Speculative metaphors: a design-led approach to the visualisation of library collections

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ABSTRACT

We are at a critical moment when a library patron's first, and sometimes only, point of access to library collections is an interface. The relationship we have with physical collections can not be discounted but it also can not be re-created within the screen space. There is a need to understand not only how interfaces operate and how they can be 'usable' but also how they shape our relationship with library collections. There is a need to understand how dominant orders of classification are reinforced through their visual representation within collection interfaces and how this shapes the way in which we come to know things. Johanna Drucker notes: "Digital technology depends on visual presentation for much of its effectiveness…but critical understanding of visual knowledge production remains oddly underdeveloped" [7].

We have an opportunity to rethink how we encounter collections through the physical act of browsing and through an interface; an opportunity that is not being addressed. What does each of these experiences afford? How can we reimagine the library collection? In this dissertation I will explore these opportunities through a practice-based approach to the development of a set of speculative prototypes. I will seek to re-imagine the collection through an exploration of the role of metaphor in the visual language of library interfaces and our experience of library collections.

Categories and Subject Descriptors

H.3.7 [**Information Storage and Retrieval**]: Digital Libraries – *User issues;* H.5.2 [Information Interfaces and Presentation]: User Interfaces – *Theory and Methods*

General Terms

Design, Experimentation, Human Factors, Theory, Speculative Design

Keywords

Interface design, digital libraries, visual communication, metaphor

1. INTRODUCTION

1.1 Background: burying the books

In 2016 the University of Technology, Sydney (UTS) will open a new library. A significant feature of this development involves moving a large proportion of the collection to an Automated Storage and Retrieval System (ASRS). The ASRS will house books underground, making physical access to them no longer possible. Patrons will be able to request books from the ASRS, which will then be retrieved by a robot. Access will be possible only through digital interfaces such as the existing online catalog. Although we currently access the collection through this catalog, when using an ASRS the retrieval moment is lost. When a robot retrieves the books from the shelves our relationship with the collection is altered: we are no longer able to understand or experience the physicality of the collection.

The changes at UTS are not unique. Many scholarly and research libraries are in the midst of changes that will affect access to their book collections: the New York Public Library, the University of Sydney library, and the (State) Mitchell library in New South Wales, Australia are just three examples [11, 12, 28]. In cases where books are being removed, (access curtailed or books discarded altogether), library patrons have expressed a feeling of loss [25, 34]; not a loss of books as merely objects but the loss of an *experience*. Some frame these changes as an attack on their idea of what a library should be (you can't have a library without books [16]) while others are concerned with the loss of serendipitous browsing: no longer will they be able to browse the shelves and find items they did not know they wanted. "I look forward to browsing the reference shelves and other material freely available. This way I am able to make myself aware of material that is in existence. What one cannot see, one cannot ask for" [22]. Patrons are accustomed to using library interfaces but not in isolation [1]; they use interfaces in conjunction with the book on the shelves. Engagement with the collection doesn't end with the retrieval of a single item; further understanding of the collection is built through the process of navigating the physical space of the library. Judgments and decisions are made within the retrieval moment, not only when using the interface to locate items: exploration and discovery of collections happens beyond the library interface.

1.2 Research Problem

Current library interfaces enable goal-oriented search rather than discovery. These interfaces do not replicate the context provided by books on shelves. For example, when browsing shelves we can visually identify the older books, those with shorter borrowing period labels (and are thus in demand) or those with multiple editions. A library whose collection is physically accessible provides us with an embodied understanding of the collection. We

have a history of understanding library collections with our bodies, as well as our minds. Finding and then retrieving a book from such a library provides us with ways of knowing the collection that go beyond what the catalogue can tell us.

The particular materiality of this experience constitutes a way of knowing the collection. It is once we have access to only the interface that we understand what is stripped away and what we have lost. There is no need to be nostalgic about this, but there is a need to recognize an opportunity. How do we replace all that the experience of an accessible library collection tells us? Do we need to? How do we create as rich an experience through mediums like interfaces that prioritise other types of sensorial engagement?

Despite digital infrastructure providing the potential to sort information in almost infinite ways [31], the interfaces used within libraries paradoxically narrow users options. These interfaces are bound by the rules of library classification systems, without the benefit of the physical context they provide.

Research such as this has become more urgent with the gradual but inexorable transition to digital-only collections. The relationship we have with physical collections can not be discounted but it also can not be re-created in the digital realm. There is a need to understand not only how interfaces operate and how they can be 'usable' but also how they shape our relationship with library collections. [10].

1.3 Opportunity: the affordances of the miscellaneous

Whilst some express a sense of loss at the prospect of losing physical access to books, it provides interface designers with an opportunity to explore what is afforded by the potential of the miscellaneous, as described by Weinberger [28]. Once books are no longer publically accessible, they need not be in an order that enables them to be found on the shelves by library patrons.

Weinberger explains how the way in which we impose order and thus access to physical objects and information has been freed by the digital. In Weinberger's three "orders of order" we have moved from a "first order" limited by matter, through a "second order" where information about objects is maintained separate from the objects themselves, but in physical forms, through to the "third order" which is digital and miscellaneous. Order is defined dynamically in the third order. For example, iTunes provides us with the ability to sort individual tracks in multiple ways, instead of being locked into a stipulated track order by the physicality of a vinyl record.

The books on shelves in libraries are most often arranged according to the classification system employed by the library. Once patrons can not retrieve those books, the classification system no longer functions as a way-finding tool. In the case of the UTS Library, the Dewey number acts as a direction for the patron, and a location for the book. Automatic retrieval systems give the library interface the potential to be freed from library classification systems and the influence of the metaphors associated with these systems. They provide us with the opportunity to explore what can occur within an interface when the patron no longer needs directions and the book no longer needs a location.

Current interfaces are underpinned by the library convention of a stable, over-arching order. In terms of a design approach it is suitable to ask what the possible affordances of the "miscellaneous" are in this instance. What happens when you

sever the relationship of the library's classification system to the physical arrangement of books on the shelves, when users no longer need to understand their physical location? It raises the possibility of breaking the hold catalogue and other traditional library metaphors have on the interface. Instead of building on existing interface metaphors it is timely that we question these metaphors with the aim of transforming the way in which interfaces provide us with experiences of library collections. We are at a point when the interface may soon be the only way in which we can encounter a collection. The interface, then, will become the collection. It is critical to understand how we encounter collections as interfaces.

1.4 Research Questions
The research questions that flow from this are:

1. What are the dominant metaphors used in the visual language of library interfaces?

2. What alternative metaphors could be used?

3. How can these alternative metaphors shape our relationship with a library collection?

2. STATE OF THE FIELD
2.1 Positioning
This research makes a conscious move away from interface design as pursued in the fields of human-computer interaction and interaction design. It will seek to interrogate the visual language of library collection interfaces through an exploration of metaphor, rather than measurement or analysis of user satisfaction and engagement. This approach is being taken in response to the work of researchers Drucker [8], [9], [10] and Bolter and Gromala [2].

This research responds to Drucker's work in two ways: firstly in her call for a 'humanities approach to interface theory' and secondly, her belief that interface design is clinging to the dimensionality of books and paper. For Drucker there is in some disciplines an assumption that interfaces are 'neutral'. She argues that there hasn't been sustained consideration of the metaphors used within them and assumptions that underpin them. Interfaces are viewed as pragmatic and instrumental rather than rhetorical and persuasive. Much work has been done on library interfaces from library and information science and human-computer interaction perspectives and this research aims to complement this work by addressing the problem from the perspective of visual communication design, particularly as it understands visual presentation. I am calling for a metaphorical approach that design can afford. As Drucker notes, because of their historical position, human computer interaction (HCI) and other related fields differ in their approach to the resolution of problems: "Engineering solutions often stop with a design that works adequately, rather than seeking solutions that emphasise the rhetorical benefits of seductively engaging or rewarding a viewer" [9]. Rather than seeking to explore a solution that works adequately, I wish to use design practice to ask questions of library interfaces that may not necessarily be asked in other fields. This is not to critique human-computer interaction approaches but to acknowledge that there is a space within the interface design arena where visual communication design is positioned to raise useful questions.

This research, particularly within its practice elements, also responds to Drucker's assertion that the screen provides a potential that is not addressed in the visual language used within current interfaces. The screen space is "a fully n-dimensional space", [7] but whose visual design adheres to the dimensionality of books and paper.

Bolter and Gromala's analysis of interface through the lens of digital art provides a valuable framework through which to assess current library interface metaphors and to develop alternatives. Bolter and Gromala argue that we look at interfaces, rather than merely through them. Interfaces, in their view, are representations of knowledge in and of themselves, not merely gateways to knowledge. They constitute modes of knowledge production.

As Bolter and Gromala, point out, the goal of the usability community seems to be to make the interface transparent, whereas they believe "in fact the goal is to establish an appropriate rhythm between being transparent and reflective". Like Bolter and Gromala, I believe we need to move beyond the culture of usability, that prioritises efficiency and transparency, in order to raise questions specifically about how our relationship with library collections is shaped by interface metaphors. This is not to say that we should ignore usability culture and user research, rather, that we accept that such culture builds a particular argument and shapes our interfaces in a rhetorical manner. Library interfaces are not merely windows onto the collection, they enable and shape our relationship with the collection, once we are no longer able to access books and other hard copy material. If we recognize their rhetorical nature we can then begin to question elements of that rhetoric, such as metaphor, and explore alternatives.

Research on library interfaces from a visual communication design perspective is in its early stages of enquiry. More work has been done on library interfaces in the areas of human-computer interaction, interface and interaction design, and library and information science. There has been recent interest in the concept of serendipity; the role digital collection interfaces may play in encouraging it and whether or not they do it successfully. Serendipitous encounters – 'stumbling' upon a source, noting a connection via an apparent accident – are understood to be part of our embodied experience of collections. The perceived loss of serendipity that occurs when collections are only accessible via a screen interface is central to the investigations many are making into the design of collection interfaces. Attempts have been made to describe serendipity and its role in information seeking [1], [13] to describe the serendipitous strategies employed by researchers [18], [19] and collection interfaces that provide serendipitous experiences have been designed and prototyped [4], [5]. I wish to move away from the concept of serendipity and focus on the nature of metaphors used within screen interfaces, and develop and explore speculative alternatives. Whilst I acknowledge that serendipity is and should remain a central concern of collection interface design, this research is more interested in the ways in which we engage with digital collections through the metaphors employed by their interfaces.

2.2 Current interface development

2.2.1 Recreating the shelves
Many library interfaces map existing library metaphors onto digital interfaces. They try to 'recreate' the physical aspects of the library and the way in which they help us understand and interact with library collections. Some research and the resulting interfaces have sought to recreate the shelf browsing experience by leveraging covers of books and their position on the shelves. These projects, which have come often from within libraries themselves, have sought to engage library patrons visually through the use of book covers and to provide context by revealing books "sitting next to" the book through a virtual representation of the shelf [15], [27]. Whilst virtual book shelves, or a "shelf view" of catalogue listings, provide some context for individual books and the opportunity to make serendipitous finds in the immediate vicinity of a book, they do not provide an adequate way in which to understand the collection as a whole. Connections between books are still dictated by the shelf position and thus, the library classification system. The books are locked into an order that can not be pulled apart and connections created anew.

The library classification system metaphor is still dominant, and the book moves from object to metaphor. Whilst these innovations are admirable, they do not challenge our conceptions of the collection, or adequately deal with the move towards the interface becoming the collection. There is a continual oscillation between the collection and the individual book within these types of interfaces. They can not represent the entire collection within the interface but they attempt to show at least some context for each book when delivering search results. The limitations of this kind of virtualising of the collection are obvious once you move beyond the immediate surrounds of an individual item on the shelf. Further connections or comparisons can not be made. In an attempt to address this problem, research and design of collection interfaces has begun to use visualisation techniques.

2.2.2 Visualisation
There are scholars who recognise the limitations of attempting to visually represent the library collection in such a literal manner and they are seeking to employ visualisation techniques within collection interfaces, often in order to encourage "discovery" as opposed to narrow search. These interfaces have been developed for museums, archives and other specific, bounded datasets. Whilst some libraries make use of visualisation techniques to allow users to sort and view search results by parameters such as time or item location, few attempt to use visualisation as a way in which to provide an alternative reading of a library collection on a large scale or break the data relationships of the library's classification system.

There are two prominent arms of this work. Firstly, the use of visualisation to create an environment that enables serendipitous finds through novel and unexpected connections [3], [29]. The perceived loss of serendipity is the catalyst for much work in this area. Marian Dörk and his colleagues have addressed this through the development of interfaces that are underpinned by a reconfiguration of information retrieval models. The work of Dörk, Carpendale and Williamson [4] has reconfigured and extended the retrieval models used when designing exploratory interfaces. Dörk et al have recognised the narrowness of information retrieval models used to design library and other collection interfaces and how this narrowness can constrain design. They use the figure of the flâneur to conceptualise an information-seeking behaviour that is meandering, whilst effective. The model of the flâneur opens up the possibility of an engagement with a library collection, through an interface, that is pleasurable, poetic and serendipitous.

The exploration of the flâneur as an information retrieval model has led to a focus on slowing down search and a move away from efficiency within search and discovery interfaces [3], [4]. The

interfaces developed by Dörk and his colleagues encourage the information flaneur. They make use of interactive visualisation techniques to encourage users to make serendipitous connections. Recent work has seen Dörk, Comber and Dade-Robertson [6] seek to explore the concept of the monad as revived by Latour, Jensen, Venturini, Grauwin and Bouillier [17] in an information visualisation context. These interfaces focus on connections between individual items and aim to enable the user to create new connections through their interaction with the visualisations. These interfaces then play with the idea of a connections being made and remade but they also rely on a concept of underlying order. The connections are made through a faceted view of the order.

Responding directly to the loss of books in libraries and bookshops, Thudt, Hinrichs and Carpendale have developed "The Bohemian Bookshelf" [29]. The group has produced an interface with five different visualisations that provide users with different views of a collection: 'Cover Colour Circle' (browse books by page count); 'Keyword Chains' (follow keyword chains to new books); 'Author Spiral' (browse books by author name); 'Book Pile' (browse books by page count) and 'Timelines" (compare publication year and content time).

Another prominent branch of this work involves the development of "generous" and "rich prospect" interfaces that provide visualisations of entire collections and individual collection objects themselves [24], [32], [33]. Whitelaw's work with museums and other large collections provides a model interface for access to digital collections. Whitelaw suggests a 'generous interface' may provide an improved experience of large digital collections. Such interfaces, in contrast to a narrow search box, "offer rich, browsable views; provide evocative samples of primary content; and support an understanding of context and relationships". The generous interface takes on Shneiderman's visual information seeking mantra: overview first, zoom and filter, detail on demand [26].

Although not writing specifically about libraries, Whitelaw notes that the way in which we access digital archival collections has not changed "for decades". He sees these interfaces as limited in their ability to truly expose a collection and allow for exploration in that they still require the user to form a query; problematic when the user does not know what is in the collection. Whitelaw suggests a 'generous interface' may provide an improved experience of large digital collections. The importance of 'generous' interfaces can not be downplayed, given that for many, the interface will be the only way in which they experience a primary source, they will not experience it physically. This is not entirely the case with a library collection.

Although the initial interaction with the collection may be through an interface there is still, for a large part of the collection, the prospect of engaging with the primary source. In this sense, library interfaces are wrestling with a different problem to those of museum collections. These interfaces do however have to negotiate the fact that some library users may not ever enter the physical library itself [23].

The work of Reucker, Radzikowska and Sinclair [24] on 'rich prospect interfaces' has some similarities with Whitelaw's 'generous interfaces'. Like Whitelaw's, rich prospect interfaces aim to be generous in what they display (meaningful representations of every item within a collection on initial screens), items can be manipulated by users (filter, zoom, mark) and link to more detail on demand. For Ruecker et al, the ability to see an entire collection should allow the user to get a sense of the entire collection and its boundaries: "the insights available to the user…are primarily related to indicating the bounds of discourse that have been inevitably established by the collection – that is, the terms under which the items have been collected, labeled, categorized and otherwise organised." Rich prospect interfaces should then not only enable a user to find or discover, they should also assist the user in understanding the collection itself.

3. METHOD
In design, researchers often rely on prototyping to tease out possible ideas. In this dissertation I aim to develop speculative prototypes that enable to me trace possible alternative metaphors for library collection interfaces. Speculative objects have a practical or fictional purpose that does not yet exist. They challenge our cultural, epistemological and ethical assumptions [20]. They offer innovative solutions and can celebrate or highlight best and worst case scenarios. As such, this dissertation will not be an exercise in functionality and will not involve user testing. Its primary aims are to provoke and elicit thought, to help reflect on our current use of collection interfaces and imagine the different future we might build.

The research is broken into two main parts:

1. Backgrounding: preliminary prototyping, a literature review and survey of the field

2. Design practice: exploration through the design of speculative prototypes

3.1 Backgrounding
3.1.1 Challenging the shelf view
A preliminary, low fidelity prototype was developed to further shape the questions to be addressed by this research[1]. This prototype – *Football* – explores the library collection as a 'surface' to be ranged across and experiments with representations of the collection that moved beyond lists and book covers. It enacts the delivery of a set of search results for the keyword 'football' from the UTS Library collection. The results are spread across the screen according to invisible coordinates set by individual items' position in the Dewey classification system as applied by the Library, instead of in a tree-based structure. Results interfaces in current library web interfaces are arranged in ways that reinforce the idea of a formal order. The prototype doesn't seek to communicate relationships through a representation of shelf position but provides a relational context for a set of search results as a whole. The relationship between individual items and the rest of the results is communicated through proximity.

3.1.2 Materials and methods
The prototype consists of a single slide containing 650 transitions. The title and Dewey call number of the first 200 results of the 'football' keyword search performed in the UTS library catalogue were noted. These were then plotted across a rectangular field where the x axis held the Dewey call numbers before the decimal point and the y access the figures after the point. For example, a book with the call number 100.932 would appear towards the beginning of the x axis and the top of the y axis. Each search result was then 'revealed' during a transition: a dot appeared,

quickly followed by the title, which then faded as the next result began its transition The timing of the transitions was altered in order to enable the titles to be read, but with haste. At the conclusion of the results, the dots are left on the screen and the viewer is able to speculate on the nature of the items in each cluster and the relationship between each.

3.1.3 Reflection

The prototype allowed for experimentation with temporal aspects of search, such as the timing of the reveal of results and a reflection on the prospect of a performative collection interface. During experimentation it was decided the reveal of titles would be intentional: individual items were more than hinted at but never fully realised. Some titles appeared on top of others, depending on their location. There was an overlap: titles began before the preceding title had finished, diverting the eye to the new source of movement.

Library items can, theoretically, be stored in a miscellaneous manner. Indeed, within the ASRS they are truly miscellaneous. They are stored according to where they will fit, and this 'order' is continually in flux, given the movement of items in and out of the ASRS. This early prototype was an attempt to visually explore what may occur when we remove the visual fingerprints of traditional library order, without discarding it altogether. On first encountering the results, the viewer doesn't need to understand the x and y axes, but is left to ponder the relationships at which the spatial arrangement hints. *Football* helped refine the research questions for this dissertation. It demonstrated that library collection interfaces need not visually adhere to Dewey or any other single classification order, whether explicitly or implicitly.

3.2 A survey of library interfaces

Web interfaces from 30 libraries will be collected and their visual language analysed. This will include: five university libraries and five scholarly or large public libraries from Australia, North America and United Kingdom. Visual methods will be used to process and analyse these interfaces. This will include mapping, visualization and wireframing.

3.3 Design practice: prototyping

An approach to prototyping has been decided upon with particular attention paid to the work of Galey and Ruecker [14]. They argue that "the creation of an experimental digital prototype be understood as conveying an argument about designing interfaces". I propose to use prototypes through the course of this research as a way in which to interrogate the problem and through which to communicate an interpretation in way that it becomes "productively contestable" [14]. Prototyping will be used as a method through which arguments will be explored and made. The prototyping will also take a humanistic line of enquiry that will focus on the exploration of metaphor within a graphical interface. Reflection will be recorded through written and visual work. Communication and dissemination of prototypes and their accompanying reflection will be through papers, a final thesis and potentially site-based installations and exhibitions.

4. EXPECTED CONTRIBUTION

It is expected that this research will contribute to interface theory beyond the discipline of visual communication design. It will do this by providing a visual analysis and interpretation of library interfaces that will ask questions not currently posed from within other disciplines, with the aim of opening space for those disciplines to ask similar questions.

It will contribute to an emerging cross-disciplinary movement away from transactional goal-oriented search towards more open-ended and flexible approaches to collection engagement. Visual communication design offers a perspective that will contribute to a broader understanding of the relationship of the visual to our use of library interfaces

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