Framing a Set: Understanding the Curatorial Character of Personal Digital Bibliographies

Melanie Feinberg*, Ramona Broussard and Eryn Whitworth

*School of Information, The University of Texas at Austin, 1616 Guadalupe Street,
Suite 5.202, Austin, TX 78701-1213, USA*
*Corresponding author: feinberg@ischool.utexas.edu

We articulate a model of curatorship that emphasizes framing the character of the curated set as the focus of curatorial activity. This curatorial character is structured through the articulation, via mechanisms of selection, description and arrangement, of coherent classificatory principles. We describe the latest stage of a continuing project to examine the curatorial character of personal digital bibliographies, such as Pinterest boards, Flickr galleries and GoodReads shelves, and to support the design of such curatorially expressive personal collections. In the study reported here, 24 participants created personal bibliographies using either a structured design process, with explicit tasks for selecting, describing and arranging collection items, or an unstructured process that did not separate these activities. Our findings lead to a more complex understanding of personal collections as curatorial, expressive artifacts. We explore the role of cohesion as a quality that facilitates expression of the curatorial frame, and we find that when designers *read* source materials as a part of a set, they are more likely to *write* cohesive collections. Our findings also suggest that the curatorial act involves both the definition of abstract classificatory principles and their instantiation in a specific material environment. We describe various framing devices that facilitate these reading and writing activities, and we suggest design directions for supporting curatorial reading and writing tasks.

RESEARCH HIGHLIGHTS

- A robust model of curatorship focuses around framing the character of a set. The curatorial frame is communicated to an audience through the mechanisms of selection, description and arrangement.
- Personal digital bibliographies, common across social media, constitute significant sites for potential expressive curatorship.
- All systematic collecting involves curatorial judgment; however, the creative, critical components of this judgment are often de-emphasized in collecting efforts of institutions (including all domains, from cultural heritage to corporate). In making such judgments transparent, the curatorial endeavors of individuals can usefully complement institutional collecting.
- Personal information management and personal archiving focus on private, personal tasks, not on communicating with others; accordingly, they do not emphasize development of a curatorial frame.
- Strongly curated collections exhibit cohesion as a set; each included item is significant for its contribution to the set, not for its unique properties.
- When designers *read* source materials as a part of a set, they are more likely to *write* cohesive collections.
- The curatorial act involves both the definition of abstract classificatory principles and their instantiation in a specific material environment.

1. INTRODUCTION: A MODEL OF CURATING AS FRAMING THE CHARACTER OF A SET

The activity of curating is popularly associated with *selection*. As a typical example, *The New York Times* describes how users of a news app, Trove, select 'the best' stories from an algorithmically generated list of news items to create 'curated' story feeds, or troves (Goel, 2014). The criteria that motivate selection (what makes a story 'best') are not surfaced in the Trove app, and may remain uncertain to the creator of each trove, as well as the trove reader. The model of curating expressed through Trove limits the scope of curation to the results of the selection process.

In contrast, the scholar, curator and artist Mieke Bal asserts that the curatorial act is defined by *framing*, or by making the judgments that inform selection apparent (Bal, 2012). The curatorial frame 'makes explicit what one brings to bear on the object to be shown and why, and on what grounds, and to what effect.' Bal's definition reveals the character of the group as the focus of curating, and the expression of that group character as the curator's most significant task. This group character, or curatorial frame, is an imaginative construct, an artifact of human invention and design.

Bal's curatorial frame is enacted through description and arrangement of the selected items. These additional communicative mechanisms convey the classificatory principles that motivate the curator's selection. As conveyed through spatial arrangement, category labels and other elements of metadata infrastructure, the curatorial frame provides a conceptual basis for the viewer's experience, a foundation against which interpretation of the included items is generated.

To illustrate this, see Fig. 1. Without a 'curatorial frame,' this group does not seem incoherent, but it is also not very interesting. It is just some cheap knick-knacks. However, if we clarify that each item represents a fantastical being and was made on a different continent (the pig from North America, the monkey from Asia, the rhinoceros from Africa, the gnome from Europe), then the identity of the set becomes more complex, as item relations are structured through explicit organizing principles. The viewer is challenged to characterize and explore how each item is both fantastic and yet differently so.

Bal describes curatorship in its most traditional context: that of art, and of museums. But the general project of enacting principled judgments to form a collection, and expressing those judgments to an audience through classification, arrangement and other metadata operations upon the collected materials, has been described by a variety of scholars as a cross-domain activity, applicable to any sort of things (e.g. Clifford, 1991; Pearce, 1994; Stewart, 1993; Venn, 2006). Moreover, the collected materials need not be tangible, or can themselves be abstractions. The information scientist Marcia Bates has proposed a similar characterization for the practice of systematic bibliography, or collections of citations to published works, often for a particular subject area (Bates, 1976).

Figure 1. A set of objects.

A bibliography collects descriptive surrogates, or metadata records, for intellectual content, not the content itself.

Bates' discussion of systematic bibliography prefigures, in multiple ways, the situation depicted through our initial example of Trove, which we suggest is common across social media. 'Curated' social media collections also aggregate citations, in the form of links, and are structurally a form of bibliography. (Other examples include Pinterest, in which users cite Web images, as well as playlist or grouping features in YouTube, Spotify, Yelp and other media services; one could even describe social networks like Facebook and LinkedIn as bibliographies of friends, where users cite other user profiles.) Moreover, Bates observed that while systematic bibliographies formulate and enact various selection and organizing criteria upon their contents, these criteria are seldom explicitly communicated to the bibliography user. In other words, most bibliographies appear to their users like Fig. 1; while clear principles might inform their construction, these principles are not forthrightly expressed to the viewer. This situation also holds for Trove and other personal digital bibliographies across the social media landscape. Even when system features permit curatorial principles to be communicated, as with Pinterest or with Amazon's discontinued Listmania service, users seldom take advantage of these features (Feinberg, 2011).

Bates finds it remarkable that this state of affairs is both so pervasive and unacknowledged (she says, 'When you stop and think about it, is it not absurd how little information reference sources provide about themselves?' p. 13). Bates wonders how a systematic bibliography can be anything but 'loose and unrigorous' if its specifications are not transparent, or, to use the language of Bal, if the curatorial frame is not expressed. Using Bal's terminology, we can reformulate Bates' argument as finding the model of curatorship exhibited through most systematic bibliographies to be impoverished, resulting in a less productive and compelling user experience.

We likewise assert that the model of curatorship implemented through most social media environments is similarly impoverished, resulting in a similarly diminished user experience. Without a stronger curatorial frame, the expressive power of Bal's curatorial act becomes elusive. As one of our study participants complained, 'if you ever go out into the wild on Pinterest … there is just a lot of total dreck on Pinterest.'

In this paper, we present a continuing project to both examine and support the more robust curatorial act described by Bal in the context of personal digital bibliographies such as Trove (or Pinterest, or any sort of playlist, gallery or album). Our findings lead to a more complex appreciation for the expressive potential of such personal collections and suggest design directions that facilitate Bal's richer notion of curatorship in social media systems.

We begin with a brief review of the conceptual landscape of collecting, classifying and citing, which forms the establishing perspective for our work. We continue by contrasting our notion of personal digital bibliography with personal information management and personal archiving, showing how our focus complements these areas. Because personal information management and personal archiving focus on private, personal tasks, and not on communicating with others, they do not emphasize development of a curatorial frame.

Next, we summarize two previous studies, which directly inform the project we report here. Study 1 is descriptive: it identifies a set of three expressive qualities that distinguish personal digital bibliographies that exhibit a more pronounced curatorial frame. Study 2 is experimental: it assesses a simple design intervention to facilitate stronger curatorial character via the three expressive qualities of the first study.

Reporting of Study 3, a subsequent experiment to assess another design intervention to encourage development of curatorial character, forms the central component of this article. We designed Study 3 as a simple variation on its predecessor, the initial design intervention. Our findings here, however, were surprising. While the curatorial character of participant bibliographies, as operationalized via the three expressive qualities from the Study 1, did become more apparent, and the curatorial frame more salient, the design intervention did not appear to cause this shift.

We realized that what had initially appeared to be a minor change to the study conditions—substituting physical materials for digital ones—had produced much stronger effects than we had anticipated. In analyzing the role of the material environment upon the expression of the curatorial frame, we determined that the framing process essential to curatorship began with a particular mode of interacting with, or *reading,* the set of possible source content. When participants *read* the source content in this curatorial mode, they identified potential framing concepts that they then *wrote* into the presentation environment. Our findings further suggest that curatorial authoring involves both the definition of abstract classificatory principles and their instantiation in a specific material environment.

Our findings contribute to HCI in several ways. First, we illustrate how the curatorial act of framing involves preliminary interpretive interactions with source content (reading) as well as manipulations upon that content (writing). Secondly, we show how devices that facilitate framing, in both reading and writing modes, are bound into the material conditions of the interaction environment. While this point aligns with new materialist perspectives that have begun to surface in a variety of disciplines, including HCI, it nonetheless transgresses longstanding traditions of design practice for metadata systems, which have emphasized the nature of the citation surrogate as an abstract representation. Our refined understanding of the material component of metadata infrastructure enables us to elucidate promising design directions for curatorially focused reading and writing of digital bibliographies, such as those common throughout social media.

2. BACKGROUND: COLLECTING, CLASSIFYING AND CITING

Our model of curating as framing the character of a set places classification as the heart of the curatorial act. Classificatory principles motivate the selection of items to form the curated set and establish relationships between the selected items. Associated mechanisms of description (via category labels, titles and other annotations) and arrangement (sorting rules and other subgrouping elements) enable the explanation of these classificatory principles to the viewer.

The role of classification in structuring the collecting practices of institutions such as museums and zoos has been noted by anthropologists (Clifford, 1991), cultural theorists (Stewart, 1993; Venn, 2006) and museum scholars (Elsner and Cardinal, 1994; Pearce, 1994). For example, the character of a zoo as a curated collection comes from a particular point of view on its contents, as manifested through its structure—the selection, description and arrangement of the included items (in this case, animals). The zoo we are familiar with demonstrates the division of the animal kingdom into morphological units (reptiles, birds, primates) with a secondary emphasis on habitats, often non-local 'exotic' ones (African savanna, Antarctic ice). The zoo presents a system of ordering animals that emphasizes the significance of these characteristics over potential others (such as number of legs, endangered status or evolutionary descent, among unlimited options). Collections like zoos enact a perspective (such as what constitutes an animal species) through a classificatory structure (the characteristics that explain the significance of each item, or how the item fits into the domain). They establish a curatorial frame.

But framing a collection by aligning it with the understanding of an encompassing discipline, as with most museums and zoos, seems to elide the aspect of creative, if not critical, judgment that Bal's discussion of curating implies. Classificatory practice as performed by institutions such as museums and zoos

certainly provides an interpretive lens upon the implicated subject matter; however, the role of curatorial judgment appears subservient to a form of scientific consensus. The example of systematic bibliography, notwithstanding Bates' complaints about missing specifications, seems especially like a matter of rote compilation, quite different from the effort involved in curating an art exhibition. Does curating require a special form of judgment, one that is somehow distinct from more mundane collecting activities?

The status of early systematic bibliographies, such as Conrad Gesner's 16th-century opus, is instructive here. Such projects, which attempted to not only list, but organize, relate and assess the entire universe of published knowledge, were considered as scholarly works of authorship, and not at all mechanical. Early bibliographies of this type required not only painstaking research but the development of unique, complex classifications to structure and shape their contents. In this period, the division and arrangement of disciplines (and, accordingly, of subjects of documents) was a matter for learned argument and debate (Balsamo, 1991; Besterman, 1936). The determined extent of the bibliographic universe also fluctuated according to a scholar's aims. For example, the Jesuit bibliographer Possevino excluded works that did sufficiently align with the principles of the Catholic Church.

If bibliographic work today seems to avoid such matters of judgment, it is partly because we have a larger array of established standards to employ in constructing such collections: subject classification schemes, metadata content and structure standards, professional guidelines and so on. But the appearance of consensus suggested by such standards is deceptive. While certain subject classification schemes might have been adopted by particular institutions (such as the Library of Congress system in the USA), all have been continually criticized as inaccurate, insufficient and biased, among other deficiencies (see, for example, Adler, 2012; Olson and Schlegl, 2001; Ranganathan, 1959; Sayers, 1915; as Buckland, 2012 suggests, it is devastatingly easy to critique a library classification system in this way). Moreover, the application of such schemes is stubbornly inconsistent, despite the proliferation of principles, standards and rules for their use (Markey, 1984).

This account is not surprising. The social construction of all category systems, and their inherent brittleness over time, place and cultural context, has been widely accepted and described from a number of disciplinary perspectives (e.g. Bowker and Star, 1999; Buckland, 2012; Foucault, 1970; Lakoff, 1987; Zerubavel, 1991). And yet, as described by Mai (2011), it has been difficult to abandon the view that some approximation of unbiased, value-free classification is both possible and desirable in certain defined contexts, such as information access and retrieval systems. For example, Jacob (2004) contends that while everyday categorization is inherently creative and flexible, stricter rule-based schemes can be devised for specific, limited, scientific ends. Mai (2011) contends, however, that even

if such 'scientific' classifications can be constructed according to systematic laws, the application of any category system by people nonetheless requires untold interpretive judgments.

'Mundane' acts of collecting, therefore, as with systematic bibliographies, are not mechanical, although they might initially appear so. Accordingly, we can clarify that the act of curating does not require a special form of creative judgment. Rather, it involves a reflective transparency about the creativity involved in all such judgments, and their coherent expression to the viewer (or, in the bibliographic context, we might say the reader).

The role of individual curatorial judgments in the composition and character of institutional collections, however, continues to be downplayed. Aggregated infrastructures of cultural heritage, such as Europeana and the Digital Public Library of America, rely on the appearance of consistent application of metadata rules for their perceived utility in facilitating information access and discovery. Such initiatives have significant interests in maintaining an ideal of neutral, objective classification according to distinctions such as those proposed by Jacob, even as critics like Mai continue to demonstrate the integral role of human judgment in all such enterprises and to call for the rationale behind such judgments to be revealed.

Personal bibliographies that employ the curatorial act of framing can productively complement this state of affairs. Unfettered by institutional commitments, personal bibliographies may constitute an important counterpoint to the homogenized output of official venues (be they non-profit, government or corporate). Moreover, as the amount of Web information continues to increase, the activities of effective curators become increasingly valuable. As media theorist Henry Jenkins emphasizes, 'knowledge cultures depend on the quality and diversity of information people can access' (Jenkins, 2006).

As we noted in Section 1, however, the curatorial model implemented in many social media systems does not emphasize the generation or expression of a curatorial frame. One reason for this may be that the classificatory processes associated with most personal collections do not require thoughtful consideration or elaboration—because personal collections have been more often used for private purposes, such as personal information management, that are not oriented toward an outside audience. While institutional collections might lack transparency and reflectiveness in their application of classificatory principles, the principles themselves are often made apparent for the purposes of audience communication, as when museum floors are organized by style, place of origin and time period, and library stacks by classification number. Most of our personal collections—our e-mail in-boxes, our hard disks, our photo stashes—do not require this kind of detailed attention, because we are not publishing them to the outside world.

In the next section, we compare our focus on personal bibliography with the related activities of personal information management and personal archiving, and we show how our

emphasis on the curatorial frame complements and extends these areas. Following this review, we describe our three studies to characterize and support the development of a strong curatorial frame for personal digital bibliography.

3. DISTINGUISHING PERSONAL DIGITAL BIBLIOGRAPHY, PERSONAL INFORMATION MANAGEMENT AND PERSONAL ARCHIVING

Our research focuses on personal digital bibliography—the selection, description and arrangement of a group of previously existing materials, such as Spotify playlists or Flickr galleries—as a potential site of robust curatorship, where curatorial framing might reveal new, illuminating perspectives on the included content for an audience of outside readers. In HCI, research on digital collections has more often concentrated on the ongoing management of digital repositories for personal use, either in terms of personal information management (focusing on storage for ongoing access and retrieval) or in terms of personal archiving (focusing on storage for long-term preservation and memory functions). Personal information management and archiving research emphasizes the activities that people perform and how they use information collections to support those activities.

In contrast, our research concentrates on the experience that a personal digital bibliography, when created in the mode of curatorship, can offer to a reader. We think about what it means to curate a collection well, as one might think about what it means to write an essay or a poem well, and about how to support the development of collections with a strongly expressed curatorial character. Our work complements research on personal information management and archiving, showing how different properties of collections become salient in different contexts.

In this section, we briefly summarize HCI work in personal information management and personal archiving, and we explain our approach against this background.

3.1. Personal information management

Personal information management, or PIM, focuses on how people manage personal information collections to support ongoing activities. Information access and retrieval are thus important aspects of PIM research. From a PIM perspective, William Jones explains, 'information is a means to an end...we manage information in order to have it when we need it' (Jones, 2008, p. 456). Management of personal documents is an important PIM topic, beginning with Malone's (1983) distinction between filers (people who put information away in folders) and pilers (people who stack papers on their desks). Whittaker and Hirschberg (2001) also looked at paper repositories in a work setting, while Kaye et al. (2006) examined how people distributed their collections of work documents over paper and digital formats, and their strategies for working

with each. Recent PIM research focuses on digital information, including general file management and retrieval (Bergman et al., 2010; Jones et al., 2005), e-mail management and retrieval (Whittaker and Sidner, 1996; Whittaker et al., 2011), and home media management, including a variety of media-specific studies, such as photo management (Kirk et al., 2006; Rodden and Wood, 2003).

PIM research has concentrated on activities conducted by individuals for themselves: working with their own files, e-mail, Web bookmarks and so on. As such, PIM is oriented toward self-efficacy, not self-expression. Despite advances in search technologies, many people do add descriptive infrastructure to their personal information collections (that is, they use folders, tags and other tools to group, describe and arrange items), even when, as Whittaker et al. (2011) discovered for the e-mail context, implementing folder structure makes retrieval less efficient. However, people implement this descriptive infrastructure to support individual work habits and strategies, not to express their curatorial principles to others. These habits and strategies are fluid (people may file some and pile some, in other words) and tend to vary across particular types of documents and tools, as Boardman and Sasse (2004) determined. In the e-mail context, placing messages in folders can be a form of task management (Whittaker et al., 2011). On a hard disk, creating folders, placing documents in them and browsing the structure can facilitate sense-making and help to cognitively maintain important contextual information (Jones, 2008).

One's personal information collections may, of course, be used for other functions in addition to PIM, which may affect their organization, management and access. For instance, one might share a document folder with others to facilitate collaborative projects. Media collections, such as music or video collections, represent an illustrative case. Sease and McDonald (2011) studied 20 owners of large media collections. Sixteen of these participants made organizational accommodations, such as special subcollections, to support a domestic partner's interaction with the collection. Moreover, these participants were music enthusiasts who thought carefully about the composition of their collections, for example, in systematically accumulating multiple performances of a single work. While participants organized their collections to support the PIM task of refinding music to listen to it, they also organized their collections in ways that demonstrated such collecting tendencies. Still, these serious collections were primarily structured to support the ongoing activities of an individual and his or her intimate acquaintances. They were not organized to communicate their curatorial character to an outside audience, via a coherently expressed curatorial frame.

3.2. Personal archiving

Media, particularly photos, constitute a primary focus of personal archives. While PIM research looks at information

management to support current tasks, personal archiving research looks at preservation for its own sake. Marshall (2011) finds that management tasks, such as backing up files and creating descriptive infrastructure (metadata), are seen as onerous; additionally, making appraisal decisions, or determining what to keep and what to delete, is difficult. Marshall implies that some degree of loss is actually desirable; we do not really want to keep *all* our digital photos, but we do not want to *decide* which ones to keep, either. In Marshall's account, most of us adopt a position of 'benign neglect' for our personal digital materials, instead of creating and implementing a curatorial strategy. We do not care strongly enough about most of our digital items to develop and document a curatorial frame.

If we do not care about most of our digital archives, however, we do care about some things, although how, and to what end, is uncertain. The nature of value, or attachment, for digital artifacts has been an increasingly significant component of personal archives research in HCI. Kirk and Sellen (2010), for example, compare the forms of attachment given to physical and digital objects and how practices for keeping and revisiting these objects differed amongst their participants. Odom *et al.* (2012) and Gulotta *et al.* (2013) designed innovative prototypes to consider digital inheritance and legacy. In these studies, the perspective of potential recipients of archived materials begins to come into play, as participants wonder about the imagined experience of immediate heirs and future generations.

For our project, several themes emerge. First, robust curatorship is not widely implemented for PIM activities, nor does the development of a strong curatorial frame seem warranted for that context. While making conscious decisions regarding the selection, description and arrangement of collection items is sometimes useful and important for particular individuals, most people get along perfectly well with partial, incomplete systems for organizing their personal documents to support ongoing activities.

Secondly, when others are using our collections, or when we are more serious about collecting as an activity in itself, we pay more attention to collection structure. We are more likely to remain focused on our particular tasks and personal situations, however, and less likely to be thinking about a potential public audience. Moreover, most of us do not put a lot of effort into developing a curatorial strategy for our personal archives.

Thirdly, when encouraged to think about value and legacy, people do start to consider more deeply the digital items they cherish, including the nature of that attachment and how best to convey that value to others. The activities of robust curatorship—selecting, describing and arranging to express a distinctive curatorial frame—become more salient. However, in the accounts provided through research such as Odom's and Gulotta's, people seem to be uncertain about what a well-curated digital family archive might be, lacking a firm vocabulary to describe it.

The model of curatorship that we articulate, which emphasizes the expression of a curatorial frame through selection, description and arrangement, may be useful to future work in digital memory and legacy. In the following sections, we develop this model in the space of personal digital bibliography, through the description of three related studies.

4. PREVIOUS WORK ON PERSONAL DIGITAL BIBLIOGRAPHY: QUALITIES THAT SUPPORT THE EXPRESSION OF A CURATORIAL FRAME

In this section, we summarize our first two studies on curation for the space of personal digital bibliography. In the first study, we define three expressive qualities that contribute to a distinctive curatorial frame for this design space. In the second study, we devise an intervention to support the development of personal digital bibliographies that exhibit these expressive qualities. Despite Study 2's intervention, however, participants approached the bibliography authoring task as if they were information managers, and not curators. The Study 2 findings informed a subsequent experiment, Study 3, which is described in later sections.

4.1. Study 1: an initial vocabulary of expressive qualities that communicate a curatorial frame

Our initial study explores how personal digital bibliographies provide alternate filtering mechanisms to complement traditional cultural heritage databases (Feinberg, 2011). We suggest three qualities that contribute to strongly curated personal digital bibliographies: an original purpose for collecting and describing, a unique authorial voice and engagement with emotional experience. Study 1 proposes that these characteristics distinguish some of the particular curatorial insight that personal, as opposed to institutional, digital bibliographies might convey.

The quality of *original purpose* communicates a distinctive motive for selecting the items within the collection. The quality of *voice* involves the presentation of a unique authorial persona. The final quality, *emotional intimacy,* involves the revelation of personal feeling as a means to greater understanding of the collection's contents. Study 1 concludes that skilled deployment of these three qualities, achieved through the selection, description and arrangement of collection items, produces a coherent curatorial frame. Moreover, this framing differs in both its establishing criteria and mode of judgment from typical institutional perspectives.

4.2. Study 2: using the vocabulary of expressive qualities to ground a design study

Study 1 revealed three qualities that help to enact a strong curatorial frame for an audience of readers. The initial study also demonstrated, however, that these qualities appeared in relatively few personal digital bibliographies. This was not unexpected: as the PIM and personal archiving literature shows, to the extent that people organize their digital materials, they do

so partially and idiosyncratically, to support retrieval and other personal functions, and not to convey ideas to other people. When an interest in shaping a curated experience around one's digital possessions is provoked, the recent work in digital legacy shows uncertainty with how to approach curatorial tasks. In reflecting on this, we wondered about the effect of providing examples of strongly curated bibliographies on users' designs. Writers are often advised to read in order to develop their skills. Would interacting with example collections affect how people create personal digital bibliographies?

Accordingly, we designed a laboratory experiment to investigate whether exposure to strongly curated personal digital bibliographies—those that embodied all three of the expressive qualities identified in Study 1—would affect the process or product of collection design. Participants in Study 2 used the Open Video Digital Library Toolkit (OVDLT), an easy-to-use digital library environment for video, to create digital bibliographies by selecting items from two specially constructed libraries of source content, with different subject themes (Feinberg *et al.*, 2012; Geisler, undated).

Participants were asked to create a 'playlist,' the OVDLT's term for a personal bibliography, with one of the source libraries. After creating a playlist, participants interacted with two strongly curated, or expressive, sample playlists also created from the source library participants had just been working with. We created the expressive samples to exhibit all three of the qualities from Study 1, and to provide contrasting perspectives on the content. Participants then created a second playlist using the second source content library as the source material.

Participants' collections and design processes did not change after interacting with the examples. However, participants did fluently 'read' and remark upon the expressive qualities of the strongly curated samples. In particular, participants noted the examples' use of descriptive elements, such as labels and annotations, to explain how each item contributed to the collection, marking the curatorial frame. Despite this appreciation, participant collections rarely used the mechanism of description, either before or after exposure to the examples. To explain this contradiction, we suggested that, in their own creation processes, participants unconsciously associated the form of the digital collection with PIM, as opposed to creative public expression. They made this association despite the study instructions to create a playlist to communicate an idea to someone else, and despite noted appreciation for the examples they had 'read' as curatorial and expressive. Once again, this strong association with PIM is not really surprising. Moreover, as both PIM and personal archiving research has demonstrated, creating metadata is perceived as onerous, and people have little experience in using it creatively. Accordingly, even when participants were actively trying to be curators, and not personal information managers, they went into PIM mode. Exposure to a few examples of strongly curated bibliographies, in other words, was insufficient support for the design task.

4.3. Study 3 research question

In response to Study 2, we considered how to more effectively encourage participants to think like curators, as opposed to information managers. In Study 2, the task flow suggested by the OVDLT included mechanisms for description and arrangement, but it did not emphasize these actions, nor did it explain how description and arrangement might serve curatorial goals by communicating underlying classificatory principles. For Study 3, then, we decided to investigate the effect of structuring the collection design process to equally emphasize three primary mechanisms of curatorial expression: selecting resources, describing them with labels or annotations and arranging the resources in a meaningful order. We decided on the following primary research question: does a structured task that explicitly references each mechanism promote a more strongly expressive curatorial frame in personal collections?

5. STUDY 3 DESIGN

To focus our participants on the task itself, and not on a particular digital interface to the task, we employed familiar physical materials in our study design: to create their bibliographies, participants pinned paper slips representing source material on cork bulletin boards, along with handwritten labels and annotations. (Figure 2 shows a completed participant collection.) As libraries of source materials, we used print cookbooks and printed portrait images (in high-quality color on letter-size sheets). Each library contained 50 items with a range of content. For the cookbooks, we included material that focused on specific cuisines (such as Indian, Greek and Texan), on particular diets (such as vegetarian and gluten-free), and on certain types of dishes (such as soups or baked goods), as well as more general and comprehensive works. The portrait images encompassed a range of periods, styles and media (sculpture as well as painting and photography), and included artist self-portraits as well as images of historical figures (such as Constantine the Great and Charles Darwin) and less well-known or anonymous subjects (portrait of Rose de la Touche). Basic descriptive metadata on the portrait images indicated artist, date and title of each work. For the cookbook library, paper slips with representations of each book's cover were tucked inside the front page. For the portrait library, paper slips with grayscale thumbnail versions of each portrait were clipped to each color image. For both libraries, the slips included each work's title and creator and were about 3 in. × 6 in. Participants selected and manipulated the slips to create their own collections.

As indicated in the introduction to this article, our decision to employ physical materials in the study environment had unanticipated effects. Why did not we consider this possibility in our design? We had two strong reasons.

Our first reason involved the features for adding descriptive annotations in the OVDLT. While adding annotations was
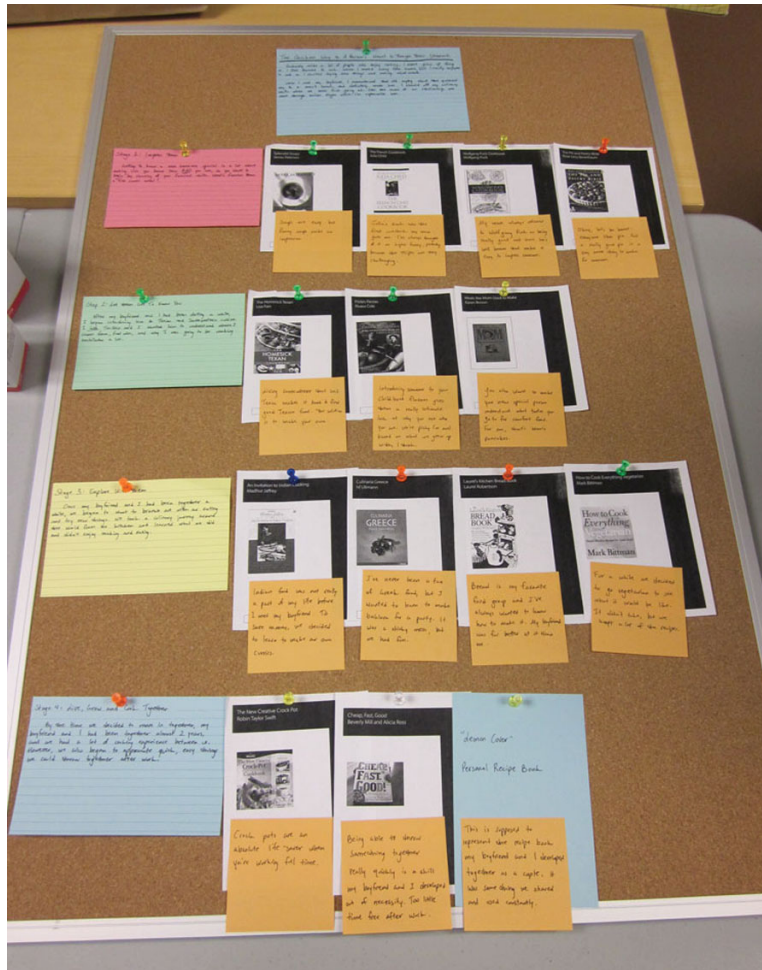
Figure 2. A completed participant bibliography. The slips with images are citations to items from the source library. The notecards and sticky notes are participant annotations.

simple, and none of our previous participants had problems doing so (that is, there were no usability issues), this feature was perhaps subtle, in terms of revealing its affordances to users who did not have a clear plan to use it. For Study 3, we did not want any possible question that participants' non-use of descriptive elements was due to the OVDLT's particular interface design. If we changed the OVDLT interface, however, we would be unsure if participants were responding to our new task structure or to the altered annotation implementation. Using note cards and sticky notes would alleviate concerns about interface design inhibiting the uptake of descriptive mechanisms: we could be certain that all participants had both facility with and awareness of the affordances of pen and paper.

Our second reason involved our conception of the materials being worked with: citations or metadata records. Metadata is primarily distinguished by its content and structure, and not by its encoding or presentation. Content and structure standards for metadata development are typically independent of encoding standards (Elings and Weibel, 2007; Gilliland,

2008). It is common to translate metadata from one format to another without hesitation; this is perceived as a relatively simple, basic level of interoperability. In typical practice, a library catalog record is considered 'the same' in terms of content and structure whether it is implemented as an actual paper card, in raw MARC (MAchine Readable Cataloging) format, displayed in HTML in an OPAC (online public access catalog), or in RDF triples as part of a linked dataset. It was well within the standard operating procedures of the metadata domain to assume a basic equivalence between paper and digital citation formats. (As it turned out, this was indeed incorrect; however, common standards of practice would not have predicted this.)

Study 3 included 24 participants in two test conditions: structured task and unstructured task. Each task group alternated between cookbooks and portrait images as the source library (even-numbered participants used the cookbooks and odd-numbered participants used the portraits). Five participants were under 25 years old, 13 were between 25 and 40, 3 were between

41 and 55, and 3 were over 56. There were 6 men and 18 women. Nineteen participants were affiliated with the University of Texas at Austin: 2 as faculty or staff, and 17 as students. Of the students, 11 were from the School of Information.

Study sessions began with a brief interview focused on previous experiences with creating or using personal digital bibliographies. Participants were then given an overview of their task: to create their own collection, using materials from the source library, that conveyed an idea to someone else. Researchers explained that this idea could be as simple as participants wished, giving examples such as portraits that are pretty or portraits that are creepy. To further assist in understanding the task, participants were allowed as much time as they liked to interact with three example collections. As with Study 2, these examples were created to enact the three expressive qualities described in Study 1. Based on the Study 2 findings that exposure to expressive examples did not affect design processes, we did not feel that such exposure here would influence participants' actions. To avoid influencing participants' ideas of the source libraries, however, the examples were created from different source material than the participants used. The three examples were:

- *A strange mix:* a collection of popular songs where happy music alternates with sardonic lyrics. (Figure 3 shows this example and the following one.)
- *Entertainment that my partner doesn't like (but I might):* this collection explores difficulties associated with interracial relationships by describing why the author's partner (identified in collection annotations as black) dislikes certain shows as either being not relevant for black people or for embodying black stereotypes too broadly. The author (identified as white) did not find these materials problematic in the same way.
- *The differences between art and craft:* this collection, whose author is identified as a professor addressing students, presents creative artifacts (a wedding dress, a painting) that illustrate distinctions between concepts of art and craft.

Each example also included a brief persona sketch that described the (fictional) author's motivations for curating the collection.

Following this introduction to the design activity, researchers pointed participants toward more extensive written descriptions of their task and then left the study room. Researchers observed participants from behind a one-way mirror. Participants were told to spend as much time as they liked on their task, taking whatever breaks they needed; snacks and water were provided.

For the structured task, three stations were set up around the study room. At the first station, instructions provided an overview of the entire design task and details for the first step, selecting items from the source library and considering potential ways to arrange or order the selections. Materials appropriate to this step, including folders to contain potential selections, and

pens and sticky notes to record ideas for selection groups, were arrayed at the station. At the second station, instructions directed participants to consider including a title and overall description for the collection and to arrange the selected items on a bulletin board with provided push-pins. Materials at this station included pens, colored index cards and sticky notes for writing labels and annotations, as well as scissors for customizing card shapes. At the third station, instructions directed participants to confirm their resource selection choices and to consider including annotations for individual items. All the instructions explicitly stated that titles and annotations were not required.

For the unstructured task, all the materials were placed at a single location in the study room. One set of instructions directed participants to use the materials as they wished to create their collections. These instructions also clarified that written titles and annotations might be considered, but were not required. Figure 4 shows the unstructured task setup for the cookbook library, along with the library (it would have been placed next to the task table).

For each task condition, participants pinned the paper representations of source items on bulletin boards, and, if they wished to use annotations, handwrote labels and other descriptions on colored index cards and sticky notes. When participants indicated completion with their task, researchers returned to the study room and conducted a second interview, focusing on the design product and process. Participants were asked to compare their collections with the examples and to describe if they had considered the examples as they went about the task.

6. STUDY 3 FINDINGS

Data sources included interview transcripts and collection materials for each participant, as well as researcher notes. Each collection was photographed, and the materials used in creating the collection (paper citation slips, annotations) were retained. Interviews were coded according to a thematic scheme based on an initial review of the transcripts.

6.1. Comparative appraisal procedure for participant and example collections

All participant and example collections were compared for curatorial expressiveness by three assessors, using an appraisal protocol developed for our Study 2, with different codes developed for these materials. (The comparative appraisal method is described comprehensively in Feinberg, 2013.) The conceptual grounding for our comparative appraisal method is inspired by the literature of writing assessment, which considers how to establish and consistently apply criteria to assess student writing.

Research in writing assessment endorses the development of locally specific evaluative criteria, instead of universal measures

Figure 3. Two of the example collections used in Study 3. The examples were created by the researchers to enact the expressive qualities identified in our earlier work. A Strange Mix is on the left; Entertainment That My Partner Doesn't Like is on the right. The photo in the corner of each collection illustrates a persona sketch that describes the fictional author's motivations.

Figure 4. Setup for unstructured task with cookbook library.

(Broad, 2003; Huot, 1996). Accordingly, we based our appraisal on the expressive qualities we had previously identified. Writing assessment research also recognizes a tension between validity and reliability in dealing with the products of creative expression (O'Neill *et al.*, 2009). While quantitative measures such as counts of grammatical mistakes are reliable, writing assessment research argues that such measures lack validity, even if these measures tend to correlate with other indicators of good writing (Charney, 1984). However, more robust and valid criteria, such as writing that uses sufficient evidence to support claims, are difficult to assess reliably. To resolve this dilemma, researchers suggest that for many assessment situations, reliability is more appropriately focused on process, rather than outcome (Moss, 1994). The goal of a writing rubric, or set of assessment criteria, for example, should be to reliably focus assessors' attention on the material being examined, and not to ensure

repeatable judgments. If two reviewers disagree about an essay's identification of evidence to support its claims, for example, this disagreement does not indicate an assessment failure, as long as both reviewers understood the appraisal criteria similarly. In fact, this disagreement can enable productive debate about the essay being assessed and the criteria being used. We also take this approach to reliability and do not attempt to achieve statistically significant numerical comparisons of collections. Instead, we focus on creating a process that directs assessors' attention consistently and systematically toward the manifestation of the expressive qualities in each collection. Through this procedure, we can sort the collections into rough ranges that separate, for example, strong manifestations of an original authorial persona (one of the three expressive qualities from Study 1) from weak manifestations of this quality.

Our protocol looks at each expressive quality in turn and describes how it is demonstrated in a collection through the communicative mechanisms of resource selection, resource description and arrangement. First, assessors described, in free text, how the collection manifested each quality. For selection and description, assessors applied codes for each instance within the collection where a particular aspect of selection or description seemed to contribute to the identified purpose. Description codes identified both the substance of content, with codes such as 'beliefs and values' and 'personal experiences,' and the means by which content was expressed, such as 'sentence structure.' Selection codes addressed elements such as content of the source material (such as a particular cuisine for the cookbooks or the subject of a portrait), form, tone (such as lighthearted, somber or creepy) and the creator. For arrangement, assessors described any effects in free text. Finally, assessors assigned a rating on a scale of 1–10 for each quality and for overall expressiveness, supplemented with text explanations. All of these ratings are independent of other appraisal elements (for example, a rating for any particular quality is not tied to the number of codes applied, and the overall expressiveness rating is not dependent on the ratings for specific qualities). Although we employ numbers to enable rough sorting for broad comparisons, the collections being appraised are not being described as holistically good or bad; our link to writing assessment does not extend to the assignment of 'grades' in that way. The appraisal compares perceived differences in the strength in which the particular qualities of interest appear, similarly to describing a hue as bright red or light pink. A weakly curatorial collection is merely pink instead of red.

In keeping with our process-focused approach to reliability, we do not attempt to reach agreement on ratings; mild discrepancies are expected, and significant discrepancies are themselves data points to be further examined. To ensure that assessment discrepancies result only from principled interpretive differences, we performed rigorous process checks to ensure that each assessor understood the expressive qualities and the protocol in the same way. To this end, the assessors discussed their initial reactions to multiple collections at length, to achieve consistent interpretation of the assessment structure and criteria (a strategy common in writing assessment). We also enacted checkpoints to ensure consistency within individual assessors (although not across assessors). As one means of accomplishing this, assessors wrote internal memos that described and justified their judgments (e.g. collections X and Y do not exhibit a strong authorial voice because of reason Z, while collections A and B do exhibit a strong authorial voice for corollary reason C). Additionally, after completing initial appraisals, assessors went back over their work and harmonized their internal results to assure themselves that, for example, all the collections assigned an overall expressiveness rating of six were appropriate members of that group.

6.2. Results of comparative appraisal

Table 1 shows descriptive statistics from the assessment procedure. While our assessments are only meant to provide rough sorting of the collections, they do indicate divergence between groups and the relative strength of that divergence. For Study 3, although the participant collections as a group exhibit a weaker curatorial character than the examples, overall and in each of the three expressive qualities, the gap is much smaller than that between examples and participant collections in Study 2 (also see Table 1).

In both Studies 2 and 3, the example collections, which were created by the researchers specifically to enact a strong curatorial frame, manifested the three expressive qualities to a greater degree than the participant collections, as we would expect. (We might say that the examples were bright red in hue.) In Study 3, the participant collections as a group manifested all the qualities more strongly than the participant collections in Study 2, and were almost twice as curatorially expressive overall. (We might say that the participant collections in Study 3 were bubblegum pink, while those from Study 2 were pale pink.) However, this stronger curatorial character was not achieved by structuring task flow. No clear differences emerged between the two test conditions. Neither were there substantive differences between the two different libraries of source materials. Nonetheless, increased curatorial expressiveness and

Table 1. Descriptive statistics for Study 3 collection assessments.

Collection group	Ratings				Number of codes per item	
	Expressiveness	Purpose	Voice	Emotion	Selection	Description
Study 3 examples, mean	8	9.44	6.56	4.56	2.64	3.79
Study 3 participant collections, mean	4.78	5.18	4.19	2.56	1.34	1.71
Study 3 structured task condition, mean	4.75	5.08	3.97	2.36	1.28	1.56
Study 3 unstructured task condition, mean	4.81	5.28	4.42	2.75	1.39	1.96
Study 3 cookbooks source library, mean	4.94	5.42	4.19	2.81	1.47	1.62
Study 3 portraits source library, mean	4.61	4.94	4.19	2.31	1.21	1.8
Study 2 participant collections, mean	2.5	4.3	2.3	1.5	N/A	N/A

productive use of descriptive elements seems both too great and too consistent across participants to result from chance. Moreover, certain additional features of Study 3's participant collections also suggest a considerable shift toward a robust curatorial focus, in which the character of the curated set becomes the focus of activity. The following contrasting examples from Studies 2 and 3 demonstrate the extent of this conceptual shift.

In Study 2, participants seemed to conceive of their own collections as aggregations of individually and uniquely interesting articles, in a manner congruent with keeping track of items for one's own private purposes, as with PIM. When we asked participants in Study 2 to describe their collections to us, they would often talk about reasons for selecting particular items. This participant is a typical example:

> P105 (Study 2): I picked this rain garden one because my cousin actually designs rain gardens. So I have an interest in that. I like Sun Chips so I picked that one.

Or when we asked participants in Study 2 to tell us what they particularly liked about their collections, they would often describe characteristics of the items themselves, as with this participant:

> P101 (Study 2): I think that they [the videos] deal with what people can do in their own lives. Like the garbage one has a strong visual effect.

The next set of examples, from Study 3, shows how those participants understood their task differently, demonstrating a more robust curatorial focus. Participants in Study 3 were more aware of their collections as curated structures through which a group identity was communicated; the individual items were less important in determining either the character or the success of the collection. When we asked Study 3 participants to describe their collections, they consistently talked about the process of generating an overall theme, or curatorial frame, instead of discussing particular items. Participant PB10 (B indicates the unstructured task condition) contributes a representative response to this question:

> PB10 (Study 3): I started looking at the cookbooks and I decided to focus on the books that I would probably actually read cover to cover that might tell more of a story rather than just a collection of recipes. These are the ones that I picked out of that and I grouped them on this board according to the stories that I felt like they were telling.

Similarly, when participants in Study 3 talked about things they liked regarding their collections, they tended to comment on a conceptual or visual frame, and *never* about specific items. Participant PA07 (the A indicates the structured task condition) notes the thematic structure of her collection, which explores how women are depicted as the subjects of portraits and self-portraits, as what she likes:

> PA07 (Study 3): It was always interesting to me, like how, until you get to the 20th century, the female artists are so unusual and so uncommon, even as the female subject is one of the most common subjects in art. So I like the idea of pulling those out of a larger collection and focusing a viewer's attention on that fact.

This new focus on thematic framing for Study 3 participants was especially notable because it contradicted how Study 3 participants described their existing practices with collections. When Study 3 participants recounted their own collection design experiences in interviews, they talked about creating holding pens for particular items—books to read, music to listen to, crafts to make—and not about creating thematically framed sets.

Moreover, when Study 3 participants recalled previous interactions with others' collections, their comments were also focused around items, not thematic frames. In this typical exchange, the interviewer asks Study 3 participant PB01 about her recent experience with a friend's Pinterest board.

Interviewer: Was there a theme to her collection?
PB01: I don't remember.
Interviewer: Just random stuff?
PB01: Yeah, just random stuff.
Interviewer: Was there anything about the collection in particular that was memorable, or that you . . .
PB01: I guess that one recipe that I might go back to was memorable.

Another indicator of this new Study 3 focus on the curatorial frame, instead of the item, was Study 3 participants' use of internal categories to demonstrate and clarify a collection's thematic structure. Neither of the instruction sets mentioned creating categories as a form of description, referring only to titles and annotations. One of the three example collections did use internal categories, but this was neither explained nor emphasized by the researchers when introducing the examples to participants. Yet 19 out of 24 Study 3 participants implemented some form of internal categorization scheme. (The OVDLT environment used in Study 2 did not enable personal collections to be ordered with categories, so this element cannot be compared across studies; however, none of the participants in Study 2 noticed this restriction, either in asking about it or in complaining that they could not do it.) Additionally, participants in Study 3 consistently felt like it was part of their task to ensure that every item in the source library that fit the determined collection structure was included. Accordingly, participants went through all the source materials in a systematic manner, sometimes doing so multiple times as their thematic ideas evolved. Participant PA08 describes this process:

> PA08 (Study 3): Definitely as I would start to have an idea I'd go back…. I spent a lot of time going back and pulling books one more time to take a closer look to see where they really fell.

In contrast, in Study 2, no participants went through the entire source library systematically.

In summary, based on what our participants did, in terms of producing more strongly curated collections with more descriptive elements, with a new emphasis on internal categories, as well as on how they described what they did, and on how they went about doing it, something about Study 3 encouraged participants to conceptualize their design product as a cohesive structure through which items were curatorially framed, instead of a set of unique items. But if our test condition did not facilitate this transformation, what did? We suggest that this reorientation of the product and resulting shift in design goals resulted from the change in material conditions for Study 3, in the use of physical materials instead of digital ones.

In the next section, we examine Study 3 participants' articulation of a curatorial frame in more depth. First, we examine the property of cohesion more closely and explore its manifestations in the collections created by Study 3 participants, showing how cohesion is linked to the expression of a curatorial frame. Next, we discuss how the use of physical materials enabled the conceptual shift for Study 3 participants, focusing on the role of different framing devices in encouraging participants to curate, instead of manage, their collections.

7. COHESION: COHERENCE THROUGH TRANSPARENCY

In the domain of functional linguistics and writing instruction, cohesion refers to the tactics that writers employ in linking discourse blocks, such as transitions between paragraphs. If these tactics are successful, then readers of a text are more likely to find it to be coherent, or that the flow of ideas makes sense (Campbell, 1995). (Cohesion is a desirable quality across the expressive arts, noted in critical discourse from fashion to music, painting to architecture to drama.) As we proceeded with our comparative appraisal, we identified lack of cohesion as an indicator of weaker curatorial character; if it was difficult for the raters to link elements of the collection together, then the collection as a whole lost expressive power. This lack of cohesion was especially notable in collections that initially seemed opposite in approach: those limited to the creator's unexamined preferences ('stuff I like') and those that their creators described as either 'objective' or 'user-oriented' in style. In collections of both these types, the classificatory principles that motivated curation remained obscure to the assessors.

As an example of the first type, the 'stuff I like' approach, participant PA06's collection, as shown in Fig. 5, presents a set of cookbooks oriented around recipes that she herself might like when compared with those that people she knows (guests) might enjoy. Two smaller categories are also included. One groups books that PA06 might like to read (as opposed to cook from). The final rather obscure category 'General and

Figure 5. Participant PA06's collection groups what the author likes and what the author imagines that others would like. Rationale for these preferences is not given.

All' includes two baking books. A scribbled annotation here clarifies that most people like pastry, perhaps indicating that the items here might be appreciated by any guest. Annotations on individual items in the Guests category indicate which of PA06's acquaintance might be pleased with dishes from that book (e.g. 'Dad & Kristi & Dave'). Two raters assigned PA06's collection an overall expressiveness rating of 3, and one rater an overall expressiveness rating of 2, with ratings for individual qualities ranging from 1 to 4. On the one hand, PA06's collection demonstrates a compassionate authorial persona who puts significant thought into preparing meals for guests. On the other hand, the classificatory principles that she uses in selecting a recipe for a guest remain murky, as does the composition of her own personal taste. Because of this, the reader cannot really learn more about PA06's views on cooking, either for guests or for oneself. This sort of collection is quite close to a personal information management tool, although its labels make it somewhat intelligible to others.

In describing their collections, creators of the second, 'objective' type spoke of their desire to increase usability by avoiding personal preference in their category structures. For example, an overall description for participant PA02's collection, shown in Fig. 6, states that 'the books are arranged by interest of the user.' Nonetheless, despite this explanatory annotation, assessors invariably did not understand the classificatory principles that motivated PA02 and other creators who tried to instantiate what they believed to be intuitive ordering systems. In the case of PA02's collection, for example, assessors could not determine the difference between Regional and Cultural as two separate categories at the same taxonomic level. Because the assessors could not discern what each category meant, they could not understand why a book focused on (say) Texas cuisine would be placed in either one or the other.

Just as with PA06, two assessors assigned PA02's collection an overall expressiveness rating of 3, and one rater an overall

Figure 6. Participant PA02 aims to create a user-centered collection, but our study assessors did not understand the category relationships.

rating of 2. All raters noted the dissonance between the goal of user-centeredness and the 'obscure' and 'idiosyncratic' categories.

In contrast, collections with a strong curatorial frame were found by the assessors to cogently explain the conceptual underpinnings of their ordering principles, clarifying the significance of particular categories and illuminating taxonomic relationships. Order only becomes so when its logic is revealed; it is not order as such but the explanation of order that enables audience perception of the curatorial frame. In collections assessed with a strong curatorial frame, individual experience or perspective emerged as a compelling initiation point for developing curatorial character, due to its concreteness and specificity. An example of this is PB04's collection, shown in Fig. 2. All assessors assigned PB04's collection overall expressiveness ratings that were similar to the example collections (two ratings of 8 and one of 10). The collection's ordering structure illustrates how the progress of a romantic relationship can be facilitated through mutual experiences with cooking and eating, drawing on PB04's own experience to illustrate the motivations behind each category. For example, the second row, 'Step 2: Let Them Get to Know You,' explains how, as PB04's relationship with her British boyfriend progressed, she introduced him to Texan cuisine as a means of sharing her own cultural background. Moreover, each item is annotated with a note that explains how it fits into the category. In the Step 2 category, the note for the book Meals Like Mom Used to Make reads: 'You also want to make your new special person understand what tastes you go to in comfort food. For me, that's mom's pancakes.'

In PB04's collection, interactions between expressive qualities (purpose, voice, emotional intimacy) contributed toward overall cohesion. But we also identified cases where cohesive tactics facilitated the production of one expressive quality over another. This fractured cohesion was a primary cause of disagreements between assessors (such as there were; the largest discrepancies were differences of 3 points between

two assessors, which occurred in only 4 out of 24 collections). In one of these cases, participant PB03's collection pointed out that while women artists in the portraits source library often represented themselves in self-portraits abstractly, men artists represented themselves more realistically. PB03 highlighted this difference in an unusual way by drawing attention to the extravagant mustaches depicted in the men's self-portraits. PB03 also included some additional portraits that were not abstract women or mustachioed men, because she 'couldn't resist' including them. These digressive item annotations were found by two assessors to obstruct cohesion of purpose, while the third assessor found these annotations to increase cohesion of authorial voice, because the digressions exhibited the same exuberant quirkiness as the mustache detail. While the third assessor acknowledged the fragmented purpose, this assessor considered the increased cohesion of the voice quality to be compensatory. The effect of fractured cohesion is an intriguing question to explore in future work.

8. FRAMING DEVICES: BOUNDARIES AND LIMITS AS CREATIVE RESOURCES

Cohesion becomes important for collections oriented toward public expression because it is the explanation of ordering principles, or the collection structure, that forms the character of curatorial frame. While individual items contribute to this character, they do so as category members shaping the identity of a group, rather than as items in themselves. In personal collections focused around PIM, on the other hand, the items themselves are more often the focus. Based on participants' comments regarding social media environments such as Pinterest, GoodReads and YouTube, this is how readers often approach collections as well as authors. Yet readers do not seem satisfied with this; in the context of their own practice, most participants did not find others' collections to be very interesting. We reiterate the blunt critique of one participant:

> PB09: If you ever go into the wild on Pinterest . . . there's a lot of just total dreck out there on Pinterest.

It is clear that our participants reoriented their ideas of personal collections for Study 3, seeing their task as more like curating an art exhibition and less like creating a hoard of items opportunistically scavenged. We suggest that our use of physical materials for the collection environment facilitated this shift by enacting thematic, procedural and aesthetic framing devices that focused participant attention on the collection as a holistic structure. This identification of the collection as a system, more than the sum of its parts, in turn emphasized the character of the curatorial frame as a creative work and the act of curating as a form of authorship. Two devices in particular seem to have interacted in producing framing effects: the clearly bounded source library and the blank canvas of the bulletin board.

8.1. Bounded source library as framing device

The distinct physical boundaries of both source libraries worked as a thematic framing device by encouraging systematic, sequential browsing through the entire expanse. From the way that participants described the development of their designs, this browsing compels mental categorization as a means to cognitively process the library, which strengthens and encourages the generation of curatorial themes and the use of internal categories to support those themes. This internal categorization process focuses the collection author's attention on the system of relations between items as the real object of the design process. For example, PB06 made sense of the cookbook library as a whole by grouping its items as stages in a pedagogical path to teach cooking:

> *PB06: I took a look at all the cookbooks, and I realized that cookbooks in general are trying to convey some instruction to people . . . And so, I looked at the larger collection as, what would be a good progression through these for them to go through just microwave cooking to being able to throw a dinner party.*

PB06 describes the bibliography authoring process as making a system, and focuses the authoring task on the creation of infrastructure to bring out the character of the new collection as a system oriented around pedagogical stages. This understanding is facilitated through an understanding of the source library as a similar system in which such interpretive infrastructure was lacking. The items selected for the new bibliography are important as category representatives in the system, not as unique individuals.

The physical character of the libraries also functioned as a procedural framing device in separating the 'making of the collection' from the selection of items and their subsequent arrangement and description. Although the bulletin boards used as collection substrates were right next to the source libraries (see Fig. 4), there was still a procedural separation between selecting a representation from the source library and 'adding it to the collection' by placing it on the bulletin board. While participants could have placed individual items on the board as independent acts, no one did. Instead, participants decided on a set of thematically linked items and then transferred the set to the board. This subtle break emphasized the act of creating an entirely new artifact, instead of just saving things for later. It also reinforced the sense of the new artifact as a system or group. Many digital collection environments, including the OVDLT that we used in Study 2, do not work this way; while the collection designer often needs to instantiate a collection before adding anything to it, the designer then returns to the 'library' environment (which may just be the Web) to find and add items. One adds an image to a Pinterest board while browsing the Web, and one adds an item to an Amazon wishlist while on the item's page. There is no need for the collector to return to the collection to define or organize it further.

8.2. Blank canvas as framing device

The bulletin board provided a literal frame that accentuated the collection as both a conceptually expressive and as a purely visual artifact. The single, open, yet bounded space served as a thematic framing device in emphasizing the collection as a unified whole, with a group identity, focused through a directed visual flow from top to bottom and side to side. Interacting with the board also put the participant in the role of reader as well as in the role of creator, seeing at the time of creation how the reader would experience the collection. Participants knew that readers would interact with their collections exactly as they created them, with the same set of elements and viewing conditions, and so were encouraged to make use of features of the display environment, such as 'white space' (or lack of it) and spatial arrangement. Some participants created elaborate spatial arrangements to convey thematic information, such as the degree of relationship between categories. For example, participant PB10's collection (see Fig. 7) was focused around a general idea of cookbooks that might be read for pleasure, like novels. PB10 used a spatial arrangement to explore various non-recipe themes that might motivate one's interest in reading a cookbook this way: a specific place, people, region or culture, and a combination. ('A specific place' refers to a location like a restaurant, while 'region or culture' is a larger and more inclusive concept, like Provence or TX, USA) Each of these four themes was specified on a corner of the bulletin board, with citations arranged between them. Citations closer to the middle of the board were hybrids, while those nearer the corners were more clearly related to one theme over another. For example, a book of Indian cookery by Madhur Jaffrey, with the author's picture on the cover, was in the middle, because its primary focus was India, but there was a strong identification with the author as well.

Figure 7. Participant PB10's collection uses spatial arrangement to refine a thematic idea, placing items according to their relative identification with each of the four corner attributes.

Participants also responded to the board as a visual framing device, some putting great effort into developing a visually harmonious and balanced presentation. Many participants selected particular colors of index cards, sticky notes or push-pins for this purpose. Sometimes these choices had conceptual effects, such as delineating internal categories through the use of differently colored annotations. But often this was solely to increase the visual attractiveness of the board. In this exchange, a participant explains how she carefully matched the colors of cards used for item and category-level annotations:

PA05: Sometimes, I've changed the little cards just because I got the color of them wrong. I hate to tell you that.
Interviewer: You wanted green ones for the green.
PA05: I wanted green with green, and yellow with yellow, and pink with pink.

Although using color in this way did not convey meaning in the sense of symbolic representation, as with PB10's collection, such authoring moves did contribute to the collection as an encompassing system in which the selected items were embedded, adding complexity to the overall reader experience. We can think of this attention to purely aesthetic elements as implementing another sort of system infrastructure, forming an additional layer to the conceptual infrastructure of category labels and spatial arrangements.

8.3. Framing as creative empowerment

These multiple framing devices ultimately enabled a sense of freedom through constraint. Just as poets have found artistic expression to be encouraged through established verse forms, so did our participants find the boundaries enacted by our study environment to be creatively liberating. In their own practices, participants saw their collecting activities as both opportunistic and diffuse, instead of concentrated creative episodes, and their collections as dynamic and ongoing, but formless. In providing a defined expanse for the source library, the design task, and the design product, the material conditions enacted by our study scaffolded an approach to curating that was both more systematic and more creative. While Study 2 included some of these limitations (a bounded design task and relatively small source library), the use of physical materials here enforced the constraints by making them unavoidably apparent, heightening the contrast between the study environment and similar digital activities. As participant PB03 noted:

PB03: I feel like online you have just kind of a limitless supply of things that you can pull from. So sometimes it's almost overwhelming. Like you want to get all of them, and here you can get all of the men with mustaches. But you cannot find all of the men with mustaches to put on a Pinterest board!

And yet, while the set of framing devices enabled through Study 3 did promote curatorial activity for many participants, we would not suggest that personal digital collection environments should restrict authoring activities to single creative episodes.

This would certainly not be appropriate for the dynamic nature of the Web. The next section interrogates our findings more deeply by reading them against a wide set of literature that considers the material embeddedness of symbolic representations into larger experiential systems (for example, the painting in its frame, the novel in a typeface and book design, rock art in a landscape).

9. DISCUSSION: MATERIAL EMBEDDEDNESS OF THE CURATORIAL FRAME

In Study 3, framing devices enabled through the use of physical materials changed participants' perceptions of the source content collections (libraries) that they read, and similarly changed perceptions of the citation collections (bibliographies) that participants wrote. For both reading the libraries and writing the bibliographies, effects from the change in materials from digital to physical appeared primarily at the level of collection, or system, rather than item. Differences in the content medium of particular items did not seem to matter: there were no observable distinctions in how participants interacted with the source library of portrait images or the source library of cookbooks, in either the reading or writing process. The material of system representation, rather than the material of content representation, seems to have affected the changes we found.

These materially influenced framing devices encouraged participants to perceive the structural form of a collection as a system of relations into which items might be placed, with salient qualities related to an aggregate identity, instead of a list of items with salient qualities distinguishing each element as an individual. These devices facilitated development of a curatorial frame. In the source libraries, this sense of collection as system was incipient, brought into being by a mode of reading instigated by the framed, and thus limited, extent of the library. As readers, participants developed their own conceptual infrastructure to comprehend the library as an encompassing text, or system, fitting the individual items into an understanding of the larger system that surrounded them. This conceptual infrastructure constituted the genesis of the participants' curatorial frame. This initial act of framing by the participants was abstract; it involved perceiving a certain character for a curated set, such as PB10's cookbooks that tell a story, but not enacting that character.

In the bibliographies written by participants, the initial curatorial frame was refined through interactions with the literal writing frame of the blank bulletin board. The easily grasped affordances and constraints of the bulletin board substrate and accompanying elements (index cards and sticky notes with shapes, colors and space for writing) encouraged participants to shape their initial infrastructure ideas into more fully realized curatorial experiences. Some of these authorial acts, such as the use of category labels or symbolic spatial arrangements,

extended the initial, abstract curatorial frame by defining, relating and describing system classes. PB10, for example, used spatial arrangement to explicate types of cookbook stories and relationships between the types.

Other authorial acts that contributed to the curatorial frame were focused on audience presentation. Expressive mechanisms such as the use of a complementary colors of push-pins or index cards did not reveal curatorial rationale but nonetheless contributed to the experience of the finished work. In PB10's case, selecting pink sticky notes for category labels and placing these labels to delineate a rectangle contributes to an overall aesthetic balance, even as these moves are unrelated to the abstract curatorial character of storytelling.

Our analysis of these presentation-level authorial acts extends our notion of the curatorial frame and its instantiation. Bal's discussion of framing focuses on the interpretation of art exhibition objects through the textual description of selection principles. One of Bal's examples is a museum exhibition that surfaces the 'social' aspect of madness. In Bal's interpretation of this exhibition, the material environment of the museum plays only a minor role in the expression of the abstract frame. Similarly, in most discussions of systematic collecting (as with Stewart, 1993; Pearce, 1994; Venn, 2006), the curatorial character of a collection is generated from the underlying content and structure of its foundational classificatory principles. The material instantiation of those principles is largely irrelevant. As we noted in describing our Study 3 design, this tendency is even stronger when the collection items themselves are also abstract representations, as is the case with bibliographies and other forms of metadata collections. Accordingly, our initial concept of the curatorial frame in the environment of digital bibliography was also focused on content and structure. The expression of a thematic selection principle, like 'cookbooks that tell a story,' with subordinate principles for different types of story, forms a representative example of our initial sense of the curatorial frame. It constitutes an abstract structure that relates a set of linked classificatory principles (different kinds of stories).

The findings from Study 3 lead us to consider presentation elements, even those not related to the expression of classificatory principles, as an additional component of the curatorial frame, one that instantiates the conceptual infrastructure of abstract character as a specific composition in a particular material environment. These presentation elements expand the scope of the curatorial frame, even in the metadata context, to encompass the manner of its embodiment as well as its symbolic meaning. These presentation elements are not mere ornaments that can be stripped away without damage to the essential character of the curatorial artifact. They are integral to the audience experience.

The relationship between such visual 'ornament' and 'art,' as with the role of a (literal) frame around a painting, is addressed by the art historian Gombrich (1979). For Gombrich, while the 'picture' is associated with representational meaning, the 'frame' or decoration around it is associated with 'order,' or the creation and manipulation of patterns. While Gombrich claims that decorative patterns do not achieve meaning in the same way as representational art, he does imply a relationship between the meaning of representation and the order of decoration. Gombrich suggests that a ring of cherries decorating the outer edge of a layer cake is perceived mostly for its 'order' in appearance, in terms of the cherries' consistent shape, size and color, and not for their potential taste, which is how we might construe 'meaning' in this situation. The cherries are decorating and not signifying, we might say. However, an additional single cherry at the center of the cake is 'very much a cherry' as the object or focus of the frame. This featured cherry signifies, as well as decorates. The space around the text in a book design is a similar interaction between order, in the sense of lines and patterns made by text and page, and meaning, or the ideas conveyed by the text. The kind of order discussed by Gombrich is materially bound; while the border of cherries on a cake and white space on a page may function in similar ways, the pattern effects at the heart of decoration are dependent upon the material used, for both the decoration and for the item being ornamented. (Accordingly, if we decorated the border of a cake with peas instead of cherries, the border itself would be manipulated into signifying mode as a result of the unanticipated material. We would see the peas 'very much as peas,' and we would probably wonder at the juxtaposition of vegetables and pastry. With the cherries, on the other hand, the conventional use of material permits the 'cherryness' of the red orbs on the border to recede into the background, and their decorative function to predominate.)

As we have described, this dialectic between the orders of decoration and representation did not initially seem germane to the context of bibliography. While the conceptual infrastructure that gives structure to a metadata collection may refer to material qualities (in designating images by color scheme, for example, or books by size), the infrastructure itself does not seem materially associated. As previously discussed, metadata schemas and the controlled vocabularies used with them are explicitly designed to be independent of implementation details. This is a longstanding cornerstone of professional practice. (Such reliance on abstraction is of course pervasive in software development, and Blanchette (2011) discusses the neglected material considerations that underlie computing in general.)

The findings from Study 3 forced us to reexamine these common assumptions. (It is perhaps ironic that our dedication to overturning one common assumption of descriptive practice—the possibility of judgment-free classification—did not inoculate us against another such assumption in the dismissal of 'encoding' as a mere carrier for content and structure.) For example, it is typical for library catalogers to think of their metadata records as equivalent, no matter their display. Catalog records have the same structure and meaning in paper and digital form, and the system of relations between records is also the same: just the display and means of access is different. And

yet, of course, the overall experience of using an online catalog is very different from a card-based version. To find a book by author in a card catalog, one searches the set of cards organized by author. To find a book by author in the online catalog, there are two methods. In the first, one searches the online author file for the correct author name, and then searches the catalog for that controlled value in the author field. This approximates the physical card search and achieves the same result. But most users use the second method instead: keyword search for some portion of the author name. This retrieves a much longer and imprecise list that must be manually culled to remove items by authors with similar names, or items with subjects or titles that include the desired author's name, and so on. Item records maintain perfect equivalence in paper and digital catalogs. Relationships between items and controlled value for author name are also maintained in both catalog environments, if one uses the first search method. But in the digital catalog, the underlying system of relationships between items and controlled vocabulary values has become much less salient. Most catalog users have no idea that using the first search method reveals a different relationship between records than a keyword search does. In the digital environment, the experience of reading the collection has changed, and its character as a system has become harder to discern. In other words, the 'meaning,' as determined by content and structure of records, is only part of the reading experience. The 'presentation' also plays a key role.

In classification design, the separation of meaning and presentation has suffused both scholarship and practice. A controlled vocabulary is supposed to identify and relate concepts, not words, so that even the textual labels that designate concepts can change; the real identifier of a concept is a notational string, not a word (e.g. Z696 is the Library of Congress Classification notation for the concept represented by the word 'classification' within the larger class 'bibliography and library science'). This emphasis on materially independent meaning as the focus of attention is similar to the emphasis, in literary studies, on such meaning as the goal of textual interpretation. Johanna Drucker, a scholar of both textual studies and visual book arts, excavates this assumption by noting how odd it would seem for a literary critic to consider the typeface of a particular edition when interpreting it. As Drucker describes the prevailing approach to literary interpretation, graphic elements may be present in every text, but they are seen as mere distractions to the 'real' content: 'Material presentation is a necessary, maybe even interesting element of a work, but once we get serious we just 'read'' (Drucker, 2006, p. 267.) Just as with the card catalog and online catalog, though, it is clear that 'presentation' in a particular environment affects the reading process. Drucker recalls having students switch the text of headlines from *The Wall Street Journal,* a conservative, business-oriented newspaper, with those from a scurrilous tabloid, *The National Enquirer,* so that the WSJ's story about bond markets 'took on a screaming impact', while the Enquirer's article about a two-headed boy and aliens 'was modestly set in

the greyest and least exclamatory of formats' (Drucker, 2006, p. 269).

Of course, visual rhetoric is indeed an established field of study, and such assertions are not new. But it is more common to think of visual elements as coming into play only in special cases, where it 'screams' out, as in tabloids or advertisements. Drucker emphasizes that presentation interacts with 'text' all the time, not only sometimes. For Drucker, it is productive to consider the text more generally as a larger system or space in which content (the more narrow version of text), visual elements and structural elements (such as paragraphs) interact to 'make themselves available to be read.' One can also take this line of thinking to consider the 'content' (narrow text) as a type of script or score, with each material instantiation as a sort of performance, like the staging of a play. We might then understand the physical and digital instantiations of a library catalog as very different performances of the same script.

A similar set of assertions to Drucker's is made by archaeologist Tilley (2008) in the context of rock art, ancient images that appear on boulders and cliff faces throughout extended sites, such as Vingen in Norway. Tilley contends that the experience of rock art is as much about doing as about meaning; viewing rock art is an encounter by a body in a landscape, and involves physical movement and sensation. The art is not limited to the image itself but involves the environment in which the image is embedded. The anthropologist Tim Ingold likewise notes how a material like stone is never just 'itself'; 'there is no way that its stoniness can be understood apart from the ways it is caught up in the interchanges across its surface, between substance and medium' (Ingold, 2007, p. 15).

In HCI, as well, scholars have begun to contemplate how the interplay between materials embedded within an environment shapes experience. Dourish and Mazmanian (2011) use the example of digital and film photography, as investigated in the work of Rebecca Grinter, to consider how photography in these two material instantiations becomes a different set of activities, even though the symbolic meaning of the product (the image we see) is the same in a digital or film photograph. The environment in which the photograph is produced thus encourages the production of different sorts of images; for example, capture, display and distribution via a cell phone makes the picture-taking event more casual and alters both the type of image produced as well as its composition and processing. Rosner (2012) uses the site of a bookbinding workshop to explore how materials, both physical and digital, interact with the people making use of them, with each other and with the work environment (glue used to bind the books leaves traces in the press; a font used to specify a title is not available on another computer and is automatically substituted for another). Rosner describes the interactions of materials, environment and people as a collaboration, demonstrating the activity-shaping agency of material elements as well as human ones. Rosner's work emphasizes how material properties reveal themselves situationally. For example, the cords that bind book

spines, which appear stiff and brittle, are revealed to be flexible when expertly frayed with a knife. Dourish and Mazmanian's and Rosner's articles are only two of a rapidly growing set of HCI scholarship in this area (Fernaeus and Sundstrom, 2012 provide a helpful overview of associated research challenges).

In using this body of work to expand upon our findings, we turn first to the relationship between reading a collection and writing one, and how the character of that relationship caused certain qualities in the collection being written to become salient as objects of craftsmanship. We noted that mode of reading supported by the limited extent of the small physical source libraries encouraged participants to perceive the source library in terms of conceptual infrastructure, and we additionally noted that the separation between reading and writing activities furthered the development of conceptual structure as a core element of the written bibliographies participants produced. The separate, browseable library, with its small size emphasizing the potential of cohesion within it, instigated a form of concentration in the initial reading that presented the library itself as a form of material to be comprehended and interpreted as such, with latent qualities that might be drawn out through the perception and manipulation of craft. In his book on workmanship, the designer and craftsperson David Pye remarks that material qualities that seem inherent to the naive eye, such as the beautiful grain of English walnut, are in fact the product of significant labor on the part of the worker. Pye explains that 'material in the raw is nothing much. Only worked material has quality, and pieces of worked material are made to show their quality by men, or put together so that they show a quality which singly they had not. "Good material" is a myth' (Pye, 1968, p. 2). (A similar perspective appears in Redstrom (2008), where he notes how a finished product may in turn become a material.) The physical basis of the library in our study, and the way in which this physical basis underlined the act of reading *the library* (as opposed to reading *its items*) as a distinct activity, facilitated its perception as material to be worked, so that the beauty of its potential inner conceptual cohesion could be expressed. The corollary separation of writing the bibliography as a similarly distinct activity continued this orientation. Participants saw their selected citations as a unified material, as a single plank of walnut to be planed and polished, instead of as a group of independent and unique pieces to be perceived and shaped differently.

We also return to the incorporation of presentation elements in the written bibliographies and the sense of these products as an extended composition or system, integrated with its environment. Once again, the relationship between reading and writing activities seems important. Our participants began perceiving the source library as an incipient system during the distinct reading process, and then transitioned to develop and refine the conceptual infrastructure for their written bibliographies in a separate physical and mental space from the eventual display environment, the bulletin board. (They tended to browse the library first, then select their own citations, then group and order the selected citations, before transferring the entire citation set to the board and physically annotating and arranging them.) The initial writing activity, prior to moving to the board, was closest to traditional classification design in being independent of a display environment; we might characterize this preliminary writing process as developing an initial script or score. The need to translate that preliminary script to the board emphasized that the writing activity also involved the staging of a full-fledged performance based on the score. We might also say that the initial writing activity focused on the narrow text, or ideational content, while the subsequent writing activity expanded the text to include the entire presentation system. As with the unknown creators of the rock art in Tilley's study, who may have developed some images based on the surrounding landscape features, this engagement with the display environment spurred refinements of the conceptual infrastructure, along with means of expressing that infrastructure. Participant PB10, for example, as discussed in the previous section, generated the basic idea for her bibliography, to demonstrate that some cookbooks can be read for pleasure like other books, via the reading process. But the properties of the display environment facilitated both the expression of that basic idea and its refinement through the development of non-recipe themes and a way to demonstrate, through spatial arrangement, the relative inclusion of those themes in particular citations. In a complementary fashion, participants' appropriation of aesthetic affordances of the materials at hand—making use of different colors, shapes and means of orientation—speaks to a sensitivity of the imagined reader's experience. Tilley argues that the placement of Vingen rock images owes something to a show of prowess on the part of the artists, because making those images in those places would require exceptional strength and agility, which the audience (also physically challenged just in getting to an appropriate spot for viewing) would have to recognize. Here, attention to presentation details demonstrates a similar audience awareness.

10. DESIGN DIRECTIONS: FROM ONE SET OF MATERIALS TO ANOTHER

Interpreted against this selection of literature on materiality, our findings reveal these primary insights regarding the curatorial act:

- A mode of reading that encourages the reader's development of conceptual infrastructure to understand the source material as a system, or unified material, similarly encourages the bibliography author to create a system, or cohesive work, establishing a strong curatorial frame.
- An authoring environment that both reveals and provides control over the full extent of the reader's experience of the bibliography, including elements that appear focused on 'presentation' in addition to 'content,' contributes to both the refinement of conceptual infrastructure and its

compelling expression, further developing the curatorial frame.

We briefly explore how each of these points might influence the design of environments for reading and writing curatorially-focused personal digital bibliographies.

10.1. Reading: interpreting a performance, developing a script

In Study 3, we identified participants' perception of the source library as a composite system with the ability to comprehend the extent of the library and comprehensively browse through it. Indeed, we were initially quite surprised at the pervasive tendency of Study 3 participants to go through the entire source library; no one in Study 2 did this, and nothing in our instructions suggested it. This comprehensive browsing propelled Study 3 participant readers to begin developing a nascent curatorial framing to interpret and keep track of what they had read. Supported through this mode of reading, participants began developing a basic script of conceptual infrastructure for their own bibliographies. They developed this script against their active interpretation of the source library as a particular performance, or unified composition.

One might expect a digital library, as used in Study 2, to facilitate this mode of active reading more strongly than a physical library. The Study 2 libraries were structured with a variety of browsing categories that represented multiple descriptive dimensions: subject, genre, location and so on. Study 2 participants could have used this powerful array of configuration mechanisms to understand and interpret the libraries as unified composite systems. However, Study 2 participants only used these existing metadata features to search for particular items. They did not use them to read the library as a composite document. The source libraries for Study 2 and Study 3 were of similar size, so this was not the determining factor. It would have been equally possible for participants to survey all the library items in Study 2, and yet this mode of interaction did not suggest itself. Both libraries were small and tractable, and yet only the libraries in Study 3 were perceived as systems, instead of items.

We understand the larger design problem, therefore, as presenting the source library as *something to read*, not only something to search. One means of doing this might be to use non-standard, potentially contentious metadata structures. When designing the Study 2 libraries, we developed the descriptive metadata in accordance with traditional practice standards of neutrality, using common attributes and values. We did so despite our convictions that such neutrality is impossible and inadvisable, because we wanted to present a naturalistic, normal-seeming environment, and we did not want to unduly interfere with participants' own interpretative processes. But one way to spur reading of a digital library may be to make its status as a text impossible to avoid, clearly establishing

the source library as a unified composition to read and write against.

As an illustrative example, Fig. 8 shows a digital library that uses provocative metadata infrastructure. Instead of subject, genre, goal and other typical browsing categories, this version includes categories that examine whether the library's videos feature elements that are Everywhere, Somewhere or Nowhere in Texas; the descriptors inside these categories feature idiosyncratic, clearly subjective concepts such as Poverty, Diversity, Cowboy Boots and Opportunity as being 'everywhere' in Texas (but only in 3, 11, 4 and 2 videos of the 50 in the collection).

If we were to determine, through another experiment, that such atypical category structures facilitate curatorial reading, and thus curatorial writing, then we might prompt institutions, like museums and libraries, to create 'reading' versions of their collections, as well as 'retrieval' versions. As more cultural heritage institutions release their collections data as linked open datasets, such projects could also be pursued by others.

10.2. Writing: refining a script: staging a performance

The writing process for Study 3 participants began through interpretive reading and the initial development of a basic curatorial frame. The move to the bulletin board propelled the refinement of this initial curatorial framing, as Study 3 authors began to consider their audience. Participants realized that everything enabled in the bulletin board writing space would constitute the eventual reader experience, and they began to incorporate a sense of audience reception into bibliography development. Moreover, the easily grasped affordances of the physical materials helped participants to include presentation as part of the authoring task. As participants worked to transition their ideas to the bulletin board, the interaction between curatorial frame and material environment provoked participants to continue refining that initial conceptual script, resulting in a fully staged performance.

Two key elements emerge here. First, although the transition to the writing space was important in provoking consideration of the reader's full experience, the writing actually began in the reading space, as the basic curatorial frame (or initial script) was developed. Participants would often group, shuffle and rearrange the paper slips that they gathered in their initial reading process before making that shift to the board and the writing space, sometimes using written labels to keep track of subgroups. Second, having this sense of initial structure upon moving to the writing space then facilitated perception of the ultimate performance and its possibilities for the reader.

The general design issues here involve supporting the development of that basic curatorial frame during the reading activity, and then highlighting options for enacting that initial script in the writing space. One approach might be to develop a form of 'holding pen' that enables not only the preliminary

Figure 8. A digital video library that swaps out traditional browsing categories for atypical, provocative ones, as a proposed spur for curatorially focused reading.

selection of citations but the development of multiple category groups to structure them. Determining an effective means of spatial arrangement and shuffling for this script development would be a key challenge.

11. CONCLUSION: LEARNING FROM PERFORMANCES IN SPECIFIC MATERIAL ENVIRONMENTS

In a July 2013 review of Sarah Butler's novel *Ten Things I've Learnt About Love,* Maria Russo notes that each chapter is prefaced by a different list of 10 things ('things in my father's shed,' 'things I thought I'd do with my life'). Russo comments that in the world of the Internet, 'the list has become inescapable,' and wonders whether the novel really needs to incorporate such a flat, superficial content form. Russo then concedes, however, that Butler's lists 'have a surprising emotional resonance (just as, it must be admitted, the most effective BuzzFeed lists do)' and she opines that when 'a good list' is 'used well,' it functions as a compelling and powerful means of expression.

The series of three linked studies that we describe in this paper interrogate the notion of 'a good list' or curated collection and what it means to 'use one well,' in terms of establishing a robust curatorial frame. Through an extended analysis of Study 3, we refine our understanding of the curatorial product as a materially specific performance of conceptual infrastructure. While the conceptual basis for the curatorial frame may be located in a set of abstract categories, those abstractions become inextricably entangled in the means of their particular expression. The three expressive qualities that distinguish curatorial character for personal bibliography—original purpose, authorial voice and emotional intimacy—are produced through this union. For example, the general purpose of participant PB10, to demonstrate that some cookbooks are worthwhile to read 'cover to cover,' like novels, was first conceived as an abstract idea. This basic category structure, or nascent curatorial frame, was refined into abstract subcategories (books emphasizing people, places and specific locations) before being 'written' onto the bulletin board. The particular material affordances of the board and citation slips spurred the subsequent elaboration of the curatorial frame, as the physical arrangement of citations was used to demonstrate subtle relationships between

these subcategories, as applied to particular items. While the preliminary conceptual infrastructure forms the basic curatorial frame and initial script, the ultimate bibliography is fully integrated with its material environment. The reader experiences an enacted performance, not the script.

Our analysis also demonstrates an important link between reading performances and writing new scripts. We contend that robust curating requires support for active and productive reading, as well as writing. When we approach a database as a set of facts to be commanded, we diminish both its existing interpretive effects and its interpretive potential upon remixing. We can facilitate the design of personal digital bibliographies as expressive artifacts by emphasizing the curatorial aspects that structure source repositories, by revealing database reading as a complement to database searching.

At a more general level, our work provides another example of how our longstanding enchantment with abstraction can distract us from the full spectrum of user experience, or the full scope of each extended text that we encounter, be it neolithic rock art, a printed book or digital database. In particular, our experience shows how well-reasoned and demonstrably useful traditions of professional practice, such as the separation between content and implementation for descriptive metadata like library catalogs, subtly distort our perceptions of particular performances as they simultaneously enable the deployment of focused expertise on more general scripts. Literary critics look at words, not typefaces; classificationists work with concepts, not labels; interface designers are concerned about task flow, not color choices. All of these are meaningful and productive distinctions, and yet they also dismiss as inessential significant aspects of the integrated work that users actually interact with. In our increasingly layered digital environments, in which every application is mediated through amalgamations of continually evolving hardware and software, complete authorial control over any performance is impossible. Stronger awareness of the role that each component plays in constituting the character of experience, however, can help us to support both reading and writing of digital compositions.

FUNDING

ACKNOWLEDGEMENTS

REFERENCES

Adler, M. (2012) Disciplining scholarship at the Library of Congress. Knowl. Organ., 39, 370–376.

Bal, M. (2012) Curatorial acts. J. Curatorial Stud., 1, 179–192.

Balsamo, L. (1991) Bibliography, History of a Tradition. (Pettas, W., trans.). Berkeley, CA: Bernard M. Rosenthal.

Bates, M. (1976) Rigorous systematic bibliography. RQ, 16, 5–24.

Bergman, O., Whittaker, S., Sanderson, M., Nachmias, R. and Ramamoorthy, A. (2010) The effect of folder structure on personal file navigation. J. Am. Soc. Inf. Sci. Technol., 61, 2426–2441.

Besterman, T. (1936) The Beginnings of Systematic Bibliography. Oxford, UK: Oxford University Press.

Blanchette, J.-F. (2011) A material history of bits. J. Am. Soc. Inf. Sci. Technol., 62, 1042–1057.

Boardman, R. and Sasse, M.A. (2004) "Stuff goes into the computer and doesn't come out": a cross-tool study of personal information management. In Proc. ACM CHI 2004, Vienna, Austria, pp. 583–590.

Bowker, G. and Star, S.L. (1999) Sorting Things Out: Classification and Its Consequences. Cambridge, MA: MIT Press.

Broad, B. (2003) What We Really Value: Beyond Rubrics in Teaching and Writing Assessment. Logan, UT: Utah State University Press.

Buckland, M. (2012) Obsolescence in subject description. J. Doc., 68, 154–161.

Campbell, K.S. (1995) Coherence, Continuity, and Cohesion: Theoretical Foundations for Document Design. Hillsdale, NJ: Lawrence Erlbaum Associates.

Charney, D. (1984) The validity of using holistic scoring to evaluate writing: a critical overview. Res. Teach. English, 18, 65–81.

Clifford, J. (1991) Four Northwest Coast Museums: Travel Reflections. In Karp, I. and Lavine, S. (eds), Exhibiting Cultures: The Poetics and Politics of Museum Display. Washington, DC: Smithsonian Press, 212–254.

Dourish, P. and Mazmanian, M. (2011) Media as Material: Information Representations as Material Foundations for Organizational Practice. In Third International Symposium on Process Organization Studies, Corfu, Greece.

Drucker, J. (2006) Graphical readings and the visual aesthetics of textuality. Text, 16, 267–276.

Elings, M. and Weibel, G. (2007) Metadata for all: descriptive standards and metadata sharing across libraries, archives, and museums. First Monday 12(3). Available at: http://firstmonday.org/article/view/1628/1543.

Elsner, J. and Cardinal, R. (1994) Introduction. In Elsner, J. and Cardinal, R. (eds) The Cultures of Collecting. London: Reaktion Books.

Feinberg, M. (2011) Personal expressive bibliography in the public space of cultural heritage institutions. Libr. Trends, 59, 588–606.

Feinberg, M. (2013) Comparative Appraisal: Systematic Assessment of Expressive Qualities. In Proc. IEEE/ACM Joint Conf. on Digital Libraries (JCDL), Indianapolis, Indiana, pp. 115–124.

Feinberg, M., Geisler, G., Whitworth, E. and Clark, E. (2012) Understanding personal digital collections: an interdisciplinary exploration. In Proc. ACM DIS, Newcastle, UK, pp. 200–209.

Fernaeus, Y. and Sundstrom, P. (2012) The material move: how materials matter in interaction design research. In Proc. ACM DIS 2012, Newcastle, UK, pp. 486–495.

Foucault, M. (1970) The order of things (1st American ed.). New York: Pantheon Books.

Gilliland, A. (2008) Setting the Stage. In Baca, M. (ed.) Introduction to Metadata, 3rd ed. (online edition). Available at: http://www.getty.edu/research/conducting_research/standards/intrometadata/setting.html (accessed February 7, 2014).

Geisler, G. (undated) Open Video Digital Library Toolkit. Documented at http://www.open-video-toolkit.org/.

Goel, V. (2014) Trove is a treasure for news junkies. Bits blog. The New York Times, January 22, 2014.

Gombrich, E.H. (1979) The Sense of Order: A Study in the Psychology of Decorative Art. The Wrightsman Lectures, delivered under the auspices of the NYU Institute of Fine Arts. Ithaca, NY: Cornell University Press.

Gulotta, R, Odom, W., Forlizzi, J. and Faste, H. (2013) Digital artifacts as legacy: exploring the lifespan and value of digital data. In Proc. ACM CHI 2013, Paris, France, 1813–1822.

Huot, B. (1996) Toward a new theory of writing assessment. Coll. Compos. Commun., 47, 549–566.

Ingold, T. (2007) Materials against materiality. Archeol. Dialogues, 14, 1–16.

Jacob, E. (2004) Classification and categorization: a difference that makes a difference. Libr. Trends, 52, 515–540.

Jenkins, H. (2006) Convergence Culture: Where Old and New Media Collide. New York: New York University Press.

Jones, W. (2008) Personal information management. Annu. Rev. Inf. Sci. Technol., 42, 453–504.

Jones, W., Phuwanartnurak, A., Gill, R. and Bruce, H. (2005) Don't take my folders away! Organizing personal information to get things done. In Proc. ACM CHI 2005, Portland, Oregon, pp. 1505–1508.

Kaye, J., Vertesi, J., Avery, S., Dafoe, A., David, S., Onaga, L., Rosero, I. and Pinch, T. (2006) To have and to hold: exploring the personal archive. In Proc. ACM CHI 2006, Montreal, Canada, pp. 275–284.

Kirk, D.S. and Sellen, A. (2010) On human remains: values and practice in the home archiving of cherished objects. ACM Trans. Comput.—Hum. Interact., 17, 1–43.

Kirk, D.S., Sellen, A., Rother, C. and Wood, K. (2006) Understanding Photowork. In Proc. ACM CHI 2006, 761–770.

Lakoff, G. (1987) Women, Fire, and Dangerous Things. Chicago: University of Chicago Press.

Mai, J.-E. (2011) The Modernity of Classification. J. Doc., 67, 710–730.

Malone, T. (1983) How do people organize their desks? Implications for the design of office information systems. ACM Trans. Inf. Syst. (TOIS), 1, 99–112.

Markey, K. (1984) Interindexer consistency tests: a literature review and report of a test of consistency in indexing visual materials. Libr. Inf. Sci. Res., 6, 155–177.

Marshall, C. (2011) Challenges and opportunities for personal digital archiving. In Lee, C. (ed.) I, Digital: Personal Collections in the Digital Era. Chicago, IL: Society of American Archivists.

Moss, P. (1994) Can there be validity without reliability? Educ. Res., 23, 5–12.

Odom, W., Banks, R., Kirk, D., Harper, R., Lindley, S. and Sellen, A. (2012) Technology heirlooms? Considerations for passing down and inheriting digital materials. In Proc. ACM CHI 2012, Austin, Texas, 337–346.

Olson, H. and Schlegl, R. (2001) Standardization, objectivity, and user focus: a meta analysis of subject access critiques. Cat. Classif. Q., 32, 61–80.

O'Neill, P., Moore, C. and Huot, B. (2009) Guide to College Writing Assessment. Logan, UT: Utah State University Press, 2009.

Pearce, S. (1994) Collecting reconsidered. In S. Pearce (ed.) Interpreting Objects and Collections. London: Routledge, pp. 193–204.

Pye, D. (1968) The Nature and Art of Workmanship. Cambridge, UK: Cambridge University Press.

Ranganathan, S. R. (1959) Elements of Library Classification. London: The Association of Assistant Librarians.

Redstrom, J. (2008) RE: definitions of use. Des. Stud., 29, 410–423.

Rodden, K. and Wood, K. (2003) How do people manage their digital photographs? In Proc. ACM CHI 2003, 409–416.

Rosner, D. (2012) The Material Practices of Collaboration. In Proc. ACM CSCW 2012, Seattle, WA, 1155–1164.

Russo, M. (2013) Count your blessings. Sarah Butler's "Ten Things I've Learned About Love." New York Times, Sunday Book Review, July 28, 2013.

Sayers, W.C. (1915) Canons of classification. London: Grafton.

Sease, R. and Macdonald, D. (2011) The organization of home media. ACM Trans. Hum.—Comput. Interact. (TOCHI), 18.

Stewart, S. (1993) On Longing: Narratives of the Miniature, the Gigantic, the Souvenir, the Collection. Durham, NC: Duke University Press.

Tilley, C., with the assistance of Wayne Bennett. (2008) Body and Image: Explorations in Landscape Phenomenology 2. Walnut Creek, CA: Left Coast Press.

Venn, C. (2006) The collection. Theory Cult. Soc., 23, 35–40.

Whittaker, S. and Hirschberg, J. (2001) The character, value, and management of personal paper archives. ACM Trans. Comput.–Hum. Interact., 8, 150–170.

Whittaker, S., Matthews, T., Cerruti, J., Badenes, H. and Tang, J. (2011) Am I wasting my time organizing e-mail? A study of e-mail refinding. In Proc. ACM CHI 2011, 3449–3458.

Whittaker, S. and Sidner, C. (1996) E-mail overload: exploring personal information management of e-mail. In Proc. ACM CHI 1996, 276–283.

Zerubavel, E. (1991) The Fine Line. Chicago: University of Chicago Press.