

Sharing Encountered Information: Digital Libraries Get a Social Life

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ABSTRACT

As part of a more extensive study of reading-related practices, we have explored how people share information they encounter in their everyday reading as a complement to the more traditional digital library focus on sharing intentionally retrieved materials. In twenty contextual interviews in home and workplace settings, we investigated how people encounter and save published material in the form of paper and electronic clippings. We found that sharing forms a significant use for encountered materials. Furthermore, the function of these clippings extends far beyond a simple exchange of content to inform the recipient; in fact, the content itself may have little immediate value to the recipient. We also found the practice to be ubiquitous: all of our participants had both shared clippings with others and received them themselves. Specifically, this paper reports on: (1) how sharing encountered items fits into the broader spectrum of clipping practices; (2) the function and value of the shared information; and (3) the social role of sharing the encountered information. We conclude that from a technological standpoint, we should think beyond an email model for sharing encountered information and, from a social perspective, we should attend to how sharing this sort of material contributes to the strength of social ties outside of a traditional information needs framework.

Categories and Subject Descriptors

H.3.7 [Information Storage and Retrieval]: Digital Libraries – User issues; H.5.2 [Information Interfaces and Presentation]: User interfaces – Evaluation/ methodology; H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces – Computer supported cooperative work

General Terms

Design, Documentation, Human Factors, Performance

Keywords

Electronic periodicals, reading, browsing, encountered information, clipping, collaboration, field study, interaction

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JCDL'04, June 7–11, 2004, Tucson, Arizona, USA.
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1. INTRODUCTION

A marketing manager spots an online review of her company's new product in the *Wall Street Journal* and posts a hardcopy of it on the lunchroom bulletin board; a father emails his daughter a *New York Times* op-ed piece about the war in Afghanistan; two friends exchange recipes cut out from their respective *Cooking Light* and *Gourmet* subscriptions.

What do these vignettes have in common? They are all examples of sharing information encountered in the course of everyday activities such as reading the newspaper, browsing the Web, or leafing through a magazine. These encounters with published materials are often unintentional, unplanned, and may have elements of serendipity. The subsequent sharing of the found materials is usually informal and unbidden.

As part of a more general research program to characterize how people interact with paper and electronic publications, we have performed a study of how people save and expect to use the materials they encounter as they read everyday publications such as newspapers, magazines, catalogs, and Web sites. Encountered information forms an important counterpart to information retrieved as the result of an explicit query or a directed browsing session [8]. It is thought to foster creativity [20] and be a significant source of the information people acquire. For our study, we chose to look specifically at *clipping* – cutting an item out of a newspaper or magazine, saving transient published material from the Internet (either as the literal content or as a URL), or keeping an entire periodical to have access to particular content – as a particular form of encounter.

One important use of clippings is to share them with others, the aspect of our study we report here. Much of the work on sharing information to date has focused on conducting searches on behalf of others (for example, [15]) or sharing one's own knowledge in electronic forums (for example, [1]) and how this kind of sharing relates to the development of community. Our investigation complements this body of research by examining the role of encountered information in social settings.

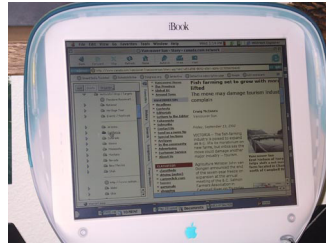
To date, digital libraries have not been conceived as a venue for browsing and sharing material that is not directly connected with information needs. We suggest that adding this element to digital libraries will increase their ultimate value and make them more of a part of everyday life.

Figure 1 shows examples of the sorts of physical and digital clippings that people share. Figure 1a shows an example of a physical clipping, a photocopy of a picture that appeared in the local paper, which has been saved to send to a colleague in another city. Figure 1b show an example of a digital clipping, a newspaper article saved from the electronic version of the

Vancouver Sun. The digital clipping has been saved as a link to the actual article (as a Favorite). These two examples illustrate some of the diverse methods people use to clip and share material from physical and digital media.



(a) Example of a physical clipping: a photo from a local newspaper which has been photocopied to mail to a colleague in another city.



(b) Example of a digital clipping: an article from a distant newspaper which has been saved as a Favorite.

Figure 1. Clipping examples. The range of clipping forms in physical and digital media, as well as the ways in which they are shared, is diverse.

Our data suggested three kinds of questions to help us characterize how and why people shared the encountered material:

- 1) Our initial focus was on the general phenomenon of clipping and saving encountered information, but the data we gathered indicated that people frequently shared the materials they found with others. What is the significance of sharing the materials relative to simply saving them for one's own future or immediate use?
- 2) Much of the sharing that we observed served a variety of functions in its social settings beyond simply informing. By carefully examining an extensive set of instances of this activity, can we understand the ultimate functions of clippings in various social settings and evaluate the utility of their content?
- 3) Information brokers are often portrayed in the literature as a distinct social type [15]. Is this true of people who share encountered information as well? Are there people who tend to encounter and share more materials with others and, on the other hand, people who tend to be primarily recipients of the items encountered by others?

To provide a backdrop for this study, we first describe the study participants, their demographic profile, and the kinds of publications they typically read. The next section is devoted to our findings, specifically those that pertain to the areas of inquiry we outlined above— characteristics of shared clippings; the functions the shared materials fill for the givers and recipients and whether their various intents seem to be met; and finally, we examine what we've learned about the givers and recipients themselves. Our discussion explores the implications of our findings and issues they reveal; included in this discussion are technology implications that build on current directions for sharing electronic material, such as [18].

2. STUDY DESCRIPTION

To characterize clipping practices, we performed a qualitative study consisting of contextual artifact-driven interviews of 20 diverse individuals at home and at work. The study brought together narrative accounts and physical examples to investigate the ways in which people currently collect, save, and use physical and digital clippings as part of their everyday reading activity in different social settings. Initially, we were driven by the challenge of whether clipping is still a necessary kind of interaction in an age of electronic publications; after all, it is easy to imagine the function of paper clippings being readily replaced by a digital library of periodicals with well-designed searching and browsing capabilities.

Studying how people clip from paper publications (e.g. magazines, newspapers, and catalogs) and electronic publications (e.g. online digests and electronic versions of traditional publications) must take into account both the ubiquity of the practice and the many genres of periodicals available today in paper and digital form. Thus, the study was organized around a number of short field visits in as many different kinds of sites as possible, both homes and offices.

We conducted the artifact interviews in two West Coast cities. Half of the interviews took place in homes and the other half in workplaces; one participant, the head of a commercial nursery, was interviewed both at her business and in her home. The intent was to be in locations where people receive, encounter, and read newspapers, magazines, and catalogs and have access to the Internet. Participants were selected across a broad range to ensure that we would understand whether or not clipping practices might be specific to age, gender, occupation, or genre of reading materials. Thus, we covered an age range from 16 to over 65; half of our participants were male and half female; and we made sure we included people with different levels of education, different uses of published materials in their jobs, and different reading interests (either personal or work-related).

Table 1 summarizes the characteristics of the participants in our study and includes several examples of what kinds of periodicals each participant reads. In addition to receiving local newspapers or subscribing to national newspapers online (such as the *New York Times*), many of our participants received trade magazines and higher circulation glossy magazines.

Our primary screening criteria was that the participants read magazines or newspapers and that they had some form of access to electronic information. We did not require them to subscribe to electronic publications. All study participants had some access to the Web, although there was considerable variation in the frequency, ease of access, and comfort level with going online. For example, one participant, a homemaker, had relatively little experience using electronic information; another (from a low-income household) accessed the Web from the local public library; a third, a partner in a commercial nursery, was more likely to use his business partner as an intermediary for Web access and did not go online often himself. At the other end of the spectrum, several of our participants had regular access to Web-based publications both at work and at home and read electronic periodicals daily.

The interviews were semi-structured and open-ended. When an interview took place at a participant's home, we did not limit our

Table 1. Overview of Participant Characteristics. Participant IDs are included to clarify quoted material used other places in this paper.

ID	M/F	Job	Location	Frequency of Web Access	Age	Education	Examples of what the participant reads
P1	F	Teacher (unemployed)	Home	few times/week	45-54	college graduate	Local newspaper; <i>Yoga</i> ; <i>Alternative Education</i>
P2	M	IT director	Home	several times/day	35-44	college graduate	Local newspaper; <i>Sunset</i> ; <i>Network World</i>
P3	M	IT manager	Work	several times/day	35-44	some college	<i>Storage</i> ; <i>Oregon Business Journal</i>
P4	M	Environmental outreach coordinator	Work	several times/day	25-34	some college	Local newspaper; online newspapers; <i>TidePool</i> (online); <i>High Country News</i>
P5	F	Administrator	Work	several times/day	65+	college graduate	<i>Meetings and Conventions</i> (online and on paper); <i>American Law Technology</i>
P6	F	Student	Home	several times/day	16	in high school	<i>People</i> ; weekly free paper; <i>NY Times</i> (online)
P7	M	Business services developer	Home	several times/day	35-44	college graduate	<i>This Old House</i> ; <i>Martha Stewart Living</i> ; <i>Fine Home Building</i>
P8	M	Individual consultant	Work	several times/day	25-34	college graduate	<i>NYT</i> ; <i>WSJ</i> ; <i>Fortune</i> ; golf magazines; Hawaiian papers
P9	F	Public relations coordinator	Work	several times/day	25-34	college graduate	<i>Business Week</i> ; <i>EuroMoney</i> ; <i>NY Times</i> (online)
P10	F	Environmental scientist	Home	several times/day	25-34	college graduate	<i>UTNE Reader</i> ; <i>Backpacker</i> ; local newspaper
P11	M	Senior sales manager	Home	several times/day	25-34	college graduate	<i>Instinct</i> ; <i>Wired</i> ; Pottery Barn catalog; local newspaper
P12	F	Executive assistant	Work	several times/day	25-34	some college	<i>Marie Claire</i> ; CNN.com; <i>Sacramento</i> ; <i>VIA</i>
P13	M	Retail clerk; Army reservist	Home	few times/week	18-24	some high school	<i>Expert Gamer</i> ; <i>Maxim</i> ; local free weekly; <i>Soldiers</i>
P14	F	Homemaker	Home	seldom	25-34	some high school	<i>Parenting</i> ; <i>Better Homes and Gardens</i> ; Costco catalog
P15	F	Secretary	Home	few times/week	35-44	college graduate	Local newspaper; <i>Cosmo</i> ; <i>Time</i>
P16	M	Partner in a design firm	Work	several times/day	35-44	college graduate	local business journal; <i>WSJ</i> ; <i>ESPN</i> ; <i>NY Times</i> online
P17	M	Partner in a retail nursery	Work	few times/month	25-34	college graduate	<i>Garden Center Products</i> ; <i>Sunset</i> ; local newspaper
P18	F	President of a commercial nursery	Both	several times/day	45-54	college graduate	<i>Cooking Light</i> ; <i>Better Homes and Gardens</i> ; <i>People</i>
P19	M	Financial advisor	Work	several times/day	35-44	college graduate	<i>NY Times</i> online; <i>Barron's</i> ; <i>WSJ</i> ; Golfsmith catalog
P20	F	Museum content coordinator	Work	several times/day	25-34	college graduate	<i>Nature</i> (online); <i>Exhibit Builder</i> ; local online paper

questions to materials related to personal interests; likewise we did not limit workplace interviews to work-related materials. Rather, we focused on any type of material they read at the interview site. Participants were not told the aim of our study or the corporate sponsorship of the study until the conclusion of the interview.

Together we spent 60-90 minutes with each participant to explore the kinds of published material they encountered, what they saved, and what they shared or had received from others. Because reading-related practices like clipping are fairly unselfconscious and lightweight, we often had to probe their accumulated paper and electronic “stuff” for examples, and used the examples to drive the interviews.

3. DATA

The data we collected included notes, audiotapes of the interviews, and digital photographs that documented the examples

and interview sites. To prepare for the more intensive phase of data analysis, we reviewed and categorized all of the clipping examples and stories into collections that reflected the various forms and functions of clippings, and how they were shared. Our data show that clippings do not fall into a few simple categories; the encountered material is saved in multiple forms for multiple uses. Most people saved information from published material in some form or other.

Because we decided to focus on shared clippings as our first area of inquiry, we extracted all of the examples of this phenomenon that arose during the interviews. These specific instances gave us a core collection of over 150 entries to analyze. Table 2 illustrates the types of examples we identified from the interview notes and transcripts. In P4’s case (in the electronic/work quadrant of the table), the example discusses a clipping he received; in the other three examples, the study participants are giving the materials to others. Each participant had some experience with sharing

clippings and each participant had both given and received clippings.

Table 2. Examples of how the study participants shared electronic and paper materials related to both work and personal interests.

	personal	work
paper	P10, an environmental engineer, gave her friend an entire issue of <i>UTNE Reader</i> when they took a camping trip to Yosemite together because it had an article about Edward Abbey and she knows her friend likes him... He read it and gave it back to her.	P20, a museum content coordinator, has an article photocopied from <i>Nature</i> on Interactive Bus Shelters that she plans to hand to her project manager so that she can talk to him about it. "My plan is to actually give it to him and talk to him about it, rather than just put it in his in-basket, because he'd kind of wonder where it came from or why he was getting it."
digital	P11, a sales manager, emailed Rob Morris's article from the <i>Chronicle</i> on 9/11/02 to his friends all over – New York, DC, Boston, and San Francisco. He pasted it into an Outlook message and sent it without much of a cover letter. He just prefaced it with, "Something I found interesting on the way to work this morning. Hope you find it interesting too."	P4, a national outreach associate for an environmental organization, received a URL from one of his colleagues that had been taken from an online publication, <i>TIDEPOOL</i> . It has a paragraph excerpted from the article as a cover message, and the title line says, "from TIDEPOOL.org." This example turns out to be redundant for P4 though – he already subscribes to this newsletter himself and had read the article.

We coded each of the shared clipping examples to reflect the important characteristics of the example, including whether it was a given or received item, whether the item was related to personal or work interests, how it was delivered (for example, by email or posted on a bulletin board), how much context was provided for the item (for example, was it a URL, an article, or an entire section of the newspaper), and the form it was delivered in (for example, as original material or as a photocopy).

Table 3 illustrates the distribution of the examples according to whether we observed the sharing at home or at work, whether it was an example of giving or receiving, and whether the content itself was related to personal interests or work. Our data suggest that many people mix personal and work-related reading and activities seamlessly throughout the day; for example, several of our participants reported reading online newspapers on the computer screen when they take a break from their work; several also reported that they read trade magazines at home, where it is quiet and they can concentrate.

Table 3. The number of examples we collected of personal and work-related clippings. The participants' reading habits were such that we often encountered personal clippings during interviews conducted in work settings and work-related clipping at home. The examples are further divided to indicate whether the participant gave or received the clipping.

	Total	At Home		At Work	
		Personal	Work-related	Personal	Work-related
Giver	82	31	5	13	33
Receiver	69	21	5	11	32

To get a richer perspective on the data and to identify potential patterns, we also coded more subjective aspects of each clipping example. These aspects included whether received clippings were perceived by the recipient as immediately useful, potentially useful, or not useful at all and how the recipient interpreted the giver's intent (if they had verbalized it). For example, sometimes recipients thought the givers were just saying "hello" by sharing a clipping with them. We similarly tried to capture the giver's primary motive and the intent of the interaction.

We individually coded every example and compared our interpretations. Where they differed, we reconciled the differences by either refining our shared understanding of a category, by creating a new category, or by agreeing one interpretation was more likely than another.

In 69 examples, our participants told us about clippings they had received. Figure 2 shows that most of the received material fell into two main categories: (1) the material was work- or task-related and potentially (but not immediately) useful; or (2) the content was not particularly useful as such, but served to demonstrate a shared interest. A relatively small proportion of the clippings, regardless of the giver's intent, represented content that was perceived as immediately useful to the recipient.

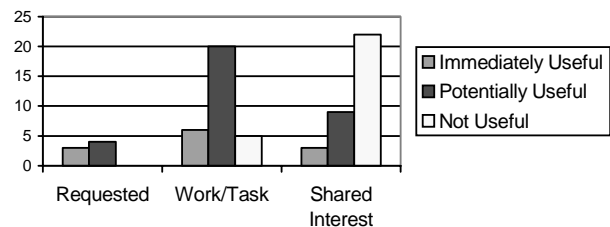


Figure 2. Much of the shared material is not considered immediately useful by the recipient.

Participants referred to 82 examples of clippings that they shared with at least one other person. We looked at the item's role (for example, did it have an identified purpose in a joint project?) and the sender's motivation (for example, the material pertained to a known interest of recipient). Figure 3 shows that less than a quarter of the clippings were shared as work- or task-related exchanges; of those, less than half had a known use. In almost half of the total cases, senders' motive was to demonstrate knowledge of the recipients' interests or emphasize a connection between sender and recipient (e.g. a shared sense of humor).

4. FINDINGS

As we gathered data about encountering and clipping items from published material, we identified three general areas of inquiry to pursue in our analysis:

1. *How does sharing encountered items fit into the broader spectrum of clipping practices?*
2. *What is the function and value of sharing encountered information?*
3. *What is the social role of sharing encountered information?*

We discuss findings related to each of these three areas of inquiry. In so doing, we will also touch on observations about how the materials were shared and how much context the sender included. For example, physical materials might be posted in a central location or delivered personally. The clipping itself might be a URL, an extract taken from a longer article, or a whole magazine or other form that includes substantial content that is not directly relevant.

4.1 How sharing encountered items fits into the broader spectrum of clipping practices

Although in this paper we have focused on sharing clippings, sharing is only part of what people do with the materials they save. Because clippings can act in a broad range of functions, we need to put sharing in perspective: Does sharing represent an important role for encountered material? Is it a significantly different kind of practice than saving encountered material for personal use?

We found that the personal uses for clippings include saving content that might be useful later or might serve as a reference; setting aside material to read or re-read later; putting the clipping in view to serve as a reminder for future action (e.g. “buy concert tickets”); or evoking memories of a personal or historic event (e.g. a newspaper section saved from a European vacation or a magazine published in January of 2000 that covered significant 20th century events). From our examples, we can infer that personal clippings are more often content or information-centric rather than immediately of use. To realize the intended value of the clippings, people rely on re-encountering them at the proper time or in the appropriate situation, for example when the anticipated information need arises. In contrast, shared clippings often are not so strongly content-oriented. They may serve their intended function at the time of initial receipt, for example, strengthening social ties by demonstrating a shared interest. Thus the shared material’s importance is not tied so tightly to the anticipated utility of the content, but rather the appropriateness of the content to the sender’s communicative goal.

How common is the practice? All twenty of our study participants both saved encountered material for themselves and clipped it to share with others, although some participants seemed to be more inclined toward personal use, and others toward shared use. If we examine the relative prevalence of examples of shared material and of personal clippings, about forty percent of the examples are examples of sharing encountered material. Sharing encountered material is therefore common, reasonably ubiquitous, and likely to be important in the roles we go on to describe in the next section.

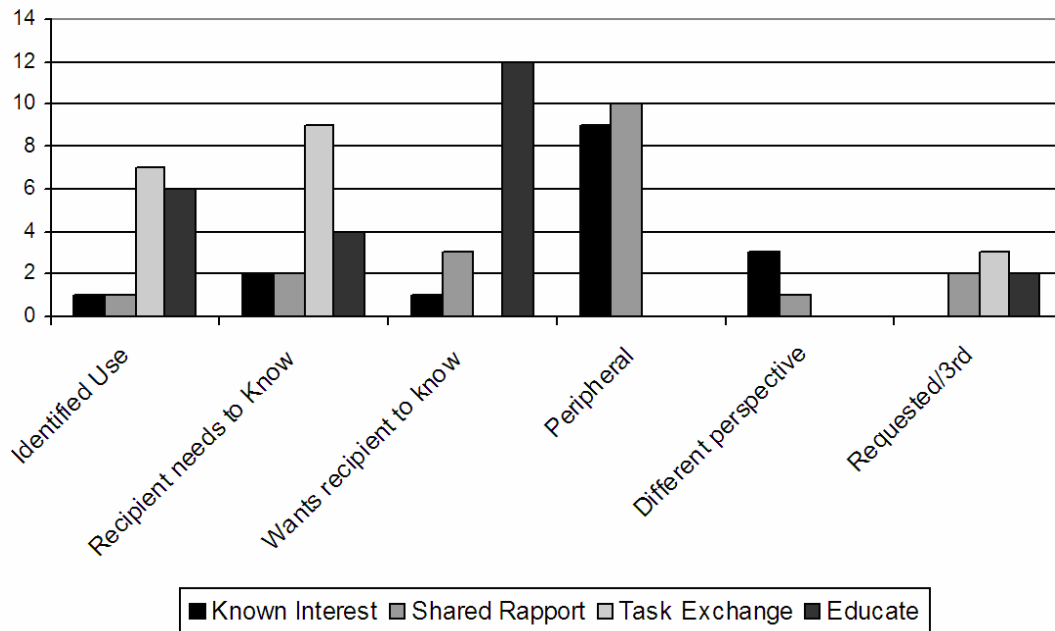


Figure 3. The person sharing the material is more apt to be sharing it for reasons associated with strengthening social ties than passing on content with a known use. One of the other common categories is material shared to educate and promote the giver’s values.

4.2 The function and value of sharing encountered information

It is tempting to take the practice of sharing encountered information at face value; to look at it simply in terms of passing on content that would seem to meet the recipient's information needs at home or at work. Yet it was apparent to us from the outset that our participants had material they had received from others that was not particularly useful for the content itself. Sometimes they had already encountered it themselves prior to receiving it from others; other times they said they weren't going to actually read it; and sometimes the sharers indicated that it was something they wanted the recipient to know regardless of whether they had indicated a prior interest. Nevertheless, the recipients indicated that they valued receiving the shared material independent of its immediate utility.

The significance of this paradox is that the shared materials often appeared to serve a function other than that of an expressed information need. The content frequently demonstrated a shared interest that created, strengthened, or renewed the social bonds between giver and receiver. Several recipients alluded to these clippings as an indication that the giver was "thinking of you". Naturally, this paradox did not reflect a universal characteristic of the shared materials. Some of the shared information represented a task or project-based exchange in which the content was of either known or anticipated utility. However, this was by no means the dominant kind of sharing that occurred.

We will describe several important categories of shared clippings from the giver's perspective since they were each relatively common:

- News items, articles, and advertisements that helped establish mutual awareness;
- Articles shared to educate the recipient, particularly in ways that reflected the giver's values and concerns;
- Items of peripheral importance to both giver and receiver, intended as a means of developing rapport; and
- Clippings that reflected known interests of the receiver (but probably not the giver), where the content itself may have been of peripheral importance.

In the first two categories, especially the second of the two, the content is quite likely to be of greater importance to the sender than the recipient; the interest may not be reciprocated in the exchange. In the third and fourth categories, the content is clearly of peripheral importance. That is not to say the content is irrelevant; quite to the contrary, it must acknowledge the recipient's interests for it to serve its social function, which is in most general terms, to build or strengthen social ties. As such, these may be anything from recipes to cartoons to sports coverage to news items that involve people known to sender and recipient.

Sharing to establish mutual awareness. These are usually work-related clippings, and are a common form of exchange among our study participants in customer-focused jobs, who were especially concerned about being aware of what their customers would have read in the press and would clip accordingly. Alternatively, they might represent some form of awareness that would help a sales person understand the customer's situation. For example, P11, a senior sales manager, described putting an article on his colleagues' desks if the article is about one of their clients –

promotions or layoffs or other significant events in the client company. He felt no need to put a note on these clippings because his colleagues would be able to figure out why he had given them the article and if not, they would ask.

These clippings generally took the form of whole articles; their form was intended to duplicate the way that customers were expected to encounter the information. Thus, some of our participants would look for physical newspapers even though they had the online form of the article because they would be concerned that the content would differ slightly. Dissemination was usually to multiple recipients and occurred in a variety of ways, from leaving the physical artifact in a shared place, to putting a copy in mail slots or on desks, to group-wide emails. Recipients did not always read this kind of material, but they would save it, at least for awhile, to consult it if necessary.

Sharing to educate or raise consciousness. The information in this category reflected a value important to the giver that was perhaps not known or not initially held by the receiver. More often than not, these were personal topics.

For example, one of the study participants, P15, had a pre-adolescent son who had been diagnosed with Asperger's Syndrome, a form of high-functioning autism. She created a file of clippings for distribution to people central to her child's life. In particular, she had photocopied "a really good" article for her mother, her sister, and her son's teacher from a *Time* magazine. She told us, "I mailed this to so many people. Because it was very, very good... It was just last year." She photocopied the cover of the magazine as well, since it was the cover story. She put a note on the photocopy she gave to her mother and to her son's teacher ("You need to read this"), but didn't include a note with the copy she sent to her sister:

"On my sister's, she just knew... It was just people I wanted to share it with... Every once in awhile we'll go back to it. [Her daughter] did a speech on it. And she took some of the pictures from this to her school."

Although there are fewer examples of work-related clippings of this sort, we observed them in situations in which an organization's values are legitimized by appearing in a reputable publication. For example, P4, a national outreach coordinator for an environmental advocacy group, showed us a newspaper-sized sheet of an article (from "way back in '97") that had been laminated for use when the advocacy group staffs a booth or table at public events for attendees to look at. He told us:

"Publications are important for us, especially daily newspapers that reflect opinion and science and economics. These are tools that we can use to advocate for [his cause]."

Sharing using common interests to develop rapport. Clippings that are shared to develop rapport between giver and recipient have a curious property: the content must appropriately reflect the interests of both, but it is essentially unimportant to the actual communicative intent of the act. Rather, the encountered information is shared to say something like, 'I'm thinking of you,' 'we have common concerns,' or 'we have the same sense of humor.'

For example, P8, an individual consultant for a financial services company, saved an article about a so-called Vice Fund that he had received from a colleague by email. When we interviewed him, he

had already sent the URL on to a friend (“up his alley”) who had in turn sent back an email saying, “is this for real?” P8 “stashed” the email with the URL “in case I wanted to send this to anyone else.” He said it “cracks me up to see it.”

Sharing to demonstrate knowledge of the recipient’s unique interests. Another way to develop social ties using encountered information is to share clippings that reflect the recipient’s distinctive interests. This mode of interacting through (but not necessarily over) information was reported by a number of our study participants.

For example, P10, a young environmental scientist, reported saving an article from the local paper about the baseball player Barry Bonds for her aunt to give to her in person. Instead of clipping the article, P10 saved the entire special section for her.

4.3 The social role of sharing encountered information

Information brokers are often seen as a distinct social type, people who desire to act as intermediaries or informal reference librarians for their friends, relatives, neighbors, and co-workers. For example, Pettigrew, Durrance, and Unruh assert that “the Internet has made it easier for researchers to label and identify a particular social type, one that might be described as ‘information gatherers’ or ‘monitors’ [15].” Most of these discussions in the literature refer to people who actively perform research – browse or query – on behalf of another (see, for example, [21] or [14]). Does this observation hold true for encountered information? Are there people who tend to share more of the results of their successful information encounters with others? Are there people who receive more encountered information than they pass on? Are there others who, like Erdelez’s non-encounterers, neither give nor receive this kind of material?

Upon reflection most of us can identify a person in our own lives who sends us encountered information – a mother who sends us hometown newspaper clippings about our high school classmates; a co-worker who warns us of new computer viruses; a friend who knows we like David Sedaris and points us at articles in this month’s *Esquire*. It is easy to come up with examples and anecdotes that reinforce the notion that there is a distinct information role – an intermediary for encountered information – that bears the burden of encountering material on a variety of topics, tracking the interests of others, and sending on clippings or other forms of encountered information.

However, when we examined the data we collected from our study participants, we were surprised to find that there was no bright-line distinction between people who initiate sharing and those who are typically recipients; our study participants generally encountered materials they found interesting or potentially useful and both shared and received clippings. Table 4 shows the number of examples participants offered that showed them sharing or receiving encountered materials as clippings; these examples came up readily during the interviews and are not intended as absolute measures, but rather as qualitative indications of the ease with which they could describe giving or receiving clippings.

Even given the qualitative nature of these numbers, we can interpret them as showing:

- All of our participants shared clippings;¹
- All of our participants acted as both givers and receivers in some instances;
- Younger participants are no less likely to engage in this practice; and
- People were likely to share clippings either at home or at work.

Table 4. Tabulation of examples of giving and receiving encountered information at home and at work. The study participants’ age group is included to demonstrate that these trends do not seem to be age-related.

ID	Where	#Given	#Received	TOTAL	Age
P4	Office	8	5	13	25-34
P8	Office	6	6	12	25-34
P16	Office	3	9	12	35-44
P11	Home	9	2	11	25-34
P20	Office	6	5	11	25-34
P10	Home	5	6	11	25-34
P12	Office	7	3	10	25-34
P15	Home	7	3	10	35-44
P9	Office	5	2	7	25-34
P18	Both	4	3	7	> 45
P1	Home	3	3	6	> 45
P2	Home	3	3	6	35-44
P17	Office	3	3	6	25-34
P3	Office	2	3	5	25-34
P6	Home	2	3	5	15-24
P19	Office	1	4	5	35-44
P5	Office	3	1	4	> 45
P14	Home	2	2	4	25-34
P13	Home	2	1	3	15-24
P7	Home	1	2	3	35-44

Given this set of qualitative observations, we may conclude that the intermediary role is highly contextual. The circumstantial nature of the role reinforces the social aspect of the sharing: the clippings are not just used to share information; they are also commonly used to “keep in touch” and strengthen social ties by demonstrating shared interests or values.

5. DISCUSSION

Our findings point in two different, but mutually reinforcing, directions. First, there are implications for further exploration of digital library technologies for sharing encountered electronic materials. The forms and modes of transmission of physical materials are far richer than we saw with electronic clippings. Yet electronic clippings hold the promise of greater convenience and the ability to bridge distances without the intervening steps

¹ Our more extensive data that covers the broader practice of clipping also tells us that each of our study participants had encountered information that he or she thought was worth saving, at least temporarily.

inherent in sending a physical item. Thus it is worthwhile to take a closer look at some examples of ways the intentions behind physical modes of sharing can translate into technology design. Second, it is clear that sharing everyday materials like clippings plays an important social role that we have only begun to understand. To better gauge the effects of the technologies that have been proposed for information sharing, the social role of everyday information bears further examination.

5.1 Technology implications

Field studies of the sort described in this paper are frequently used to support the design of new technologies. Yet, in this case, we might think that there are already effective and sensible mechanisms in place for sharing electronic materials encountered in everyday venues. For example, most online newspapers and newspaper archives offer their readers the ability to simply “email this article” *in situ* either as text or a link, to keep a copy for themselves at the same time, and to append a personalized note to the recipient by way of explanation or greeting. Such mechanisms could be added to other kinds of digital libraries and electronic archives as well.

However evaluation of these mechanisms has shown that they are not widely used; people who share things from the Web (including articles from online newspapers) most often use their regular email program even if there are other sharing tools available. They either clip URLs into a message or (less commonly) cut and paste whole articles into a message [18]. Rioux asserts that there are many reasons for this, including: the sharer doesn't have the recipient's email address at hand and has to go into his or her email environment anyway to get it; it doesn't seem as personal as sending the other person email (even though they may be able to attach a personal note in the sharing tool); the sharer doesn't know what the received article will look like (e.g. will it have advertising? Will it look like spam?); and the sharer is concerned about privacy, both his or her own and the recipient's, since now the third party may retain their email addresses and will even know about a common interest.

As a first strategy, our findings suggest that by digging deeper into the diverse forms and functions of shared encountered information, and by examining senders' motivations and recipients' reactions, there is opportunity for innovation and refinement in areas such as the representation of collection elements, the facilities we give to readers for interacting with interesting material they encounter while they are browsing (and often looking for something else), and the modes of exchange we offer them.

The representation of functional elements in an electronic collection has important consequences for how readers will clip and share them. At the very least, in a complicated multipart electronic document like a newspaper or magazine, the ability to clip at article boundaries and preserve the sense of the article's characteristics – how it is laid out, how long it is, and its other metadata – is central for meaningful sharing. For example, one of the study participants tried to share a *New York Times* article discussing high fat versus low fat diets with two of his co-workers. He had initially read the article in the physical newspaper over the weekend, and explained it to a seemingly interested group of co-workers on Monday. But when he printed the electronic version, it was far longer than he expected:

“It was a little verbose. I didn't realize it, because you see it online, but when it prints out, it was like 20 pages. It was probably a little intimidating. And I don't even know if those guys are interested as I was in that. I thought I'd print it out, it would be like three pages, and it would be easy to hand to them. And it came out as this tome.”

Some of our participants clipped and shared article subparts (as shown in Figure 1a) or entire sections or pages of a newspaper. This practice of either limiting how much is included (for example, a photo instead of a whole article) or providing extra material (for example, the entire page or a complete newspaper section) is a useful way of focusing the recipient's attention or providing additional context, such as a sense of the publication genre, the clipping's position in the publication, or the news locale. Representational requirements are implicit in supporting this kind of sharing: a photo needs to be marked up as such or superstructure such as section starts and ends must be adequately delimited.

Additionally, the examples of sharing in the study strongly imply that it is frustrating for readers to interrupt their primary activity (e.g. reading, browsing, or looking for something else) to extract and immediately enter into a complicated secondary activity (for example, trying to copy an article from a Web periodical into a mail message to send it). Both mark-up and interaction design should support non-intrusive, lightweight sharing of the desired portion of the reading material.

Modes of exchange of physical materials varied greatly also, including:

- sending a clipping in the US mail;
- delivering the physical material in person (sometimes to spur immediate discussion);
- placing it in a conspicuous place in the recipient's office or room at home (such as on desk or in an inbox at the office or on a bed or end table at home);
- putting the clipping in a designated neutral place at home or in the office (for example, a space on the kitchen counter or a table in the break room);
- posting the clipping in a central location intended for this kind of sharing, a place where it might remain for a longer period of time such as a bulletin board; and
- delivering material through an intermediary, a third party who can carry the material and act as a surrogate for hand delivery.

Yet much of the electronic sharing we observed simply took place over email or the electronic material underwent a transition to a physical form (i.e. it was printed) and the person sharing the encountered material used one of the physical delivery mechanisms listed above.

It is difficult to be prescriptive about electronic means of supporting what are essentially social activities. For example, bulletin boards and counters suggest various spins on shared information spaces, central or agreed-upon places where materials can be casually left for inspection in the course of daily activities (as opposed to more formal shared document stores, where materials are left in a less casual, more purposeful way). While there are a growing number of tools that promote different kinds

of information-based shared awareness [4] and tools that implement shared information spaces [6][19], they may need to be reformulated to have the sense of a lightweight shared place that a kitchen counter conveys or the kinds of casual encounters with materials that the break room bulletin board and tabletops provide. It is an open question how these less formal shared spaces may be integrated with more intentional collections like digital libraries or electronic newspaper and magazine archives.

Some exchanges of material – those where the shared clippings are saved and passed hand-to-hand – have more immediacy and thus may be more reminiscent of peer-to-peer real-time music sharing (along the lines of Microsoft’s ThreeDegrees²) or artifact-based chatting (see [5]) than of setting up a situation where the recipient simply encounters the material as they would on a bulletin board. The material itself becomes the basis for interaction and conversation.

A second strategy for using our findings in design is to discover artificial barriers to familiar modes of sharing; technology can be designed to avoid these barriers. For example, if Digital Rights Management software disallows digital library contents to be printed, then readers will encounter problems sharing electronic materials as they do now. For example, see P20’s account (elaborated in Table 2) of handing her project manager an article on Interactive Bus Shelters so she can have a conversation with him about it. Most of today’s digital libraries have no such barriers in place; but if we consider a broader spectrum of archives and for-pay collections, we often find publishers choosing to implement more restrictive policies.

Similarly, to make it easier to transmit a clipping across a distance, it may be important to allow a reader to find the electronic form corresponding to an article in a paper publication readily, and to identify the differences between electronic and paper forms of the “same” article. Several of our study participants said they checked for print articles after they had encountered an item in an online publication or received a URL in email; this practice was particularly important in cases where the study participants had to be in sync with customers who might see more or less (or different) information than the online item contained. We expect digital libraries to continue to have a strong relationship with comparable physical materials.

5.2 The social roles of information

In addition to having implications for technology design, the study results also contribute to research on information behavior and the social roles of information. Much of the existing work that falls under the rubric of human information behavior has taken a *user needs* orientation and tended to focus on search strategies to, for example, resolve anomalous states of knowledge [3], fill cognitive gaps [7], match an evolving understanding of how information needs are met by information resources [1], use complex digital libraries [12], and re-find the familiar [11].³ Recently, researchers have been examining the role of encountered information in everyday media such as

telecommunications [23], periodicals [9], and the Web [10]; this research retains a needs focus, although it looks at information acquisition outside of the normal retrieval framework.

Our work builds on this foundation by exploring the role of encountered information in a social setting, where the information content can sometimes play a secondary role to building rapport. Thus, sharing encountered materials goes well beyond the information content and may not be connected with information needs. We can see this by looking at Figure 2: only a small percentage of the information that is shared meets the immediate information needs of the recipient. Yet those same recipients turn around and share information that they themselves have found – the lack of immediate utility is clearly not the most important characteristic of the exchanged material. Rather *the content demonstrates a commonality of interests, goals, or values.*

In a digital library situation, we tend to rely on users’ needs to help them both identify a particular information resource to use and to formulate a specific query expressing their interests. Many browsing interfaces to digital libraries also assume fairly goal-directed activities rather than chance encounters with interesting material.

When we examine the motives that people have for sharing encountered material, we find it unlikely that in this situation human intermediaries will be replaced by agents who search online newspapers, magazines, and other information resources in anticipation of our interests [13] or that trusted search engine technology such as Google will render this sort of exchange unnecessary by virtue of giving us what we want when we need it. All of our study participants reported exchanging both encountered digital and physical materials, and many of those exchanges were not simply information transactions; rather they were intimately connected to the interaction necessary to share the material and the social fabric that the sharing strengthens.

Current research on information brokering in a community network setting shows that the practice “fosters social cohesion” as people search for materials on “behalf of another person (e.g., relative, friend), and not always at that person’s behest” [15]. Similar to the way expertise and help is shared in newsgroups, finding materials on the Internet relevant to the interests of others may play an important – if supplemental – part in building social capital and strengthening social ties within a community [22].

As we sought to define future work based our findings, we began to think about a broader issue about shared clippings: what role does the relatively informal exchange of encountered information play – if any – in developing Putnam’s notion of social capital in communities and the workplace? What implications does this interpretation have for technologies designed to support the sharing of encountered material? Is sharing encountered material more apt to be used to strengthen weak social ties, where shared interests are much of what binds people together, or is it used to maintain strong ones where casual shared interests are better known? Investigating the role of encountered everyday information in building social capital – including the mechanics of how information will be encountered and shared in digital libraries – is one focus for future work in this area.

It strikes us as crucial that digital libraries become a venue for encountering and sharing information beyond that which meets immediate needs.

² <http://www.threedegrees.com/>

³ This paper will not attempt to summarize many years of work in this area. Instead, we direct attention to recent rigorous explorations of information behavior frameworks such as that of Pettigrew, Fidel, and Bruce in [16].

6. ACKNOWLEDGMENTS

We would like to thank our colleagues in Advanced Reading Technologies at Microsoft, especially Kevin Larson, and the study's participants.

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