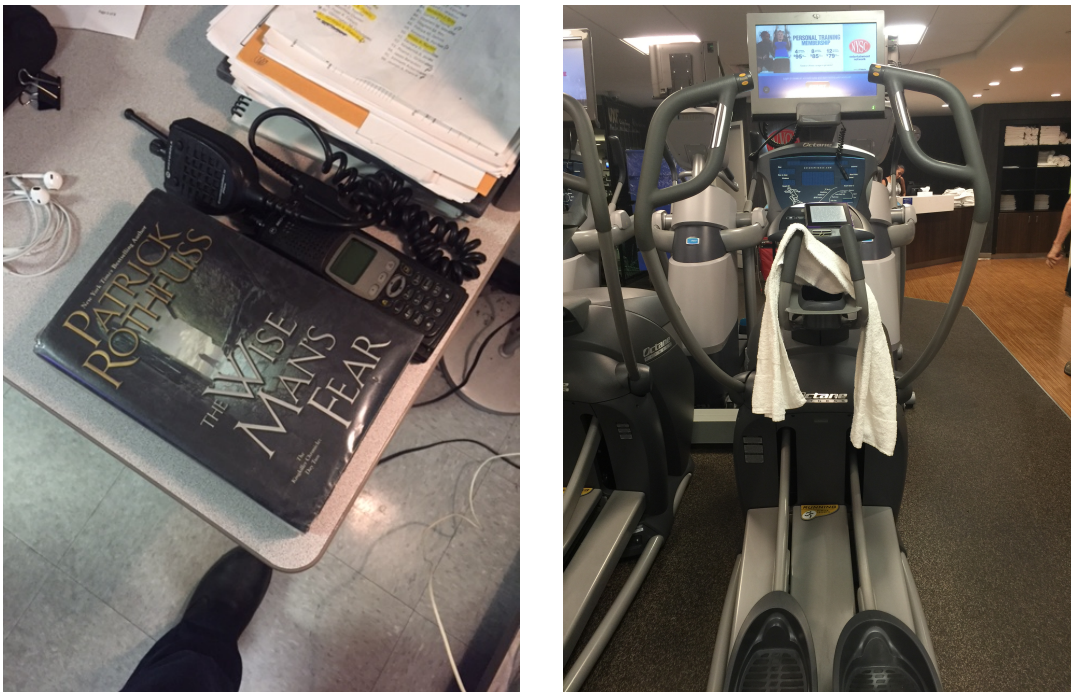


Figure 4: Examples of participants' photos documenting reading events: P27's paper book on a table at work (left), and P5's Kindle balanced on a stair climbing machine at the gym (right).

These photos also provided additional context for an event, giving more insight into a participant's surroundings than their words alone were able to do: for instance, the photos in Figure 4 of P27's paper book sitting on a table at the fire station where he was

reading during a slow period in his shift and P5's Kindle resting on a stair climbing machine at her gym.<sup>39</sup>

The photo elicitation technique does involve asking participants to recall events after time has passed, instead of asking them to report on events at the time that they occur. This increases the possibility of retrospective or recall bias, in that the delay in answering questions could cause the accuracy of participants' answers to suffer. However, "retrospective bias may be less of a concern if investigators are interested in examining concrete, objective events" (Iida et al. 2012, p. 280). Because the diary protocol used in this study (discussed in the following sub-section) focused almost completely on concrete and easily identifiable information (e.g., book title, location of event) rather than topics such as emotional states or feelings which are difficult to recall and define after time has passed (Redelmeier & Kahneman, 1996), retrospective bias was less of a concern for this diary study design.

### ***Diary Protocol***

The diary protocol was designed to capture the broad strokes of participants' reading and acquisition events without requiring lengthy responses. I provided participants with the diary questions ahead of time and reminded them weekly via email to send their diary entries to me. I suggested that they use the same device to take all of the photographs so that photographs would be easy to locate when it was time to answer the diary questions. In addition to the time and location of the event, the diary questions that I asked participants to answer were:

#### **Reading Events:**

1. What is the title of the book you are reading?
2. Is it an e-book, a paper book, or some other format (like an audiobook)?

---

<sup>39</sup> In this case, the title of P5's book is not visible, however this photograph followed another in which the book was identifiable.

3. If it is an e-book, what device are you using to read it?
4. How did you acquire the book (where did it come from, where did you get the book)? (If you already answered this question for this book in a “Book Acquisition” answer, you can skip it).
5. About how long did you read for? (An estimate is fine here – for example, “About 20 minutes,” or “More than an hour.”)<sup>40</sup>

**Acquisition Events:**

1. What is the title of the book you purchased or borrowed?
2. Where did you acquire the book? (Specific bookseller, library, friend, etc.)
3. What book format did you choose (e-book, paperback, hardback, etc.)? Were there other book formats available for this book, that you were aware of? If so, why did you choose the format you did?<sup>41</sup>

My aim in asking these questions was to capture basic descriptions of reading and acquisition events, and (in the case of the third acquisition question) to gather information regarding motivations behind choosing paper or e-books in acquisition events.

***Maintaining Contact with Participants throughout the Diary Period***

Collecting data on a weekly basis rather than collecting it at the end of the study served two purposes: first, it shortened the length of time that passed between the occurrence of events and participants’ recall of those events when answering the diary questions (minimizing retrospective bias), and second, it allowed me to maintain contact with participants throughout the study.<sup>42</sup> As Palen and Salzman (2002) note,<sup>43</sup> it is especially important in lengthy diary studies for researchers to have continued contact with participants for several reasons: this ensures that participants correctly interpret the diary protocol (because the researcher is able to review data prior to study completion), maintains participant interest in the study, and confirms for participants the importance of

---

<sup>40</sup> The pilot protocol included the question “Did you plan to read this book at this time, or was it a spur-of-the-moment decision?” which proved to be confusing to participants and was removed. It also did not include questions three or five.

<sup>41</sup> The pilot study included the question, “Is the book for your own use, or for someone else?”, which was intended to capture information about books purchased as gifts, but the question proved to be confusing to participants. I instead opted to include a note in the instructions to participants to include gifts purchased for others in their acquisition data.

<sup>42</sup> While I contacted participants weekly, I encouraged them to feel free to contact me with questions at any time.

<sup>43</sup> Of their two diary studies, one had a noticeably lower participation rate, which the authors attribute to “the less personal relationship investigators had with participants” (p. 91).

their role in data collection. I add to this that in a diary study that incorporates interviews (which is typical within HCI research), continued contact serves to build relationships with participants and supports a level of trust that facilitates post-diary-period interviews.

After initial contact with a potential participant, I sent them more extensive information regarding the study and the requirements for participation (see Appendix C). I also asked to meet with them in person<sup>44</sup> prior to beginning the study to ensure that they understood what participation entailed, and to have them sign the consent form required by the IRB (if they agreed to participate), and to give them the initial portion of participant compensation. Before we met in person I sent participants the consent form and diary study protocol, which included the questions for acquisition and reading events (see Appendices B and D). I maintained a calendar spreadsheet with scheduled contact times for each participant to ensure that they received diary reminders on a set schedule, as well as to track the receipt of data from participants. Throughout the study, I compiled each participant's diary data in a spreadsheet upon receipt of this information. I reviewed this spreadsheet to become familiar with participants' habits and patterns of book usage and develop personalized interview protocols (discussed in further detail below) prior to interviewing them.

### ***Participant Retention***

To maximize participant retention, I employed several strategies that have been found to be effective in retention of participants in longitudinal studies within medical research, an area of research in which longitudinal studies are common and meticulous reporting on both methods used in research and the success of those methods is *de rigueur*. These strategies consisted of providing study reminders to participants (as

---

<sup>44</sup> In the cases of five participants who were recruited at a distance I instead conducted our initial discussion via phone or email.

mentioned above), offering financial incentives or compensation (described in the following sub-section), and having a single researcher as the point of contact for participants to develop a strong relationship between the research team and participants (as I was the sole researcher for this project, this was a simple requirement to fulfill). Through careful implementation and follow-through of these strategies, this study achieved a 90 percent participant retention rate.

With these strategies in place, I began recruiting participants in July of 2016 and completed the final interview in January of 2017. As mentioned previously, my initial goal was to recruit 30 participants. When I had recruited 19 participants, I paused active recruitment to evaluate the success of my recruitment and retention strategies and to determine whether to continue using my initial strategies or to try new approaches to recruitment. This is the point at which I noted the gender imbalance in my initial group of participants (discussed in the Recruitment and Participation section above) and, after evaluating the situation, began new recruitment approaches to address that issue while also continuing use of my initial recruitment strategies.

As the first participants began to complete the diary period I also began to analyze data. This approach reflected my strategy of ongoing iterative data analysis, which allowed me to rely on topics and themes revealed through data analysis to inform subsequent interviews. Because the four-week diary period was relatively long, participation in the study was staggered, allowing me to analyze data from participants who had completed the study while others continued to return diary data. Therefore, by the time that the last interview was completed (in January of 2017), I was thoroughly engaged in data analysis and able to determine that the data I had collected from 27

participants was sufficient in terms of theoretical saturation<sup>45</sup> as new issues and themes had ceased to surface in analysis, and that recruitment of new participants was not necessary. In comparison to the studies on which this research builds, the number of participants in this study is comparable to or greater than the number of participants in many of the HCI studies on this topic.

### ***Compensation***

Participants in this study received two gift cards to a book retailer of their choice in compensation for the time and effort that they invested in the study. Participants received a \$25 gift card when I initially met with them prior to the beginning of the diary period, and a \$35 gift card at the time of the home tour and interview. I chose to split the compensation for two reasons. First, acceptance of compensation at the beginning of the study indicated a commitment to complete the study on the part of the participant, as it was accompanied by my explanation of the requirements of participation. Second, giving participants a gift card at the initial meeting conveyed to them my own commitment to the study and my trust in them. Providing a second gift card upon the end of the diary period provided an incentive for completion. More generally, my decision to offer a financial incentive to participants was intended to convey my respect for the value of their time and effort, in recognition of the fact that diary studies require a significant amount of work on the part of participants.

### ***Home Tours***

I chose to include the home as a site of investigation in this study for several reasons. First, as the pilot study showed, it was a place in which many reading events occurred, and one such site which it was possible to visit (the second-most frequent

---

<sup>45</sup> “The point in analysis when all categories are well developed in terms of properties, dimensions, and variations” (Corbin and Strauss 2008, p. 263).



location for reading events was participants' workplaces, which they might not have been willing to have me visit). Second, centering part of this research on the home made the study more directly comparable to previous HCI research in this area, the vast majority of which focused on the home context. But the most central reason for investigating the home in this study was my goal of understanding participants' interactions with books over time. The home was not just a location where participants read books, it was also the location where participants engaged in interactions with books that they owned over long periods of time. No other location would have yielded data on participants' collection management practices for their personal libraries, that is, on their long-term relationships to book artifacts.

Once participants had completed the four weeks of the diary study, we arranged a time for the home tour and interview portion of the study, and I reviewed their diary data and developed the individualized interview protocol (discussed in more detail in the Semi-Structured Interviews, section below). I began interviews with a discussion of each participant's diary data, after which I initiated the home tour by asking participants to show me their books and requesting their permission to take photographs during the tour. This typically led them to show me the books in more public areas of the home first, then leading to books kept in private areas of the home such as bedrooms. This sequence allowed me to question participants about how they decided where particular books should be kept (i.e., which books were "public" and which were "private"), as well as introducing questions about any other organizational schemes they might employ (e.g., by genre or alphabetically).

Asking participants to show me their books generally prompted them to lead me to their paper books. Once we had thoroughly discussed paper books, I requested that they show me their e-books as well (if they were e-book readers). This process typically

started with a tour of the device(s) they used to read e-books, which included Kindles, iPads, smart phones, Nooks, and laptops, in which we viewed and discussed the e-books stored on those devices. Device tours often began with participants showing me the e-book they were currently reading on their e-reader, after which we reviewed the remainder of the e-books stored on the device. When e-books were stored on devices such as phones or iPads, I asked them to show me where books were stored on those devices. When participants managed e-book storage on a separate device (such as a desktop computer), we toured books stored on that device, as well. These digital tours supported lines of questioning regarding organization of e-books and storage of e-books (i.e., backup practices or the lack thereof). In cases where participants used multiple devices to read e-books, digital tours prompted comparisons of how reading and organization practices were influenced by the affordances of different devices. For instance, devices specifically designed for reading e-books were preferable for reading, but could be frustrating for purposes of managing the organization of e-book collections. This foregrounding of participants' physical and digital books in the interview process allowed me to base our discussion of their practices of book usage in an understanding of participants' uses of and relationships to particular artifacts.

Within 24 hours of the completion of each home tour, I wrote up field notes and drew maps of each home to support my memory throughout the analysis process (example pictured in Figure 5). I created these descriptions of participants' homes to preserve concrete details and descriptions of the home as the primary context of book ownership and site of book maintenance. As Emerson, Fretz, and Shaw note, in ethnographic research detailed descriptions from field notes often can be "important for understanding subsequent action" taken by participants (Emerson, Fretz, & Shaw, 1995,



the average interview length was 69 minutes. I employed a transcription service to transcribe the majority of the interviews (excepting two that I transcribed), and additionally listened to each interview to further familiarize myself with the interview data.

As mentioned previously, I devoted the first portion of each interview to a discussion of the participant's diary data. In preparation for this discussion, I used each participant's diary data in combination with the base protocol I developed for the study (see Appendix E) to customize their interview protocol so that it addressed specific events they reported in the diary study (an example can be found in Appendix F). The base protocol consisted of questions that were relevant for all participants who read both paper and e-books. For participants who did not read e-books I instead included questions about whether they had previous experiences with e-books and e-readers and why they did not use those artifacts. The base protocol therefore represents topics that were consistently addressed across the interviews (making comparisons between participants possible), whereas individualized protocols also included questions that were specific to each participant and so were comparable only between participants who engaged in similar behaviors. The base protocol was, then, the portion of the interview protocol that was not derived primarily from either the diary data or the home tour, although discussion around base protocol questions did involve elements from those aspects of the study data when appropriate.

In the process of developing the base protocol, I derived interview questions directly from the research questions. This process included developing a spreadsheet that listed each interview question, the research question(s) to which it was related, and the relationship between the interview question and the research question. The base protocol addressed topics such as acquisition preferences (often with references to diary data

incorporated), sources for new books, favorite books, books a participant had owned “for a long time” (to spur discussion regarding keeping books), re-reading books, and how participants made decisions about book divestment. For participants who read e-books, I asked them about their e-reading histories: the first device they had used to read e-books, any shifts to new e-reading devices, transferring e-book libraries between devices, and backup practices for e-books. Additionally, I questioned e-book reading participants about characteristics of interactions with each type of artifact (paper and e-book) that they preferred when compared to the other type (e.g., convenience of acquiring e-books or the longevity of paper books).

One question that was perhaps the most difficult to ask, in that it could seem either strange or obvious to participants (or both), was, “What does reading do for you?” P19 summed up the reaction of many participants to this question when she said that the answer was “hard to articulate.” Their answers to this question, however, were often quite informative in that this question prompted participants to think about *why* they read books. Because it led to participants’ consideration of the purpose(s) of their reading, their answers to this question often addressed central aspects of RQs 1 and 2 by highlighting how books functioned for participants and the activities to which books contributed. Participants’ answers to this question were central to the findings in Chapter Six, which concerns the various activities to which book-reading contributed.

When tailoring interview protocols for each participant based on their diary data, I first reviewed their diary entries to identify patterns in their reading and acquisition practices. At this time, I also reviewed participants’ diary photographs to identify any additional contextual factors affecting reading or acquisition events that might be important to discuss with participants. In interviews, I presented participants with my understanding of the patterns I identified in their diary data, asking them if my

characterizations of their habits was accurate. For example, in an interview with P29 who frequently listened to audiobooks on his long daily commute, we had this exchange about his listening practices:

Interviewer: *...It seems like you're going back and forth, you're often listening to the Bible and then listening to another book.*

P29: *Yes, morning and afternoon...*

Interviewer: *You usually listen to the Bible in the morning and then listen to something else on the way home?*

P29: *Yes... When I started [listening to audiobooks] and I started with fiction, I was like, "I feel like I should be reading some religious stuff." ...I felt like a healthy compromise about it was there's morning drive and then there's afternoon drive and I can split them up. That's worked out.*

This excerpt shows how P29 balanced his available listening time between listening to the Bible, which he felt was important for his spiritual life, and listening to books that were enjoyable but not necessarily edifying. The diary data in this case showed me what P29's listening practices were, and in the interview I was able to build on that knowledge to learn more about the motivations behind these practices. Discussing participants' diary data with them provided an opportunity for participants to correct interpretations of mine that they felt were inaccurate and to alert me to any unusual circumstances during the month of the diary period that might have affected their behavior during that time (e.g., vacations or illnesses). This process of discussing diary data with participants was a means of member checking (Creswell and Miller, 2000), supporting the credibility of the research and ensuring an additional kind of validity in addition to the ecological validity discussed in the diary study sections above; this is what Silverman refers to as "respondent validation" (2000, p. 177). Using member checking to confirm (or deny) the accuracy of the researcher's interpretations of data also aligns with Nardi's fourth

methodological implication for activity theory research, “A commitment to understanding things from users’ points of view” (1996, p. 95), and foregrounded participants’ own agency in my understandings of the choices they made regarding book usage.

If relevant, I also questioned participants about any events that stood in stark contrast to their normal patterns as revealed in the diary data. Sometimes, these unusual events exposed reading that they did for a purpose that was distinct from their “normal” purpose for reading; frequently, this proved to be reading that contributed to a different activity than the majority of their reading. This kind of data was again useful in analysis that contributed to the findings discussed in Chapter Six, which focuses on the various ways that books supported higher-level activities in participants’ lives.

### ***Incorporating Home Tours with Semi-Structured Interviews***

While the portions of the interviews that focused on participants’ reading and acquisition actions during the diary period were grounded in individual participants’ diary study data, the home tour portions of interviews were based, instead, on the “data” of participants’ personal libraries. Home tours necessarily include an interview component in that the participant introduces the researcher to various spaces and artifacts in the home that are relevant to the topic of the study. This entails a verbal back-and-forth between participant and researcher, making the home tour a genre of semi-structured interview in which the interview is structured by the home, the artifacts within it, and their relevance to the topics of the study, rather than an interview protocol alone. As the participant is the guide in a home tour, this method reverses the typical interview dynamic; it requires the participant (rather than the interviewer) to lead the discussion. As Hartel (2007) documented in her field notes from home tours, participants “are more articulate when showing and handling materials, it makes it less abstract...they very

naturally fall into the mode of tour guide (more readily than interviewee)” (p. 71). While participants may sometimes feel uncomfortable or unsure of what to expect in a typical interview scenario, in a home tour they are able to take charge. It is a space in which they are the expert. This reversal is fruitful from a data-gathering perspective, because it tends to encourage participants to explain “how things came to be the way they are” in the home.

The approach to interviewing described above, in which I worked with participants to interpret both diary study and home tour data, allowed me to ensure that their perspectives on the topics under study were well-represented in my analysis of the research data. In the following section, I describe my approach to analyzing the various types of data gathered through the diary study, home tour, and interviews.

## **DATA ANALYSIS**

The methods described in previous sections produced a variety of types of data, including participant diaries describing book reading and acquisition events, photographs taken by participants (representing diary events),<sup>46</sup> interview audio files and transcripts, photographs I took of participants’ personal libraries during home tours, field notes from home tours, and hand-drawn maps of participants’ homes with locations of paper books and e-book-supporting technologies.

Many participants provided additional data beyond what I had requested of them. P20, for example, kept a reading journal in a notebook while he completed the diary portion of the study. In this journal (a page of which is pictured in Figure 6, on the following page), P20 recorded his reflections about particular diary events as they occurred, as well as reflections on the place of reading and books in his life more broadly.

---

<sup>46</sup> A by-product of the photo-elicitation method incorporated into the diary study, discussed in more detail in the Diary Study section above.



He then gave the journal to me during our interview. Another participant added me to her book-focused email list through which she shared book recommendations and book-related articles with friends. Two participants “friended” me on the book-focused social networking site Goodreads,<sup>47</sup> and many participants provided additional contextual notes through email or within their diary entries. This section describes the process of analyzing all forms of data.

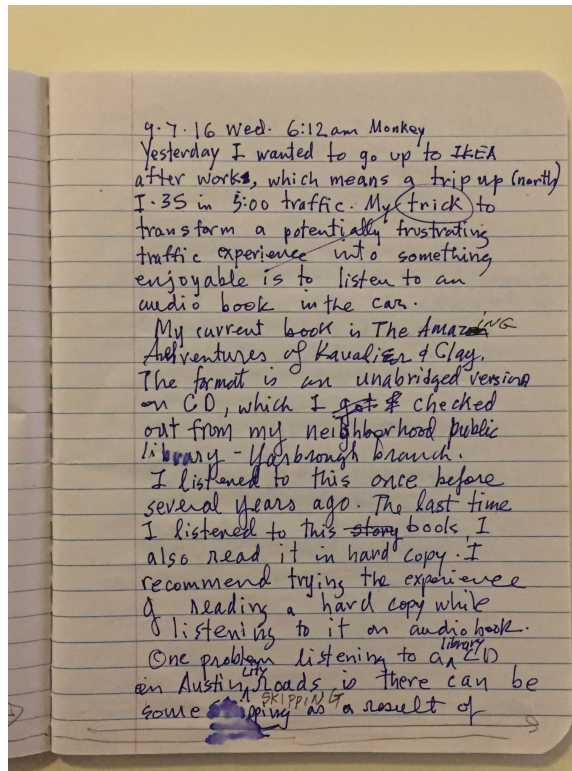


Figure 6: A page from P20's reading journal.

<sup>47</sup> I do not quote from sources such as the book-focused email list or material that I had access to through participants' Goodreads accounts, because participants did not consider this material to be part of their participation in the study (and because quoted material from Goodreads could be traced back to individuals). These materials nonetheless contributed to my understanding of participants' relationships to books, hence my inclusion of them here.

Data analysis extended for several months after I finished collecting data, and therefore I employed much of the non-transcript data to aid my memory during analysis: as I coded each interview transcript, the field notes, home tour photographs, and maps helped me to mentally re-create the experience of being in participants' homes. Being able to revisit these experiences in detail aided me in recalling each home as a context for both reading and ownership practices. This was especially important in supporting my ability to make comparisons across participants during the analysis process. Additionally, I created codes for areas of each home visited during home tours (e.g. living room, kitchen, bedroom) to further facilitate comparison of participants' book storage and organization practices across home tours.

Although the interview transcripts might initially appear to be a single type of data, in actuality they incorporate other types of data as well, as I have alluded to throughout this chapter. By this I refer to my development of individualized interview protocols based on diary data and to the additional interview questions inspired by the home tour. Therefore, although the interview transcripts are the data that I relied on most heavily in my analysis (as described in Chapters Five and Six), those transcripts incorporated much of the data that resulted from my other approaches to data collection as well. Additionally, I reviewed and engaged with participants' diary photographs, my own home tour photographs, and the diary data throughout the process of analyzing the interview transcripts.

### **Interview Transcripts**

The transcribed interviews were analyzed using open and axial coding (Corbin & Strauss, 2008). This is an iterative process in which transcripts are first coded without any predetermined categories, in order to allow identification of all existing themes in the

interview data. Corbin and Strauss (2008) define *open coding* as “breaking data apart and delineating concepts to stand for blocks of raw data,” and *axial coding* as “the act of relating concepts/categories to each other” (p. 198); they note that these coding processes take place concurrently. I chose this approach because it combines the advantages of open and thematic coding. Because the researcher’s initial approach to the data is not confined only to searching out pre-identified themes, this approach supports identification of unexpected and surprising interpretations of data. This approach does not, however, preclude the researcher from identifying themes in advance of data analysis (e.g., from related literature and theoretical frameworks) and considering those themes in the process of analysis.

Once several interviews had been conducted and transcribed, I began coding the interview transcripts using Atlas.TI software. During the coding process, I identified major themes and sub-themes and associated sections of transcripts with relevant codes. Some codes were primarily descriptive (e.g., audiobook, Kindle, library, “difficult” books) and served as ways for me to easily return to quotes that related to particular topics; others were thematic codes that emerged from initial stages of analysis. While the majority of the low-level codes were derived solely from the data, the activity theory lens employed here also informed my coding process influencing me to actively seek out data that depicted participants’ purposes in using books as well as the activities to which those uses contributed.

The activity theory lens of the project often served to inform the process of axial coding in which the identification of relationships between low-level codes brought out larger themes. For instance, in the initial process of open coding an interview I might use a participant’s own descriptive words as a code, as when I developed the codes “stress relief” and “break from work” in examining data from P8 and P10, who both frequently

read books while on breaks during the workday. During the coding process, I noted a connection between these codes, coming to the realization that they were related to an activity that these and other participants engaged in: “reading as self-care,” which I then identified as a larger thematic code. This example also reveals how my conceptions of codes often changed over time, based on my developing understanding of the theme. Considerations of how particular actions taken by participants might be part of one or more higher-level activities, and how affordances played roles in actions taken by participants, also played a central role in the development of codes and themes over time.

Examining the relationships between codes also served as a means to identify disconfirming evidence, i.e., data that apparently contradicted the themes represented by codes I had developed (Creswell & Miller, 2000). The process of identifying and exploring disconfirming evidence frequently deepened my analysis: while the process of identifying data that contradicted my nascent conceptualizations of themes could lead to my rejection of a theme, it often instead resulted in a more complex and accurate understanding of those themes. An expansion of my discussion of the “reading as self-care” code above provides an example of this process. Similar to P8 and P10, another participant (P24) also frequently read on breaks while at work. However, the “reading at work” codes in his interview did not overlap with “reading as self-care,” as occurred for P8 and P10. This shed light on the distinction that, for P8 and P10, reading events that occurred at work were often reactions to the specific kinds of work that they did—they both had emotionally demanding jobs that often required close personal interactions with clients who were living through traumatic experiences (care work). P24’s work as a financial analyst, however, was quite different in that it did not require him to provide emotional support to other people. P24’s habit of reading during his breaks at work therefore initially appeared to contradict my interpretation of these kinds of actions as

reading as self-care. Upon investigation, however, this lack of alignment between P24's habits and those of P8 and P10 was due to the fact that his work did not prompt him to engage in actions directed towards self-care (as P8 and P10's work did). In other words, because of the similar nature (and similar stresses) of P8 and P10's work, their actions contributed towards an activity to which P24's reading-at-work actions did not contribute—because it was unnecessary for him.

## **SUMMARY**

This chapter has described my design and implementation of the dissertation research, through which I have contributed to knowledge about how differences in physical and digital books affect human uses of and relationships to these artifacts. I investigated this phenomenon through diary studies that captured participants' interactions with books over a four-week time period, tours of their physical and digital book collections, and interviews with them in which we addressed both how participants used paper and e-books in their daily lives and how they felt about those artifacts and perceived their utility for various purposes. The following two chapters, which focus respectively on the purposes of reading and on book acquisition and ownership, describe the central findings and contributions to knowledge that emerged from the process of analyzing the data I collected through these methods. These chapters detail how the affordances and limitations of paper and e-books contributed to participants' uses of them for different purposes, and how the differences in the ways these artifacts could be used shaped participants' relationships to the artifacts themselves.

## Chapter Five

### Purposes of Reading: Self-Care and Self-Improvement Activities<sup>48</sup>

This chapter examines reading and how reading as an action contributes to certain kinds of activities; the following chapter will examine books' broader functionalities. In this chapter, I explore two concepts: 1) how participants used books as tools within the contexts of two broad types of reading actions (leisure and learning) which contributed to two types of activities (self-care and self-improvement), and 2) how the different sub-actions supported by paper and e-books contribute to or undermine reading actions that are part of each larger activity.

Reading was typically the immediate motivation behind book acquisition and the maintenance of books within a collection, and decisions about the types of books participants wanted to acquire were heavily influenced by the ways in which the affordances of different book artifacts affected the possibilities for reading actions. Perceived possibilities for reading actions, therefore, provided some answers to the “why” portion of the first research question: In what contexts and for what activities are paper books preferable to e-books (and vice versa), and why (RQ1)? I initially approached the concept of “context” in RQ1 in terms of environmental considerations of location and circumstance, and anticipated considerations of contexts such as home, work, and travel. I expected that combinations of circumstances and affordances would provide answers to the question. Answers to questions about these kinds of contexts confirmed the findings of previous research:

---

<sup>48</sup> Material from this chapter has been published in J. Gruning (2018), “Displaying Invisible Objects: Why People Rarely Re-read E-books,” in *Proceedings of the 36th Annual ACM Conference on Human Factors in Computing Systems*.

- People prefer e-books when traveling because of considerations such as their portability and the convenience of acquisition (minimizing the weight of their luggage and the ability to acquire a new book “anytime, anyplace”).
- When people read in bed at night their decisions about book medium reflect concerns of creating a relaxing experience for themselves and, if they share a bed, not disturbing their partner.
- People who listen to audiobooks do so primarily while commuting to and from work in their cars.

When people are at home reading in their free time and these various constraints do not apply, they will choose the book that is most appealing to them at that time regardless of the medium of the book. This choice, unsurprisingly, is guided by their mood (e.g., do they want to be intellectually challenged or simply entertained?), and whatever book(s) they have already begun reading. Most participants tried to finish books they had already begun reading prior to beginning new books to limit the number of books they were reading concurrently.

That is to say, my initial approach to considering the contexts of book usage – the first portion of RQ1—produced answers that, while they confirmed findings from previous research, did not expose new understandings of this topic. When I, instead, considered the activities to which reading actions contributed as the contexts for book usage, more intriguing answers to this question began to emerge. In particular, I found that the motives for reading played a central role in guiding participants’ choices to read paper or e-books, as this chapter will show. This chapter, therefore, focuses on the activity towards which a reading action is directed, including the object or desired outcome associated with that activity, as the context for that action. My understandings of these activities emerged through participants’ own accounts of why they read books, as

considered in the light of activity theory. As I explore in detail below, the interviews with participants revealed that the overwhelming majority of reading events contributed to two broad types of reading actions, leisure reading and reading to learn. The interviews also suggested that these reading actions contributed to the larger activities of self-care and self-improvement (the motives for which are implicated in their names).

I begin the chapter by providing an overview of the “what” of participants’ reading actions in the form of descriptive statistics derived from the diary study data. These statistics supply context for the “why” questions—that is, why participants carried out these actions, the purposes towards which they were directed (on the action level), and how these goals contributed to activities of self-care and self-improvement. In the first part of the chapter, I examine the activity hierarchies that comprised self-care and self-improvement activities and how reading actions that participants engaged in for leisure and learning purposes contributed to those activities (examples of these hierarchies are shown Figure 7, below).

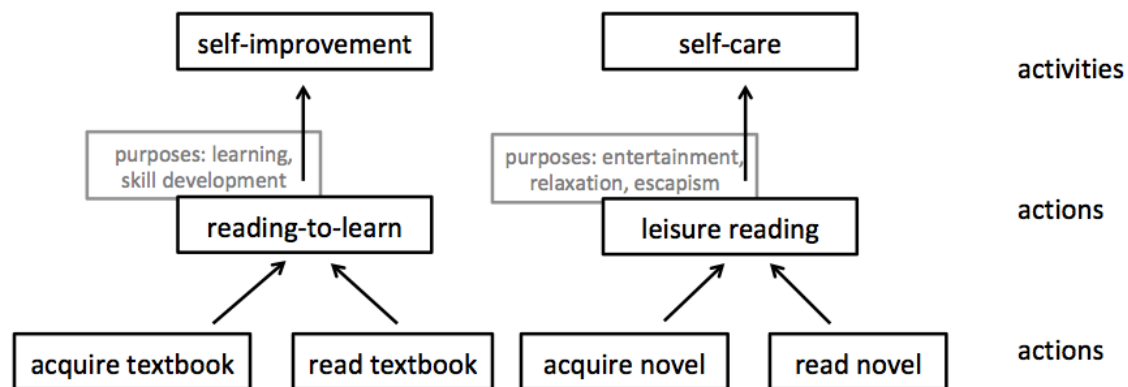


Figure 7: High-level activity hierarchies for reading to learn as part of self-improvement and leisure reading as part of self-care.



While I argue that “reading-to-learn” actions (directed towards goals of learning and skill development) were mostly associated with the activity of self-improvement and reading actions that participants engaged in for leisure-related functions (done for purposes such as entertainment, relaxation, and escapism) were associated with the activity of self-care, I do not claim that these activity and action categories are wholly separate from each other or mutually exclusive. Instead, I recognize that these categories can overlap, for instance learning can be pleasurable and that readers can learn from fiction (Broussard & Doty, 2016). Activity paths<sup>49</sup> could certainly be identified to describe alternatives to the connections between tools, actions, and activities that I examine here (and these are identified at relevant points throughout this chapter). While recognizing these counter-examples, I focus primarily on leisure reading as contributing to self-care, and reading to learn as contributing to self-improvement as these represent the predominant patterns of activity reported by participants through their reading diaries and the interviews.

The second part of the chapter employs a shift in the activity hierarchies examined to change the level of analysis, considering leisure reading and reading to learn as activities rather than actions. This allows me to explore the operations and associated affordances, and therefore the actions, which are supported by paper and e-books. As Bødker notes, “Even though activity, actions, and operations appear to form a hierarchy, these levels are not fixed once and for all: Transformations between operations and actions and between actions and activity take place all the time in specific situations” (1989, p. 177).<sup>50</sup> In her approach to activity theory research, Bødker frequently employs an examination of shifts between operations and actions to understand problems in user

---

<sup>49</sup> I use the term *activity path* to describe the place of a single operation within an action within an activity: following one path in the tree of operations and actions that make up an activity.

<sup>50</sup> See also Nardi 1996 and Leontiev 1974.

interface design (e.g., Bødker, 1991, see p. 77). Operations become actions when the user's attention moves from being on the larger task at hand (accomplishing an action) to some aspect of the action that was previously carried out unconsciously (the operation). An illustrative example is that of the broken key on a keyboard: until the experienced typist needs to use that key, typing is an operation that does not require conscious thought. But once it becomes necessary to type with the broken key, the typist's attention shifts to examine the process of typing and it becomes an action.

In this chapter, I rely on a similar shift in perspective to support an examination of lower-level actions and operations that contribute to leisure reading and reading to learn. This approach allows me to address the second research question (RQ2): How are the affordances and limitations of each kind of artifact related to the activities that they can (or cannot) support for users? Figures 8 and 9, below, demonstrate how this shift in perspective to viewing leisure reading and reading to learn as activities highlights the variety of possible operations that contribute to reading actions for these activities.

I describe the place of navigation actions (i.e., moving about in the text in a non-linear way, such as referring to an earlier passage) in both leisure reading and reading to learn and how support for these types of activities is closely bound up with the material constructions of each type of artifact.

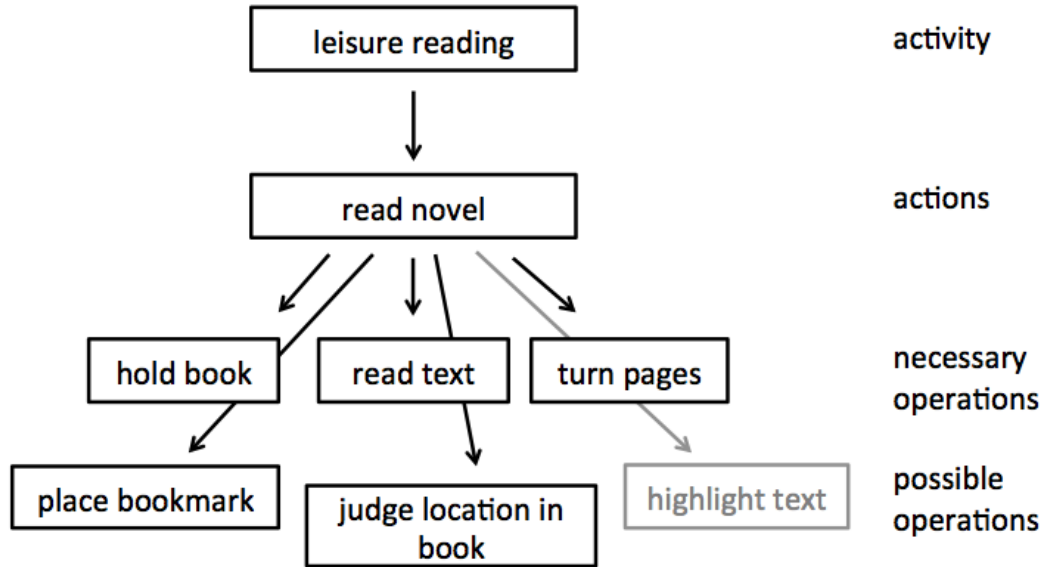


Figure 8: An example hierarchy for leisure reading (considered as an activity) using a novel, including both necessary and possible operations. The “highlight text” operation is gray because it was rare (only P8, P12, and P18 reported highlighting during leisure reading).

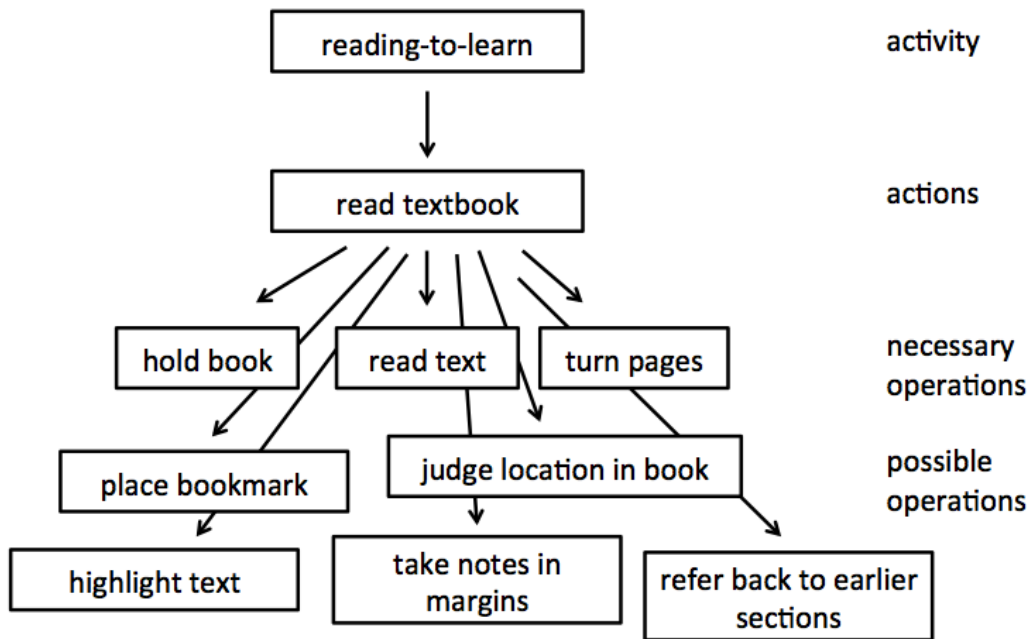


Figure 9: An example hierarchy for reading to learn (considered as an activity) using a textbook, including both necessary and possible operations.

Table 3, below, shows the key differences between these two types of reading activities, which are explored in detail in the Leisure Reading Actions and Reading-to-Learn Actions sections below.

	<b>Leisure reading</b>	<b>Reading to learn</b>
<b>Navigation style</b>	Linear	Linear and non-linear
<b>Amount of book read</b>	Entire book	Relevant portion of book
<b>Additional operations</b>	Highlighting (rare)	Annotation (writing and highlighting) and note-taking

Table 3: Differences between leisure reading and reading to learn.

My discussion of how participants made these choices centers on consideration of the differing materialities of paper and e-books, as well as and how these materialities affect the use of books as tools within actions that support leisure reading, and actions that support reading to learn.

The final section of the chapter focuses on how paper and e-books are used differently for reading actions in the long-term, examining both re-reading books from beginning to end and returning to books for reference uses (linked respectively to leisure and learning goals). Addressing questions of interactions over the long term and the affordances and limitations of book artifacts that are bound up in these interactions, begins the process of addressing the third research question continued in Chapter Six: “Do expectations about ownership and long-term interactions with books differ between paper and e-books, as previous research implies? If so, which affordances and limitations of paper and e-books contribute to these expectations, and how do participants’ expectations affect their interactions with paper and e-books?” Prior to presenting the interview data, however, I begin with basic statistics describing participants’ reading

practices. These statistics supply context for the qualitative data analysis, from which the primary findings of this research emerged.

#### **THE “WHAT” OF READING PRACTICES: DATA DESCRIBING PARTICIPANTS’ READING HABITS**

As described previously, 27 participants completed a four-week diary study, yielding a total of 108 weeks of diary data. The tables in this section depict the broad contours of the reading events<sup>51</sup> described in that diary data and provide more detailed data for e-book-specific reading events, including types of e-books and devices used to read e-books. Table 4, below, provides statistics describing all reading events in the study, as well as reading events categorized by book type. Because the study was designed to capture data from participants who engaged in a variety of book-related behaviors involving different book formats, there are only two categories in Table 4 that include all of the participants: those for Total Reading Events and Number of Books Read (because every participant read books during the study). Therefore, I have also included an additional column (Number of Participants in Category), which reports the number of participants represented in each row, revealing how prevalent each type of action was across all participants.

Table 4 shows that paper books were the most frequently read type of book in the study, with 552 reading events, as compared to 233 reading events for e-books. This is unsurprising, given that nine of the 27 participants did not read e-books.

---

<sup>51</sup> Acquisition events from the diary study are described in Chapter Six, which focuses on that topic.

	<b>Total for All Participants</b>	<b>Average per Participant</b>	<b>Range Across Participants</b>	<b>Number of Participants in Category</b>
<b>Total Reading Events</b>	785	29.07	1 to 70	27
<b>Paper Book Events</b>	552	20.44	1 to 57	26
<b>E-book Events</b>	233	8.63	1 to 56	14
<b>Number of Books Read</b>	192	7.11	3 to 26	27
<b>Audiobook Events</b>	66	2.45	1 to 41	6

Table 4: Reading events (total, and by book type) for all participants throughout the entire diary period. Audiobooks<sup>52</sup> are not included in Total Reading Events or Number of Books Read.

Table 5 shows the same information as Table 4 above, but includes only participants who read e-books in order to allow comparisons between the e-book and non-book-reading participants. As Table 5 reveals, paper books still dominated reading events even among participants who read both paper and e-books, although by a smaller margin: paper book reading events comprised 62 percent of the total number of reading events for these participants as opposed to the 70 percent of reading events that paper books comprised across all participants.

---

<sup>52</sup> Although the data does include audiobook listening, that behavior comprised a minimal portion of reported events in the diary study: only six participants listened to audiobooks, yielding 66 listening events as compared to 785 book reading events. Additionally, 41 of the 66 listening events are from a single participant's data. Therefore, because of the relative lack of data on audiobook interactions I do not focus heavily on this topic in the dissertation. While I do not feel that the audiobook data in this study provides sufficient grounds for a thorough comparison between these and other types of books at this point, such a comparison would be a fruitful area for future research.

	<b>Total for All Participants</b>	<b>Average per Participant</b>	<b>Range Across Participants</b>	<b>Number of Participants in Category</b>
<b>Total Reading Events</b>	606	33.67	1 to 70	18
<b>Paper Book Events</b>	374	20.78	1 to 16	17
<b>E-book Events</b>	232	12.89	1 to 21	13
<b>Number of Books Read</b>	157	8.72	3 to 26	18
<b>Audiobook Events</b>	51	2.83	1 to 41	3

Table 5: Reading events (total, and by book type) for e-book reading participants throughout the entire diary period. Audiobooks are not included in Total Reading Events or Number of Books Read.

As shown in Table 6, below, of the 18 participants who reported themselves to be e-book readers, 13 of these read e-books during the study.<sup>53</sup> This difference in e-book reading frequency stems from variations in reading frequency broadly among participants, and their personal preferences for one type of book over the other. Of the participants who did not read e-books, all but two had experimented with using an e-reader in the past but had abandoned use of the technology.

The frequency of e-book reading events, however, varied greatly among participants who read both paper and e-books, from e-books comprising 4.44 percent of reading events to 100 percent of reading events.<sup>54</sup> Of the 13 participants who read both

<sup>53</sup> This number includes participants from the “Both paper and e-books” category and the “E-books and not paper books” category.

<sup>54</sup> This was P29, the only participant who read no paper books (he read e-books and listened to audiobooks). Other participants also had high percentages of e-book as compared to paper book reading, such as P13 (93.75 percent) and P21 (91.84 percent).

paper and e-books during the study, seven participants read e-books more often than paper books (that is, over 50 percent of their reading events were e-book reading events).

	<b>Book Types Read/Listened To</b>	<b>Number of Participants</b>
<b>Reading/Listening Practices as Reported in Interviews</b>	Paper books only	9
	Both paper and e-books	18
	E-books and not paper books	0
	Audiobooks	8
<b>Reading/Listening Practices as Reported During Diary Study</b>	Paper books only	14
	Both paper and e-books	13
	E-books and not paper books	1
	Audiobooks	4

Table 6: Number of participants who read each book type, both during the diary study and in their reading practices generally (as reported in interviews).

The technologies that participants used to read e-books also varied widely, as described in Tables 7 and 8, below, which show the different e-book formats read by participants and the devices they used to access e-books.<sup>55</sup> Table 7 shows that Kindle e-

<sup>55</sup> The numbers in these tables are greater than the numbers of participants who read e-books during the diary study (from Tables 4 and 5 above) because several participants read e-books in multiple formats and used multiple devices to access e-books.



books (AZW file format) were the most popular among participants, 14 of whom read e-books in this format.

	<b>Kindle (AZW)</b>	<b>Nook</b>	<b>Digital file (non-proprietary)</b>
<b>Number of Participants</b>	14	2	4

Table 7: Number of participants who used each type of e-book.

Participants also used many kinds of devices to access e-books, as Table 8 shows, and seven participants used multiple devices to access e-books.<sup>56</sup> Choices regarding which device to use often depended on the circumstances of reading events. For example, P24 and P21 were both frequent e-book readers who read books while taking breaks at work. While they both typically used their e-reader devices to read e-books when they were reading at home, they both used their phones to read at work—so as not to have to bring an additional device to work. Both P21 and P24 also used the Kindle system (buying books from the Amazon store and reading them on the Kindle device and Kindle app), which allowed them to sync their reading across devices.

	<b>Kindle</b>	<b>Kindle FIRE</b>	<b>iPad</b>	<b>Nook</b>	<b>Smart phone</b>	<b>Computer</b>
<b>Number of Participants</b>	11	1	6	1	3	2

Table 8: Number of participants who read e-books on each kind of device.

These statistics describe the “what” of participants’ reading practices, and the remainder of the chapter is devoted to understanding the motivations behind the practices described here. The following section begins this work by exploring the understanding I

<sup>56</sup> Table 2 in Chapter Four lists the devices used by each participant to read e-books; aggregate numbers of devices used are listed in Table 8 on p. 118.

developed of participants' purposes for reading through their answers to the especially difficult interview question described in Chapter Four, "What does reading do for you?"

### **IDENTIFYING PURPOSES OF READING ACTIONS**

Pleasure and enjoyment were by far the most common aims of reading that participants cited when discussing the topic of why they read books, or their "motives" for reading activities, in activity theory terminology. While participants most frequently cited personal enjoyment as the purpose of their reading (i.e., leisure reading—reading for entertainment, relaxation, and escape from daily life), they also read books in service of other purposes. The second most common type of reading events were those that I categorize as "reading to learn." This category includes purposes for reading such as improving one's knowledge about particular subjects, developing a skill, or in service of personal development (e.g. self-help). While recognizing that it is not possible to cleanly separate types of reading in that, for instance, leisure reading may be informative and reading for professional purposes may be pleasurable, I identified 727 leisure-reading events and 44 reading events geared towards professional purposes (e.g., consulting legal reference books). Three participants (P23, P26, and P29) engaged in reading for spiritual or religious reasons during the diary study. Because these three participants considered this type of reading to be edifying rather than primarily pleasurable, I considered these events as belonging to the category of reading to learn (particularly as it contributes to self-improvement). However, because there was relatively little data on this type of reading due to the low number of participants who engaged in it, I do not attempt to draw larger conclusions about the differences between reading for spiritual purposes and other types of reading. Uses of cookbooks and instances of reading to children were some of

the less common types of events that participants reported;<sup>57</sup> therefore, this chapter focuses on the two most common types of reading events: leisure reading and reading to learn.

### **LEISURE READING AS SELF-CARE: “READING FOR READING’S SAKE”**

The most common response to the question of what purpose reading served for participants was simply that it was enjoyable. This kind of reading falls into the category that Stebbins (1997) defines as casual leisure: “immediately, intrinsically rewarding, relatively short-lived pleasurable activity requiring little or no special training to enjoy it” (p. 18). Participants used words like escapism, entertainment, and enjoyment to describe their reading as in the following quotes: “*Fiction reading for me is more enjoyable... It's a little more escapist, I guess*” (P12), and “*I really didn't want to put it down, because it was so sweet and compelling and wonderful...*” (P1). One participant’s experiences with audiobooks provided a particularly compelling account of the joy that fiction can produce for a reader or listener. Throughout his life, P29 experienced learning difficulties that made reading paper books challenging for him. Shortly prior to the study, he discovered audiobooks while seeking a way to make his lengthy daily commute more pleasant. His description of encountering audiobooks for the first time captures the joy of newly discovering fiction, an experience that was much more temporally distant for most participants:

*I didn't start really reading until recently, after I graduated college, and didn't realize how much joy I would take from it until I started. They got me with that free Audible, free first month. I was so hooked. I was so hooked... I loved it! It was so cool. It was like a movie playing out right before me* (P29).

P29’s comparison of audiobooks to movies suggests a key aspect of this kind of experience provided by books: that it was pure entertainment, something that participants

---

<sup>57</sup> For those interested in research on these topics, I suggest Hartel’s work on gourmet cooking (2007) and Massimi et al. (2013) and Rounfield and Tolmie’s (2011) work on reading in home contexts.

did for themselves rather than something that had a purpose external to the experience of reading itself. As P18 put it, leisure reading was “*reading for reading’s sake.*” P14, whose employment as a science tutor required a considerable amount of reading for work-related purposes, saw a clear divide between the reading for work and reading for leisure. In her work, P14 read for the purpose of absorbing information and conveying it to other people:

*...If all I'm doing is just absorbing information, that is a kind of escapism for me, 'cause I don't have to do anything more with it. You know what I mean? I don't have to...I don't have to take in the information and then think of a way to explain it to somebody else. I don't have to share it with somebody else if I don't want to. It can be just for me and just like a one-way absorption of information (P14).*

For her, leisure reading was particularly enjoyable because it was something she engaged in for herself, rather than an action she undertook in service of helping others. A key aspect of the pleasure of leisure reading was that it was purely self-directed.

While it might seem obvious to associate fiction with leisure and non-fiction with reading to learn, a leisure reading action or event was defined by a reader’s approach to the book—that is, their purpose in interacting with it—rather than the genre of the book itself. This is well-illustrated by a quote from P27 about why he enjoyed reading one of his non-fiction music books: “*None of it's new information to me. It's just enjoyable information...It's just an ongoing pleasure to, like, read about this band again for the millionth time. It's just an indulgence.*”

On the surface, leisure reading seemed for many participants to be reading that they did purely for its own sake, but participants also spoke about how their leisure reading supported them in other parts of their lives by functioning to relieve stress and anxiety. These kinds of outcomes contribute to the activity of self-care, which consists of

maintaining or improving one's physical, mental, and emotional health.<sup>58</sup> The action of reading at work (while taking a break from work tasks) was a primary example of leisure reading that supported participants in carrying out other activities, particularly for people who had high-stress or emotionally taxing jobs. One participant, P20, described his morning routine of reading at a local coffee shop as a way of preparing himself for the day:

*So I get there at 6:05 and sit there for 45 minutes, eat a breakfast taco and have a small cup of coffee... And it's always some combination of reading and working a crossword puzzle and writing a little bit in my journal and just being there (P20).*

P20 worked in sales, and as he said, “98 percent of it is somebody telling you some version of no.” To do this work effectively, he needed to be able to maintain a positive outlook despite the constant rejection that pervaded his workdays. He found that self-help books were especially effective for this purpose, describing himself as, “...a personal development or self-help or positive mental attitude junkie.” These books provided him with an “emotional chest protector” that made it easier for him to get through the day. As he put it in a note, “...Ritualized reading serves as a Kevlar shield saving me from frustration, disappointment, and other energy-draining activities” (P20).

Two other participants who worked in emotionally taxing jobs (grief support for families of organ donors and as a manager at a center for people affected by domestic violence) also cited reading as an activity they engaged in to relieve stress associated with their work. This was revealed in their diary data, which showed a pattern of reading actions that took place on breaks during the workday. The participant who worked with people affected by domestic violence described her job as “...both absorbing and helping other people absorb personal trauma narratives constantly” (P8). She sometimes took

---

<sup>58</sup> See Barnett, Baker, Elman, & Schoener (2007) and Shapiro, Brown, & Biegel (2007) for examples of approaches to self-care within professional psychology.

breaks at work to read books that were, “*Lighter. Maybe something a little bit more fun or...Just because the nature of the work is very emotionally charged...So it's nice to have just a really clean mental break*” (P8). During the period of the diary study, P8 tended to read novels and poetry on her breaks at work (as shown in Figure 10); she found that reading books that could directly inform her work in this context did not provide enough of a distance from her work to be restful: “*I actually picked up a Sontag book the other day, the one, Regarding the Pain of Others... But then I tried to read it at work and I was like, ‘What the fuck am I doing, this is terrible’*” (P8). Reading books that removed her from the emotionally taxing concerns of her job allowed her to return to work refreshed.

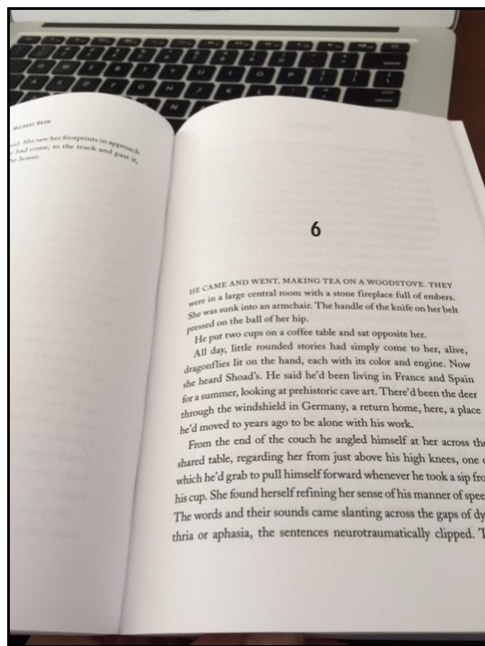


Figure 10: P8 reading a novel while on a break at work.

Two other participants, P1 and P5, recounted instances when books played important roles for them in personal times of grief.

*We went through a period in our family life, where we had five people die in a span of four years...It was very difficult. And they were all home deaths, so we were at home, in a sick room for weeks on end. And there are a set of books that I very closely associate to that particular period of time...And in a way those books were very valuable because they didn't exactly help me process grief, but they helped me live more fully in what was happening (P1).*

P1 also spoke about how reading some of these books, the collections of poetry *Staying Alive* and *Being Alive*, helped her during her grandfather's illness:

*I spent late hours of the night unpacking the poems, just with my feet propped on his hospital bed, unpacking the poems, having really quiet time internally...That was really valuable because it kept me with my grandfather 'cause he loved poetry (P1).*

P5 recounted a similar situation, which occurred shortly before her mother's death, when she and her sisters sat in a hospital room talking to her unconscious mother: *...even when she was in a coma because you never know whether or not she can hear something. We didn't think she was gonna come out of the coma, but we didn't want her to feel abandoned"* (P5). During this time, P5 developed a habit of going to a convenience store near the hospital to buy romance novels to read herself and to read aloud to her mother:

*...What I got into the habit of doing is picking up two or three Harlequins every morning before I went into the hospital because I'd read two or three over the course of the afternoon or read them to my mother or whatever. But the nice thing is you could always be sure what the answer was going to be and that it was all gonna come out okay.*

These participants' narratives show how in situations of grief, books were helpful both for connecting them to a loved one who was physically present but mentally absent and for the comfort that they themselves took from these books.

While these experiences of using leisure reading to manage grief and stress were particularly powerful kinds of leisure reading actions, leisure reading functioned primarily to create enjoyable experiences, which participants engaged in solely for themselves—whether or not this was done in the context of an emotionally difficult experience. P8 and P10's accounts regarding reading to relieve work-related stress, and

P1 and P5's accounts of using books as tools to engage with grief and live through emotionally painful experiences revealed important secondary functions of leisure reading. Fiction books—with overarching, cohesive plots and narratives, that participants typically read start-to-finish—were the most common type of book people used for this purpose, but participants also read poetry (e.g., P1, P8, P18), self-help (P10, P20), and non-fiction (P5, P27) books for leisure purposes, as well. The data also showed that these leisure reading actions, in contributing to the activity of self-care, also positively affected other parts of participants' lives, enabling them to perform their work effectively and to weather difficult circumstances.

#### **READING TO LEARN: SKILL DEVELOPMENT AND SELF-IMPROVEMENT**

Following leisure, the second-most prevalent purpose that participants cited for reading books was that of learning or building particular skills. Participants sometimes engaged in these kinds of self-improvement<sup>59</sup> actions both for purely internally focused reasons, such as to be a more knowledgeable or well-informed person, and in service of external purposes, such as preparing for graduate school and acquiring (or honing) skills that would help them improve their performance at work. Non-fiction books were most frequently associated with these purposes, both for participants who read them to gain skills or knowledge they wanted to apply in some area of their lives, and those who read them simply out of curiosity or to achieve personal goals to be well-informed. The following quote reemphasizes the understanding discussed above, that reading actions

---

<sup>59</sup> Sedikides (1999) describes self-improvement as such: “Individuals are often motivated by the desire to improve aspects of the self, such as personality attributes, performance skills, attitudes or opinions, outlook on life, and behavior. Individuals may wish to improve the present or the future self. They may wish to improve for the benefit of affective returns (e.g., feeling vital, energetic, and full of life rather than feeling lethargic, uninterested, and stagnated) or for instrumental purposes (e.g., to understand and predict better other persons' behavior, to prolong their marriage, to become more tolerant of diversity, or to achieve a professional promotion)” (p. 64).



may address multiple purposes but that there is typically an identifiable primary purpose for any particular event:

*Non-fiction reading though, I really enjoy doing it, I like learning new things. I've been reading a lot of history of food books lately. I find them really fascinating, but I read them slower and I don't get as caught up in them...I mean, the non-fiction ones are less escapist, more learning, and then the fiction ones are more escapist and just pleasure reading (P12).*

P11 spoke of his purchases of books that taught skills as an investment in himself. When questioned about whether this applied to both fiction and non-fiction books, he responded:

*For non-fiction, certainly. For the fiction, I guess I don't really see... I think the short answer to your question is, no. I don't see buying fiction books as much as an investment in myself. The distinction that I'm making is investment as something for me being a CPA, being something where I'm expecting a payoff (P11).*

In this quote, P11 framed the non-fiction reading he did as building skills that he could potentially apply in his work as an accountant. In a similar example, P25 was a librarian at a state library and often read historical primary sources from his library's holdings while on breaks at work. He hoped that familiarizing himself with the library's collection in this way would help him be a better resource for patrons. These kinds of uses of books framed them as tools participants used for changing themselves through improving their knowledge or skills.

These examples contrast with the quote about leisure reading from P27, discussed earlier, who sometimes re-read favorite non-fiction books for “enjoyable information he already knows”: “None of it's new information to me It's just an ongoing pleasure to like read about this band again for the millionth time. It's just an indulgence” (P27). That quote provides a contrast to reading events in which participants were reading to learn; in those cases participants tended to say that books were only useful for this purpose if the

information they conveyed was unfamiliar. One participant cited this as a reason he might abandon a book:

*I'm not learning anything new, like, I kind of know this. It's just things that I already know. Sometimes I will just skip over things...Instead of actually reading a book in a non-linear fashion, I will just go to a different chapter (P30).*

The majority of P30's reading was done for the purpose of improving his knowledge about specific topics, such as the history of his home country. For P30, if a book was not providing new information, it was not worth his time. *"I was reading and I was like yeah, I'm not learning anything new and just why waste my time and so I just like stopped"* (P30). While the outcome of his reading was not directed towards a job or other external purpose, P30's reading was not "reading for reading's sake"—it was "reading for learning's sake." Purposes for reading play a part in how the reader reads, and therefore what actions (and operations) they need to be able to take using the book as a tool towards a particular purpose.

Prior to this point in the chapter, I have focused on participants' purposes for reading without attending to how these different purposes for reading actions interacted with the medium of the books that participants were using to accomplish these actions. In the following section I refocus on the bottom of the activity theory hierarchy, shifting to consideration of leisure reading and reading to learn as activities and their components—such as choosing, acquiring, and reading a book – as actions. Figures 11 and 12 (initially introduced as Figures 8 and 9 on p. 111-112) are reproduced on the following page to illustrate the operations revealed in through this shift. This shift in focus centers the artifacts themselves and allows examination of how particular affordances and limitations support or limit actions that participants were able to take using paper and e-books (key to addressing RQ2, which examines the roles affordances of artifacts play in supporting

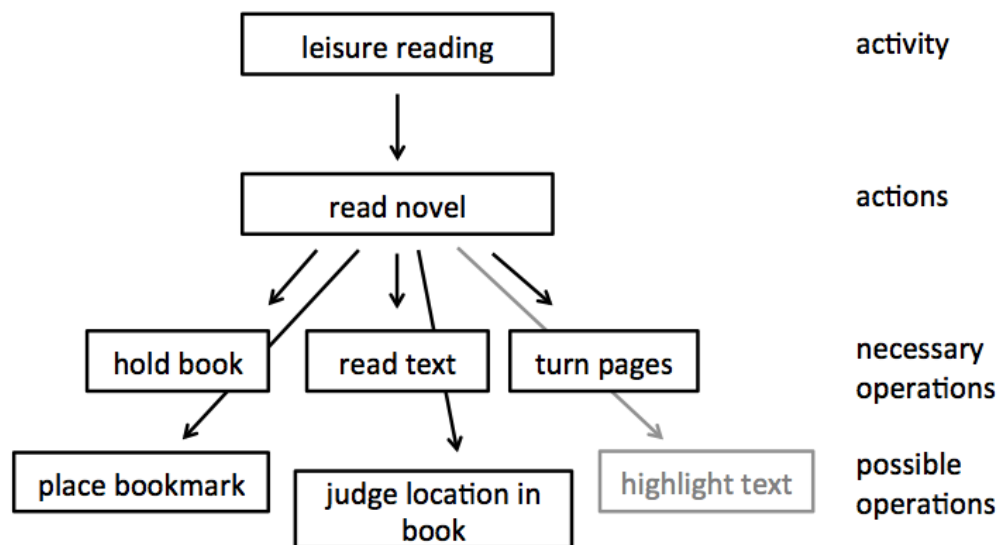


Figure 11: An example hierarchy for leisure reading (reproduction of Figure 8).

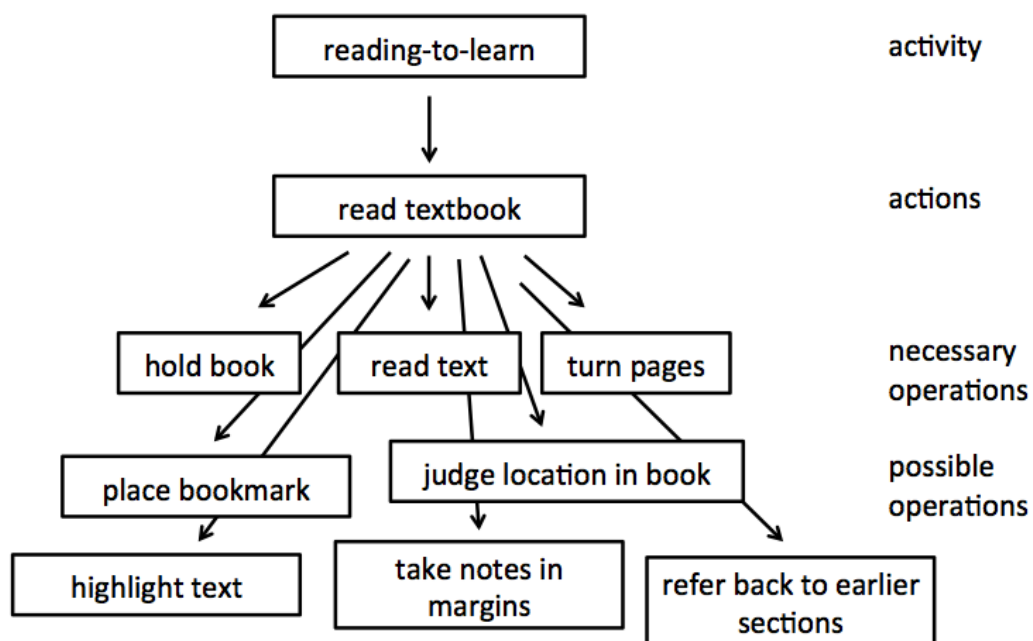


Figure 12: An example hierarchy for reading to learn (reproduction of Figure 9).

activities). This section examines how these kinds of reading actions (leisure reading and reading to learn) are composed of actions and operations that may or may not be well-

supported by the affordances of the different types of books artifacts participants used as tools to accomplish these actions.

### **LEISURE READING ACTIONS: CONTRIBUTING TO SELF-CARE**

Leisure reading was typically straight-through, start-to-finish, linear reading, as previously described in Table 3, which is reproduced below for reference as the following sections further explicate its' contents. There were exceptions to the rule of leisure reading as linear (e.g., P8 reading poetry on her work breaks), but typically when participants talked about leisure reading they spoke of employing long-form fiction for these purposes. While leisure reading actions varied in length, they were much more likely than reading-to-learn actions to last for long periods of time, occasionally extending over multiple hours for some participants (e.g., P5, P17, P12, P11).

	<b>Leisure reading</b>	<b>Reading to learn</b>
<b>Navigation style</b>	Linear	Linear and non-linear
<b>Amount of book read</b>	Entire book	Relevant portion of book
<b>Additional operations</b>	Highlighting (rare)	Annotation (writing and highlighting) and note-taking

Table 9: Differences between leisure reading and reading to learn (reproduction of Table 3).

Leisure reading, at its best, was an immersive and intensely enjoyable experience in which participants often were “caught up in” (P12) a book. As P12 said in describing the experience of reading fiction, “*So, it's something that when I start reading it I wanna keep reading it for hours*” (P12). Participants’ diary data reflected the potential immersiveness of leisure reading for hours-long reading sessions. A vignette reconstructed from P17’s diary and interview data illustrates just such an intensive reading event.

### **Vignette: P17's Late-Night Reading**

On a Monday night in August, at 11:16 p.m., a 22-year-old recent college graduate buys the first volume of a graphic novel, *The Runaways*, on his Kindle Fire tablet and gets in bed to read for a while before going to sleep. His room is dark, hiding the coffee-colored walls, closed black venetian blinds, desk covered in GRE preparation materials, and dark wood-veneer IKEA bookcases where a few trinkets balance on top of the books that are tightly packed on the shelves. With the overhead ceiling fan light switched off, he reads by the light of the Kindle screen. He reads graphic novels quickly, focusing on the text rather than the images, and by 1:50 a.m. he has finished reading volume one. Not ready to stop reading, he purchases the second volume on his Kindle and keeps reading.

Having recently graduated from college, P17 is in an unsettled and transitional period of his life, working two service industry jobs and preparing to apply to graduate programs in American Literature. He shares a ranch house with roommates in a town that is home to the small liberal arts college he graduated from the previous spring. The streets of the town are quiet at night, and his reading is undisturbed. P17 turns off the Kindle at 2:32 a.m. Despite his late night of reading, P17 is at work at his motel desk clerk job by 7:25 a.m. Business is slow so early in the morning, so he takes the opportunity to keep reading. Often he reads “difficult,” more academically focused books during these slow mornings at the motel desk as preparation for graduate school (he has been working his way through *Metafiction: The Theory and Practice of Self-Conscious Fiction*), but this morning he cannot wait to get back to *The Runaways*.

### **Intensive Reading Experiences**

Intensive reading experiences, similar to the one described in the vignette, above, were not unique to P17; other participants described books that they read in this manner (quickly and in a few lengthy reading sessions) variously as “candy corn” (P5) and “French fries” (P13). Tellingly, these food metaphors describe something that is delicious and consumed quickly, but perhaps not entirely good for you. In this vignette, it was important to P17 to be able to access the graphic novels he was reading quickly to continue his immersive experience of reading *The Runaways*, and the immediacy of acquisition that the digital form of these books supported made this kind of intensive reading experience possible. Several participants identified e-books as being particularly suited to supporting “light” reading (P1, P5, P10, P17), as graphic novels were for P17.

P10, for instance, preferred the e-book format when she read “super light” young adult novels.

Intensive reading events require that the reader be immersed in the text and not be taken out of its narrative flow. P24 felt that novels (especially genre fiction) are often structured to engage readers in this manner:

*I think authors try and do this, they try and add a plot thread through a line that engages you, where the end of the chapter happens and there's a cliffhanger and it makes me read the next page. So, I feel like the form is built to keep you reading, and so, it's what it does for me (P24).*

Fiction reading events therefore generally involved only the essential operations of the reading action itself: holding the book or e-reader, moving one's eyes across the page, turning pages. They do not typically include actions like highlighting, annotating, or taking notes, which were associated with reading to learn.

### **Navigation and Materiality**

While being able to quickly and easily navigate across sections of a book was not particularly important for leisure reading actions, participants did like to know “where they were” in a book, for multiple reasons. For example, participants reported that it gave them a sense of how much longer it would take them to finish the book, or to finish a particular chapter (e.g., should they finish it or just go to sleep now?). With e-books, this sense of location in the book is diminished. The material construction of a paper book, with its covers, spine, and pages, is such that the action of reading and turning pages has the secondary effect of providing feedback to the reader on how much of the book they have read and how much they have left to read. Figure 13 shows P20 interacting with a book in this manner.



Figure 13: P20 flipping through one of his books.

The shape of a paper book changes under the reader's hands as they read, flipping pages from the back of the book to the front. A physical e-reader device, however, does not change in relation to the reader's location within the e-book file it displays, and it is not capable of providing this physical feedback. As P21 said: "*You can't tell how long a book is from the size of the Kindle*" (P21). This loss of location feedback is a deficiency that e-reader designers have tried to address in several ways, such as offering the estimated number of pages remaining to be read (visible at the bottom of the current page), the percentage of the book that remains before the reader will finish it, and an estimated amount of time it will take the reader to finish the book based on the speed at

which they are reading it. Two of these (percentage and estimated reading time) are shown in Figure 14, below.<sup>60</sup>



Figure 14: A screenshot from P9 reading *The Best American Short Stories* on her iPad while travelling. Note that her reading app is showing her both the estimated time left in the chapter and the percentage that she has read of the book.

These replacement feedback indications may be rendered ineffectual in various ways. For instance, some participants mentioned feeling that the Kindle's Time to Read algorithm incorrectly estimated their reading speed, and excerpts of another book added to the end of the current one sometimes misled the reader regarding how many pages of

<sup>60</sup> As when (with book series) publishers append a portion of the following book in a series to its' immediate predecessor, to encourage readers to purchase that following book.



the book remained to be read. P21's story of reading a set of novellas, which had been sold as one e-book illustrates this last navigation issue:

*And the first book, unlike the rest of them, is really like four novellas put together... And so I was re-reading the first one, and the way that I had purchased it, was a three-book bundle for the first three books. So, instead of having one download of each book, it was all three books in one file. So I started reading it and I got most of the way through it and I was just so tired, that I was like, "You know what, I'm gonna go to bed and I'll wake up and I'll finish this." It was literally half a page left. [chuckle] I just had to turn one more page and I would have finished it. But I had no way of knowing because I couldn't tell where I was in the story because, again, of that whole novella aspect of it. But also, there's no way to tell when you're reading a bundle like that where one book ends and the next one begins (P21).*

Therefore, despite these efforts to support navigation actions on e-readers, even participants who regularly read e-books and enjoyed them typically preferred the feedback mechanism that is inherent to the paper book's construction of covers, pages, and a spine. Navigation can be desirable even for leisure reading that progresses directly from the first to the last page (as demonstrated by the examples above); however, for non-linear reading (typical of reading to learn) it becomes much more central.

### **READING-TO-LEARN ACTIONS: CONTRIBUTING TO SELF-IMPROVEMENT**

Reading to learn differs in two important ways from leisure reading. First, this kind of reading is more likely to be non-linear reading. It may require navigating backward and forward within a text to refer back to previously read portions of text, or, only particular parts of the book might be useful for the reader, requiring them to skip portions of the book. Non-linear reading requires complex navigation operations. Although many e-reader interfaces have incorporated a bookmarking affordance to allow readers to quickly return to a previously marked location in a book, participants still reported that e-books were far inferior to paper books in terms of navigation. Second, reading for learning or skill development often spurs additional actions such as

annotation (writing, highlighting, or underlining in a book) and note-taking (making notes external to the book). This section addresses these two issues and goes on to explore how issues of the materiality of paper and e-books are related to navigation affordances and limitations.

## Navigation

P5 was a retired lawyer and spent much of her ample free time reading. She typically read e-books but also had an extensive library of paper books; however, she noted that many of the paper books she maintained in her collection were books that she read in a non-linear way:

*If you're reading an environmental book or something that isn't filled with chronology, then you're sometimes gonna want to flip back and forth, because they're talking about how grain is modified and what happens. Then in another place they're talking about Monsanto and killing bees. And you might want to go back and forth and look...In the same way in a poetry volume you're apt to want to either pick it up and go to where it is that you know that there is a poem, or you're looking randomly or whatever. But you're not reading sequentially. And I think actually most of the [paper] books that I have are not meant to be read sequentially (P5).*

Similarly, P1 recounted a problem she encountered when attempting to use an e-book for reference while traveling:

*And so I bought the book on e-reader to be able to reference it while I was working. And it bothered me to no end that I couldn't actually flip back and forth between the pages to read the underlined parts, and the notes scribbled in the margins and the page numbers under that. It drove me nuts (P1).*

The lack of support for non-linear interaction with the e-book impeded her use of it.

P11's use of a paper book on medical interviewing included no such frustration, although he similarly spoke of how he read these skill development books in a piecemeal fashion:

*That medical interview book I've had for a number of years, for a couple of years. And that was the first time that I picked it up and sort of leafed through it in at least nine months. And I kind of got what I needed to out of it, I took some notes down...So I didn't need to read, the further the chapters got along for instance, in*

*that book, the more it was about medical interviewing which is a little off topic for me (P11).*

This was in direct contrast to his fiction reading habits, which followed the pattern of intensive leisure reading described above: “...*When I read fiction it tends to be, I will sit down and if I don't knock it out that day, it's usually that weekend. And it absolutely consumes me*” (P11). He was employing the medical interviewing book to build his interviewing skills, which he thought would be of use in his new job. While the parts of the book that focused on interviewing broadly were useful to him, the portions of the book that were specific to medical interviewing were not relevant. With books that teach a skill, people are able to pick and choose the portions of the book that serve their purpose. Unlike novels, these books do not necessarily need to be experienced as coherent wholes to achieve the goal that inspires their use for readers. P11 made a direct connection between these different ways of reading and how they were related to the different purposes of the reading, as illustrated in his response to a question about his identification of different reading styles for different kinds of books:

*...The first thing that comes to mind is the difference of my intention for the reading. When it's nonfiction it's largely about developing, either building a knowledge base or developing a certain skill set...So that reading tends to be a little more drawn out, especially because my reading of that tends to be slower, because there are certain objectives related to whatever, business or work project that I'm trying to address with whatever the reading is. With fiction, it's much more...Frankly it's much more about the diversion...Yeah, why did I read it all in one day? Well it was interesting and I was enjoying being caught up in the environment...Being consumed by that environment for this very, very intensely for a brief period of time...(P11).*

P11's descriptions of the distinct ways in which his reading practices changed when he had different purposes for his reading actions displays a clear divide between leisure reading and reading to learn. He also mentioned that not only was his learning-focused reading non-linear, but he also took notes while engaging in this kind of reading,

which raises the second difference in actions that participants undertook in support of the reading to learn activity: annotation and note-taking.

### **Annotation and Note-Taking**

While P11 kept a series of journals in which he took notes on his reading (the majority of which was geared towards learning) on a regular basis, some other participants preferred to take notes in the books themselves (P1, P12, P17, P18, P23, P30). P12 also highlighted that this note-taking was necessary for non-fiction but not for fiction: *“I underlined and wrote a lot of notes in it, and I don't tend to do that in fiction, because like I said it's more escapist...”* (P12). However, e-book readers who attempted to use the annotation functions agreed that support for these actions within e-reader interfaces was clumsy and frustrating—because text input functions (via touchscreen) for the e-readers were slow and difficult—to the point that they did not use this affordance.

Although people preferred the navigation affordances of paper books, the two types of artifacts seem to be essentially equal for leisure reading—at least, frustration with lack of navigation affordances within e-books did not prevent readers from employing them in leisure reading. For instance, although P1 preferred to avoid e-books she did occasionally read them when she was travelling, for the sake of convenience. In these circumstances, though, she said she chose books that would not be too engaging: *“And they have to be books that I don't, I know that I'm just gonna read but I'm not gonna like...Or YA [young adult] series 'cause I typically don't annotate them...”* (P1). These, ideally, would be books she read straight through without needing to intellectually engage with them to the point where she ended up taking notes. When I asked P17 about why he annotates books, which he said he does with “dense” literature that he thinks might be good background for graduate school, he said that it helps to fix the book in his

memory: *“If I'm like underlining and writing notes on the side, it helps me to visualize the book after I read it. So it's like a spatial thing”* (P17). He also noted that this affordance of paper books was lacking on his Kindle: *“And that's like why I have trouble with like... 'Cause with a Kindle you can highlight and take notes but there's no spatial aspect to it, like the pages aren't fixed...”* (P17). P11 referred to this as “geographic coding metadata,” and explained that phrase by saying, *“What I'm talking about is sometimes I remember where in the book it is. In an e-book, that is completely lost... But for the highlight”* (P11). These issues with navigation and spatial memory in e-books seem to be related to the lack of fixed page structures of e-books combined with the lack of feedback on the reader’s “place in the book” (as noted by Mangen et al., 2013)—both limitations that stemmed from the material constructions of these artifacts.

In contrast to these issues of navigation and annotation, reactions to support for highlighting actions in e-books were mixed. Some participants complained that e-reader highlighting systems removed context from highlighted quotes, but other were satisfied with the digital support for this action. For example, P8 was happy with the Kindle’s highlighting function, saying, *“Once I figured out how to highlight passages I started doing that, so I could come back to the end and maybe pull out passages that I liked and wanted to just keep handy”* (P8). Whereas, P12 had tried to take notes and highlight in her e-books but ended up abandoning the practice out of frustration, because e-books did not support the practices of returning to these quotes that she had learned through use of paper books:

*And it's because I used to take notes on my e-books and then I didn't use them because the way I look for notes is that I hold the book in my hands and then I flip through the pages, and so I see an underline or a note. And I can't do that on an e-book. Physically, it just doesn't work for me, and looking at them out of context bothers me. I don't remember why I highlighted it. I'm just confused* (P12).

She found that those annotations were useless, because her typical approach to reviewing them relied on being able to quickly visually review books by flipping through the pages. E-books' affordances, for P12, did not support this action; it required the navigation affordances of paper books.

These issues led participants who read e-books to, as a general rule, prefer paper books for those that they read for the purposes of learning and skill development, such as P17's reading in service of preparation for graduate school and P11's reading-to-learn interviewing techniques for his work. As P23 said, when recounting his issues with navigation in an e-book version of the *Canterbury Tales*: "...If I get serious about it, I'll buy it in paper" (P23).

To this point, this section has described differences in reading actions that are supported by paper and e-books, and how these matter (or do not matter) for the two dominant kinds of reading activities in which participants engaged. In the next section, I further explore the connections between the navigation actions supported by paper and e-books and the material differences between them in terms of how these affected participants' re-uses of books over time, and why the materiality of paper books better supported these re-uses than did that of e-books. Additionally, I describe how re-reading entire books can function in particularly powerful ways as a self-care-directed action that informed participants' identity maintenance in significant ways, and why paper books were overwhelmingly preferred to e-books by participants for this type of re-reading.

## **RE-USES OF BOOKS OVER TIME**

While previous research regarding e-reading and e-books has almost entirely focused on immediate or single instances of book usage, one goal of this study was to consider how participants used books over long periods of time. The two kinds of re-uses

of books over time, which this section discusses are *referencing* (by which I mean returning to a book to review a limited piece of the text) and *re-reading*, by which I mean reading a book (start-to-finish) that a person has previously read.

## Referencing

As a type of reading action, referencing (over the long-term) is better supported by paper books than e-books for the navigation-related reasons discussed above. Participants said that it was more difficult to return to particular portions of texts for reference purposes if the book in question was an e-book. Interestingly, reference uses of books occurred for both leisure and learning purposes. P18 describes how she uses books for “leisure” reference here:

*P18: But yeah, I definitely will reread books, for sure. Or reread a passage or a chapter.*

*Interviewer: If not the whole thing?*

*P18: Right. If I wanna remind myself of something or if...Not necessarily if I'm writing, but it could just be more of an emotional thing, "Oh, I need to read that right now because I'm feeling," whatever, "I'm feeling depressed," or, "I'm feeling sad or upset about," whatever. Or just loving...I know there's several sentences in this one short piece by Sam Shepard in his book, I think it's Cruising Paradise. And there's a few sentences in one of the pieces that I like to reread a lot 'cause they're just so beautiful and it just, I don't know, made me feel something.*

Multiple participants (P1, P8, P11, P12, P9) spoke of re-visiting passages in paper books for reasons similar to those that P18 describes, above, which served self-care-centric purposes of deliberately managing their own mental states or moods. For the navigation-related reasons discussed in the previous section, participants did not mention using e-books in this way. As P10 described:

*It's nice to have the physical copy I think just to be able to flip through and look. Whereas I feel like if you have the electronic version, obviously you can go back through it, but it's harder to just randomly look for something without any idea what it is that you're looking for (P10).*

Returning to a book to review a particular passage or to refresh one's memory regarding information in the book was not an action that participants always recorded for the diary study (some did, but others interpreted this as being outside the purview of the study). However, participants spoke in interviews about doing this both for leisure and learning purposes.

Participants also reported using reference books over time in what might be considered a more expected fashion. One example comes from P2, an occupational therapist, who keeps a set of paper books that are a helpful reference for her work: "*So, all of these books are from occupational therapy kinda stuff...There are times where I'll say, 'Oh, I have a patient who...' And I'll look something up*" (P2). While e-books could be useful for reference purposes when searching for a specific piece of information (because of full-text search), they were less useful for browsing through a book to find a passage that a participant only vaguely remembered. This reflects previous research, which has found that reading comprehension and recall is supported by their spatial mental representation of the text, and that this spatial mental representation is better supported by text in "fixed" formats such as paper than digital text that "re-flows" to fit page formats (like most e-books) (Mangen et al., 2013).

### **"Coming Home" and Seeing With New Eyes: Functions of Re-reading Books**

Many participants mentioned the scarcity and therefore preciousness of reading time (a topic that 15 participants independently raised); despite this, however, the majority of the participants were re-readers. Fifteen participants said they re-read books regularly, often re-reading the same books repeatedly over many years. For instance, P25 read the same book every year when returning to his parents' home for the holidays ("*Usually when I go down for Christmas, I read A Confederacy of Dunces, every*



*Christmas*”), and P23 first read the Horatio Hornblower series when he was a child and was re-reading it during the diary study. In a note added to a diary entry, P23 wrote, “*I first read this as a boy, borrowing my father’s books. Now I read it every ten years or so. Once I start the series, I can’t stop until I finish*” (P23). Eight more participants said they had re-read books but that it was not an activity they engaged in frequently, as in this quote: “*...There have been books that I have re-read. I’ve read A Farewell to Arms probably three times. I’m trying to think of another example...I’m not really a re-reader*” (P4). Four participants said they did not ever re-read books, or at least could not remember having done so of their own accord (that is, without some external prompting such as reading a book as a requirement for school). Participants who did not re-read books or only rarely did so typically said that they preferred to spend their reading time reading new books. Their view of this action was that, given the number of books in the world, they did not want to waste precious reading time on books they had previously read. “*I feel that there’s one experience, and if I go back, it’s just like re-heated steak. (laughing) It’s like steak in a microwave*”(P13). For these participants, the uniqueness and unexpectedness of the experience of reading a new book was more valuable to them than re-visiting an experience created by a book they had already read.

For participants who engaged in this practice, re-reading books from beginning to end was an action that had had two potential outcomes. First, the familiarity of a favorite book, rather than making it boring, could make it precious. The value of these familiar books came from the comfort of knowing exactly what to expect from the experience of re-reading them. This kind of book could provide the same reading experience to a participant the second (or third, or fourth) time they read it. This was similar to P18’s wanting to again experience the feeling that the few special sentences in Sam Shepard’s *Cruising Paradise* made her feel (“*...Pieces that I like to reread a lot 'cause they’re just*

*so beautiful and it just, I don't know, made me feel something*” [P18]), but on the scale of an entire book.

Participants reported that this kind of re-reading was often an action they engaged in during times of stress, because it was comforting to re-experience these familiar books.

*Oh yeah, I love re-reading books, yes. I do it at times when I'm especially stressed. There's something very comforting about...And I think it's the escapism, but it's the escapism without...It's like escapism plus comfort. You can lose yourself in the story again but you know what's gonna happen, so you're not...Like you're not looking for the excitement of a different story* (P14).

Re-reading functioned as a particular kind of leisure reading that was preferable for relieving stress and anxiety for some participants, because the effects of the action were to some degree guaranteed. As P1 described it, re-reading favorite books was like coming home: *“It's not exactly emotional support. It's more of...It's more of a coming home...It's like coming back to a place that feels familiar, that feels known”* (P1). Ideally, re-reading these books would have the desired outcome, one that was similar to the past reading experience. Reading a new and untested book might not serve to comfort the reader as effectively.

However, re-reading a book did not always produce precisely the same reading experience as previous readings had, and this was an additional way in which re-reading proved valuable to participants. The experience of re-reading a book sometimes showed them how they themselves had changed, because their perspective on the book changed over time. Sometimes this meant that the book became less enjoyable for them. An unsatisfactory re-reading might cause a book to be dropped for the participant's category of “re-readable books,” as in the case of P17's re-reading of some childhood favorites: *“I've reread Michael Crichton novels that I read. I read them as like a kid and my mind was blown, and then I went back and was not so blown away”* (P17). The happier

outcome was when re-reading a book revealed aspects of the book that a participant had not previously noticed. As P10 said,

*I think because there are a lot of books where I feel like I read it during a particular point in my life where maybe there were particular things that I really liked about that book or that really stood out to me, and then I feel like I can go back at a later point in my life when I've had different experiences and things that different feelings that I can maybe connect to different parts, different elements of that book (P10).*

Some participants said that for this reason they had to wait the “right” amount of time between re-readings of these books, and talked about how they might start re-reading a book but put it down if they felt that not enough time had passed and they weren’t “getting anything new” (P1) from the re-reading. Participants often spoke of these kinds of books as being particularly special;<sup>61</sup> in a sense, these books were artifacts against which participants measured themselves as they changed over the years. P12 contrasted these two types of re-reading:

*And I think sometimes I do that with books. I want something familiar, I wanna feel a particular way, and I know that book makes me feel that way, and so I will do that for comfort, often when I'm sick. But I don't do that nearly as often as the 'I've changed enough in six months to read this and I'm gonna get a new thing out of it' (P12).*

Re-reading, then seems to be a particularly potent type of reading for self-care that participants turned to, both in difficult times, and as a means to understand their own changing selves over long periods of time.

### **Re-reading E-books**

Participants who read e-books frequently said that if they read an e-book and anticipated that they would want to re-read the book in the future, they would purchase a paper copy of the book. Few participants remembered ever having re-read an e-book, and

---

<sup>61</sup> P20, for instance, made a paper cover to protect his favorite book to re-read, John Steinbeck’s *Sweet Thursday*.

only two (P12 and P21) reported that they re-read e-books regularly. Some reasons for the apparent unlikeliness of e-book re-reading are related to limitations of e-books such as their “invisibility” and therefore participants’ lack of awareness of them (discussed in more depth in the final chapter). Additionally, the ubiquity of e-books and e-readers is typically linked to the unveiling of the Amazon Kindle in 2007, which was only nine years prior to this study. While it is of course possible to re-read a book immediately after finishing a first reading, people tend to wait some time in between start-to-finish readings of a book. Participants said that they typically spaced out re-reads of a book at least a year apart, and often longer. Therefore, given the relatively short time that e-readers have been both available and popular it is perhaps not surprising that even regular re-readers had not re-read e-books. Several participants (such as P4 and P24) reported that they thought of the e-reader as a representation of the book they were currently reading, as opposed to being a means for accessing a collection of books.

The two participants who *did* regularly re-read e-books had a markedly different attitude towards their e-readers. Both of these participants carried their digital libraries with them constantly, whether in the form of a Nook (P12) or smart phone and Kindle (P21). Both were also relatively high-frequency readers, with 31 and 49 reading events (respectively) during the time of the diary study. They both kept e-reading devices available at all times just in case they had time to read, and they regularly shoehorned reading into spare moments, such as while commuting on the bus and waiting in line at a drive-thru restaurant. Because of these habits it was important to them to always have something available to read, and both kept spare unread or re-readable books on their devices so that they were never at a loss for something to read if they finished the current book. The following quote from P12 exemplifies this attitude:

*Like if I'm going on a road trip, I usually won't pick out books, I'll just bring my reader with me...There's usually fiction books in there I haven't read in a while, so then I'll just reread them...I probably reread them more often actually than my paper ones, 'cause I have to make a decision to reread those (P12).*

In a sense, P12 and P21 both approached their e-readers as libraries rather than books—perhaps the key to their re-reading of e-books is in this approach to the device itself, rather than the e-book artifacts. These participants saw their e-readers as homes for a collection of books, and therefore as a potential means for accessing any book in that collection.

## SUMMARY

RQ1 asks how the contexts of reading influence people's choices about the types (paper or e-book) of books that they read and about the tool they choose to use to pursue the goal of that reading action. This chapter describes how, when people intend to use books for linear reading actions for leisure-related goals of enjoyment, entertainment, and relaxation, paper and e-books were on a relatively equal footing for participants who read both. The assertion that e-books are equal to paper books for leisure purposes may raise a question of whether it is truly the case that e-books are suitable for leisure reading, or instead that they are suitable for reading fiction. I argue that it is the former, based on the disconfirming evidence that participants also sometimes read fiction for purposes of learning (e.g., P17 reading “difficult” novels such as *Moby Dick* as preparation for graduate school and P23's reading of *The Canterbury Tales*, for which an e-book was inadequate). In these cases, reading-to-learn actions such as annotation and note-taking contributed to the reading activity, which was not typically the case within leisure reading (see Figures 8 and 9, p. 111-12). My argument, then, is that it is the larger purposes that motivate the reading activity (i.e., leisure and self-care or learning and self-improvement)

that determine the actions that contribute to that activity, and therefore influence what kind of book artifact is preferable for that use rather than the genre of the book.

The study also reveals the perhaps surprisingly powerful role that re-reading played for many participants within the activity of self-care. But for this particular type of leisure reading action, e-books were not able to compete with paper books, because of limitations stemming from their lack of visibility in comparison to paper books, and because many participants associated e-reader devices with the book they were currently reading rather than all of the books to which the devices could provide access (an issue that is further explored in the following chapter).

With regards to the context of self-improvement, reading actions that contributed to that activity tended to rely on non-linear reading and on additional actions such as annotation and highlighting that were less well-supported by e-books than paper books.<sup>62</sup> Findings from this chapter also address RQ2, in that they identify that it was navigation and annotation actions that were better supported by paper books and therefore allowed those artifacts to better support non-linear reading, which was particularly tied to learning actions and the activity of self-improvement.

To return to a question that I posed as a premise for this study: what have we learned about the reasons for complementary use of paper and e-books? For immediate usages of books that are read in a linear fashion (the central example being novels, within the activity of leisure reading), the answer seems to be related to availability and price rather than any particular functions that one artifact provides compared against the other—excluding special circumstances such as travel, reading outside, or reading at night; and excluding particular circumstances of an individual.<sup>63</sup> Paper books did have

---

<sup>62</sup> Reflecting findings from previous research such as Marshall (1997; 2000).

<sup>63</sup> Such as one participant's joint health issues that made the e-reader form preferable to that of a paper book for holding the book.

advantages related to the navigation affordances they provided, which were especially important when a participant wanted to read in a non-linear fashion. This applied most often in cases of reading for the purposes of learning or skill development, but was also preferable (or even essential) for particular types of texts such as poetry, which was more typically read for leisure purposes. In terms of any long-term uses of books, paper books held another central advantage for the majority of the 18 e-book reading participants: affordances of paper books (particularly their visibility) contributed to participants' continued awareness of them over time, and therefore supported their re-use in a way that was not typical for e-books. This example epitomizes how the affordances of different types of books allowed participants to use them within different kinds of activities. We might also examine the outcomes of these activities more closely, and I close the chapter with that examination in the following section.

### **How People Use Books to Change Themselves**

Participants in this study used books for various purposes, which led to various outcomes. First, participants used books for leisure reading as a means to recalibrate their mental state or mood, allowing them to cope with stressful and difficult situations. While this was a temporary change, it was also an ameliorating action that could be (and often was) taken regularly if necessary. Paper and e-books were seen (by participants who used both) as equal for this activity. Second was perhaps the most obvious example of how people engaged in personal development using books: to gain knowledge or develop skills. In this case, participants were actually using the books to make change in themselves, in their knowledge or abilities. Paper books were preferred for this purpose for their superiority with regards to navigation and annotation functionalities.

Although these were the two primary types of reading activities examined in this chapter, re-reading books (as a specific type of leisure reading action) proved to be distinct from other leisure reading in that it could at times have an unusual and particularly valued outcome. Re-reading for leisure purposes sometimes functioned essentially similarly to leisure reading generally; it was comforting and promoted enjoyment and relaxation (although it could be especially good for this purpose, as the book is a “known quantity”<sup>64</sup>). But the alternative outcome of the action of re-reading was to reveal that the reader themselves had changed as a person since they last read the book. This was revealed in how their reaction to the book had changed in comparison to previous instances of reading it. With this outcome, it was not that the experience of re-reading the book changed the person (as was the case with reading to learn), but that the experience of re-reading the book revealed that the person had changed since they last read the book. The book, in these cases, became a touchstone for self-knowledge.

From the perspective of activity theory, the implications of these findings with regards to e-books—that e-books were suitable for single or first-time reading of a book for leisure purposes, but inferior to paper books for any other type of reading—are that the design of e-books incorporated only a portion of the cultural and historical lessons embedded in the paper book. As the previous section described, people’s uses of books had various outcomes resulting in different types of changes to the individual, and people used books purposefully as tools for achieving these outcomes. E-books’ narrower range of uses (as compared to paper books) made them a less versatile and powerful tool for change; while they were able to stand in for paper books with regards to single or first-time leisure-related uses, paper books were preferable for all learning-related uses and for repeated readings over time (whether leisure or learning-focused). Therefore, paper books

---

<sup>64</sup> Similar to some genre fiction, as P5 noted regarding romance novels.



appear to be able to play more roles in human development through reading than do e-books. In the following chapter, I explore the powerful roles that books can play in human development and self-transformation through identity-related activities.

## Chapter Six

### Human Relationships to Artifacts: Acquisition and Ownership<sup>65</sup>

The previous chapter examined the reading-related actions and activities that participants carried out using books. Reading was the primary action for which participants used books, and the desire to engage in reading was the central motivation for book acquisition and ownership—although as Chapter Five showed, participants’ larger motivations for reading influenced their preferences for paper or e-books. If a participant’s motivation for use of a book was solely to read it once (a motivation that was distinct in important ways from repeated reading, as discussed in the previous chapter), either approach to acquisition—purchasing or borrowing—enabled that use. However, participants also took other kinds of actions with books, such as actions related to supporting social relationships (e.g., display, lending, and gift giving) and those that related to management of a book collection (e.g., display, organization, and divestment).<sup>66</sup> These kinds of actions were particularly significant due to their potential to contribute to identity-related activities, and they became possible through the stable and long term relationship to a book artifact that was afforded by ownership. As this chapter shows, these non-reading actions often motivated participants’ decisions to purchase, rather than borrow, a book. Additionally, because these actions were central to aiding participants in activities such as constructing and maintaining their personal identities, they were common across many types of physical artifacts<sup>67</sup> (Golsteijn et al., 2012; D. S.

---

<sup>65</sup> Material from this chapter has been published in J. Gruning (2018), “Displaying Invisible Objects: Why People Rarely Re-read E-books,” in *Proceedings of the 36th Annual ACM Conference on Human Factors in Computing Systems* and in J. Gruning (2017), “Models for Ownership: Implications for Long-term Relationships to Objects,” in *Proceedings of the 35th Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems*.

<sup>66</sup> As the examples given here demonstrate, actions often have more than one purpose or outcome, i.e., display can figure both in collection management and supporting social relationships.

<sup>67</sup> The visible, touchable, and portable artifacts on which material culture studies focuses, as described by Woodward (2014) and discussed in more depth in Chapter Three.

Kirk & Sellen, 2010; Petrelli & Whittaker, 2010). Therefore, while the previous chapter focused on utilitarian book-related actions that apply primarily to textual artifacts, this chapter's findings provide insights about human relationships to artifacts that are more widely applicable, contributing to knowledge about how people interact with physical and digital artifacts more broadly.

In focusing on reading, the previous chapter was able to describe clear and direct activity paths linking affordances (and accompanying operations) to actions and activities. These were based on “immediate,” purposeful utilitarian motivations, which turned out to contribute to larger activities such as self-care and self-improvement. The actions described in this chapter are more obscure and difficult to define. They often rely on peripheral and apparently incidental affordances of artifacts that were frequently taken for granted by participants – reminiscent again of Miller's contention that the power of artifacts to shape behavior lies in their humility. The relative obscurity of the actions and affordances that are the focus of this chapter makes the clear-cut hierarchies drawn in the previous chapter difficult to replicate for the topics of this one. Nonetheless, I argue that the same structure of activities does apply here, and that viewing these pervasive but nebulous identity-related activities through the lens of activity theory can bring new insights to our understanding of the roles that artifacts and their affordances play in these activities.

This chapter builds on established knowledge about how people use artifacts for identity-related purposes from HCI research—that people tend to perceive digital artifacts as less valuable and useful for these purposes than physical artifacts—by uncovering the new insight that these perceptions of value differ across various digital systems. This overarching finding centers around two related topics which this same literature had

previously identified as key issues: control and visibility, and extends our knowledge regarding these topics.

With regards to control, participants' feelings of ownership over artifacts differed across digital systems due to differences in possibilities for actions within those systems, i.e., the extent to which the participant has control over artifacts in the system. In referring to digital "systems" in this dissertation, I am speaking of digital files in a particular format, and the combination(s) of software and hardware that allow access to those files. This chapter identifies a new finding that explains problems of participants' negative perceptions of their control over digital artifacts that arose in previous research. This finding is that, in the case of e-books, lack of trust in digital artifacts (i.e., uncertainty as to their "realness" and longevity) is due at least in part to the conflicting mental models on which the rules for interaction with these artifacts are based (which also differ across systems). The mental models within which we frame our interactions with artifacts (e.g., the concept of personal property) guide those interactions. However, when designers of digital systems draw on multiple and conflicting mental models in their creation of a "system image" (Norman 2002), the rules for interaction with digital artifacts in those systems become unclear. This dissertation shows that when those rules are unclear, people cannot be sure of their relationship to or control over those digital artifacts and any long-term human-artifact relationship is undermined.

With regards to visibility, this chapter deepens our understanding of this topic by describing how the presence or absence of visibility affects artifacts' functionalities within actions and activities. First, it demonstrates how the visibility of artifacts functions to make maintenance practices meaningful and to support continued awareness of owned artifacts. This research finds that systems that decrease the visibility of digital artifacts and discourage users from engaging in maintenance-related actions (such as organization

and divestment) limit the possibilities for use of those artifacts within identity-related activities. This decreases the value of the artifacts for their owners by decreasing their functionality. Extending the finding from Chapter Five regarding re-uses of artifacts and the role that re-use (in this case, re-reading) allows artifacts to play in identity processes, this chapter reveals that lack of visibility diminished participants' continued awareness of artifacts, i.e., their "peripheral visibility" (Miller, 2010), which in turn discouraged re-use. Differences in the visibility of artifacts across various systems, therefore, influenced participants' perceptions of those artifacts as useful within activities that required display. When artifacts' affordances of visibility were diminished or unsupported by the digital systems through which participants accessed them, maintenance and organization actions taken with those artifacts were not able to contribute to high-level identity-related actions, thus making these artifacts less valuable to their owners.

I begin this chapter with a discussion of understandings of ownership in the United States—based on the legal concept of personal property—for the purpose of illuminating the implications of two types of book acquisition: purchasing and borrowing. Next, I present the diary data revealing participants' acquisition decisions during the diary period of the study. This data provides an overview of their practices as background for a discussion of participants' relationships to books as borrowers and owners. The chapter then outlines participants' personal and social uses of paper books, followed by an explanation of how conflicting mental models foment confusion regarding possible uses of e-books, using the example of borrowing. Finally, I turn to describing how actions available for owned e-books differ from those available for owned paper books and the consequences of these differences.

## **TAKING ACTIONS WITH ARTIFACTS**

Within the U.S. legal system, ownership of a physical artifact is understood to be associated with a set of rights related to use of the artifact and the control of others' use of that artifact. The concept of alienability, or “the right of an owner of an item to resell it, give it away, or otherwise transfer it” (Perzanowski & Schultz, 2016, p. 17), is central to the concept of personal property in this system. Ownership also includes the right to physically alter or destroy an item, as long as the act of destruction does not harm others or their property. These rights, then, are associated with a set of actions (listed in Table 10 below) that may be taken with regards to an artifact by its owner: use of the artifact, making changes to the artifact, lending the artifact, and divesting oneself of the artifact, whether through re-sale, passing ownership of the artifact to another without compensation (i.e., “giving away”), or destruction of the artifact. Additionally, it is important to note that personal “use of the artifact” includes not only the utilitarian actions associated with particular types of artifacts (such as reading, in the case of books), but also secondary actions—the related actions of maintenance (as in, the act of keeping a book), storage (including organization), and display (and its counterpart, concealment) which are the focus of this chapter.

Each of the actions outlined in Table 10 (on the following page) are made possible, at least in part, by the ownership relationship between person and artifact. They are a result of the rules for interaction with artifacts that stem from this relationship (and Western cultures' social and legal norms surrounding ownership) in combination with the affordances that stem from the material construction of the artifact itself.

	<b>Actions</b>
<b>Primary</b>	Use of artifact Alter artifact Control others' use of artifact Lend artifact Sell artifact Give away artifact Destroy artifact
<b>Secondary</b>	Keep artifact "Get rid of" artifact (divestment) Organizing/Storing artifact(s) Display artifact

Table 10: Primary and secondary actions associated with ownership of an artifact.

Figure 15, below, displays a simple activity path, which demonstrates how the ability to lend a book can contribute to the social activity of reinforcing a friendship.

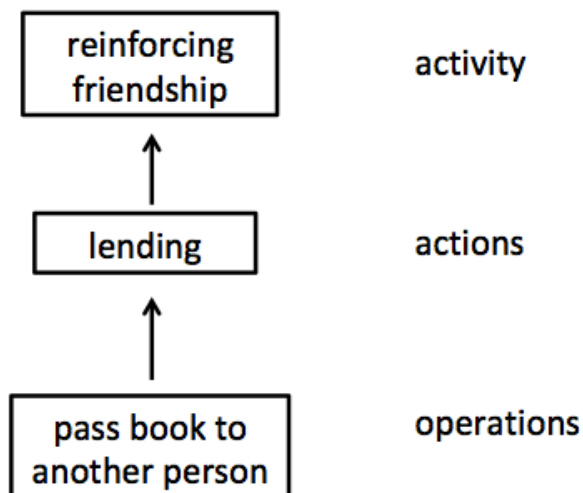


Figure 15: An activity hierarchy showing the place of lending in contributing to reinforcing a friendship.

These rules for interactions with artifacts (laying out permissible and impermissible actions) comprise the legal concept of personal property and contribute to

people's mental models of artifact interaction. Here, I am speaking of mental (or conceptual) models in Norman's (2002) sense: "the models people have of themselves, others, the environment, and the things with which they interact,"<sup>68</sup> and which are formed "through experience, training, and instruction" (p. 17). We might consider a toddler learning the concepts of "mine" and "yours" with regards to artifacts such as toys as the beginning of the construction of a mental model of "property." The personal property rules for action do not physically constrain people from acting against those rules, but they are powerful norms that carry potential consequences if visibly flouted. For example, the restriction of a two-week lending period for a library book (based on the library's control of use of an owned artifact) does not stop a borrower from keeping the book beyond the limits of that time period, but it justifies the library in issuing a fine to such borrowers. In terms of activity theory, participants' mental models can be seen as internal, mental tools (indeed, mental tools were a key area of interest for Vygotsky). This line of thinking is also helpful in that it illuminates how tools have both affordances and limitations—participants' mental models could either support or constrain the actions and activities in which they were used as tools.

Participants often cited the rules for interactions with owned books (based on the personal property model) as reasons for purchasing books. This is illustrated in the following quote, in which P14, a 34-year-old science tutor who read only paper books, recalls her reasoning for purchasing a book to read for the political book club of which she was a member:

*And so borrowing it from the library is problematic, 'cause you'd have to renew it several times, and you're not actually supposed to write in it. So, I think in that case it's just easier to buy it and to have that book (P14).*

---

<sup>68</sup> The point that learning occurs through the process of interaction with one's environment is also central [to the approach to psychology in the USSR – the context from which activity theory emerged (Wertsch 1981, p.11)].



P14 cites two ramifications of the rules for interaction with owned artifacts here: continued access to owned books and the right of an owner to make material changes to a book. Lending was another ownership-dependent action participants frequently cited as a reason for purchasing books. As P30 (a 33-year-old graduate student and former e-book reader), said about the choice to buy, rather than borrow, a book, “*Part of the calculus is also sharing. This is a book that I want to either pass it to my children or to my nephew or something like that*” (P30). The library was a means for temporary access to both paper and e-books that were “worth reading,” but a participant’s control over a borrowed book was limited, restricting the possible actions they were able to take using that book. Books are relatively unusual, in that they are a kind of artifact to which people have access even if they do not choose to purchase it; therefore, the decision to own books becomes more significant.<sup>69</sup> A participant’s decision that a book was not only worth reading but also worth owning was often an indication that they wished to be able to take a greater number of actions with that book. P30’s consideration of his ability to transfer use or ownership of a book he purchased reflects this.

Actions such as lending, altering, and the continued right or ability to use are perhaps the most obvious actions associated with ownership, but ownership also allowed other kinds of actions. These were actions such as collection organization and maintenance, and relatedly, display. This chapter shows that when participants chose to purchase a book (i.e., to enter into an ownership relationship to that artifact), their choice was influenced by the differences between the actions it is possible to take with owned artifacts and those it is possible to take with borrowed artifacts. The differences between

---

<sup>69</sup> It is important to note that library access is uneven across the U.S. population and that some books are easier to access through a library than others; however, for participants in this study (like many living in the US) the library was a viable and often common means of access to books.

these sets of actions resulted in distinctions in how owned and borrowed artifacts may be used as tools within activities.

Having introduced some essential differences between acquisition methods and how they supported varying kinds of uses for book artifacts, I turn now to presenting the diary data describing the acquisition decisions made by participants during the four weeks of the diary study.

#### **PARTICIPANTS' BOOK ACQUISITION PRACTICES: DESCRIPTIVE STATISTICS FROM THE DIARY STUDY DATA**

Just as the previous chapter showed that reading events were dominated by paper book usage, paper books also made up the majority of acquisition events as revealed in Table 11 below.

	<b>Total</b>	<b>Average per Participant</b>	<b>Range Across Participants</b>	<b>Number of Participants in Category</b>
<b>Acquisition Events</b>	171	5.70	1 to 33	22
<b>Books Purchased</b>	112	3.73	1 to 33	18
<b>Books Borrowed</b>	63	2.10	1 to 20	11
<b>Paper Books Purchased</b>	85	2.83	1 to 28	18
<b>Paper Books Borrowed</b>	35	1.17	1 to 15	10
<b>E-books Purchased</b>	27	0.90	1 to 13	5
<b>E-books Borrowed</b>	24	0.80	1 to 15	6

Table 11: Acquisition events and book types for all participants throughout the entire diary period (does not include audiobooks).

The top three rows (highlighted in gray) provide information about all acquisition events (not including audiobooks), while the bottom four rows break down acquisition events by book type. As in the tables describing the reading event data in Chapter Five, I have also included an additional column (Number of Participants in Category), which reports the number of participants who are represented in each row, revealing how prevalent each type of action was across all participants.

While participants also preferred paper books when borrowing, the margin between book types was smaller, at 35 paper books and 24 e-books. However, these comparisons are less meaningful because Table 11 includes all participants, some of whom only read paper books.

	<b>Total</b>	<b>Average per Participant</b>	<b>Range Across Participants</b>	<b>Number of Participants in Category</b>
<b>Acquisition Events</b>	141	4.7	1 to 33	15
<b>Books Purchased</b>	93	3.10	1 to 33	13
<b>Books Borrowed</b>	48	1.60	1 to 17	9
<b>Paper Books Purchased</b>	66	2.2	1 to 28	12
<b>Paper Books Borrowed</b>	24	0.8	1 to 15	6
<b>E-books Purchased</b>	27	0.9	1 to 13	5
<b>E-books Borrowed</b>	24	0.8	1 to 15	6

Table 12: Acquisition events and books types among e-book readers throughout the entire diary period (does not include audiobooks).

Table 12 above compares purchasing and borrowing behaviors for both paper and e-books among participants who reported that they were e-book readers at the time of the study (whether or not they read or acquired e-books during the diary period). As this table shows, even when examining data only from participants who read both paper and e-books, paper books continued to be preferred in purchasing events, with 66 paper books purchased in comparison to 27 e-books. Table 12 also reveals that e-book-reading participants borrowed paper and e-books at the same rates. This aligns with the contention from the previous chapter that paper and e-books were essentially equal for leisure reading purposes (which was the primary type of reading that participants engaged in during the diary period). The diary data suggests that when ownership-related actions are not at issue and borrowing is an acceptable acquisition method, paper and e-books were essentially equal for participants' purposes.

Participants chose to borrow books instead of purchasing them for financial reasons, and to conserve physical storage space. In the rare cases that considerations of money and of storage space were not at issue, participants were more likely to purchase (as opposed to borrowing) paper books for reasons of "trying them out," with the intention of culling those not worth keeping at a later point in time. The habits of participants in the study fell along a range of acquisition approaches: some people bought nearly every book that they wanted to read (e.g., P1), and some relied almost entirely on the library for book acquisitions (e.g., P9). Most participants' behavior, though, fell in between these two extremes.

Because book acquisition events are rare in comparison to book reading (in that one acquisition event can lead to many reading events), the diary data likely does not provide as complete a picture of participants' acquisition practices as does the data for reading events. They do, however, provide some insight into those practices, and they

served as a foundation for further discussion of participants' acquisition practices in interviews. The following sections explore participants' acquisition practices from a different perspective, relying on the home tour and interview data to investigate acquisition and the practices that extended from acquisition: those of ownership and collection management.

### **Ownership and Paper Books: The Home as a Context for Relationships to Artifacts**

The diary data showed that participants chose paper books more frequently than e-books when purchasing books. I begin an exploration of why participants considered paper books to be preferable, overall, as owned artifacts by describing the ways in which participants used paper books. This provides grounds for comparison in investigating their e-book-related practices. Maintenance of paper books as part of a collection in a participant's home carried with it the expectation of access at any time and the possibility of display. The visibility of a book collection was central, not only for social purposes that relied on others' awareness of a participant's books, but also for personal purposes that depended on participants' awareness of their own collections. These functions of visibility proved to be a central distinction dividing participants' conceptions of and interactions with paper book collections from their conceptions of and interactions with e-book collections. Through providing a space for display of physical artifacts, the home supported continued visibility (and therefore awareness) of the artifacts a participant chose to maintain, as illustrated through the following vignette.

#### ***Vignette: A Library's Personal and Social Purposes (P1)***

P1's apartment is a calm oasis in a bustling international city. In this city, where real estate is at a premium, her decision to install a library in the two-story space overlooking the street in her large apartment is indicative of P1's priorities. If someone else owned this apartment, this room would likely have been a living or dining room, instead of being devoted to housing books. Both the windows and bookshelves take full advantage of the room's height, and built-in, mobile ladders

provide access to the top shelves. The library is lit with bright afternoon sun on the fall day when she shows me her book collection.



Figure 16: P1's library shelves and uncluttered arrangements of books.

P1 is reluctant to divest herself of books, and almost always errs on the side of keeping them. When asked, she can only recall one instance when she has rid herself of books: *The Babysitters Club* series. Therefore, her library reflects a nearly complete chronicle of her reading life. It contains favorite books that she read as a child, from Dr. Seuss and the Berenstain Bears, to a book of Greek mythology, to *Roll of Thunder, Hear My Cry*. It contains the copy of the complete works of Shakespeare that her father used to read aloud to her (“*He did all the voices and everything*” [P1]) and her mother’s copy of *The Hitchhiker’s Guide to the Galaxy*, as well as current favorites such as *Shotgun Lovesongs* by Nickolas Butler and Libba Bray’s *Going Bovine*. P1’s library is a collection of books that have been important to her throughout her life. She relies on her extensive book collection for relaxation and enjoyment, as well as drawing on it for inspiration in her work as a playwright.

P1 also values her library for the social connections it supports. Not only does her book collection contain books that reflect past familial bonding experiences and attachments (as with her father’s volume of Shakespeare and her mother’s *Hitchhiker’s Guide*), it additionally supports book-related interactions with friends and family in the present.

*I actually love it when my friends come over and they're just like, ‘Can I just sit here for a couple hours?’ Like, ‘Yeah sure.’ ‘Cause it feels good. To have them sit and feel it's peaceful and feel they can explore and it's really kind of cool actually (P1).*

She keeps children's books on a low shelf behind one of the armchairs, in a hidden spot that children can disappear into while she and their parents visit.

Her library also allows her to be a resource for book recommendations and lending, facilitating shared experiences with family and friends of reading the same books. For instance, her father had essentially stopped reading for pleasure during his busy career, and once he retired he came to her asking for guidance in finding new books. Her extensive library was a key resource in providing that guidance:

*So my dad came over and we stood here and it was like, "Okay, what are you interested in?" So we pulled... a little Neil Gaiman, because he really loves fantasy, and then we pulled some memoirs because he really loves personal stories, pulled a few plays 'cause he loves plays (P1).*

Here we see an instance of books facilitating shared cultural experiences, and strengthening personal connections (Gruning & Lindley, 2016). Book recommendations serve a dual social purpose: they express P1's own preferences (representing her identity to others) and they allow her to convey her care for and knowledge of the person to whom she is recommending a book—a book recommendation expresses that the recommender has considered the recommendee's tastes and preferences. P1's books are a set of artifacts that both she and her friends and family are able to enjoy, and sharing those artifacts could create a common ground of shared experience and strengthen relationships.

The vignette about P1's library illustrates three central themes from the data regarding how participants' collections of paper books functioned in service of personal identity- and relationship-related activities, addressing RQ1: First, that participants who maintained extensive book collections saw their own lives and identities as reflected in these collections; second, these collections represented participants' interests and identities to others; and third, the collections supported relationships to other people by supporting knowledge of shared experiences of book reading (all themes that contribute to answering RQ4 regarding social and personal implications of book collecting). These functions of paper books all relied on the visibility of those books, which allowed

participants' continued awareness of owned books as well as making books' existence known to others who visited participants' homes. The following discussion will build on P1's vignette, as well as data from other participants to address RQ2 (regarding how particular affordances support larger activities), demonstrating how particular affordances of the paper books allowed them to contribute to various identity-related activities.

### ***Paper Books At Home: Personal and Social Displays***

The above vignette described how P1's collection of paper books contained nearly every book that she had ever owned; many of these books performed different kinds of functions within identity-related activities. Actions of adding books to a collection, keeping books, and book divestment were all central to the activity of identity construction as reflected in a participant's book collection. While P1 tended not to divest herself of books (always imagining a potential future use for them), most participants reported that they occasionally reviewed their books collections in search of candidates for divestment. These determinations about books were often reflective of participants' judgments about these artifacts' relationships to their current identities. P3, for instance, spoke of ridding herself of books that were no longer relevant to her identity. One example of this was several books about dating which were not germane to her current identity as a married person (*"Well, I'm not dating anymore, [it would] probably be weird if I still had those..."* [P3]). These books had been part of an activity of seeking a romantic relationship, which befitted her previous identity as a single person; now, ridding herself of these books was an affirmation of P3's identity as a married person and her relationship to her husband. The action of book divestment, in this case, was a means for development of her identity. A second example of this kind of divestment was a collection of books related to the topic of cancer that P3 had collected during a period



when she worked for an organization that focused on support for people affected by the disease. As she said, *“So like, that’s an example where like I don’t work there anymore, not that I don’t care about cancer...in the same way but I don’t feel the same need or desire to have like a collection”* (P3). Another participant chose, instead, to *keep* books that represented a prior interest in religion: *“Yeah, I have some old religious books, religious memoirs that I used to be really into, and those are another example of stuff that was really important to me and it's not so much now. It's hard for me to let go of completely”* (P10). Despite her shift away from organized religion, these books had been very meaningful to her once and were a part of her personal history that continued to contribute to her identity, whereas P3’s books about dating had instead represented an aspect of her identity that was supplanted by her new identity as a married person.

For P3 and P10, as well as other participants, decisions about maintenance or divestment of paper books, which represented past phases of their lives, were ways of expressing the relationship between those phases and their personal identities in the present. These maintenance decisions reflected the development of their identities over time, personal changes and transformations either made through books or represented by books. Maintenance actions could be jettisoning a book that represented a connection to a former phase that was now unimportant, or keeping a book as a connection to a previous phase of life that continued to have an effect on their identity. Both choosing to keep and “get rid of” books were actions that contributed to the activity of identity construction. However, P10 kept her religious memoirs out of the way in a nook in her bedroom; they were not prominently displayed. This storage or organization decision reveals how visibility was a particular affordance of paper books. This affordance played a key role in paper books’ ability to function within identity-related activities: they could be hidden out of the direct line of sight or proudly displayed. As in the above quotes, paper books

were able to represent participants' identities *to themselves*, remind them of their personal histories, and reinforce aspects of their identities that they valued and wished to maintain. However, paper books also had the ability to represent participants' identities to other people. P11 and P21 provide examples of this function of paper book collections.

P11 had a large collection of what he referred to as books that had “kitsch value,” which he acquired on his frequent visits to used bookstores. While the value of these books was not always apparent to his wife, (“*She's like, 'Why the hell did you buy this book? It's a dollar, but why did you buy it?'*” [P11]), he enjoyed the conversations they could prompt with others. The book his wife questioned was one about “how to be a professional stewardess,” and he felt vindicated in its' purchase when, “*Two weeks after I picked it up, we had a guest in from out of town and he's like, 'So there's a book about flight attendants. That's just awesome'*” (P11). He enjoyed having friends browse his extensive library and the conversations that this could inspire: “*And if people see it, which I know they will, and if it prompts a conversation, great...It's very consciously [that] I'm curating a collection to provoke some kind of emotional response or reaction from an audience*” (P11). He housed much of his book collection in a set of bookshelves in his living room, which were immediately visible upon entering his house. The prominence of the placement of this collection within his home reflected his desire to share it with visitors. P11 carefully considered which books should be stored in the living room (a corner of which is pictured in Figure 17), and which should be kept in less visible areas of the house, as in this quote: “*...It's not that it's questionable in nature but the more adult stuff is up on the top shelf as opposed to, where people with kids...*” (P11). P11's decisions about display reflected the desired (and appropriate) audiences for his collection.



Figure 17: P11's living room bookshelves and reading chair.

P21 spoke similarly of keeping hardback sets of her favorite fantasy series in the front room of her condominium, where she planned to have built-in bookshelves installed on either side of the fireplace:

*And then up here in the front room, I wanna have all the really fancy ones that I love...I wanna have my entire collection of Ann McCaffrey hardbacks, my entire collection of Harry Potter, my entire collection of all of my Sharon Shinn books (P21).*

These, she said, were “*nice display copies*” (P21). In contrast, she noted, “*...I'm not gonna put romance paperbacks out here in the front street for everybody to see*” (P21). Romance paperbacks were instead stored in the bedroom, as they were for private reading rather than display purposes. These separate functions for books was made even more clear through her unusual practice (in comparison to other participants) of keeping multiple copies of some books, one for display and one for reading.

Decisions about display depended both on conveying the participant's interest in and knowledge of the displayed paper books and, for some participants, the quality of the books themselves. Although not all participants cared about the quality of their paper books, for participants who made distinctions between mass-market paperbacks and "nicer books" (typically hardbacks and trade paperbacks), decisions about acquiring, keeping, and displaying books could hinge on the solid construction and aesthetic appeal of a book. P18 explicitly tied her acquisition preferences to her ideas of how her collection appeared to other people:

*Yeah, and so I'm definitely gonna buy the hardcover, spend the extra money. And then with my favorite authors, when they first come out with a book and I really want to read it, I will spend the extra money and get the hardcover. It's gonna last longer, the quality...To me, there's also an emotional thing to it where there's something more respectable and meaningful about buying a trade paperback or a hardcover versus the mass market. It just looks more respectable, it looks like you care about your library (P18).*

P18's remarks here convey that she wants visitors to see that her book collection is important to her and that she is a person who cares about her books. This sentiment was also echoed by P4, who said, *"I'm not interested in the cheapest version. I want the one that I feel like is the one that I wanna keep. The prettiest one, the nicest one"* (P4). She was clear that this judgment was related to her anticipation of other people viewing her books: *"...I do think about books as something that I wanna keep, and that if I saw that, if somebody was in my library and saw that, they would be like, 'Oh that looks like a cool book'"* (P4). These examples from P21, P18, and P4 also convey that part of the value of "nice" copies of books was in their anticipated longevity. P18 expected her hardback books to "last longer," and P4 was willing to pay more for books that she planned to keep. Books that participants intended to continue using for the personal and social purposes described here needed to be long-lasting.

Affordances of paper books, particularly their visibility, were thus central to the kinds of purposes discussed in this section. These were both personal and social purposes, such as using books as a representation and reminder of one's identity for oneself, as a representation of that identity to others, and as providing and supporting connections to other people. Figure 18, below, revisits the example of lending to demonstrate how paper books' visibility allowed them to function within the social activity of reinforcing friendship.

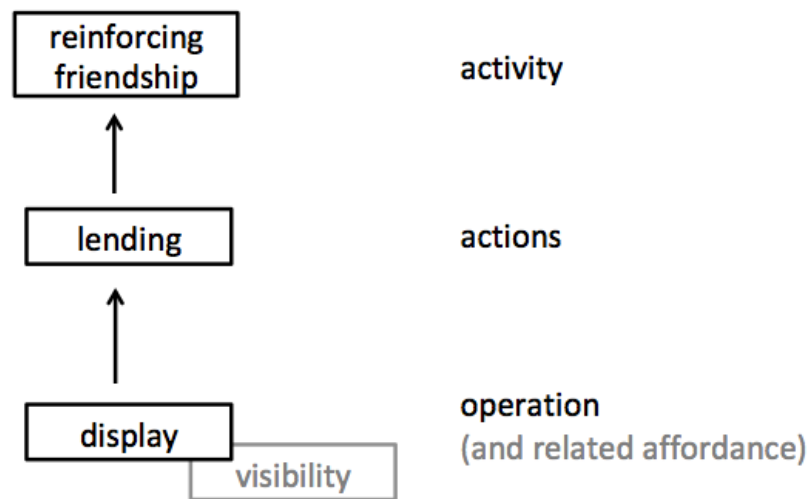


Figure 18: The role of visibility and display in lending paper books.

To remind a participant of a period of their life or aspect of their identity that they wanted to remember, books had to be visible; this visible reminder also spurred participants to rid themselves of books that no longer accurately represented their identities. Similarly, the visibility of paper books allowed visitors to peruse participants' bookshelves and so supported lending actions. Each paper book has a unique physical presence and occupies visible space in a home. Their material constructions support their visibility for their owners (and others), with spines bearing titles and facing outward on a

bookshelf to remind book owners of each book's existence, presence, and availability. As a personal resource for identity construction and as a set of artifacts that supported social functions, this visibility was crucial.

The physical structure of the home also underpinned these functions of paper books. The visibility of paper books relied on the availability of a location for displaying and storing them<sup>70</sup>, and participants worked within Western cultural norms surrounding privacy and the structure of the home as they made decisions about book storage. The most pertinent norms were those regarding public and private areas of the home: the designation of the living room as a relatively public space that is open to visitors, and the bedroom as a private space (as exemplified in P21's decision to keep display copies of prized fantasy series in the living room and trashy romance novels in the bedroom). P21's decisions about displaying books support Gregson's (2007) contention, drawing on Goffman's concepts of front-stage and back-stage, that the bedroom is "the ultimate backstage zone" (p. 100) where artifacts that were not intended to be visible to anyone but their owner are stored. Participants' determinations of appropriate and preferable locations for particular kinds of books, and (for some participants) preferences about "nice" books demonstrated that the visibility of paper books had social implications.

Participants saw paper books as stable and potentially enduring artifacts, and the home provided a place to store these artifacts over a long period of time, making the artifacts' stability meaningful in practice. This storage, combined with the material construction of paper books, allowed each book's affordance of visibility to function for multiple purposes. It made organization meaningful, allowing display and concealment of

---

<sup>70</sup> It is important to note that the home as also imposed limitations on participants' book collections, in that each paper book occupied some of the finite physical space in a home. Differences in the stability of participants' living situations also affected how they approached the management of their book collections. While financially stable participants in settled living situations (like P1) were able to accommodate large book collections in their homes, younger participants tended to be in less permanent living situations which affected their decisions about collection maintenance.

books, and was also useful in supporting re-use of books over time (as discussed with regards to re-reading in the previous chapter). Affordances of visibility and longevity, which this section has demonstrated, were key to allowing books to function within identity-related activities for participants. These activities also depended on the stability provided by ownership as understood through the concept of personal property as outlined early in this chapter. It is the combination of the affordances stemming from the material construction of the artifacts and the rules for interaction stemming from the ownership relationship that allowed paper books to function as tools for identity purposes. However, participants were also able to acquire books through borrowing, creating a situation in which their interactions with those books were shaped by participants' status as borrowers rather than owners. As the next section describes, participants' uses of borrowed e-books revealed the complications not only of borrowing vs. ownership, but also those introduced by conflicts between mental models of personal property and of digital files. Just as borrowing and ownership were associated with possible sets of actions, so too were digital files—and ownership of digital files did not yield the same possible actions as did ownership of physical artifacts.

### **BORROWING E-BOOKS FROM THE LIBRARY: CONFLICTING MENTAL MODELS**

Despite the differentiation of borrowing and purchasing as means of book acquisition, both depend on the same mental model of artifacts as personal property. In the case of library borrowing, the library, rather than the participant was the artifact's owner and had the "right to control use" of the artifact. The actions that participants could take using borrowed books were more restricted than those that were available for owned books, and the library could potentially impose penalties for improper use of borrowed books. These restrictions on actions placed by libraries typically consisted of a bounded

time for use by the borrower, limitations on the availability of artifacts (both the selection of books that are available and when they are available), and prohibition against actions that would cause an irreversible change in the book (such as writing in the margins of paper books). Penalties for improper use could be fines on overdue books or revocation of borrowing privileges in extreme cases.<sup>71</sup> The advantage of borrowing as compared to purchasing is, of course, that a borrower does not have to pay money to borrow a book. In this section, I briefly describe participants' practices of library usage for both paper and e-books, before turning to an examination of how participants' understandings of e-book borrowing revealed the conflicting mental models that contributed to the design of e-book artifacts and led to frustration for participants.

Although borrowing frequency varied across these participants, 21 of the 27 participants used a library as a means for acquiring books (Table 11 in the Participants' Book Acquisition Practices section provides an overview). For many participants, the first step in acquiring a book they were interested in reading was to check the availability of that book on their library's website.<sup>72</sup> For one participant with a five-year old who was learning how to read, going to their local library was a regular part of their routine:

*We'll probably go once every couple weeks with [our daughter], and so she checks out a stack of books, and so we tend to be there fairly often for her. And I'll put things on hold and I'll go pick them up (P7).*

The participants who checked out paper books from the library tended to be those whose routines involved going to the library on a regular basis, such as P7 above, as well as several participants who passed their libraries on their routes to work, and a librarian (P9)

---

<sup>71</sup> In cases of borrowing books from friends as opposed to a library, penalties were less likely to be defined explicitly but nonetheless could exist, perhaps as restricted borrowing privileges or deleterious effects on the relationship between the lender and borrower. P25, for instance, told a story about a friend who took a Polaroid photograph of people who borrowed books from her (with the book featured in the photograph as well) as means for enforcing the eventual return of her books.

<sup>72</sup> Some participants maintained membership in more than one library and checked book availability based on a hierarchy of the relative convenience of each library. One (P3) even traded library account passwords with a family member who lived in another area of the country to expand her access to library e-books.



for whom the library was one end of her commute. For participants who used the library to borrow e-books, the immediacy of access and lack of the need to visit a library in person was the primary draw: *“If I can get it, if I check the library and then they have it immediately available, I can download it immediately...”* (P7). That convenience was a powerful draw for many participants, and participants who borrowed e-books from the library tended to prefer them to borrowing paper books: *“99.99 percent of the books that I get from the library I borrow on e-book. And the only times I’ve ever borrowed a hard copy is if they just didn’t have it in e-book”* (P21). In these situations where ownership was not at issue and the participant was familiar with borrowing both paper and e-books, they preferred e-books.

However, interactions with borrowed e-books sometimes highlighted participants’ confusion about the rules that governed library e-book borrowing and the reasoning behind those rules. These points of confusion were typically related to how restrictions on borrowing e-books from the library conflicted with participants’ mental models of digital files. This became particularly clear with regards to the actions that participants expected to be available when interacting with digital files. People form mental models of digital files in the same ways that they form mental models of other artifacts with which they interact: through “experience, training, and instruction” (Norman, 2002, p. 17).

Expectations for interactions with digital artifacts, then, are formed around the actions we expect to be able to take with those artifacts (our past experiences). For digital files, many of these actions are represented in a menu (e.g., Open, Create New, Save, Copy, Delete, etc.) Most of these actions correspond to actions supported by the legal concept of personal property: access, control, and divestment (“Copy” being an important exception to this parallel). Harper et al. (2013) argue that while the concept of “digital file” has changed over time (noting both increasingly social uses of computers and the

advent of cloud computing), the concept of a (digital) file should be centered on a “grammar of action,” a set of things it is possible for a person to do with a file. They note that, “...A consistent grammar aids understanding of what actions are available...The set of generic actions that can be imposed on a file reinforce the perception of that thing, that file as a generic object, as an instance of ‘a file’” (Harper et al., 2013, p. 1133). Alongside these actions, people’s current expectations of digital files include the ease and speed of access to digital files—reliant on Internet access rather than geographical location.

The action of copying was both inherent to participants’ mental models of digital files and, importantly, a departure from available actions for physical artifacts. For instance, P3 noted, *“I don’t know how supply totally works with e-books for libraries, that’s a whole question I have”* (P3). This confusion about the available supply of e-books within a library reflects the understanding that P3 (and other participants) had: that as a digital file, e-books could potentially be infinitely and perfectly copied. Therefore, limitations on the number of available copies of a library e-book did not align with P3’s mental model of digital file interaction. P3 was not alone in her confusion about how e-books “worked” in the library system. Another participant mentioned borrowing an e-book from the library for the first time only to have it disappear before she had a chance to read it: *“I didn’t realize that I only had two weeks or whatever it was, and by the time I went back to it...It was gone”* (P2). P2 was a frequent borrower of paper books and was well aware of the library’s borrowing period for those artifacts, but she had been unaware that the two-week lending restriction applied to e-books—why would the library need her to “return” a digital file that (in theory) should be easy to duplicate? She also did not realize that the library retained control over the e-book file during the borrowing period (a level of control that would have been impossible with a borrowed paper book).

Library e-books, then, had some affordances normally associated with digital files, such as the “anytime, anyplace” access to the artifact participants in this and other studies (Foasberg, 2011a; Keller, 2012; Kemp et al., 2012; Shrimplin et al., 2011) saw as a central advantage of these artifacts in comparison to paper books. To participants who were accustomed to the automatic removal of e-books at the end of a loan, automatic e-book returns were seen as an advantage in that they sidestepped the oft-neglected responsibility of the borrower to physically return books to the library, and, therefore, forestalled the issue of fines. As P8 put it, “*It's the easiest, most convenient, I don't get a fee, 'cause I'm terrible about returning books, as everyone is*” (P8). However, the library (or more precisely, book publishers and vendors, via the library) also imposed limitations on e-book usage: limited time for access to e-books (possible because of the library’s continued control over the e-book through the participant’s Internet-connected e-reading device), and limitations on the number of copies of e-books that libraries were allowed to lend (i.e., P3’s “supply” question above). These limitations placed on e-books seem to be based on rules developed around personal property and physical artifacts, a case in which the artifact did have to be returned to the library to be lent out to another patron. The affordances and limitations of library e-books, then, actually drew from two different (and conflicting) mental models—that of digital files and that of physical artifacts. In Norman’s (2002) explanation of mental models and their relevance for designing digital systems, he argues that confusion and difficulty using a system on the part of the user can often be traced back to problems with the designer’s mental model of the system or poor representation of that model within the system. He argues that while the designer has a “design model” in mind for the system they build and expect that the user of the system will also have that model in mind, the user actually develops their *own* mental model of the system through interaction with the system. “But the designer doesn’t talk directly

with the user—all communication takes place through the system image” (Norman, 2002, p. 16).<sup>73</sup> Problems arise when that system image is “incoherent or inappropriate” or “incomplete or contradictory” (Norman, 2002, p. 17), as is the case with library e-books.

This amalgamation of two conflicting mental models left P2 confused about the limitations on her use of the library e-book, and several other participants also expressed frustration about the rules regarding library e-book usage and confusion about the imagined justifications for those rules (P3, P5, P10, P11). Confusion about the limitations placed on library e-books might discourage library patrons from borrowing e-books completely (P2, for instance, did not try to borrow a library e-book again). Even participants who were conversant with the library e-book system at times objected to the conflicts between these two mental models, as P3 did with regards to the “supply” of library e-books. There were participants (e.g., P8, P27) who borrowed library e-books and did not specifically object to the restrictions placed on their use; perhaps they considered these books as artifacts for which the book’s status as a library book took precedence over its existence as a digital artifact for the particular action of borrowing. The important point here is not P2’s abandonment of library e-book borrowing, but the source of the confusion that led to that abandonment: conflicting mental models that led to a participant’s confusion or frustration with as system. In the next section, I turn to examination of the interaction between participants’ mental models (of personal property as applied to physical artifacts and to digital files) and how those models shaped their reactions to digital systems for ownership of e-books.

---

<sup>73</sup> The system image is Norman’s term for “the visible part of the device” or technology.

## CONTEXTS OF E-BOOK OWNERSHIP

“Ownership” of e-books is more complex than ownership of paper books, because within the most prevalent systems that support e-book purchase and interaction (e.g. Kindle, Barnes & Noble NOOK)<sup>74</sup>, e-books are in fact licensed rather than owned. Although some participants were aware of this, others were not. Additionally, the Kindle and NOOK systems use proprietary file formats and digital rights management (DRM) to control the ways people can interact with e-books that exist within those systems. 18 participants in the study read e-books, and as shown in Table 13, 14 of these used the Kindle system. Six participants used alternative systems either in addition to or instead of the Kindle system.

	Kindle	Nook	Digital file (non-proprietary)
Participants	14	2	4

Table 13: Number of participants who used each type of e-book (reproduced from Chapter Five).

In the case of the Kindle system<sup>75</sup>, this is the AZW file format, which can be read on the Kindle (or Kindle Fire) device or through the Kindle app on a personal computer, smart phone, or tablet (the various devices used by participants are shown in Table 14, below). I consider the defining part of this system to be the file or digital artifact; that is, I define use of the Kindle system as use of an AZW file rather than use of the Kindle device, as it is possible to read non-Kindle (AZW) files using that device.<sup>76</sup> This is

---

<sup>74</sup> There is a third relatively popular e-book system (Kobo); however I focus on these two systems because they were the only systems used by participants in this study.

<sup>75</sup> As previously defined as, “digital files in a particular format and the combination(s) of software and hardware that allow access to those files” on p. 163.

<sup>76</sup> Of the e-book file formats, only ePub files are not compatible with Kindle. Other file formats, such as MOBI, PDF, and TXT (and Kindle’s native AZW format) are accessible on a Kindle device if they are unprotected by DRM.

because the file is the essential component and can be accessed through a variety of devices. Non-Kindle e-books, even if accessed through a Kindle device, are not part of the Amazon Kindle system, in that they were not acquired through Amazon nor does Amazon have any direct control over them post-acquisition (as it does for Kindle e-books). Kindle dominates the e-book market in the United States, with Kindle e-books comprising an estimated 80 percent of e-book sales in 2016 (Hiltzik, 2017), and the prevalence of Kindle users within this study reflects that dominance.

	Kindle	Kindle FIRE	iPad	Nook	Smart phone	Computer
<b>Participants</b>	11	1	6	1	3	2

Table 14: Number of participants who read e-books on each kind of device (reproduced from Chapter Five).

Participants in this study tended to view the Kindle system as the default means for accessing e-books. For instance, P13 cited the Kindle's prevalence and his assumption that because of that prevalence his library would be more likely to offer Kindle versions of e-books, as a reason for his purchase of the device: *"And Kindle always wins. If there's a battle, there's always a Kindle option"*(P13). Those who employed alternative systems generally framed that choice as being directly informed by their desire to avoid use of the Kindle system. P12's feelings on this topic, although perhaps more strident than some other participants, accurately represents the views of Kindle-avoiders. In a discussion of her decision to replace her Kindle with a Barnes & Noble NOOK, I recounted her previous mention of removing the digital rights management (DRM) restrictions on her Kindle e-books so that she would be able to read them on her NOOK.

Interviewer: *...And you also said, this was super interesting to me, that you stripped DRM off of your Kindle books.*

P12: *Off my Kindle books. Yes, fuck Kindle.*

She followed this statement by explaining,

*It's not that I have a problem with buying from the stores, it's that...Amazon wants to make sure that I can't read any other e-books on their reader,<sup>77</sup> and they wanna make sure I can't read their e-books on any other reader and just 'screw them' basically (P12).*

There are several ways to avoid using the Kindle system, such as using alternative platforms such as the NOOK (which also uses proprietary file formats and DRM), the Kobo e-reader (which has no associated proprietary file format), using the Kindle device but with PDF or e-pub (an open standard file format) files, or pirating e-book files. While the majority of the data presented here on e-book acquisition and usage reflects Kindle e-books—most of the e-book reading participants used that system—the six participants who used alternative systems provide an illuminating contrast.

When participants acquired and accessed e-books outside of the Kindle and NOOK systems, they managed storage and organization of the e-book files on their computers. This is in contrast to Kindle system e-books, which by default reside in the Amazon cloud storage associated with the participant's Amazon account.<sup>78</sup>

The actions that are possible to take using e-books are distinct from those available to owners of paper books in several ways, as illustrated in Table 15, below. In the previous discussion of borrowing from libraries, I noted that the borrowing and lending actions for e-books sparked confusion for some participants, as they drew from multiple and conflicting mental models for artifact interactions—the personal property model for physical artifacts and the basic digital file model.

---

<sup>77</sup> Although it is possible to read non-Kindle e-books on the Kindle device, it requires several additional steps in comparison to reading Kindle e-books.

<sup>78</sup> It is possible to download Kindle books to a personal computer, although the downloaded files are only accessible through the Kindle device or app. This action is not well-publicized by Amazon, and none of the study participants engaged in it or mentioned awareness of the possibility of downloading their Kindle e-books to their computers.

	<b>Paper books</b>	<b>Kindle</b>	<b>NOOK</b>	<b>Open formats</b>
<b>Lending</b>	Yes	Yes, with significant restrictions	Yes, with significant restrictions	Giving away replaces lending (no restriction on file duplication)
<b>Divestment (Gift/Charity)</b>	Yes	No	No	Yes
<b>Divestment (Re-selling)</b>	Yes	No	No	No
<b>Displaying</b>	Yes, in home and online	Only online	Only online	Only online
<b>Control of Storage Defaults to User</b>	Yes	No	No	Yes

Table 15: Paper books compared against e-book systems by possible actions.

Borrowing and lending e-books between individuals provides an illustrative example, and reveals some of the same concerns while additionally highlighting the social implications of restrictions on e-book lending. Before delving into the structure of these actions within e-book systems and participants' reactions to them, it is important to draw attention to the fact that many participants were either unaware of the lending action within the Kindle system or did not know how to use it. For instance, one participant said she did not feel like she owned her e-books because she did not know how to lend them: *"How do you lend a...Something from your Kindle library? I don't know how to do that. I don't know if it's possible"* (P4). Actions that a person is not aware of are unavailable to that person; affordances must be perceived to be acted upon.

Some participants were aware of the possibility of lending within the Kindle system. However, they were typically dissatisfied with the restrictions that Amazon built into the lending action: *"Kindle has a lending program but it's very constrained...It's a limited period and during that time it's not in your library, and I think you can even only*



*lend it once, which I don't really understand"* (P5). Kindle and NOOK e-books have similar restrictions on lending in that books can only be lent out within the system through which they were acquired. That is, a borrowed Kindle book can only be read on a Kindle device or through the Kindle app, and the same is true for NOOK e-books. The lending period is 14 days and e-books are automatically returned to owners at the end of that period. As P5 noted above, e-books are not accessible to their owners while they are lent out and can only be lent out one time (P5's consternation regarding the latter restriction is perhaps attributable to the fact that it aligns with no other mental model of book artifact interaction). Additionally, NOOK users can only lend out one book at a time and must wait for that book to be returned before they can lend out another. Finally, publishers completely restrict lending for some e-books.<sup>79</sup>

In that it was possible for participants to allow others to use a Kindle e-book that they owned, the Kindle lending action did partially mimic the lending action in the personal property model. However, the enforced time period for lending and the one-time lending limitation diverged from lending as accomplished with physical artifacts. Participants disliked the lending action for Kindle e-books because it conflicted with their mental models of digital artifact interaction. Participants were familiar with digital artifacts as being easily copied, and, thus, accessible by multiple people simultaneously through creating indistinguishable copies. Therefore, participants interpreted the constraints on lending within the Kindle system as not being inherent to digital artifacts generally but instead imposed by Amazon through the design of the lending action for Kindle e-books.

Amazon, however, also supported sharing in another way, through what they term the *Family Library*. Through the Family Library, Kindle users can share e-books across

---

<sup>79</sup> Publishers have not, to my knowledge, explained the rationale behind this limitation.

multiple accounts and devices between two adults and up to four sub-accounts for children (which must be associated with an adult account). Only one participant was using this means of sharing books. P24 happily used the Family Library to share e-books with his wife. They read *The Martian* together, both using their Kindles and the Family Library: “...*We read The Martian together, and we discussed it...We could for Kindle because you can share, you can have a family account, so we shared The Martian on eBook*” (P24). Another participant (P5) appropriated Kindle’s system in various ways to share books with many different people. She would either carry out a one-time massive download of books from her account to other people’s devices, or she would simply allow others to keep their devices logged into her account on a continuing basis (this method was reserved for family and close friends). As she put it,

*I discovered early on that if I signed a Kindle into my account, I could download all of the books in my library if I wanted to, to that person's Kindle, and then I could log them out from my account and they could log in to their account and they would still have all of my books* (P5).

This method of sharing Kindle books was unusual, and P5 thought that Amazon probably would not condone it, but as this option had not been eliminated from the Kindle system, she considered it to be a legitimate appropriation of the technology. Notably, P5 would not have been able to accomplish the action of sharing many books with many people if she had been using Amazon’s Family Library method, which only allowed sharing books across two accounts. These two participants considered these ways of sharing e-books to be much more useful than the Kindle lending action.

Although P24 was happy with his ability to share e-books with his wife, he noted that his heavy use of e-books limited the amount of lending he was able to do with friends. “...*The reason I don't [lend] in part is because most of them that I'm reading are on Kindle. I suppose I wouldn't...It's hard to say. If I had more paper books, would I say,*

*‘Hey, you should read this book’*” (P24). This quote illustrates that while the Kindle system does support a method of sharing that matches and even surpasses the sharing actions that are possible with paper books, this method is limited to a much smaller group of people than paper book sharing allows. The preferred methods of sharing within the Kindle system necessitated giving access to a participant’s entire Kindle library and therefore required a higher level of openness than lending out a single paper book—as revealed by P5’s practice of buying books she did not want her library-sharers to see in NOOK rather than Kindle format.

As mentioned previously, the paucity of the sanctioned lending, sharing, and divestment actions for e-books within the Kindle system was mentioned by both Kindle users and those who avoided e-books entirely. P30, who did not read e-books, cited this lack of a lending action for e-books as one of the reasons he preferred paper: *“I can mention a book to you and you can say oh that's interesting, I would like to read it, and I can just pull it out of my shelf and say there you go, read it and return it, please”* (P30). Similarly, P17 talked about reading e-books on his Kindle and then purchasing paper copies to give to friends: *“And I've read both of those on Kindle and then bought those for other people”* (P17). Anticipated social interactions that centered around books also affected people’s decisions around book divestment: *“...When we have gone through and purged books, the ones that I've kept either, to me are more of a classic, um, or obviously I liked them... And think that I would either read them again or loan them out”* (P24). Social actions involving sharing books with other people played an important role in participants’ decisions about book acquisitions and maintenance—by which I mean the actions related to “keeping books.”<sup>80</sup> In an activity theory framing, we might think of

---

<sup>80</sup> Such actions include placement (storage decisions), which involves concerns of display and concealment (for paper books), making space for books (either in a stack on the floor, on bookshelves, or digital storage), and making decisions about keeping or divesting oneself of books.

different affordances and actions that support various approaches to lending and borrowing paper and e-books as different sets of actions that contribute to the same activity of “sharing,” in the sense of allowing someone who is not the owner of an artifact to use it. However, they do not equally support that activity, in that the lending action for Kindle e-books includes restrictions that are not present in lending paper books. Other alienability-related actions (those related to control of artifacts), which people expect to be available with regards to owned artifacts were altered within e-book systems as well. Within the Kindle and NOOK systems, it is not possible to re-sell an e-book or give it as a gift to someone, as participants did with paper books.

### **Strange Gifts: Gift-giving and E-books**

Several participants purchased books as gifts for others during the course of the study; all were paper books. People did not tend to consider e-books as candidates for gift-giving:

*I've never gifted somebody an e-book. I've given them a credit that they can use for whatever they want but I've never said like, “I'm gonna send you a copy of this.” I'll just buy it for them and put it in the mail (P4).*

One participant had received an e-book as a gift, but found the experience of receiving an e-book as a present strange: “*Although, someone did give me an e-book as a gift..I just got an email out of the blue, that was like, ‘Hey, somebody gifted you this book’*” (P17).

In discussing the strangeness of receiving an e-book as a gift, he said:

*It would be like, “Oh, I got you this Netflix subscription.” Gift-giving is such a physical kind of thing..And that was the other thing. When I got that book as a gift, that person didn't even tell me. I just opened my email that day, and I had received a book, which was very nice, but weird (P17).*

This instance of gift-giving was done at a physical distance, with no other interaction between the giver and recipient, and this breaks with norms around giving physical artifacts as gifts—even gifts that are sent by mail are typically accompanied by a card as

a kind of formalization of the gift-giving action.<sup>81</sup> Gift-giving is also a meaningful social action, expressing the importance of the recipient to the giver, and reinforcing their social connection (Davies, Whelan, Foley, & Walsh, 2010; Komter, 2007; Mauss, 1966). Some of P17's reservations about his e-book gift were related to the lack of interaction with the giver; this gift seemed divorced from the social interaction that would normally have accompanied such an action.

Another participant, who recounted giving e-books to others (as non-proprietary digital files), spoke of this action as a casual one: *"Yeah, just 'cause I knew how to do it. And one of my friends had asked me to download books for 'em"* (P25). He remembered finding a PDF of an expensive textbook and sending it to friends who were also enrolled in the class that required that textbook: *"I downloaded those books and then shared them with select friends"* (P25). This kind of "giving" of books, however, did not have the social implications of a gift. Instead, it fit into the realm of sharing digital files: done at negligible cost to the giver and requiring only the technical knowledge of how to accomplish the action (which can vary across file type and protections). Perhaps the strangeness for P17 of receiving an e-book gift was precisely that it was presented as a gift—rather than a more casual act of file sharing—claiming the social import of a gift without the exchange of a physical artifact or the surrounding social interaction. To give a gift is to transfer ownership of an artifact from one person to another: participants did not typically feel that they owned Kindle e-books, making them strange gifts. Gift-giving was not the only way that participants divested themselves of books; they also sometimes simply did not want to own a particular book any longer and chose to remove it from

---

<sup>81</sup> For several studies that explore digital gift-giving, see (McGee & Skågeby, 2004; McMillan, Brown, Sellen, Lindley, & Martens, 2015; Skågeby, 2010).

their book collections. Divestment-related actions also proved to be quite disparate for paper and e-books, but with altogether different outcomes.

### **Divestment and E-books**

Some participants, like P1, rarely ever got rid of books. She would sometimes replace books that were physically disintegrating (i.e., “*completely shot to hell*” [P1]), but it was rare for her to completely remove a book from her collection. The only books she could remember actively removing from her collection were *The Babysitters Club* series. Of these, she said that she could not conceive of their contributing to her work as a playwright (often a reason for maintaining books in her collection,), much less imagine that she would want to re-read them. Just as anticipated future uses of books for reference or re-reading were reasons for keeping books, *not* being able to imagine a book’s future use was a standard reason to rid oneself of a book. Books that had been given to a participant as a gift were notable exceptions here, because of the emotional attachment of these artifacts; they represented the participant’s relationship to the gift giver. For instance, P9’s book collection was extremely small but made up almost entirely of books given to her as gifts: “...*the few books that I do have are gifts that people have given me... It has that sentimental value*” (P9). Ridding oneself of these kinds of artifacts—those given to one as a gift—was seen as a rejection of the relationship to the giver, while keeping them maintained the connection between the giver and recipient.

P17 said of books that he chose to get rid of: “...*It's stuff that I know I'm never gonna go back to,*” and books that he particularly disliked “*Or I started this and hated it, so there's no reason to keep it around*” (P17). Other participants also cited extreme negative reactions to books as motivations for getting rid of paper books, but they did not typically feel the need to delete e-books they disliked: “*There are only two books that I*

*can remember in my life that I hated so much that I had to stop reading. So I will finish a book... And leave it on [my Kindle]... Even if I hated it. I would definitely get rid of a paper book that I had that feeling about” (P4).* Because they were not constantly visible within participants’ homes—because the affordances of e-books did not support participants’ continued awareness of those artifacts—it was not important to remove them from collections: *“Because they’re invisible. They don’t matter. You don’t understand them in the same way as like seeing that terrible book on your shelf every day when you walk by. It’s like, you can hide it really effectively and it never shows up” (P4).* This quote shows how P4’s continued awareness of a book that she particularly disliked was upsetting—similar, although more extreme, than P3’s reasoning behind divesting herself of dating books. But while it was important that paper book collections reflect their owners’ identities, this was not typically an issue when it came to e-books. While paper book collections represented their owners’ personal development and transformation over time, e-book collections were not able to serve this purpose. There is also a cost to maintaining paper books, in that they take up space and potentially demand effort and energy if their owner moves residences. That cost was perceived as being much lower for e-books; most participants reported that they regularly divested themselves of unwanted paper books but never actively deleted e-books that they owned.

Actions related to divesting oneself of books are more meaningful when the collection as a whole is meaningful. One participant, P19, spoke of her her book collection as a way to surround herself with positive influences; being able to exclude negative influences from such a collection highlights the value of the artifacts that are maintained. In contrast, people rarely got rid of e-books; they simply allowed those that they did not particularly want to read to fall to the forgotten back of the digital library.

Typically, only front-page books were kept in mind;<sup>82</sup> that is, books that were visible on the home screen of the e-reader. Only in cases of extreme antipathy did participants report actively deleting e-books from their accounts (or computers), and these instances were rare. One example came from P11, who recounted, *“They are ones that I spent no money to acquire, and I realized, ‘Wow, this is really just shite. You know what, away with you’”* (P11). He did note that an e-book would have to be “pretty crappy” for him to take the time to delete it, because of the negligible cost of maintaining e-books. However, participants also did not value their collections of e-books to the same degree that they did their paper book collections.

One common means that participants employed for divestment of unwanted paper books was to re-sell them to a second-hand bookstore. Of the 27 participants, 13 specifically mentioned this method of divestment, and nine mentioned donating to thrift stores and to both formal and informal libraries (such as collections of books at a workplace or “little free libraries”). Actions of resale and donation were unavailable for protected e-books (such as Kindle or NOOK e-books), which several participants considered to be a serious disadvantage: *“I love the e-book, but the big thing for me is just control. If you can sell your book as a PDF, as an open format for e-books, I am all for it”* (P30). This participant eschewed the use of e-books altogether because of this and other issues of control of e-books, such as lending and the continued control that Amazon maintains over Kindle e-books. P11 chose, instead, to pirate open format e-books and considered the lack of a used e-book market as a partial justification: *“...That’s my acting out against the publishers for not allowing a secondary market”* (P11). Indeed, he acquired almost all of his paper books second-hand, so the lack of a re-sale market within

---

<sup>82</sup> The exceptions here were participants who kept one or two unread or unfinished books on their e-readers for the purpose of “always having something to read,” such as P12 and P25.



e-book systems such as Kindle's system did prevent him from carrying over his typical acquisition practices for paper books into the e-book world.

The actions discussed in this section, (lending, borrowing, gift-giving, re-selling, and destroying), are those related to control and alienability<sup>83</sup>—concepts central to personal property, as discussed in Chapter Five. As previous research has established, control and alienability are central to understandings of ownership of artifacts (Odom et al., 2012; Perzanowski & Schultz, 2016). Participants frequently cited the ability to take these kinds of actions as a reason for purchasing a paper copy of a book as opposed to a Kindle e-book, or even for purchasing a paper version of an already-purchased e-book. These issues bring to mind Odom et al.'s (2012) work on perceptions of digital possessions in the cloud, in which participants felt that their lack of complete control over their possessions diminished their ownership of those possessions. The data in this study additionally reflect that participants felt that they had even less control over their Kindle e-books than they did over unprotected e-book files, which they interacted with as they would most digital files on a desktop computer. Previous literature revealed that people are uncertain of their ownership of digital artifacts in comparison to physical artifacts. This study uncovers additional complexity in the subject of ownership of digital artifacts, revealing through comparisons of digital e-book systems that people's confidence in their ownership of these artifacts can be positively or negatively affected by the rules for interaction with artifacts of those systems. Data from this study shows that not all digital systems are equally deficient in supporting ownership, as the Kindle system was markedly worse for this purpose than was the basic system for interaction with digital files (the graphical user interface of the personal computer).

---

<sup>83</sup> "...The right of an owner of an item to resell it, give it away, or otherwise transfer it" (Perzanowski & Schultz, 2016, p. 17).

This section examined the differences in participants' interactions with e-books in multiple systems, as implicitly (and at times explicitly) compared against their interactions with paper books and expectations engendered by the legal concept of personal property. The restrictions placed on e-books, particularly in the Kindle system, discouraged participants from seeing e-books as useful for many of the activities in which they used paper books. The affordance of visibility (and the maintenance actions made meaningful by visibility) also played a key role in participants' perceptions of paper books as useful within various activities; the following section examines visibility and maintenance with regards to e-books.

#### **VISIBILITY AND MAINTENANCE FOR E-BOOKS**

As this dissertation research demonstrates, differences in the affordance of visibility are perhaps the most impactful difference between paper and e-books. This difference stems from the fact that e-books, unlike paper books, are experientially divorced from their physical presence. While the only necessary component of any specific e-book artifact is the inscription that makes up the e-book file itself (the ones and zeros recorded on the storage medium), that file cannot be interacted with directly and has no meaning to human users until it has been translated through layers of software and rendered on the screen of a device. Devices that support access to e-books, however, are not uniquely tied to a single file; they may be used to access many such artifacts. E-books do not, then, have a unique and visible presence within a home as paper books do. While this was an affordance, in that e-books did not "take up space" in the home, many participants remarked that it was a limitation as well: *"Because, unlike with a book on your shelf, you don't see it and have it call out to you that you haven't read it in all this time. It's just sitting there hidden away in the library, and you won't see it unless you're*

*scrolling through it*” (P21). This complaint was typical for participants (such as P4, P11, P12, and P21) who had large e-book collections whether or not they used the Kindle system. Several such participants independently referred to their e-books as being “invisible;” they had to be actively sought out,<sup>84</sup> whereas the simple presence of paper books within a home served as a reminder of their availability.

This invisibility of e-books may be related not only to their material composition but also to the design of e-reader interfaces, particularly in the case of the Kindle. The design of the Kindle interface emphasizes reading to the detriment of actions related to collection management and maintenance. When turning on the Kindle, the device displays the last page of a book that the user was viewing when they turned off the device. The default home screen (shown in Figure 19, below) displays books in descending order, with the most recent book positioned at the top left corner.

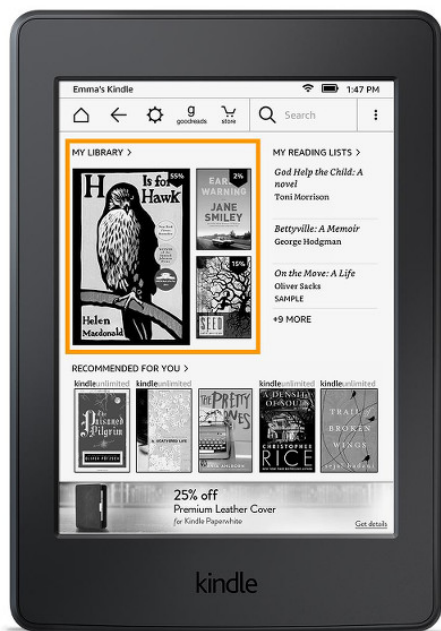


Figure 19: Kindle home screen (2016).

<sup>84</sup> Reminiscent of Kirk & Sellen (2010) and Petrelli & Whittaker’s (2010) studies.

Therefore, books that a user has not interacted with recently are eventually replaced on the home screen by more recent additions. This design may encourage users to view the device as a means for reading rather than a means for collection management and organization—as a book rather than as a library. For instance, P24 noted that he saw his Kindle as primarily representing the e-book he was using it to read at the time, rather than the whole of the collection that he had downloaded to the device:

*I have a bunch of books on my Kindle, but they're just there. I don't know that they're there, I don't look for what is there. I know I'm reading the book that I'm reading. And then when I'm done with that one I'm not usually going through my Kindle library, and seeing what is there. I'm going more likely to my Goodreads bookshelf, and seeing what do I want to read (P24).*

These limitations—the lack of a visible external presence for e-books combined with the Kindle interface’s emphasis on recent interactions—resulted in P24 reading e-books one time only; their material construction did not support his continued awareness of their existence, which inhibited their use in actions that relied on such continued awareness as shown in Figure 20. That figure depicts the argument that visibility plays a key role in allowing artifacts to function for identity-related purposes, and that the decreased visibility of artifacts within many digital systems makes the use of those artifacts for identity-related purposes difficult or even impossible. As mentioned above, P24 was not alone among the participants in his difficulty recalling the contents of his e-book library.

Kindle users noted that while the Kindle interface was seamless and easy to use for the purpose of reading books, it did not adequately support organization of the collection of books that were stored on it. As P24 said, “*It can be a pain to browse through the library,*” on the Kindle, and P21 preferred the Sony reader’s interface for

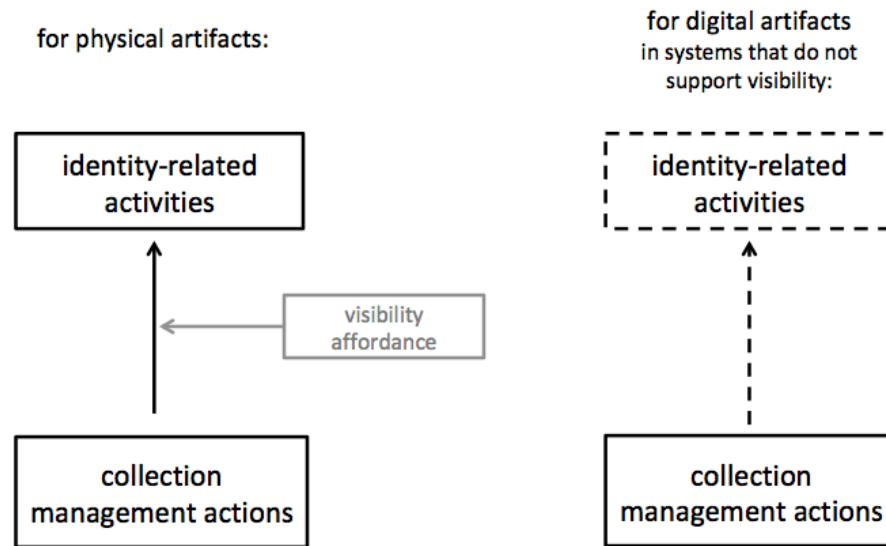


Figure 20: The influence of the visibility affordance on the use of artifacts in identity-related activities. The dotted lines on the right side of the figure indicate the difficulty of using “invisible” artifacts for identity-related purposes.

organization purposes: “ ‘Cause one of the things I liked better about the Sony reader is that it organized stuff in collections for you... So like I said, I don’t necessarily love their organizational aspect of [the Kindle]...” (P21). These complaints may be reflective of the fact that the Kindle interface displays only six e-books at a time, making it difficult to browse large collections (another aspect of the emphasis on recent interactions). P17 had abandoned his attempt to organize the e-books on his Kindle. He attributed this partially to the fact that “the interface isn’t good for organizing” (P17), but additionally noted that because he did not read multiple books concurrently on his Kindle, organization was unnecessary. “I found with the Kindle I wasn’t like, ‘Well I’m going to put this book down and then pick this book up.’ Like going back and forth like that” (P17). Like P24, P17 essentially treated the device as though it was a single book: whichever book he happened to be reading at the time. The Kindle’s emphasis on supporting actions related to reading seems to have impaired its support of actions related to ownership. This recalls

Denegri-Knott et al.'s (2012) argument that maintenance work that people carried out with regards to digital artifacts helped to encourage them to view those artifacts as valuable. Making such maintenance work difficult or simply unnecessary within a system may in turn result in users of the system viewing the artifacts that exist within the system as less valuable.

In this section, I have so far focused primarily on the Kindle system and interface, which were used by a majority of the e-book reading participants. To provide a contrast to Kindle users' experiences, I now turn to an exploration of the practices of participants who avoided using the Kindle system. Of the 27 participants, three had engaged in e-book piracy<sup>85</sup> or currently did so (P8, P11, and P25), and others mentioned their acquisition of open format e-books that were unprotected by copyright (P12, P17, P21, and P25). Regardless of the legality of the means of acquisition, these artifacts were all open format e-books not protected by DRM or proprietary file formats; therefore, they had the same possibilities for actions as other digital files (e.g., Open, Save, Copy, Delete). P11, who estimated that he had a collection of roughly 5,000 e-books, was the participant in the study who was most open about discussing his practices of illegally downloading e-books. Here, I focus on P11's practices to illustrate how the actions he (or any other person interacting with open format e-books) was able to take with his e-books differed from those that were available to Kindle users.

P11 had amassed large collections of both paper and e-books. He managed the e-books on his computer and an external RAID (redundant array of independent disks<sup>86</sup>) drive, which he used to back up his files, and used a Kindle as his e-reading device. As

---

<sup>85</sup> Out of concern for participants' privacy, I did not introduce the topic of e-book piracy in interviews so as not to coerce participants into discussing the sensitive topic of illegal activities. Therefore, I only became aware of this behavior if participants mentioned it of their own accord; other participants may have engaged in e-book piracy and chosen not to introduce the topic.

<sup>86</sup> RAID drives have more memory and are more stable than typical external hard drives.

mentioned in the above section on paper book collections, P11 particularly enjoyed sharing his favorite unusual or “kitschy” paper books with friends. He noted that, in contrast, his e-books were invisible not only to his friends but to himself: *“It’s much harder for me to serendipitously come across something in the e-book collection. It happens, but not very often”* (P11). He preferred paper books because of *“the immediacy of the visual feedback”* (P11) that they offered. P11’s reflections on how the invisibility of his e-books affected his ability to use them for both social and personal purposes is a reminder of how central these purposes were to the ways that participants used their paper book collections. In terms of comparing systems for e-books, however, his practices as described up to this point are not obviously different as compared to those of Kindle users—the differences between e-book systems emerged not in the context of the visibility of e-books, but in the control of their storage and organization, which I turn to now.

Participants who avoided the Kindle model either had specific backup practices for their e-book libraries (as P11 did) or incorporated e-book backup into their regular computer backup practices. No participant who used the Kindle system attempted to control backup of their e-books, which was unsurprising as Kindle e-books are by default stored on the Amazon cloud. When a Kindle user purchases an e-book, it becomes associated with their Amazon account and is downloaded to their Kindle. If they reach the limit of the storage space on their device, they are able to delete books from the device while these books remain associated with the account and therefore can be re-downloaded in the future.

The Kindle system, however, did not interact well with open-format e-books. P8, for instance, lost some pirated e-books when moving from an older Kindle to a new model: *“And so when I moved from one Kindle to the next, I think I did lose all of that. It*

*didn't move over*" (P8). Her habit of relying on Amazon to maintain her e-books meant that she lost books that were not part of that system. Moving her open-format e-books from the old Kindle to the new one would have required P8's active intervention, whereas that was unnecessary for Kindle e-books.

The Kindle system removes the responsibility for maintenance from the reader, but (perhaps relatedly) it also discourages the reader from thinking of e-books as things that they are responsible for maintaining and that therefore might have the potential for long-term ownership. This issue touches on RQ3 regarding differences in participants' expectations about long-term interactions with paper and e-books: as discussed above, many Kindle-using participants preferred paper books for books they "wanted to own." This may be because they recognized that long-term access to their e-books was dependent on Amazon. As one reluctant Kindle user said: *"And I guess, if say, [Amazon] went under, not that they're going to, but say they do, then what?"* (P4). This preference for paper books for long-term ownership may also reflect participants' awareness that their reliance on Amazon for access to their Kindle e-books also reflected Amazon's continued control over those books (contrary to control residing solely with the owner, as under the personal property model). Participants who managed their own e-book files, however, did not cede control of those artifacts to an external service. In either of these systems, however, maintenance actions such as keeping and deletion of e-books were less meaningful actions than they were when taken with paper books.

There are two intertwined types of functions that comprised the central differences in participants' interactions with paper and e-books: 1) those that supported alienability-related actions, which related to participants' control of artifacts and made decisions about maintenance of their book collections meaningful, and 2) those that relied on the affordance of visibility, which was central to supporting both personal and social



actions related to identity. In describing these as “intertwined,” I draw attention to the fact that the visibility of paper books made alienability-related actions both more meaningful and simpler to accomplish than these actions were for e-books. While both types of functions were diminished across the various systems that supported their existence (both proprietary and non-proprietary), the former type was noticeably more impaired in proprietary systems (e.g., Kindle and NOOK). The implication here is that while participants like those in previous HCI studies did feel that their ownership of digital artifacts was less “real” than that of physical artifacts, these feelings were exacerbated in proprietary e-book systems.

As this chapter has demonstrated, the comparative lack of visibility for e-books within participants’ homes decreased their value not only by removing possibilities for display, but also by making collection maintenance actions less meaningful. 11 participants, however, engaged in display and organization of books through use of a supplementary system called Goodreads. The following section described Goodreads and participants’ practices of using the site.

### **Goodreads: An Online System for Book Display**

While some of the prior research on interactions with physical and digital artifacts found that participants (like most of the participants in this study) considered digital artifacts to be essentially invisible ((D. S. Kirk & Sellen, 2010; Petrelli & Whittaker, 2010), others highlighted the possibility of online display for increasing digital artifacts’ visibility (Cushing, 2013; Denegri-Knott et al., 2012; Lehdonvirta et al., 2009; Odom, Sellen, et al., 2012; Odom et al., 2011).<sup>87</sup> As previously mentioned, P24 reported he browsed his collection of saved books on the social media site Goodreads, rather than his

---

<sup>87</sup> This research did not focus on comparisons of physical and digital versions of the same type of artifact; instead, these studies examined artifacts in online gaming environments or social media as an artifact.

Kindle library, to find a book to read: *"I'm not usually going through my Kindle library, and seeing what is there. I'm going more likely to my Goodreads bookshelf, and seeing what do I want to read"* (P24). P24 was not the only participant who was a Goodreads member. At least 11<sup>88</sup> of the participants in this study were members of the site, which currently has over 65 million members, according to the website's About Us page.<sup>89</sup> Goodreads was launched in 2007 and purchased by Amazon in 2013. Goodreads describes itself as a means for members to see what friends are reading, to track their own reading, and to receive book recommendations. At the time of the study, members' homepages featured a feed of updates from friends, an overview of their own "to-read bookshelves," a list of links to their other bookshelves, links to book recommendations and to the Goodreads blog, as well as links to other pages within the site. As this description indicates, Goodreads allows members to categorize books into "shelves," which members can create. Goodreads members build their "bookshelves" by manually adding book titles to their accounts and assigning them to shelves. Pages for individual shelves display an array of covers for books on that shelf.

Participants who were Goodreads members typically employed the site both to keep track of books they had read and books that they were interested in reading, both paper and digital. P8 described her Goodreads practices for maintaining a list of favorite books: *"And sometimes if there are particular passages or something that I really loved, I'll mark it as read on Goodreads and then put in a little review. It's just the passage more or less, for a way for me to bookmark it for later, if I wanna find it"* (P8). As this quote reflects, although Goodreads was a social media site, P8 saw her use of the site as

---

<sup>88</sup> Goodreads accounts were a topic that I did not raise with every participant, as they were not part of the original interview protocol (although by the end of the study I actively questioned participants on this topic). Therefore, there may have been participants who were using Goodreads who are not included in this number.

<sup>89</sup> This page can be found at: <https://www.goodreads.com/about/us> (accessed February 10, 2018).

having primarily personal functions: maintaining her awareness of books that she had enjoyed reading, as well as making favorite passages from those books easy to return to in the future.

Both of these personal uses were especially important for P8 because although she maintained a personal library of paper books (pictured in Figure 20, below), she was a habitual library borrower and therefore would not necessarily have the physical presence of the paper book on her bookshelves as a reminder or as a means of returning to those favorite passages.



Figure 21: Although P8 acquired many of the books she read from the library, she also maintained a personal library of paper books.

In fact, most of the participants who used Goodreads reported that they used the site primarily as a personal memory aid, rather than as a display of their reading to others:

*Almost all my Goodreads reviews are just excerpts that I like, or things I want to come back to later, so it's just for my reference and sometimes people like my*

*reviews, which doesn't make any sense to me, because they're not really reviews, they're just my notes of things I like, things that struck me... (P9).*

These participants tended to limit their reviews to a star rating and a couple of sentences about their opinion of the book to remind them of what they had liked (or disliked) about it (e.g. *"And I'm also trying to write one to two sentence reviews, just so I know how I felt when I finished it"* [P25]), or they did not write reviews at all.

Although participants generally stated that they used Goodreads more as a memory aid for themselves than for the social aspects of the site, Goodreads is nonetheless an online platform; the possibility for social uses exists. Most of the participants who used Goodreads for finding new books were "friends" on Goodreads with people they personally knew. Friends' Goodreads profiles, thus, functioned as an extension of offline person-to-person book recommendations, as the following quote illustrates.

Interviewer: *Do you also browse other people's Goodreads reviews?*

P9: *I don't browse that much, but sometimes my Goodreads friends will recommend things and then I'll get them, or I'll get an email that says, 'Your friends put this on their to read lists.' Sometimes I'll end up reading them at roughly the same time, which is kind of like a semi-book club.*

P9 received a regular email notification from Goodreads that aggregated information about which books her friends had recently tagged as "currently reading." This awareness of what other people were reading could support social interaction around books: *"...We might not be reading them at exactly the same time, but we can talk about it at some point"* (P9). Perhaps these conversations would have happened even without Goodreads, but their usage of the site clearly facilitated social interactions around books for some participants.

In addition to supporting participants in bookmarking favorite passages and engaging in social interactions around books, Goodreads also enabled participants to

organize and display books for personal purposes. For example, P21 categorized books in her Goodreads account by the year in which she first read them as a way to quickly identify candidates for re-reading: *“I like to go back through and look at books that I read in previous years. On Goodreads, this is one of the reasons that I divide them into years”* (P21). Such an organization system would have been useless to others who perused her account; it was solely for her own convenience. Goodreads (combined with the affordances of the personal computer) allowed participants to view collections of books (their “bookshelves”)—a visibility-dependent action which was not well supported on the Kindle device. For participants who frequently maintained their Goodreads collections, this may have resulted in increased “visibility” of their e-books. As Denegri-Knott et al. (2012) argued, maintenance practices around digital artifacts helped participants to see those objects as valuable simply through regular re-encountering of the objects. Notably, all 11 of the participants who mentioned their Goodreads accounts in interviews were also e-book readers, suggesting the possibility that they were employing Goodreads to augment e-books’ functionalities for display, thereby potentially serving both utilitarian re-uses of books and high-level identity-related activities.

## SUMMARY

This chapter shows how books had the potential to become (and remain) meaningful for participants through particular actions that participants were able to accomplish using those artifacts. These actions relied on the affordances of the artifacts themselves and the possibilities for action stemming from the relationship between the person and artifact (i.e. borrower vs. owner). These and actions, then, gave rise to possibilities for activities to which the artifact might contribute. Moreover, analysis provided in this chapter suggests, based on the case of e-books, that people’s perceptions

of digital artifacts as unstable and untrustworthy may be rooted in issues of multiple and conflicting mental models represented in the “system image” (Norman, 2002) of the artifacts. The chapter has additionally expanded our understanding of the key affordance of visibility of artifacts, which is important not only because it is central to their functioning as tools within identity-related activities, but also in that it makes maintenance-related actions, such as organization and divestment, meaningful—thus facilitating these actions’ roles in serving identity-related activities as well. Finally, this chapter describes how some participants employed the book-focused social media site Goodreads to recreate some of the possibilities for visibility and collection management of books that were missing from e-book systems.

## Chapter Seven

### Discussion and Conclusions: Systems for Living with Artifacts<sup>90</sup>

In this dissertation, I have taken an innovative methodological approach to understanding differences in people's interactions with physical and digital artifacts through an in-depth exploration of interactions with paper and e-books. In doing so, I chose to deviate from previous broad and exploratory approaches to this topic within HCI research by instead focusing closely and deeply on a particular set of physical and digital artifacts. My approach in this research has also deviated from typical approaches to activity theory within current research in HCI, returning to activity theory's early focus of examining the activities of individuals rather than groups of people.

This implementation of an activity theory framework serves to remind the HCI research community of the breadth of this theory and the multi-faceted possibilities for its' application. In this study, activity theory allowed me to take full advantage of the methodological approach of examining comparable sets of physical and digital artifacts in depth, supporting an analysis of how particular affordances of paper and e-books influenced people's abilities to use those artifacts as tools for their own personal development over time. My focus on the use of artifacts as tools within multiple activities also leads to diversity in the range of implications for design that emerged from this study. More specifically, this research revealed two central distinctions in the types of activities within which people use books as artifacts that determined which affordances of a book artifact made it a good tool for supporting a particular activity. These distinctions

---

<sup>90</sup> Material from this chapter has been published in J. Gruning (2018), "Displaying Invisible Objects: Why People Rarely Re-read E-books," in *Proceedings of the 36th Annual ACM Conference on Human Factors in Computing Systems* and in J. Gruning (2017), "Models for Ownership: Implications for Long-term Relationships to Objects," in *Proceedings of the 35th Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems*.

were short term vs. long-term usage, and social vs. personal usage.<sup>91</sup> This chapter will address each of these in terms of exploring how technology might be designed to better support these four types of activities. First, however, the chapter will describe the methodological contributions of the study, then review the key findings produced through this methodological approach and illustrate their contributions to the broader literature, and finally discuss the implications for the design of new technology that emerge from the findings.

### **METHODOLOGICAL CONTRIBUTIONS**

My methodological approach in this research is innovative in that the use of both diary study and home tours methods allowed for the study of activities over an extended period of time from two distinct perspectives. One of these perspectives focused on how people live and interact with books over long periods of time, and was incorporated through the use of home tours, which relied on an examination of participants' physical and digital book collections as evidence of these practices. The other perspective directly examined participants' specific interactions with books over a one-month period of time in the diary study.

While the extended length of the diary study presented difficulties (as discussed in Chapter Four), it also yielded unexpected advantages. My approach of meeting with participants in person prior to the study and maintaining contact with them throughout the diary period provided an increased opportunity to build rapport with participants, leading to more openness from participants at the interview stage. Establishing rapport with participants was of paramount importance, as a central goal of this study was to

---

<sup>91</sup> In other words, single-time or time-limited usage as opposed to usage that occurs (whether intermittently or continually) over years or decades, and uses that involve others or are directed towards them (such as lending or social display), as opposed to uses that are directed "inwards" (such as leisure reading to reduce stress).



understand the phenomenon of interest from their point of view. It was essential to the goal of accuracy in data collection that participants felt comfortable communicating with me about their experiences and perceptions. The final analysis is therefore grounded both in diary data that described participants' interactions with books in the short and long-term, and data that revealed how participants felt about those interactions and about the artifacts with which they interacted.

Building a relationship with participants prior to the home tours also positively impacted the implementation and outcomes of that method. As mentioned in Chapter Four, establishing rapport in home tours is both essential and often difficult, as the researcher is “invading” a private space belonging to the participant—often as they are meeting for the first time. Preceding home tours with an additional longitudinal research approach counteracted that inherent difficulty of the home tour method, leading to more openness not only in interviews but in home tours as well.

I chose to incorporate home tours into this research not only because the home was a primary site in which reading occurred, but also because it was a primary site in which *ownership* occurred. Previous research revealed several interrelated phenomena regarding ownership and perceptions of value of artifacts: first, that people come to value artifacts as they interact with them over time (i.e., artifacts that are not valued are jettisoned); second, that these interactions over time are supported by the ownership relationship between people and artifacts; and third, that ownership can be fraught and uncertain when it comes to digital artifacts. Employing the method of home tours successfully supported exploration of these phenomena. However, before returning to further discussion of the findings that this centering of the home yielded, I note that this choice also came with limitations in that it de-emphasized interactions with artifacts in other locations. Examining the home particularly supported investigations of public and

private display within that space as well as interactions with artifacts over the long term. It did not, however, yield an understanding of how people use books in more public spaces, such as on public transportation and in “third places” (Oldenburg, 1989) such as coffee shops, restaurants, bars, and libraries. Examining how people use books in such third places would reveal a more nuanced understanding of public displays of reading and how those displays might function within outward-facing identity construction processes. Such a study would then be likely to produce a better understanding of how to design for these kinds of public interactions with artifacts.

Nonetheless, for this study’s emphasis on understanding multiple kinds of interactions over time, the home proved to be a rich setting for research that produced detailed data describing participants’ uses of and relationships to their books and book collections. I now turn to an examination of how the home served as a system for supporting human relationships to paper books, and what a comparison of this system against digital systems for book ownership revealed about the often taken-for-granted strengths of the home as a means for supporting interactions with artifacts.

## **THE HOME AS A SYSTEM**

Homes are places that people inhabit over time; that we customize and make appealing through our actions within them and towards them. In what he calls the *dwelling perspective*, Ingold (2000) argues that human dwellings, or homes, “...arise within the current of their [inhabitants’] involved activity, in the specific relational contexts of their practical engagement with their surroundings” (p. 186). An emphasis on cultivation—care and preservation of the home—is a key aspect of this perspective. The collection management activities discussed in this dissertation are just such actions. In the process of dwelling in a home, we frame our lives and identities by surrounding ourselves

with chosen artifacts. These artifacts continue to influence our lives through our continued awareness of them and their peripheral visibility (Miller, 2010); we use them to frame our lives. The home provides a stage, or a setting, for creating ourselves through artifacts over time, and my focus on this setting provided deep insights into people's long-term interactions with book artifacts.

I have argued that it is the visibility of paper books that makes ownership of them, and ways of organizing and displaying them (along with other actions associated with artifact ownership), meaningful. This would not be possible without a place to house these artifacts where their owner(s), and others, can see them. The home serves this purpose and allows books to serve as framing for identity. A home library presents the occupant of the home as a person to whom reading and books are important: recall P1's decision to install a large library in her apartment in place of a traditional living room and P11's library nook that was immediately visible upon walking through his front door. The home additionally supports the choice of proudly displaying books in a public or front stage area (e.g., P11 placing conversation-provoking books where visitors would see them), or hiding them in a private or back stage area (e.g. P21 storing romance novels in her bedroom). As P10's decision to keep but conceal her religious memoirs revealed, the home also afforded meaningful private maintenance of books that were important for participants' own conceptions of their identities over time, even if this history of their identity was not one they wished to publicly display.

What does it mean to say that the home is a system? In part, it means that is a physical structure, a place to keep artifacts safe and maintain them over time. But the home is also part of a social infrastructure (as described in this discussion and throughout the dissertation), providing front-stage and back-stage locations for artifact storage and therefore allowing the visibility of physical artifacts to perform framing functions. The

home is a system not only for supporting long term relationships between people and artifacts, but also for allowing those artifacts to perform meaningful personal and social functions. It is not only the affordances of physical artifacts themselves, but the combination of those affordances with the rules for interaction with artifacts derived from both our understandings of personal property and the social infrastructure of the home, that create the full range of possibilities for artifacts' uses as tools within activities. The home is a framing system for interaction with physical artifacts over the long term, but digital artifacts exist within yet more framing systems that may isolate them further (e.g. personal computers, e-readers) or, alternately, expose them to interactions outside of the home context (e.g. Goodreads). In activity theory terms, we see how the context of the tool usage (that context being the system, physical or digital, that houses the tool) changes the usefulness, and therefore the value, of the tool.

One key contribution of this dissertation has been to reveal in more depth the practices through which people dwell with physical artifacts in their homes. In doing so, it extends not only the HCI literature but also the material culture literature. Because material culture research has always been based on visible and tangible physical artifacts, those qualities were taken for granted. In contrast, this research, along with the HCI research on which it builds, shows how human relationships to artifacts change when those artifacts are “invisible” and intangible. We now know that it is in fact the visibility and tangibility of those artifacts that make them useful for identity-related practices. In showing that the Kindle system made organization and collection management actions less meaningful, this dissertation has also revealed in more depth how the home functions as a system for interactions with artifacts that *does* make these actions powerfully meaningful. Thus, this research also shows more precisely what is missing from digital systems and why we do not seem to be able to dwell in the same way using digital

artifacts. Ingold (2000) argues, “it is through being inhabited...that the world becomes a meaningful environment for people” (p. 186). But what this research shows, in conjunction with previous HCI research, is that despite the prevalence of digital artifacts in our lives, they are often not fully a part of our experiences of inhabiting our home environments.

What would it mean to “inhabit” a world of digital artifacts? Or alternatively, how can we bring digital artifacts into the world that we inhabit (or at least the world of the home)? The practices of a number of participants in this study suggest possible answers for these questions. Participants who actively used the social media website Goodreads (that is, they cataloged and organized their book collections on the site,) were able to use it to support continued awareness of their book collections (both paper and digital).

## **VISIBILITY AND CONTROL**

While the previous section discussed how the home supported interactions with physical artifacts, I will now turn to discussing the findings that show how interactions with digital artifacts were different—in large part because of the systems within which people interacted with those artifacts. These findings are centered on two key differences that characterized distinctions between interactions with physical and digital artifacts: visibility and control.

The key findings regarding **visibility** are:

- Visibility functions to make maintenance practices (such as organization, display, and divestment) meaningful and to support continued awareness of owned artifacts. While previous research noted the importance of visibility, this study has revealed how visibility intertwines with and supports various actions (beyond simply display) that people take with regards to artifacts, thereby making those

actions meaningful and consequential. This research thus explains *why* visibility is so central to artifact interaction, rather than simply noting its importance.

- Visibility, and therefore the impacts of maintenance practices, varied across different digital systems that supported e-books—and this impacted how participants valued e-books that “lived” in these systems (see also the related third finding under the “ownership and control” section below).
- Visibility had important implications not only for social purposes (as shown in previous research), but for personal uses of artifacts as well. Visibility allowed participants to display artifacts, therefore supporting their continued awareness of these artifacts over time. This was essential not only for repeated uses of artifacts, but (relatedly) to artifacts’ abilities to play roles in identity processes that play out over long periods of time.

The key findings regarding **ownership** and **control** are:

- This research has identified the issue of conflicting mental models represented in the “system images” (Norman, 2002) of e-books as key to explaining participants’ lack of trust in digital artifacts. Specifically, actions associated with participants’ mental models of ownership (based on the concept of personal property as applied to physical artifacts) were at times contradicted by rules for interacting with “owned” e-books. Because participants’ control of e-books was limited, they interpreted those artifacts as not being truly owned in the same way that physical artifacts were, and therefore valued them less highly. While previous research identified that concerns about control were related to people’s perceptions of digital artifacts as less valuable, this research extends our understanding of this

phenomenon by identifying its' connection to the conflict between mental models for personal property and those for digital artifacts.

- Systems that discourage users from engaging in maintenance-related actions with regards to digital artifacts (such as organization, display, and divestment) limited the possibilities for use of those artifacts within identity-related activities (thus decreasing the value of the artifacts for their owners).
- Perhaps the most significant finding on this topic was that digital systems were not all “equally bad” for ownership; some were better than others at supporting human interactions with digital artifacts over time. That is, although previous research showed that people typically saw digital artifacts as being less valuable than physical artifacts, this research shows that it is possible to positively influence human relationships to digital artifacts by making changes to the systems that house those artifacts.

I argue that this last finding is most significant because it has the largest potential for offering solutions to the problem of making ownership of digital artifacts “real.” This potential is explored in more detail in the following section, which explores possibilities for incorporating the lessons from these findings into designs of new digital systems that would better support meaningful human interactions with digital artifacts within various types of activities.

#### **IMPLICATIONS FOR DESIGN: DWELLING WITH DIGITAL ARTIFACTS**

The home as a system for interacting with physical artifacts supported important personal and social uses of those artifacts through allowing control of artifacts and making their visibility effective. The previous chapter established how some participants used Goodreads to re-create those social and personal functions (which were not well-

supported within e-book systems) for their e-books. However, there were important differences between displaying books in Goodreads and displaying a collection of paper books in a home setting. First is the matter of audience, in that a Goodreads profile was visible to both friends and strangers, and this visibility was not confined to the home context. Importantly, Goodreads does not support private collections, i.e. those visible only to the owner of the account (should P21's romance novels, hidden in the bedroom of her home, be placed out in the "front street" of Goodreads?). Given the prevalence of personal, inward-facing uses of Goodreads to remind participants of otherwise invisible e-books, I would argue that an option for private display of artifacts within digital systems<sup>92</sup> is necessary to allow people to support their own awareness of artifacts that they may not wish to be visible to others. This kind of control over directing display to specific audiences is necessary for supporting both personal and social activities to which display contributes.

Second, the information conveyed by a Goodreads account is only accurate and current if the account holder continuously maintains it, and some participants reported that they were not consistent about updating Goodreads regularly. That this maintenance work may have its own part in making artifacts visible (and therefore valuable) does not change the fact that it requires more active intervention from users than does maintenance of a paper book collection. This is because maintenance of paper book collections may be done quickly and in passing simply because people regularly encounter their paper books in the home context, whereas they must seek out books within the Goodreads context. We might then consider possibilities for making virtual possessions visible in certain contexts (such as the home) without such significant added work for their owners. This could be achieved in various ways, such as through tangible technologies for display (e.g.

---

<sup>92</sup> A Goodreads competitor, LibraryThing, does include such an option.



Crampton-Smith, 1995; Ishii & Ullmer, 1997). In some such systems, digital artifacts are assigned to or associated with physical ones, as with the Marble Answering Machine (Crampton-Smith, 1995). Voice messages in the Marble Answering Machine are represented by marbles, which the user can interact with in various ways to listen to the messages or return phone calls. Such tangible technologies can allow digital artifacts a presence within the space where they are stored, opening up possibilities for interaction that have previously been the domain of physical artifacts. In implementing this type of approach for supporting e-book visibility, it would be particularly desirable to connect the tangible representation of the book artifact to access to the book artifact for reading purposes. For instance, perhaps touching a tangible representation of an e-book to a user's e-reader might prompt the e-reader to download that e-book from the user's cloud library. A simpler approach to making e-books visible within a home would be to use one or more screens for displaying a book collection; again, to make this display useful, it should be possible to connect the display to a user's ability to access the book itself.

A third difference is that visibility of books in Goodreads is medium-agnostic, as both paper and e-books can equally be represented because participants can list both on their shelves. This could result in participants forgetting whether they owned a paper or digital version of a particular book (or both), although participants could include this information in their Goodreads account if they chose to do so. In terms of designing new systems for supporting ownership of both physical and digital artifacts, such systems should connect the artifact's visibility with information necessary to accessing it for reading purposes (i.e., it's material form—and therefore where it can be found).

Finally, ownership of a book is not necessary for it to be represented in a Goodreads account; people use Goodreads to track books that they want to read or have read, which may or may not be books that they own (again, a Goodreads user could

intentionally include this information alongside books in their account). This last point highlights a notable ramification of display within Goodreads: that display of an artifact within this system is display that is divorced from the artifact itself, reminiscent of the separation of an e-book file from its display on a screen. This situation gives rise to the question of whether Goodreads-based functions would be able to support participants' desires to maintain collections of cherished books. This seems unlikely, in that use of Goodreads cannot address a reader's desire for long-term accessibility of a book artifact, only remind the reader of that book's existence. Indeed, the design directions and requirements that I have suggested throughout this section emphasize the importance of connecting the visibility of an artifact with access to the artifact. This connection is taken for granted in interactions with paper books. However, in the digital systems discussed in this dissertation, display is divorced from ownership: Goodreads promotes display of artifacts but does not connect this display to access, and the Kindle system offers access while diminishing visibility. This separation of visibility and ownership is the most significant of the differences between display of owned paper books and display of book artifacts in digital systems, and it is the problem that must be addressed in any future system that intends to support ownership—and therefore interactions over the long term—for digital artifacts.

In this chapter so far, I have primarily discussed one type of action associated with ownership: organization. This action is crucial for supporting continued awareness of artifacts particularly because of its' integration with visibility (especially in the home context). After all, it is the choices about organization of artifacts that make them visible (or hidden) within the home. However, other ownership related actions are equally central to making artifacts valuable for people because it is through them that people exert their control over owned artifacts. This research found that people's perceptions of

their control over artifacts are reliant on a robust conception of ownership. This includes controlling others' use of owned artifacts (e.g., sharing and lending), altering artifacts, and divesting oneself of artifacts. Exclusive control over how artifacts may be used is also essential to the perception of those artifacts as stable and reliable.

These findings suggest a way forward for design of systems that support ownership of digital artifacts: increase users' control over artifacts within those systems. But how do the design implications discussed in this chapter relate to the four categories of activity types mentioned in the introduction: short term vs. long term usage, and social vs. personal usage? That is, how would implementing these features in a new system support people in using e-books within these activities? First, I would argue that for short-term leisure reading uses, the current digital systems in fact work well. Participants, for example, were satisfied with the Kindle for the purposes of first time reading of a book for leisure purposes; it was purposes outside of that category that the Kindle system did not support. For short term uses of e-books for learning purposes there is clearly room for improvement: better support for annotation and note-taking are obvious directions for design efforts, but I would argue that for this purpose, fixed page formats (for support of spatial memory, which is key to reference uses of books) are perhaps the most essential requirement.

The remaining three types of activities rely on people's control of owned artifacts and the visibility of those artifacts in different ways. First, sole control of an artifact by its owner is essential to the perceived stability of that artifact in the owner's eyes; this is the single most important design requirement for encouraging people to perceive digital artifacts as artifacts that can function within long term activities. But to robustly support the use of digital artifacts in long-term activities, control must be combined with visibility to ensure continued awareness of those artifacts. It is through visibility, and therefore the

possibility of repeated use, that artifacts can potentially gain value or remain valuable for people over time. This combination of affordances was also central to both personal and social uses of books, but for different reasons. For social uses, visibility supported others' awareness of books, allowing social interactions between the owner and others around those artifacts, some of which (such as lending) also relied on the owners' control of the artifacts. Personal uses relied on the owners' awareness of books (as in the case of conceptions of one's own identity supported over time through maintenance of book collections), and also on their confidence in the longevity of the artifacts. Personal uses and long term uses of books frequently coincided. Thus, when designing systems for interactions with artifacts for personal, social, and long-term purposes (which may be complementary), allowing users full and sole control of artifacts, and promoting the visibility of those artifacts is key. The reason that these kinds of uses of artifacts are important to promote is because they all allow artifacts to function in identity-related activities—and contributing to such activates is a primary way in which artifacts become valuable to people.

## **CONCLUSIONS**

In this study, I have drawn on knowledge from material culture studies about how people use artifacts (particularly those that are “touchable,” visible, and portable (Woodward, 2014)) to shape their own, and others', understandings of themselves. Daniel Miller argued that part of the power of artifacts was their “humility”: that even if people are not paying direct attention to artifacts, physical artifacts have a presence that is peripherally visible and may therefore influence behavior. In contrast, this dissertation research, and the previous HCI work on which it builds, examine how our understanding of the processes of material culture might change when the artifacts in question are

digital—how do people carry out practices of meaning-making with digital artifacts, which are not peripherally visible in the same way as are physical artifacts? Or more broadly, repeating a question I posed in the introduction to the dissertation, if we “make ourselves” (Miller, 2010) in part through our uses of artifacts, how do those processes and their outcomes change if the artifacts we use to make ourselves are digital in form? In concluding this dissertation, I will review how the findings revealed in previous chapters inform answers to these questions, particularly as they relate to the two areas identified within the previous HCI literature as central to this area of research: visibility and control.

The lack of visibility of Kindle e-books and the discouragement of collection-management actions, combined with Amazon’s continued control over artifacts that participants “owned” (contrary to the expectation of “control over the use of an owned artifact” associated with the concept of personal property) all contributed to Kindle using participants’ general impression that their Kindle books were not particularly valuable. That is to say, they were not useful for nearly as many purposes as paper books were. As this dissertation has demonstrated, the low-level affordances of paper books combined to make them powerful tools for identity-related activities. E-books, in contrast, were not generally able to contribute to such activities because of their lack of these affordances. Employing the activity hierarchy as a framework for understanding participants’ uses of artifacts has allowed me to identify the role that those artifacts play in larger processes that might initially seem to be distant from these low-level practices; activity theory’s emphasis on development over time and human engagement in activity as having the potential for supporting people in self-transformation has revealed how small changes in artifacts and systems can have outsized ramifications. This approach combines advantages of both encouraging designers to be mindful of the impacts of their design

decisions on users, and demonstrating the potential for technology to have positive impacts on human lives.

Chapter Six closed by discussing how some participants used Goodreads in ways that increased visibility of digital artifacts for both personal and social purposes in meaningful ways. These practices suggested potential means of addressing the larger problem discovered in previous literature—the perceived lack of value of digital artifacts—through creating opportunities for displaying and organizing digital artifacts in supplementary online systems. Reflecting on the two central aspects of the discussion, Goodreads improved upon interactions with e-books (in comparison to other e-book systems) by supporting collection management and continued awareness of e-books through promoting visibility—which therefore made organization meaningful. These added functionalities of the Goodreads system allowed it to mimic the support for interactions with physical artifacts within the home context. That is, if we consider support for interactions with books on a spectrum from digital systems to the home as a system, the things that made Goodreads better for these interactions were the things that brought it closer to the “home” end of the spectrum. To make digital artifacts valuable for people, we must make them controllable and visible. Goodreads made e-books more visible for P12 and P21, but it did not address issues of control; it did not change the fact that e-books (for Kindle user P21, at least) did not yet meet the standards for ownership of physical artifacts. While Goodreads and systems like it represent progress towards solving problems of visibility; those of control are still unresolved. To fully support people in dwelling with digital artifacts, it is not enough to make them visible, they must also be stable and reliable.

## Seeking Participants for a Research Study on Reading Habits

[illegible]

## **Appendix B: Informed Consent**

### **INFORMED CONSENT**

Conducted by: Jane Gruning of The University of Texas at Austin  
School of Information, 1616 Guadalupe, Austin, TX; (512) 765-5360  
Email: [jane.gru@utexas.edu](mailto:jane.gru@utexas.edu)

You are being asked to participate in a research study. This document provides you with information about the study. The person in charge of this research will also describe this study to you and answer all of your questions. Please read the information below and ask any questions you might have before deciding whether or not to take part. Your participation is entirely voluntary. You can refuse to participate without penalty or loss of benefits to which you are otherwise entitled. You can stop your participation at any time and your refusal will not impact current or future relationships with UT Austin or participating sites. To do so simply tell the researcher you wish to stop participation. This form is being provided to you for your records.

The purpose of this research is to increase our understanding of the importance of books and reading in modern life, and our understanding of how new reading technologies (such as e-books and e-readers) may be affecting the place of books and reading in modern life.

#### **If you agree to be in this study, the researcher will ask you to do the following things:**

- Provide information about two types of events as they occur in your daily life: Reading any kind of book, and book acquisition (purchasing or borrowing) events. This portion of the study will extend over one month, and you will be asked to fill out a survey about relevant activities each week.
- Take photographs to represent each instance of a relevant activity in order to support your memory in recalling relevant events. For instance, if you are purchasing a book on a website, you might take a picture or a screenshot of the website's page for that book (but not a page that reveals any of your personal information). If you are reading a book in your living room in a comfortable chair, you might take a photo of the book sitting on the chair – anything that will help you remember the event when it is time to fill out the survey. Make sure to get both the book and some of your surroundings in the photo, as this will help you remember the event at the end of the week when you are filling out the survey.
- Allow the researcher to interview you at your home, so that she can discuss your personal book collection and book collecting habits with you. This interview will also include discussion of the events you report in the survey described above, as well as more general issues regarding e-books and paper books.
- Allow the interview to be audio recorded.
- Allow the researcher to take photos of your books in your home.



**Total estimated time to participate** in the study is five to six weeks: four weeks for the book events survey, with the final interview scheduled within one to two weeks after the completion of the survey.

**Risks** of being in the study:

- Though the researcher has no intention of asking sensitive questions, a possible risk is if you perceive that a question asks you to reveal information you would prefer not to reveal about your book reading and acquisition practices. You can address this by declining to answer any question, with or without explanation to the researcher.
- If you wish to discuss the information above or any other risks you may experience, you may contact Jane Gruning, whose email address and phone number are listed at the top of this form.

**Benefits:** The benefits of being in the study are minimal, other than knowing that you have contributed to research that aims to improve the understanding of the place of books and reading in modern life, and the ways that new technologies may be affecting those issues. You will receive compensation in the form of two gift cards (totaling \$60 in value - \$25 at the beginning of the survey portion, and \$35 at the final interview) for participating in this study.

**Privacy and Confidentiality:** Participants' names will be known only by the researcher, Jane Gruning, and will only be used in communication with participants themselves. Each participant will be assigned an **individual participant number** that will be used for tracking and storing data (so that participant names will not be associated with research data). Audio recordings and photos will also be identified with participant numbers rather than names, and no one but the researcher will have access to those recordings.

If it becomes necessary for the Institutional Review Board to review the study records, information that can be linked to you will be protected to the extent permitted by law. Your research records will not be released without your consent unless required by law or a court order. The data resulting from your participation may be made available to other researchers in the future for research purposes not detailed within this consent form. In these cases, the data will contain no identifying information that could associate it with you, or with your participation in any study.

If you choose to participate in this study, the researcher will request to **audio record** an interview with you. If you prefer not to be recorded, simply notify the researcher at the time of the interview. Any audio recordings will be stored securely and only the researcher will have access to the recordings. Recordings will be kept for two years and then erased.

If you choose to participate in this study, the researcher will request to take **photos** of your books at your home. If you prefer not to have photos taken, simply notify the researcher at the time of the interview. Any photos will be stored securely and only the researcher will have access to the photos. Photos will be kept for two years and then erased.

**Whom to contact with questions about the study?**

Prior, during or after your participation you can contact the researcher **Jane Gruning** at **(512) 765-5360** or send an email to **jane.gru@utexas.edu** for any questions or if you feel that you have been harmed.

**Whom to contact with questions concerning your rights as a research participant?**

For questions about your rights or any dissatisfaction with any part of this study, you can contact, anonymously if you wish, the Institutional Review Board by phone at (512) 471-8871 or email at **orsc@uts.cc.utexas.edu**.

**Signature**

You have been informed about this study's purpose, procedures, possible benefits and risks, and you have received a copy of this form. You have been given the opportunity to ask questions before you sign, and you have been told that you can ask other questions at any time. You voluntarily agree to participate in this study. By signing this form, you are not waiving any of your legal rights.

\_\_\_\_\_ I agree to be **audio** recorded.

\_\_\_\_\_ I do not want to be **audio** recorded.

\_\_\_\_\_ I agree to allow the researcher to take **photos** of my books.

\_\_\_\_\_ I do not want to allow the researcher to take **photos** of my books.

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

As a representative of this study, I have explained the purpose, procedures, benefits, and the risks involved in this research study.

\_\_\_\_\_  
Print Name of Person obtaining consent

## **Appendix C: Requirements for Participation Email**

Hi [participant name],

Thank you so much for your interest in this study!

The first part of the study is what is known as a "diary" study, which is where people are asked to record certain kinds of events as they occur in their daily lives. I'm attaching some instructions for how that part of the study works and what I'm asking you to do.<sup>93</sup>

After the diary portion of the study is complete there is a final interview to discuss the diary events. This interview also involves a discussion of the participant's personal library and therefore is intended to take place in their home, and I would like to take photos of people's bookshelves if possible. I want to be clear at the beginning that this is part of the study, as I understand that not everyone may be comfortable with it. If you are comfortable with having me interview you in your home, please read on! Otherwise, I am happy to discuss it with you further, and of course you are under no obligation to participate in the study.

As the flyer mentioned, participants will be compensated for their time because I recognize that this is extra work for you! Once you're ready to start tracking your reading and book acquisitions, I'll send you a \$25 gift card to Amazon via email (or another bookstore if you prefer). You will also get a \$35 gift card at the final interview.

Additionally, I'm attaching the Informed Consent form (required by my school's Institutional Review Board, which supervises research studies). I will have this form us to sign at the interview, but I wanted to make sure you had it available to you at the beginning of the study.

Please let me know if any of this is unclear and feel free to ask me if you have questions.

Thanks,  
Jane

---

<sup>93</sup> See Appendix D.

## **Appendix D: Diary Study Protocol**

**Researcher: Jane Gruning**  
**Contact info: jane.gru@utexas.edu**  
**(or @gmail.com)**

### **Tracking Your Reading: Two-Part System**

The purpose of this diary is to record two kinds of events: book acquisitions (purchasing, borrowing, etc.) and book reading. Since the study is focused on books, I am not asking you to record events such as reading magazines, articles online, or other non-book kinds of reading. However, I'm interested in any kind of book reading, whether fiction, non-fiction, reading to children, educational reading, or anything else that seems relevant! More information is always better than less information for this study.

To track these events, I'm asking you to use a two-part system of 1) taking photos to represent relevant events, and 2) once a week, answering a short series of questions about each event. The photos will help to remind you of relevant events that occurred during the week to help you answer the diary questions.

#### **Photo Reminders**

Throughout each week (four weeks total), take a photograph to record any relevant book acquisition or reading event. Examples of acquisition event photos might be: in the case of an online book purchase, you could take a photo or a screenshot of the book's page on the website from which you purchased it, or in a bookstore you might take a photo of the book in the store. For a reading event you could take a photo of the book in the place where you are reading it, as in the example photo below. But note that this is just an example, and your photos don't have to look like this one.



**Example: Reading in a library.**

In order to easily locate your photos when it is time to complete the weekly survey, it is best to take them all on the same device so that they are in one place and easy to find. It is also a good idea to make sure that the time and date settings on that device are accurate, so that you will have that information to help you respond to the question about the time and date of the event. Please do not include any personally identifying information in your photos – this will make it easier for me to ensure the confidentiality of the study.

### **Diary Survey**

Once a week, I will email you a survey to fill out that will ask about the relevant events that have occurred in the past week. You can then use the photos to remind you of relevant events. Please answer the appropriate set of questions (for **acquisition** or **reading**) once for each relevant event.

Once you have completed the weekly survey, email both the survey and the photos to me. Please contact me if you have any questions about these instructions.

This is what the survey will look like:

### **Diary Questions – Book Acquisition:<sup>94</sup>**

Time & Date:

Location:

1. What is the title of the book you purchased or borrowed?
2. Where did you acquire the book? (Specific bookseller, library, friend, etc.)
3. What book format did you choose (E-book, paperback, hardback, etc.)? Were there other book formats available for this book (that you were aware of)? If so, why did you choose the format you did?

### **Diary Questions – Book Reading:**

Time & Date:

Location:

1. What is the title of the book you are reading?
2. Is it an e-book, a paper book, or some other format (like an audiobook)?
3. If it is an e-book, what device are you using to read it?
4. How did you acquire the book (where did it come from, where did you get the book)? (If you already answered this question for this book in a “Book Acquisition” answer, you can skip it).
5. About how long did you read for? (An estimate is fine here – for example, “About 20 minutes,” or “More than an hour.”)

---

<sup>94</sup> If you ordered a book online, please fill out the survey for the time at which you made the order, not the time at which you received the book.

## **Appendix E: Base Interview Protocol**

Study:

**Functions of Digital and Physical Artifacts in Everyday Life: The Case of Books**

Jane Gruning

### **Introductory**

The interview will probably last a little more than an hour and definitely not more than two hours. I'd like to record your responses, is that ok?

Your participation in the interview is completely voluntary, and if a topic comes up that you would rather not discuss, you can just tell me that and we'll move on.

Sometimes I might ask you questions that seem to have obvious answers – the reason for that is that I don't want to assume that I know why you're doing something a certain way or have some preference, I'd like to hear it from you.

### **DIARY STUDY**

[For each participant I will start with a series of questions that covers the breadth of the types of events they reported in the diaries – e.g., reading a paper books, reading an e-book on a phone, borrowing a book from the library, purchasing an e-book, etc.]

From your survey data, some of the main kinds of circumstances under which you read seem to be either {relaxing at home, or on your way to or from work, or on breaks at work}. Does that sound typical of your reading habits to you?

When you're reading in these different kinds of circumstances, is one kind of book preferable to another? [Ask about specific examples from the diaries here]. Or does it not matter?

Do you usually read one book at a time, or do you read multiple books at once?

Where do you find out about new books?

Once you find out about a book that you want to read, what's your next step? [E.g., how do you go about acquiring it, do you have a to-read list, etc.]

[questions about acquisition methods used during the study]

[If participant borrows books from the library or friends] When you borrowed {title} from {the library}, why did you want to borrow it rather than purchase it?

Do you ever buy books that you have previously borrowed {from the library}? [Can refer to specific books from the diaries for these if relevant.]

[If not mentioned] Do you ever borrow books from friends? Do you lend books out?

Does it matter to you how you acquire a book?

Do you own any books that you've had for a long time?

Do those have sentimental value for you?

Do you re-read them?

What about a book makes it the kind of book you think you'll re-read?

Do you buy books with the idea in mind that you are going to keep them for a long time?

When you want to keep a book for a long time, what type of book do you get and why?

[Can prompt for 'paperback, hardback, e-book (DRM free e-book if that's something they're aware of), etc.]

Do you buy books for other people as gifts? Can you remember the last time you did that? [If it's not an event in the diary data.] What kind of book did you get?

Do you recommend books to other people? What about a book would make it something you would recommend to someone else?

### **Devices for e-reading**

Do you have an e-reader? What kind? Is this the first one you've had, or have you had multiple ones? [If yes] What kind(s) were the other one(s)?

If you've had multiple e-readers, did your e-book library carry over from one to the other?

Do you own a tablet computer? [If yes] Do you ever read books on it?

What kind of reading do you use your {e-reader} for, typically? [Can ask about specific examples from diaries here as well].

It looks like you read a lot of {fiction}. Would you say that's the main kind of reading you do? Do you read {fiction} mainly {to relax}? What do you enjoy about reading?

What does reading do for you?

[If they did not travel during the study] Do you take books with you when you travel? Can you remember what you took with you the last time you traveled?

Do you prefer to take paper or e-books with you when you travel?

## **HOME TOUR**

I'd like to ask you to give me a tour of your book collections, both paper and digital.

### **Paper Books**

Where do you keep books in your home?

[If there are books in multiple locations, try to get at why books are kept in particular places.]

So, you have some books in {the living room}, and some in {your office}. Which books go where? How do you decide that?

When people come over to your house, do they ever look at your bookshelves? [If yes] Is that something you think about when putting books in particular places?

[Ask about book organization.]

Do you ever have trouble finding a book you know you have?

What book or books have you had longer than all the others? Are those books especially important to you?

Do you have a favorite book?

Are there any books you have multiple copies of? How did that happen?

[If the participant lives in a home with other people]

Do you mix your books up with {other person's}, or do you keep them separate?

Do you lend your books out? Do you keep track of books you've lent out?



Do you ever go through your books and get rid of some of them?

[If yes] How do you choose which books to get rid of?

What do you do with them once you've decided you don't want them any more?

[If no] Do you ever worry about running out of space for your books?

### **E-Books**

Do you organize your e-books in any way?

Are all of the e-books that you own on {this device}?

What's the first e-book you put on {this device}?

Is this the first e-reader you've owned? [Or, "the first device you used to read e-books?"]

Are all of the e-books you've owned accessible through this device?

What do you like about reading on this device?

What do you not like about reading on this device?

Do you ever back-up your e-books in some way?

[If yes] How do you do that?

[If no] Are you worried about being able to get to your e-books in the future, or is that not a concern for you?

Do you feel like you own your e-books in the same way as you own your paper books?

Are there any books that you own both paper and e-book versions of? How did that come about?

Do you re-read your e-books?

Have you ever gotten rid of an e-book? [If yes] What prompted that decision? How did you go about getting rid of the e-book once you decided to do that?

### **Wrap Up**

Is there anything you think I should have asked you that I haven't so far?

Anything you think is important about your reading habits and your books that we haven't talked about?

## **Appendix F: Sample Individualized Protocol**

Study:

**Functions of Digital and Physical Artifacts in Everyday Life: The Case of Books**

Jane Gruning

### **Introductory**

The interview will probably last a little more than an hour and definitely not more than two hours. I'd like to record your responses to support my memory and future analysis. Is that ok?

Your participation in the interview is completely voluntary, which means that you can refuse to answer any question for any reason, or discontinue your participation at any time. If a topic comes up that you would rather not discuss, feel free to just change the subject or tell me you'd rather not discuss it and we'll move on.

Sometimes I might ask you questions that seem to have obvious answers – the reason for that is that I don't want to assume that I know why you're doing something a certain way or have some preference, I'd like to hear it from you.

### **DIARY STUDY**

You read both hardbacks and e-books over the course of the study – you took a couple of trips during the study, and a couple of times you bought e-books because you were planning to travel and you prefer them for traveling, as you mentioned. These were both vacation trips, right?

When you go on vacation, do you usually plan out books to bring? [It seemed like she did at one point – putting things on hold at the library because she knew she was taking a trip.]

What about e-books makes them good for traveling?

But also you did bring a hardback with you traveling at one point – can you tell me about that?

Sometimes you purchase e-books, but sometimes you borrow them from the library. So how do you decide whether to purchase an e-book or borrow it?

Do you ever borrow paper books from the library?

Do you usually read one book at a time, or do you read multiple books at once?

Where do you find out about new books?

Once you find out about a book that you want to read, what's your next step? [E.g., how do you go about acquiring it, do you have a to-read list, etc.]

So you borrowed *When Breath Becomes Air* from a friend – how did that happen?

Do you ever buy books that you have previously borrowed? [Can refer to specific books borrowed during the study here – *When Breath Becomes Air* (from a friend), *If I Did It* and *How to Get Dressed* (from library)]

Do you own any books that you've had for a long time?

Do those have sentimental value for you?

Do you re-read them?

What about a book makes it the kind of book you think you'll re-read?

With the Harry Potter books, you said you bought the most recent one in hardback in part because you had the others and so it was a part of a collection – can you tell me what it was you preferred about having the hardback in that case?

And then the other hardback book you read during the study that you own, *Fates and Furies*, was one you bought at Book People when you had a gift card – would you tell me a bit more about that?

Do you buy books with the idea in mind that you are going to keep them for a long time?

When you want to keep a book for a long time, what type of book do you get and why? [Can prompt for paperback, hardback, e-book (DRM free e-book if that's something they're aware of), etc.]

Do you buy books for other people as gifts?

Can you remember the last time you did that?

What kind of book did you get?

Do you recommend books to other people?

What about a book would make it something you would recommend to someone else?

### **Devices for e-reading**

Do you remember when you started reading e-books?

Have you always used your iPad to read e-books, or have you ever used another device?

[If she has used multiple e-readers follow up on this: Did your e-book library carry over from one to the other? if it transferred, was that a simple process? If not, what did they do? If they had trouble transferring books or weren't able to do so, how do they feel about that?]

We already talked about travel, but are there other things you like about using your iPad for reading e-books?

What are the advantages of reading e-books for you?

Are there things you miss about paper books when you read an e-book? Anything you prefer about paper books?

You read several different genres of books during the study: novels, memoirs, the *How to Get Dressed* book – do you prefer to read different kinds of books in paper or e-book form?

What kind of reading do you use your {e-reader} for, typically?

It looks like you typically read memoirs and novels. Would you say that's the main kind of reading you do?

What do you enjoy about those kinds of books, what draws you to them?

Do you think you read different kinds of books when you're on vacation as opposed to when you're not?

## **HOME TOUR**

I'd like to ask you to give me a tour of your book collections, both paper and digital.

### **Paper Books**

Where do you keep books in your home? [If there are books in multiple locations, try to get at why books are kept in particular places.]

So, you have some books in {the living room}, and some in {your office}. Which books go where? How do you decide that?

When people come over to your house, do they ever look at your bookshelves? [If yes] Is that something you think about when putting books in particular places? [Ask about book organization.]

Do you ever have trouble finding a book you know you have?

What book or books have you had longer than all the others? Are those books especially important to you?

Do you have a favorite book?

[If the participant lives in a home with other people]

Do you mix your books up with {other person's}, or do you keep them separate?

Do you lend your books out? Do you keep track of books you've lent out?

Do you ever go through your books and get rid of some of them?

[If yes] How do you choose which books to get rid of?

What do you do with them once you've decided you don't want them any more?

[If no] Do you ever worry about running out of space for your books?

### **E-Books**

Do you organize your e-books in any way?

Are all of the e-books that you own on your iPad?

What's the first e-book you put on your iPad?

During the study, when you bought e-books it was from Amazon – do you ever buy them from another retailer?

Are all of the e-books you've owned accessible through this device?

Do you ever back-up your e-books in some way?

[If yes] How do you do that?

[If no] Are you worried about being able to get to your e-books in the future, or is that not a concern for you?

Are there any books that you own both paper and e-book versions of? How did that come about?

Do you re-read your e-books?

Have you ever gotten rid of an e-book? [If yes] What prompted that decision? How did you go about getting rid of the e-book once you decided to do that?

## **Wrap Up**

Is there anything you think I should have asked you that I haven't so far?

Anything you think is important about your reading habits and your books that we haven't talked about?

## References

- Abdullah, N., & Gibb, F. (2008). Students' attitudes towards e-books in a Scottish higher education institute: Part 1. *Library Review*, 57(8), 593–605.  
<https://doi.org/10.1108/00242530810899577>
- Abshire, M., Dinglas, V. D., Cajita, M. I. A., Eakin, M. N., Needham, D. M., & Himmelfarb, C. D. (2017). Participant retention practices in longitudinal clinical research studies with high retention rates. *BMC Medical Research Methodology*, 17, 30. <https://doi.org/10.1186/s12874-017-0310-z>
- Adler, A., Gujar, A., Harrison, B. L., O'Hara, K., & Sellen, A. (1998). A Diary Study of Work-related Reading: Design Implications for Digital Reading Devices. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 241–248). New York, NY: ACM. <https://doi.org/10.1145/274644.274679>
- Alter, A. (2015, September 22). The Plot Twist: E-Book Sales Slip, and Print Is Far From Dead. *The New York Times*. Retrieved from <http://www.nytimes.com/2015/09/23/business/media/the-plot-twist-e-book-sales-slip-and-print-is-far-from-dead.html>
- Appadurai, A. (Ed.). (1988). *The social life of things: Commodities in cultural perspective* (1st pbk. ed). Cambridge, UK: Cambridge University Press.
- Baggini, J. (2014, June 20). Ebooks v paper. *Financial Times*. Retrieved from <http://www.ft.com/cms/s/2/53d3096a-f792-11e3-90fa-00144feabdc0.html>
- Barnett, J. E., Baker, E. K., Elman, N. S., & Schoener, G. R. (2007). In pursuit of wellness: The self-care imperative. *Professional Psychology: Research and Practice*, 38(6), 603–612. <https://doi.org/10.1037/0735-7028.38.6.603>
- Baron, N. S. (2015). *Words onscreen: The fate of reading in a digital world*. New York, NY: Oxford University Press.

- Barreau, D. (1995). Context as a factor in personal information management systems. *Journal of the American Society for Information Science*, 46(5), 327–339.
- Barreau, D., & Nardi, B. A. (1995). Finding and Reminding: File Organization from the Desktop. *SIGCHI Bull.*, 27(3), 39–43. <https://doi.org/10.1145/221296.221307>
- Baumer, E. P. S., & Tomlinson, B. (2011). Comparing Activity Theory with Distributed Cognition for Video Analysis: Beyond “Kicking the Tires.” In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 133–142). New York, NY: ACM. <https://doi.org/10.1145/1978942.1978962>
- Baxter, K., Courage, C., & Caine, K. (2015). *Understanding Your Users: A Practical Guide to User Research Methods* (2nd ed.). New York, NY: Morgan Kaufmann.
- Blaikie, N. (2010). *Designing Social Research* (2nd ed.). Cambridge, UK: Polity.
- Boardman, R., & Sasse, M. A. (2004). “Stuff goes into the computer and doesn’t come out”: a cross-tool study of personal information management. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 583–590). New York, NY: ACM. <https://doi.org/10.1145/985692.985766>
- Bødker, S. (1989). A Human Activity Approach to User Interfaces. *Human-Computer Interaction*, 4, 171–195.
- Broussard, R., & Doty, P. (2016). Toward an understanding of fiction and information behavior. *Proceedings of the Association for Information Science and Technology*, 53(1), 1–10. <https://doi.org/10.1002/pa2.2016.14505301066>
- Brown, B. A. T., Sellen, A. J., & O’Hara, K. P. (2000). A Diary Study of Information Capture in Working Life. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 438–445). New York, NY: ACM. <https://doi.org/10.1145/332040.332472>



- Bryant, S. L., Forte, A., & Bruckman, A. (2005). Becoming Wikipedian: Transformation of Participation in a Collaborative Online Encyclopedia. In *Proceedings of the 2005 International ACM SIGGROUP Conference on Supporting Group Work* (pp. 1–10). New York, NY: ACM. <https://doi.org/10.1145/1099203.1099205>
- Card, S. K., Moran, T. P., & Newell, A. (1983). *The psychology of human-computer interaction*. Hillsdale, N.J: L. Erlbaum Associates.
- Carter, S., & Mankoff, J. (2005). When Participants Do the Capturing: The Role of Media in Diary Studies. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 899–908). New York, NY: ACM. <https://doi.org/10.1145/1054972.1055098>
- Cassidy, E. D., Martinez, M., & Shen, L. (2012). Not in Love, or Not in the Know? Graduate Student and Faculty Use (and Non-Use) of E-Books. *The Journal of Academic Librarianship*, 38(6), 326–332. <https://doi.org/10.1016/j.acalib.2012.08.005>
- Chen, S., & Granitz, N. (2012). Adoption, rejection, or convergence: Consumer attitudes toward book digitization. *Journal of Business Research*, 65(8), 1219–1225. <https://doi.org/10.1016/j.jbusres.2011.06.038>
- Chin, J. P., Herring, R. D., & Familant, M. E. (1992). A Usability and Diary Study Assessing the Effectiveness of Call Acceptance Lists. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 36(3), 216–220. <https://doi.org/10.1518/107118192786751907>
- Christianson, M., & Aucoin, M. (2005). Electronic or print books: Which are used? *Library Collections, Acquisitions, and Technical Services*, 29(1), 71–81. <https://doi.org/10.1016/j.lcats.2005.01.002>

- Church, A. H. (1993). Estimating the Effect of Incentives on Mail Survey Response Rates: A Meta-Analysis. *The Public Opinion Quarterly*, 57(1), 62–79.
- Clark, D. T., Goodwin, S. P., Samuelson, T., & Coker, C. (2008). A qualitative assessment of the Kindle e-book reader: results from initial focus groups. *Performance Measurement and Metrics*, 9(2), 118–129.  
<https://doi.org/10.1108/14678040810906826>
- Corbin, J., & Strauss, A. (2008). *Basics of Qualitative Research* (3rd ed.). Los Angeles, CA: SAGE Publications.
- Crampton-Smith, G. (1995). The hand that rocks the cradle. *I.D. Magazine*, (May/June), 60–65.
- Creswell, J. W., & Miller, D. L. (2000). Determining Validity in Qualitative Inquiry. *Theory Into Practice*, 39(3), 124–130.
- Csikszentmihalyi, M., & Rochberg-Halton, E. (1981). *The meaning of things: domestic symbols and the self*. Cambridge, UK: Cambridge University Press.
- Cushing, A. L. (2013). “It’s stuff that speaks to me”: Exploring the characteristics of digital possessions. *Journal of the American Society for Information Science and Technology*, 64(8), 1723–1734. <https://doi.org/10.1002/asi.22864>
- Davies, G., Whelan, S., Foley, A., & Walsh, M. (2010). Gifts and Gifting. *International Journal of Management Reviews*, 12(4), 413–434. <https://doi.org/10.1111/j.1468-2370.2009.00271.x>
- Denegri-Knott, J., Watkins, R., & Wood, J. (2012). Transforming Digital Virtual Goods into Meaningful Possessions. In *Digital Virtual Consumption* (pp. 76–91). New York, NY: Routledge.
- Denzin, N., & Lincoln, Y. (Eds.). (1994). *Handbook of Qualitative Research*. Thousand Oaks, CA: SAGE.

- Dillon, A. (1992). Reading from paper versus screens: A critical review of the empirical literature. *Ergonomics*, 35(10), 1297–1326.
- Douglas, M., & Isherwood, B. C. (1979). *The world of goods*. New York, NY: Basic Books.
- Emerson, R. M., Fretz, R. I., & Shaw, L. L. (1995). *Writing Ethnographic Fieldnotes*. Chicago, IL: The University of Chicago Press.
- Foasberg, N. M. (2011a). Adoption of E-Book Readers among College Students: A Survey. *Information Technology & Libraries*, 30(3), 108–128 21p.
- Foasberg, N. M. (2011b, September). Adoption of e-book readers among college students: a survey. *Information Technology and Libraries*, 30(3), 108+.
- Gibson, J. J. (1986). *The ecological approach to visual perception*. Hillsdale, N.J: Lawrence Erlbaum Associates.
- Golsteijn, C., van den Hoven, E., Frohlich, D., & Sellen, A. (2012). Towards a More Cherishable Digital Object. In *Proceedings of the Designing Interactive Systems Conference* (pp. 655–664). New York, NY: ACM.  
<https://doi.org/10.1145/2317956.2318054>
- Grate, R. (2014, September 22). Science Has Great News for People Who Read Actual Books. Retrieved January 15, 2016, from <http://mic.com/articles/99408/science-has-great-news-for-people-who-read-actual-books>
- Gregson, N. (2011). *Living with Things: Ridding, Accommodation, Dwelling*. Wantage, UK: Sean Kingston Publishing.
- Grudin, J. (1990). The Computer Reaches out: The Historical Continuity of Interface Design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 261–268). New York, NY: ACM.  
<https://doi.org/10.1145/97243.97284>

- Gruning, J. (2017). Models for Ownership: Implications for Long-term Relationships to Objects. In *Proceedings of the 35th Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 2607-2613) New York, NY: ACM. <https://doi.org/10.1145/3027063.3053232>
- Gruning, J. (2018). Displaying Invisible Objects: Why People Rarely Re-read E-books. In *Proceedings of the 36th Annual ACM Conference on Human Factors in Computing Systems*. New York, NY: ACM. <http://doi.org/10.1145/3173574.3173713>
- Gruning, J., Bullard, J., & Ocepek, M. (2015). Medium, Access, and Obsolescence: What Kinds of Objects Are Lasting Objects? In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (pp. 3433–3442). New York, NY: ACM. <https://doi.org/10.1145/2702123.2702238>
- Gruning, J., & Lindley, S. (2016). Things We Own Together: Sharing Possessions at Home. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1176–1186). New York, NY: ACM. <https://doi.org/10.1145/2858036.2858154>
- Hammersly, M. (1992). *What's Wrong With Ethnography? Methodological Explorations*. London, UK: Routledge.
- Harper, R., Lindley, S., Thereska, E., Banks, R., Gosset, P., Smyth, G., ... Whitworth, E. (2013). What is a File? In *Proceedings of the 2013 Conference on Computer Supported Cooperative Work* (pp. 1125–1136). New York, NY: ACM. <https://doi.org/10.1145/2441776.2441903>
- Harrison, S., Sengers, P., & Tatar, D. (n.d.). The Three Paradigms of HCI. Retrieved from <http://people.cs.vt.edu/srh/Downloads/TheThreeParadigmsofHCI.pdf>

- Hartel, J. (2007). *Information Activities, Resources, and Spaces in the Hobby of Gourmet Cooking*. University of California, Los Angeles, CA.
- Hayashi, E., & Hong, J. (2011). A Diary Study of Password Usage in Daily Life. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 2627–2630). New York, NY: ACM.  
<https://doi.org/10.1145/1978942.1979326>
- Hiltzik, M. (2017, May 1). No, ebooks aren't dying — but their quest to dominate the reading world has hit a speed bump. *Los Angeles Times*. Retrieved from <http://www.latimes.com/business/hiltzik/la-fi-hiltzik-ebooks-20170501-story.html>
- Hupfeld, A., & Rodden, T. (2014). Books As a Social Technology. In *Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing* (pp. 639–651). New York, NY: ACM.  
<https://doi.org/10.1145/2531602.2531647>
- Hupfeld, A., Sellen, A., O'Hara, K., & Rodden, T. (2013). Leisure-Based Reading and the Place of E-Books in Everyday Life. In P. Kotzé, G. Marsden, G. Lindgaard, J. Wesson, & M. Winckler (Eds.), *Human-Computer Interaction – INTERACT 2013* (pp. 1–18). Springer Berlin Heidelberg.
- Iida, M., Shrout, P. E., Laurenceau, J.-P., & Bolger, N. (2012). Using diary methods in psychological research. In *APA handbook of research methods in psychology* (Vol. 1: Foundations, planning, measures, and psychometrics, pp. 277–305). Washington D.C.: American Psychological Association.
- Ingold, T. (2000). *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill*. Psychology Press.
- Ishii, H., & Ullmer, B. (1997). Tangible Bits: Towards Seamless Interfaces Between People, Bits and Atoms. In *Proceedings of the ACM SIGCHI Conference on*

- Human Factors in Computing Systems* (pp. 234–241). New York, NY: ACM.  
<https://doi.org/10.1145/258549.258715>
- Kaptelinin, V., & Nardi, B. A. (2006). *Acting with technology: activity theory and interaction design*. Cambridge, Mass: MIT Press.
- Kaye, J. “Jofish,” Vertesi, J., Avery, S., Dafoe, A., David, S., Onaga, L., ... Pinch, T. (2006). To Have and to Hold: Exploring the Personal Archive. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 275–284). New York, NY: ACM. <https://doi.org/10.1145/1124772.1124814>
- Keller, A. (2012). In Print or On Screen? Investigating the Reading Habits of Undergraduate Students Using Photo-Diaries and Photo-Interviews. *Libri: International Journal of Libraries & Information Services*, 62(1), 1–18.  
<https://doi.org/10.1515/libri-2012-0001>
- Kemp, J., Lutz, E., & Nurnberger, A. L. (2012). E-Readers on Trial: Qualitative Results from an Academic Library Pilot Project. *Journal of Electronic Resources Librarianship*, 24(3), 189–203. <https://doi.org/10.1080/1941126X.2012.706110>
- Kerr, M. A., & Symons, S. E. (2006). Computerized Presentation of Text: Effects on Children’s Reading of Informational Material. *Reading and Writing*, 19(1), 1–19.  
<https://doi.org/10.1007/s11145-003-8128-y>
- Kirk, D. S., & Sellen, A. (2010). On Human Remains: Values and Practice in the Home Archiving of Cherished Objects. *ACM Trans. Comput.-Hum. Interact.*, 17(3), 10:1–10:43. <https://doi.org/10.1145/1806923.1806924>
- Kirk, D., Sellen, A., Rother, C., & Wood, K. (2006). Understanding Photowork. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 761–770). New York, NY: ACM. <https://doi.org/10.1145/1124772.1124885>

- Komter, A. E. (2007). Gifts and Social Relations: The mechanisms of reciprocity. *International Sociology*, 22(1), 93–107.
- Lehdonvirta, V., Wilska, T.-A., & Johnson, M. (2009). Virtual Consumerism. *Information, Communication & Society*, 12(7), 1059–1079.  
<https://doi.org/10.1080/13691180802587813>
- Lincoln, Y., & Guba, E. (1985). *Naturalistic Inquiry*. Beverly Hills, CA: SAGE Publications.
- Littau, K. (2006). *Theories of reading: books, bodies, and bibliomania*. Cambridge, UK ; Malden, MA: Polity.
- Liu, Z. (2006). Print vs. electronic resources: A study of user perceptions, preferences, and use. *Information Processing & Management*, 42(2), 583–592.  
<https://doi.org/10.1016/j.ipm.2004.12.002>
- Mangen, A., Walgermo, B. R., & Brønnick, K. (2013). Reading linear texts on paper versus computer screen: Effects on reading comprehension. *International Journal of Educational Research*, 58, 61–68. <https://doi.org/10.1016/j.ijer.2012.12.002>
- Marshall, C. C. (2010). *Reading and Writing the Electronic Book*. Morgan & Claypool.
- Massimi, M., Campigotto, R., Attarwala, A., & Baecker, R. M. (2013). Reading together as a Leisure Activity: Implications for E-reading. In P. Kotzé, G. Marsden, G. Lindgaard, J. Wesson, & M. Winckler (Eds.), *Human-Computer Interaction – INTERACT 2013* (pp. 19–36). Springer Berlin Heidelberg.  
[https://doi.org/10.1007/978-3-642-40480-1\\_2](https://doi.org/10.1007/978-3-642-40480-1_2)
- Mauss, M. (1966). *The gift: forms and functions of exchange in archaic societies*. London: Cohen & West.
- McGee, K., & Skågeby, J. (2004). Gifting technologies. *First Monday*, 9(12). Retrieved from <http://firstmonday.org/ojs/index.php/fm/article/view/1192>

- McMillan, D., Brown, B., Sellen, A., Lindley, S., & Martens, R. (2015). Pick Up and Play: Understanding Tangibility for Cloud Media. In *Proceedings of the 14th International Conference on Mobile and Ubiquitous Multimedia* (pp. 1–13). New York, NY: ACM. <https://doi.org/10.1145/2836041.2836042>
- McNeish, J. E., & Hazra, U. (2014). Interpreting simultaneous use of an existing technology and its replacement innovation. *International Journal of Technology Marketing*, 9(4), 376–391. <https://doi.org/10.1504/IJTMKT.2014.065380>
- Miller, D. (1987). *Material culture and mass consumption*. Oxford, UK: B. Blackwell.
- Miller, D. (Ed.). (2001). *Home possessions: material culture behind closed doors*. Oxford, UK: Berg.
- Miller, D. (2010). *Stuff*. Cambridge, UK: Polity Press.
- Miller, D., Jackson, P., Thrift, N., Holbrook, B., & Rowlands, M. (1998). *Shopping, Place, and Identity*. London, UK: Routledge.
- Nardi, B. A. (Ed.). (1996). *Context and consciousness: activity theory and human-computer interaction*. Cambridge, MA: MIT Press.
- Nathan. (2016, February 14). The New Kindle Homescreen Sucks, It's Just One Big Ad [Blog]. Retrieved June 7, 2017, from <http://blog.the-ebook-reader.com/2016/02/13/the-new-kindle-homescreen-sucks-its-just-one-big-ad/>
- National Endowment for the Arts. (2004). *Reading at Risk: A Survey of Literary Reading in America* (No. 46) (pp.1–31). Washington, DC. Retrieved from <https://www.arts.gov/sites/default/files/ReadingAtRisk.pdf>
- National Endowment for the Arts. (2009). *Reading on the Rise: A New Chapter in American Literacy* (pp. 1–11). Washington, DC: National Endowment for the Arts. Retrieved from <https://www.arts.gov/sites/default/files/ReadingonRise.pdf>



- Norman, D. A. (2002). *The design of everyday things* (Revised edition). New York: Basic Books.
- Odom, W., Sellen, A., Harper, R., & Thereska, E. (2012). Lost in Translation: Understanding the Possession of Digital Things in the Cloud. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 781–790). New York, NY: ACM. <https://doi.org/10.1145/2207676.2207789>
- Odom, W., Zimmerman, J., & Forlizzi, J. (2011). Teenagers and Their Virtual Possessions: Design Opportunities and Issues. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1491–1500). New York, NY: ACM. <https://doi.org/10.1145/1978942.1979161>
- Odom, W., Zimmerman, J., & Forlizzi, J. (2014). Placelessness, Spacelessness, and Formlessness: Experiential Qualities of Virtual Possessions. In *Proceedings of the 2014 Conference on Designing Interactive Systems* (pp. 985–994). New York, NY: ACM. <https://doi.org/10.1145/2598510.2598577>
- Odom, W., Zimmerman, J., Forlizzi, J., Choi, H., Meier, S., & Park, A. (2012). Investigating the Presence, Form and Behavior of Virtual Possessions in the Context of a Teen Bedroom. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 327–336). New York, NY: ACM. <https://doi.org/10.1145/2207676.2207722>
- Odom, W., Zimmerman, J., Forlizzi, J., López Higuera, A., Marchitto, M., Cañas, J., ... Moore, H. (2013). Fragmentation and Transition: Understanding Perceptions of Virtual Possessions Among Young Adults in Spain, South Korea and the United States. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1833–1842). New York, NY: ACM. <https://doi.org/10.1145/2470654.2466242>

- O'Hara, K., & Perry, M. (2001). Shopping Anytime Anywhere. In *CHI '01 Extended Abstracts on Human Factors in Computing Systems* (pp. 345–346). New York, NY: ACM. <https://doi.org/10.1145/634067.634271>
- Oldenburg, Ray. (1989). *The Great Good Place*. New York, NY: Paragon House.
- Palen, L., & Salzman, M. (2002). Voice-mail Diary Studies for Naturalistic Data Capture Under Mobile Conditions. In *Proceedings of the 2002 ACM Conference on Computer Supported Cooperative Work* (pp. 87–95). New York, NY: ACM. <https://doi.org/10.1145/587078.587092>
- Perzanowski, A., & Schultz, J. (2016). *The End of Ownership: Personal Property in the Digital Economy*. Cambridge, MA: The MIT Press.
- Petrelli, D., & Whittaker, S. (2010). Family memories in the home: contrasting physical and digital mementos. *Personal and Ubiquitous Computing*, 14(2), 153–169. <https://doi.org/10.1007/s00779-009-0279-7>
- Pew Research Center. (2013). *Tablet and E-reader Ownership Update*. Pew Research Center. Retrieved from [http://www.pewinternet.org/files/old-media//Files/Reports/2013/PIP\\_Tablets%20and%20e-readers%20update\\_101813.pdf](http://www.pewinternet.org/files/old-media//Files/Reports/2013/PIP_Tablets%20and%20e-readers%20update_101813.pdf)
- Pew Research Center. (2014). *E-Reading Rises as Device Ownership Jumps*. Retrieved from [http://www.pewinternet.org/files/2014/01/PIP\\_E-reading\\_011614.pdf](http://www.pewinternet.org/files/2014/01/PIP_E-reading_011614.pdf)
- Pew Research Center. (2016). *Book Reading 2016*. Retrieved from <http://www.pewinternet.org/2016/09/01/book-reading-2016/>
- Rainie, L., Zickuhr, K., Purcell, K., Madden, M., & Brenner, J. (2012). The rise of e-reading. Retrieved November 29, 2014, from <http://libraries.pewinternet.org/2012/04/04/the-rise-of-e-reading/>

- Redelmeier, D. A., & Kahneman, D. (1996). Patients' memories of painful medical treatments: Real-time and retrospective evaluations of two minimally invasive procedures. *Pain*, 66(1), 3–8. [https://doi.org/10.1016/0304-3959\(96\)02994-6](https://doi.org/10.1016/0304-3959(96)02994-6)
- Reliable. (2018). *Merriam-Webster*. Retrieved from <https://www.merriam-webster.com/dictionary/reliable>
- Rieman, J. (1993). The Diary Study: A Workplace-oriented Research Tool to Guide Laboratory Efforts. In *Proceedings of the INTERACT '93 and CHI '93 Conference on Human Factors in Computing Systems* (pp. 321–326). New York, NY: ACM. <https://doi.org/10.1145/169059.169255>
- Rode, J. A., Toye, E. F., & Blackwell, A. F. (2005). The Domestic Economy: A Broader Unit of Analysis for End User Programming. In *CHI '05 Extended Abstracts on Human Factors in Computing Systems* (pp. 1757–1760). New York, NY: ACM. <https://doi.org/10.1145/1056808.1057015>
- Rouncefield, M., & Tolmie, P. (2011). Digital Words: Reading and the 21st Century Home. In R. Harper (Ed.), *The Connected Home: The Future of Domestic Life* (pp. 133–162). Springer London.
- Sellen, A. J., & Harper, R. (2002). *The myth of the paperless office*. Cambridge, Mass: MIT Press.
- Shapiro, S. L., Brown, K. W., & Biegel, G. M. (2007). Teaching self-care to caregivers: Effects of mindfulness-based stress reduction on the mental health of therapists in training. *Training and Education in Professional Psychology*, 1(2), 105–115. <https://doi.org/10.1037/1931-3918.1.2.105>
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2), 63–75.

- Shrimplin, A. K., Revelle, A., Hurst, S., & Messner, K. (2011). Contradictions and Consensus — Clusters of Opinions on E-books. *College & Research Libraries*, 72(2), 181–190. <https://doi.org/10.5860/crl-108rl>
- Silverman, D. (2000). *Doing Qualitative Research: A Practical Handbook*. London, UK: SAGE Publications.
- Simmons, E., & Wilmot, A. (2004). *Incentive payments on social surveys: a literature review* (Social Survey Methodology Bulletin) (pp. 1–11). Office for National Statistics.
- Skågeby, J. (2010). Gift-giving as a conceptual framework: framing social behavior in online networks. *Journal of Information Technology*, 25(2), 170–177. <http://dx.doi.org.ezproxy.lib.utexas.edu/10.1057/jit.2010.5>
- Sohn, T., Li, K. A., Griswold, W. G., & Hollan, J. D. (2008). A Diary Study of Mobile Information Needs. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 433–442). New York, NY: ACM. <https://doi.org/10.1145/1357054.1357125>
- Stable. (2018). *Merriam-Webster*. Retrieved from <https://www.merriam-webster.com/dictionary/stable>
- Stebbins, R. A. (2013). *The committed reader: reading for utility, pleasure, and fulfillment in the twenty-first century*. Lanham: The Scarecrow Press, Inc.
- Thayer, A., Lee, C. P., Hwang, L. H., Sales, H., Sen, P., & Dalal, N. (2011). The Imposition and Superimposition of Digital Reading Technology: The Academic Potential of e-Readers. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 2917–2926). New York, NY: ACM. <https://doi.org/10.1145/1978942.1979375>

- Tveit, Å. K., & Mangen, A. (2014). A joker in the class: Teenage readers' attitudes and preferences to reading on different devices. *Library & Information Science Research*, 36(3–4), 179–184. <https://doi.org/10.1016/j.lisr.2014.08.001>
- Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Cambridge, MA: Harvard University Press.
- Vygotsky, L. S. (1986). *Thought and language* (Translation newly rev. and edited). Cambridge, MA: MIT Press.
- Wertsch, J. V. (1981). The concept of activity in Soviet psychology. In *The Concept of Activity in Soviet Psychology* (pp. 3–36). Armonk, NY: M.E. Sharpe.
- Whittaker, S., Bergman, O., & Clough, P. (2009). Easy on that trigger dad: a study of long term family photo retrieval. *Personal and Ubiquitous Computing*, 14(1), 31–43. <https://doi.org/10.1007/s00779-009-0218-7>
- Winner, L. (1986). *The whale and the reactor: a search for limits in an age of high technology*. Chicago, IL: University of Chicago Press.
- Woodward, I. (2014). *Understanding Material Culture* (2nd ed.). London, UK: SAGE Publications.
- Zhang, Y., & Kudva, S. (2014). E-books versus print books: Readers' choices and preferences across contexts. *Journal of the Association for Information Science and Technology*, 65(8), 1695–1706. <https://doi.org/10.1002/asi.23076>