Sense-making Across Space and Time: Implications for the Organization and Findability of Information

Bhuva Narayan
University of Technology Sydney
Sydney, Australia
Bhuva.Narayan@uts.edu.au

Michael Olsson
University of Technology Sydney
Sydney, Australia
Michael.Olsson@uts.edu.au

ABSTRACT

This paper presents the results from a study of information behaviors, with specific focus on information organisation-related behaviours conducted as part of a larger daily diary study with 34 participants. The findings indicate that *organization of information* in everyday life is a problematic area due to various factors. The self-evident one is the inter-subjectivity between the person who may have organized the information and the person looking for that same information (Berlin et. al., 1993). Increasingly though, we are not just looking for information within collections that have been designed by someone else, but within our own personal collections of information, which frequently include books, electronic files, photos, records, documents, desktops, web bookmarks, and portable devices. The passage of time between when we categorized or classified the information, and the time when we look for the same information, poses several problems of intra-subjectivity, or the difference between our own past and present perceptions of the same information. Information searching, and hence the retrieval of information from one's own collection of information in everyday life involved a spatial and temporal coordination with one's own past selves in a sort of cognitive and affective time travel, just as organizing information is a form of anticipatory coordination with one's future information needs. This has implications for finding information and also on personal information management.

Keywords

Information behaviors, sense-making, information organization, personal information management, inter-subjectivity, intra-subjectivity

INTRODUCTION

Information organizing behavior is the process of analyzing and classifying materials into defined categories and includes an individual's or group's own organization methods and schemas or the lack thereof. This paper reports on the results of a study of people's everyday-life behaviors where information-organizing behaviors were examined as an integral component of information behaviors in everyday life.

BACKGROUND

We all need to make sense of the world that we live in. In doing so, we understand new ideas and experiences – new information - through those we already are familiar with, by fitting them into our existing conceptual frameworks. We continually engage in a dynamic process of organizing and re-organizing what we know. The context that these organizing processes create is what makes information intelligible, for "the most strange and remarkable characteristic of information is that it can only be understood through the idea of organization" (Morin and Belanger, 1992). According to Taylor (2004), there seems to be a basic drive in humans to organize, and psychologists tell us that even babies' brains organize images into categories such as faces or foods, and that small children do a lot of organizing during play. According to Arlene Taylor, the core of the issue is that "we organize because we need to retrieve" (Taylor, 2004), whereas Elfreda Chatman found that we can neither recognize the significance of information in the present nor recall it in the future without a context relating that information to our life-world (Chatman, 1999).

Organizing as physical doing: Marcia Bates (2001) has described the inclination of individuals to carve out a subset of the information world in a personal information collection through the metaphor of *information farming* where individuals also tend to this information on a regular basis the way they tend to a garden or a farm, including acts of nurturing, weeding, and harvesting (Bates 2001), whereas William Jones describes these behaviors in terms of a desire to keep found things found

for future use (Jones, 2007). The notion of Personal Anticipated Information Management (PAIN) proposed by Jones and Dumais (2004) conceives of information organization as a set of actions that attempt to bring order to information: the keeping behavior of organizing and storing information and the behavior of managing and using the information sources and channels that comprise the personal information collection (Bruce, Jones, and Dumais, 2004).

In the literature, much of the studies in regard to organizing information fall into either the area of cataloguing and classification studies (as in Library Studies) or under a new field called Personal Anticipated Information Management (Jones & Maier, 2003). Many of these studies take principles from library studies and apply them to individuals, but individuals often think about information organisation (or the lack of it) in their daily lives only when they encounter problems during retrieval and use of the information.

Lansdale (1990) investigated the role of memory in *personal information management* and found that information recall was positively correlated to recognition and categorisation, and Mentis (2007) found that the memory of frustrating user experiences affected the way users approached information searching. In Elizabeth Loftus' (1975) theory of memory, there are two main processes involved in the remembrance of information. The first process deals with the acquisition of information, and the second process delves into the retrieval of that information. When these two processes are separated in time, as it is with retrieving information that was organized in the past, both phenomena become as problematic as time travel (Loftus, 1975).

Hektor (2001) conducted a comprehensive study of information seeking in the context of everyday life and found the setting (or the spatial aspects) to be an important factor in everyday-life information seeking. Savolainen (2006) called for a temporal approach to everyday-life-information-behaviour research, for the process was more like a 'moving picture' than a 'still life.' Chowdhury (2009) highlighted the importance of temporal and spatial information and made a case for taking into consideration the time and space aspects in digital information management.

Organizing as sense-making: Dervin's Sense-Making (1992; 1999) is a metatheory that adds to the above approaches, and extends them, providing a broader, more holistic approach. Dervin's Sense-Making is frequently described by information researchers as a theory about information seeking (Savolainen, 1993; Godbold, 2006). Yet a reading of Dervin's more recent work (Foreman-Wernet & Dervin, 2010) makes it clear Sense-Making has become a more holistic meta-theory, one which views the sense-maker as: "…an expert in her world (e.g. in her body, her work, her life) …Sense-Making assumes the actor as theorist of her world, with hunches, hypotheses, and generalizations about how things connect to things and how power flows." (Dervin, 1999, 740). Furthermore, Dervin states that sense-making is more than a mental process but is:

> embodied in materiality and soaring across time-space …a body-mind-heart-spirit living in time-space, moving from a past, in a present, to a future, anchored in material conditions; yet at the same time with an assumed capacity to sense-make abstractions, dreams, memories, plans, ambitions, fantasies, stories pretences that can both transcend time space and last beyond specific moments of time space. (Dervin 1999, 730).

Dervin's work emphasises that our sense-making involves more than cognitive processing: it is embodied and affective as well as cognitive. Also, while it may be individual it is not idiosyncratic or truly objective: it is grounded in the power relations and social norms of a person's life-world (Chatman, 1999). It is, in essence, *intersubjective*:

> Our experience of the world, upon which our thoughts about the world are based, is intersubjective because we experience the world with and through others. Whatever meaning we create has its roots in human action, and the totality of social artifacts and cultural objects is grounded in human activity (Wilson, 2002).

An individual's sense-making, their engagement with any information system, even a highly personal one, cannot be seen in an atomistic way as a discrete individual constructing personal meaning. Rather, as Foucault (1978) suggests, an individual's need to negotiate meaning through the lens of their engagement with the discourses (*ways of speaking*) and discursive rules (accepted conventions and practices) operating within their particular cultural and professional communities at the time. Information systems, whether search engines, databases or email programs, are themselves intersubjective discursive constructs, and in using them, we must try and reconcile our own discursive position, with its associated 'truths', rules and assumptions with that of the system's creators.

So how do people in everyday life negotiate this divide between their constructs and of others' but also the divide between their current constructs and their own constructs from a different time and place?

To answer this question, this exploratory study gathered empirical evidence to examine people's experiences of

information organisation within everyday life and everyday encounters with information.

RESEARCH DESIGN

The research design was built around a diary study wherein forty participants were asked to maintain a detailed information journal or diary of their information-related thoughts and activities (including online and offline information seeking behaviors) for two weeks through a secure weblog. Thirty-four subjects completed their diaries. The participants were from all walks of life from across six countries (USA: 20, Australia: 7, Canada: 2, India: 2, China: 2, and Jordan: 1) and were selected through a *maximum variation sampling* method in order to achieve some level of heterogeneity within the sample size. In this sampling method, especially for small samples, any common patterns or convergence that emerge from great demographic and other variations are of particular interest and value in capturing the core experiences and central, shared aspects or impacts of a phenomenon (Patton, 1990). These core experiences from such a wide sample might be seen as *epistemic* (Foucault, 1972) evidence that certain modes of behavior are grounded in discourses and social conventions whose influence can be seen around the globe.

The limitations of the study are that it is not generalizable for all participants were educated English speakers, and technically literate, with about one-third of them writing in English as a second or third language. Nevertheless, the results are transferable to other similar urbanized and industrialized contexts around the world. The participants ranged in age from twenty-six to sixty-four years of age and comprised of twenty-two female and twelve male participants from diverse groups. The participants included nurses, homemakers, physicists, computer programmers, academics, librarians, students, physiotherapists, lawyers, archivists, and graphic designers.

Typically, everyday-life information studies (ELIS) discuss the ways in which people use various information sources to meet information needs in areas such as health, consumption, and leisure (Savolainen, 1995). The notion of everyday life is often associated with personal life and posed as the opposite of work, which is generally equated with public life. Notwithstanding this distinction, work and personal life are increasingly interleaved together in our contemporary day-to-day lives and the delineation between personal and work-related information seeking is thus progressively fuzzy. Hence, a naturalistic research instrument that is accessible to participants through the day, irrespective of time or place, is best suited to such a study.

Self-completion diaries also have advantages over other data collection methods to examine life as it is lived. According to Corti (1993), diaries are a reliable alternative to the traditional interview method for events that are difficult to recall accurately or that which are easily forgotten (Corti, 1993). Simultaneously, "they recognise the importance of the contexts in which these processes unfold" (Bolger, Davis, & Rafaeli, 2003) as they are designed to capture the "little experiences of everyday life that fill most of our working time and occupy the vast majority of our conscious attention" (Wheeler & Reis, 1991).

The diary or journaling instrument has been used successfully in a number of case studies of information behaviors (Spink, 2004; Julien & Michels, 2004). Kuhlthau (1993) used diaries in her study of school students; Vakkari and Hakala (2000) used the method in their research on students' task performance. More recently, Hyldegård used this instrument to study group-based information behaviors (Hyldegård, 2006).

Diaries are a reliable alternative to the traditional interview method for events that are difficult to recall accurately or that which are easily forgotten. Although it has its limitations, it has some distinct advantages over *ex situ* research in that it does not rely on the reconstruction of information from memory, but rather involves reporting on thoughts and *lived experiences* as they occur, thus minimizing recall bias, but adding an element of reflection. Lived experience is dynamic, it unfolds over time and is the outcome of a human engagement – it may be passive [listening to music], active [singing] or interactive [dancing with someone] or all three at once but the meaning of this experience is shaped and interpreted after the fact (Buchenau & Fulton Suri, 2000). The diary instrument helps record this lived experience in a very effective way that combines the immediacy of the experience with an element of reflection.

This study used a secure weblog to collect daily diary data. Recent studies have shown that the physical or virtual format of the diary does not affect data collection as much as study design and participant motivation, assuming that the participants have agreed to one or the other. Green, Rafaeli, Bolger, Strout and Reis (2006) analyzed diary entries from two previously published studies and conducted a third, original study to track the differences between paper and electronic diary compliance, and found very little evidence for any bias and found utility in both tools (Green et al, 2006).

Each private web log used for data collection was titled *My Information Journal: #ParticipantNumber* and was linked to help pages, information pages, and diary-entering guidelines. Web log tags mapped to information

behaviours (based on the literature) were provided as categories within the web log function that the participants could use if they chose to. In addition to this, participants were free to tag their entries with whatever keywords they thought was appropriate, and were encouraged to do so, even if it was not a category provided in the list. This was a way to separate the participants' own tags form the researcher's tags and also provided for their integration later on in the analysis stage, while also making sure the participants did not need to fit their information experiences into pre-defined categories, hence recording a wide range of information behaviours.

This study, with its aim of examining the participants' own thoughts, feelings, and actions that are self-reported by the participants, is inherently textual and qualitative in nature and needs to be analyzed with qualitative methods that are flexible and adaptive to surprise and discovery. The text-rich electronic diary data was analyzed using the Glaserian Grounded Theory analysis. This evolved Grounded Theory approach (Glaser 1992) is an approach to qualitative analysis that is an inductive approach to theory-construction that allows the researcher to develop a theoretical account of the general features of a topic through patterns of association while simultaneously grounding the account in empirical observations of data through the coding of categories. However, after the emergence of a theory, it can be deductively examined alongside existing theories in the literature to find out how compatible or incompatible the emergent theory is with the existing body of literature (Mansourian, 2006).

In contrast to other qualitative research, in grounded theory the researcher enters the field with an 'abstract wonderment' (Glaser, 1992) to investigate an area rather than just aiming to address a research question (van Niekerk, 2009). Although not following an hypothesis-testing model, the analysis was the product of the researchers' sense-making, influenced by their engagement with the research and theoretical literature of the field.

FINDINGS

Thirty-four participants maintained a continuous and highly descriptive daily journal (or) of their information-related activities and thoughts, to an aggregate of 2305 separate diary entries of information behavior, with an average of 25 lines per entry, for 468 participant days over a period of 5 months in 2008-09. The participants were given guidelines and examples of the various instances in everyday life that involve information, either via information searching, information seeking, information organizing, information use, communications,

or other forms of encountering or interacting with information in any way.

The results revealed both intricate and intimate interactions between the various information behaviors recorded by the participants, but almost all of the information journals expressed the frustrations participants experienced with organizing their own information or with finding information that they themselves or others had organised. The more information sources and channels that a participant had to deal with in their everyday lives, the more frustration they reported, which was related to the perceived deficiencies of the various methods for organizing information that was used by them or by someone else.

Participants' information-searching behaviours often began with retrieving from their own personal collection of information resources – memory, bookshelves, file cabinets, piles of papers, letters, receipts and bills, hard drives, e-mail folders, browser bookmarks, browser histories, backup drives, or flash drives– their own personal subset of their *information fields* (as coined by Cool, 2001) that they lived with. This kind of searching through one's own information collection was found to be either very successful, or very frustrating depending on one's memory and one's state of mind when the information was initially acquired and filed away (physically or electronically) for future *use*, and one's state of mind or time-constraints when looking for them again.

Many participants found the organisation of their e-mails, folders, files, bookmarks, online passwords, and their online personal spaces quite daunting and challenging. This led to some confusion and frustration, as the more information they collected, the more it needed tending to – this is referred to as *information farming* in the literature (Bates, 2002). One participant coined a new term "information hoarding" to describe the vast amounts of physical books and virtual bookmarks she gathered.

Below are some verbatim quotations relating to information organization from among the 179 mentions in the participants' journals (the P# refers to participant number). Such verbatim quotations are useful in qualitative research where it is important to give a voice to the participant, especially as the grounded theory approach requires that the unit of analysis is the experience and not the person or the research subject. In a study of qualitative researchers who preferred this method rather than paraphrasing or embedding participant quotations, Corden and Sainsbury (2006) found that "this was particularly useful when it was important for readers to understand complex processes by which people made sense of their lives. Understanding why people had

particular views or perspectives, or behaved in the way they did, was sometimes made easier for readers by showing the ways in which individual people constructed what was happening to them and the linkages they made for themselves. In particular, it [revealed] how people positioned themselves within societal processes, and some of their underlying assumptions, ambivalence and uncertainties. What people actually said and their choice of words was sometimes especially useful in illuminating what went on." (Corden & Sainsbury, 2006).

- **P#8**: "A new kind of organizing method came intuitively to me when I've hit a critical mass of information storage that needs to be organized in a way that specific information can be easily retrieved when needed. Conventional electronic folder storage lends itself to hierarchical classifications but I try to organize my information objects by their "attributes" that can later be used as a basis for retrieval purposes"
- **P#9**: "The amount of electronically stored information I have is now phenomenal - a veritable library in itself. I keep saying to myself "it may come in handy again one day" and due to the transient nature of many websites (and transient ability to access some sites and journal databases) I've learned that sometimes it's best to keep a copy of certain information that I may just need again. I am always in envy of people who do not suffer from this affliction."
- **P#10:** "I had to explain my new filing system to my colleague. She said it makes intuitive sense to her now (more than the old one did), but I felt bad for not having mentioned it when I changed it. Oops!"
- **P#10:** "After clearing out some system filing cards yesterday, I looked at a business card file that I have with a view to transferring the information to a electronic contacts list and clearing out the cards. Note to Researcher: Perhaps you need to add a category called *information despair*"
- **P#16:** "Sending e-mail to myself [with file attachments], storing folders with passwords, RSS feeds, parking the breadcrumbs of information"
- **P#18:** "Aaargh. Where did I put it? I am so organized and yet I can't remember which folder I saved the file in! How come I can find stuff online but can't find something on my own desktop even with desktop search? I wish I could tag my files with various tags instead of putting everything in the file name."
- **P#28:** "I still have hundreds of emails in my in-box [despite having folders for sorting]. I also regularly just dump a couple months of email in a folder called unsorted. What I really should do is sit down and have a think about how I want my emails to be organized and set up a bunch of filters to

automatically route my email to the appropriate folder."
- **P#34:** "I also added "Information auditing" [as a tag on the blog post] as I spent a lot of time today going through system cards and ripping up old ones. Note to researcher: a new category, information despair, could perhaps be useful here!"
- **P#34:** "I added a new sub-category called "Information despair" to tag some of my entries, when I have a perception that it is taking an inordinately long time to sort out basic things. "
- **P#33:** "E-mail woes: I can't find an email that I placed in a location, which I had deemed as "put there so that I won't forget where I put it." …Trudging through emails in search of one item is like looking through a box of old photos. If you only sort them by date taken, at least you have some semblance of order, but you are still left relying on personal memory of the contextual information. Providing message tagging, either system generated and searchable or user initiated would help to provide greater inroads into ones own collective message stream."
- **P#40:** "I was having trouble making heads or tails of the files [he] had on the shared drive. So I tried going over them again but they were just like something in another language."

Four participants (8, 18, 28, and 33) discussed organizing based on attributes that were meaningful to them, rather than a traditional organizing system. This concept is very similar to the *faceted classification* mentioned in the literature by Sonnenwald & Iivonnen (1999), and it is interesting to note that some participants do organize information in terms of its attributes. Yet, this is not how most information retrieval systems are conceived or designed.

One participant, a librarian, reported some feeling of guilt as she did not organize her own books on her bookshelf based on any established classification system, but instead, mapped them spatially to the countries on a world map on her home library's wall, based on a book's subject, language, or country of origin. This is an example of how concepts related to information behaviour (e.g., information organisation) can be mapped to other concepts in a person's life-world. In this case, the participant is aware of a variety of ways of relating her library to the world. Rather than using an established, pre-existing classification schema, she instead chooses to develop one of her own based on geography – using the map as a tool.

Some other tags added by participants under information organizing were terms such as *calendaring and scheduling*. In such cases, although they were not

engaging in what our field has traditionally recognized as information behavior. Instead, they were organizing the future use of their time, and keeping themselves and others informed of the same by adding information to a calendar, so they could monitor it later on a regular basis or search for and retrieve the information at a future date. Participant #16 and nine other participants (not included above) would send themselves e-mails throughout the day with files they wanted to save and with information that they had encountered (often web links) and wanted to access for later use, in a sort of reminder to themselves to file it away. But often, they had trouble accessing it later as the information was not necessarily tagged with any relevant keywords that they could search for within their own e-mail.

A dozen participants used online personal portals and cloud computing tools such as Amazon Cloud, iCloud, DropBox, to electronically "park" information for later use. The simultaneous use of several different computers and portable electronic devices that were not always synchronized caused additional problems in regard to information organization and retrieval, specifically accessibility of the information when it is needed, rather than when it is created or stored.

DISCUSSION

Documents are semiotic signifiers (Saussurre, 1983), waiting for a person to interpret them. Like people they can talk to us, but cannot tell us what they mean. This meaning is created and communicated within our own intersubjective information ecologies. Information is a human construction, and therefore, what we are attempting to do when we use information is to make sense of what we have found; we construct our own reality from what we find (Edwards, 2006). This applies to information organization as much as it does to information retrieval. Organizing information is also an act of intra-personal communication or communicating with oneself for anticipated future information need, but often caused problems because of memory issues and lack of a consistent organization schema. Some participants coined a new term for their condition: *information despair*.

Information searching, and hence the retrieval of information from one's own collection of information in everyday life involved a cognitive and affective coordination with one's own past selves in a sort of time travel, just as organizing information is a form of anticipatory coordination with one's future information needs. The problems arise due to the differences between the intended use of the information and its actual use at a future date.

Encountered information or information found *serendipitously* (as described by Foster & Ford, 2003), but deemed useful in the future was often filed away (mentally or otherwise) by the participants in a sort of investment into one's anticipated future need for information. This future need was often ambiguous, and hence the place of the newly encountered information in their organizing repertoire was not very well defined.

All humans have in their memory store, some map, some model of the universe, an intricate, multi-layered and sometimes contradictory construction developed through our previous experience and our engagement with the world we live in. According to Stonier (1990), we all have the *need* to create a mental map of our world and the things we encounter in it. Since no two mental maps can be the same, there is a lot of cognitive coordination between ones own, and others mental maps during information seeking. Creating and using organization schemas for information is a coordination of meaning between oneself and others (inter-subjectivity), and also involves cognitive coordination between one's own past and present selves (intra-subjectivity) since the person organizing the information and the person retrieving it later in time are the same. This self-coordination is wrought with problems, for the longer the time between the two, the more changes are likely to have happened within oneself, changing the meaning of the information.

In a way, *encountering* new information in everyday life was just a matter of coordinating one's present mental model with the new information pattern, whereas *organizing,* and *searching* through an organized or disorganized collection of one's own previously found information (that have presumably altered one's mental model to some extent already) is fraught with problems as it involves facing one's past in some manner, and one's anticipated future, for we organize so we can retrieve. The actions of organizing performed in the past are obdurate whereas our own memory of them is notoriously fluid.

All of these processes were also in essence, acts of communication, often uni-directional at any given moment, and were communications within a rhetorical situation, and hence the predominance of *sense-making* (as described by Dervin, 1992) across all behaviours. Participants often described feelings such as falling into a rabbit hole where nothing made sense, and reported both positive feelings of surprise and amazement, and negative feelings of confusion, puzzlement, apprehensiveness, frustration, stress, ambiguity, and fatigue while facing problems related to information organisation.

Information organization problems were found to be unique problems of coordination and communication in many ways as they had several layers of complexity, not

the least of which included the many ways in which people conceived of information and the usefulness of information. A lot of these information organization problems were related also to problems with language and communication, and of inter-subjective meanings not just between two or more people, but even between the two different mental states and contexts of the same person – from between when the person found the information and organized it, and when s/he was trying to retrieve it in order to use it for different purpose. Patrick de Gramont in his book *Language and the Distortion of Meaning* explained the workings of language on the human mind as very similar to a filing system and it helps us understand the problems of organizing information to some extent:

> Filing systems have two distinguishing characteristics which enable one to compare them to the way language works. First, they operate on the basis of the fact that the information to be filed has meaning before it is filed. Second, the system under which the information is filed is geared, not to the information *per se*, but to an ulterior purpose. For example, if I file my correspondence alphabetically, the classification I use has nothing to do with the correspondence in itself; rather it is a function of wanting to retrieve letters easily and efficiently. (Gramont, 1990, p. 65).

This illustrates the complexity associated with assigning meaning or "aboutness" (Bruza, Song & Wong, 2000) to any information in everyday life, where the artificial boundaries and formal rules of authority control as used by librarians don't apply. 'Meaning' changes not just across different people but also within the mind of the same person. It can be altered over time, independent of context and content. Combine this with the fact that an information document carries both some form of language (or communication) within its content, along with some form of assigned meaning ascribed to it by the person (its meta data), and one can understand how it can be prone to a double dissonance of meaning that would make it hard for the person to retrieve the appropriate document at a later time. If we add a layer of anticipated meaning, which is what information organization essentially is about, this can compound the problem even more.

Many participants tried to control this process of meaning creation within an information experience through maintaining surrogate records of their experiences in the form of lists and tables. Several participants engaged in some very impressive list-keeping behaviors in their everyday lives that can only be termed as information organizing behaviors – maintaining an annotated list or personal review of every book they read, every movie they saw, every game they played, and pretty much every other activity that they deemed important enough to record for their own reference or to communicate to others, sometimes through a web log or website. Through

this process, they created new information on a continual basis and recorded it, just as we all do in our minds every time we encounter some information that is meaningful to us or with which we can create new meaning (and hence new information), whether we record it on a daily basis or not.

Implications for information organization: The relationship between information object and information representation has traditionally been a binary one, but we propose a ternary one based on this study, where the time and space dimension functions as the dynamic axis around which the meaning of information is continually created, lost, found, and remade at various times by various users.

The presumed binary relationship between an information object and its representation is prescriptive in its very nature, i.e. 'A is a type B' or 'B is a representation of A'. However, this misses the third i.e. the user dimension. When the user comes into view, a third dimension is added, and the relationship becomes ternary. However, within this ternary relationship there is the hidden "Time Space Continuum" that continually influences the user context (shown outside the triangle, but actually it remains at the center). Thus the user context changes with the changing spatial and temporal dimensions. Sometimes the shift in space and or time may be very short; in other cases it may be several weeks, months or even longer. Adding another person to this context, as is often the case when the person retrieving is not the same person organizing the information, it poses additional problems, for symbolic language or the language of representation is derivative and emerges from shared intentionality (Flender, Bruza, and Kitto, 2009), and this "shared intentionality" is not always attainable.

Even when the organizer and retriever is one and the same person, the person may not look for the information in the same manner as they would have had in the past; hindsight often changes perception and also intentionality, making findability and refindability of information difficult; the meaning of the information often changes over time. In order to properly capture such a time-space continuum, we need to provide a 'kaleidoscopic' and 'descriptive' view of information objects and their different representations that can be primed for different cognitive and affective states. This has implications for systems-design.

CONCLUSION

All behaviors involving the acquisition, organization, and use of information involve the process of making meaning through complex acts of coordination including

organization, reorganization, prioritizing, and use – coordination of meaning between oneself and others (inter-subjectivity), coordination of meaning between one's own past and present selves (intra-subjectivity), and coordination of meaning between oneself and the constantly emerging patterns in the information stream of ones experiences. These behaviours are mediated through personal, social, and cultural contexts, and hence helping people with the organization of information in their everyday lives requires more than an understanding of information organization as information professionals see it, but an understanding of everyday situations, information experiences, information contexts and individual cognitive and mental models. There is a need for empirical studies on how people conceive of and categorize information and the meanings they ascribe to it while organizing, and while retrieving, and the differences between them.

The results of this exploratory study point to a need for more research in the area of *information organization behaviors* by information behavior researchers, while also pointing to the need for information organization researchers and systems-centered researchers to take into account the human aspect of information retrieval in everyday life. Most importantly, it calls for dialogue and collaboration between information researchers and systems developers.

REFERENCES

Bates, M. J. (2002). Toward an integrated model of information seeking and searching: studies of information seeking in context. *New Review of Information Behavior Research*, 3: 1-16.

Berlin, L. M., Jeffries, R., O'Day, V. L., Paepcke, A., & Wharton, C. (1993). Where did you put it? : issues in the design and use of group memory. Conference on Human Factors and Computing Systems, INTERACT '93 AND CHI '93 (pp. 23–30). Amsterdam: ACM. Retrieved from http://portal.acm.org/citation.cfm?doid=169059.169063

Bolger, N., Davis, A., & rafaeli, E. (2003). Diary methods: capturing life as it is lived. *Annual Review of Psychology*. 54 : 579-616.

Bruce, H., Jones, W. and Dumais, S. (2004). Information behavior that keeps found things found. *Information Research*. 10 (1).

Bruza, P.D., Song, D.W., & Wong, K.F. (2000) Aboutness from a commonsense perspective. *Journal of the American Society for Information Science, 51*(12), 1090-1105.

Buchenau, M. & Fulton-Suri, J. (2000). Experience Prototyping. *Proceedings of DIS2000*, ACM Press, 424-433.

Chatman, E. A. (1999). A theory of life in the round. Journal of the American Society for Information Science, 50(3), 207-217.

Cool, C. (2001). The concept of situation in information science. Annual Review of Information Science and Technology, 35, 5-42.

Corden, A. and Sainsbury, R. (2006) *Using Verbatim Quotations in Reporting Qualitative Social Research: Researchers' views*, Social Policy Research Unit, University of York, York. Accessible from http://www.york.ac.uk/inst/spru/pubs/pdf/verbquotresearch.pdf

Corti, L. (1993) Using diaries in social research. *Social Research Update*, 2. Retrieved from http://sru.soc.surrey.ac.uk/SRU2.html

de Gramont, P. (1990). *Language and the Distortion of Meaning.* New York: New York University Press.

Dervin, B. (1992). From the mind's eye of the user: The sense-making qualitative-quantitative methodology. In J. Glazier & R. Powell (Eds.), Qualitative research in information management (pp. 61-84). Englewood: Libraries Unlimited.

Dervin, B. (1999). On studying information seeking and use methodologically: The implications of connecting metatheory to method. *Information Processing & Management,* 35, 727-750.

Dervin, B. & Frenette, M. (2001). Sense-Making Methodology: Communicating communicatively with campaign audiences. In R. E. Rice & C. K. Atkin (Eds.), *Public communication campaigns* (3rd ed.), 69-87. Thousand Oaks, CA: Sage.

Edwards, S. (2006) Panning for gold: Information literacy and the net lenses model. Adelaide: AUSLIB Press.

Flender, C., Kitto, K., & Bruza, P. D. (2009) Nonseparability of shared intentionality. In Bruza, Peter D., Sofge, Don, Lawless, William, Rijsbergen, Keith van, & Klusch, Matthias (Eds.) *Third Quantum Interaction Symposium*, 25-27 March 2009, Saarbruecken, Germany. Retrieved from http://eprints.qut.edu.au/20407/

Foster, A., and Nigel F. (2003). Serendipity and Information Seeking: an Empirical Study. *Journal of Documentation* 59 (3): 321-40.

Foucault, Michel. (1972). *The Archaeology of Knowledge*. London, Tavistock.

Foucault, Michel. (1978). Politics and the Study of Discourse. *Ideology and Consciousness* 3: 7-26.

Glaser, B. (1992). *Basics of grounded theory analysis*. Mill Valley, CA: Sociology Press.

Godbold, N. (2006). Beyond information seeking: towards a general model of information behavior. *Information Research*, 11(4) paper 269 Available at http://InformationR.net/ir/11-4/paper269.html

Green, A. S., Rafaeli, E., Bolger, N., Shrout, P. E., & Reis, H. T. (2006). Paper or plastic? Data equivalence

in paper and electronic diaries. *Psychological Methods*, *11:* 87–105.

Hyldegård, J. (2006). *Between individual and group - exploring group members' information behavior in context*. Kbh. Danmarks Biblioteksskole. 369 p. (dissertation).

Jones, W. P. (2007). *Keeping Found Things Found: The Study and Practice of Personal Information Management (Interactive Technologies).* San Francisco: Morgan Kaufmann.

Jones, W., & Maier, D. (2003). Report from the session on personal information management. Workshop of the information and data management program. Seattle, WA: National Science Foundation Information. Retrieved from http://dada.cs.washington.edu/nsf2003/final-reports/Summary%20of%20IDM03%20session%20on%20Personal%20Information%20Management.pdf

Julien, H., & Michels, D. (2004). Intra-individual information behavior in daily life. *Information Processing and Management.* 40: 547-562.

Lansdale, M. W. On the Role of memory in Personal Information Management. In *Cognitive Ergonomics* (ed Falzon), pp. 39-50. New York: Academic Press.

Loftus, E. F. (1980). *Memory: Surprising New Insights into How We Remember and Why We Forget.* Reading, MA: Addison-Wesley.

Kuhlthau, C. C. (1993). *Seeking meaning: A process approach to library and information services*. Norwood, NJ: Ablex. (update citations to new edition).

Mansourian, Y. (2006). Adoption of Grounded Theory in LIS research. *New Library World.* 107 (9/10) : 386-402

Morin, E., and Belanger, J. L. R. (1992). *Method: Towards a Study of Humankind : The Nature of Nature*. New York: Peter Lang Pub Inc.

Mentis, H (2007). Memory of frustrating experiences. In Diane Nahl & Dania Bilal (Eds.) *Information and Emotion: The Emergent Affective Paradigm in Information Behavior Research and Theory* , Eds. Diane Nahl and Dania Bilal. pp. 197-210. Medford, New Jersey: Information Today, Inc.

Nieker, J. C. van and Roode, J. D. (2009). Glaserian and Straussian grounded theory: similar or completely different?. In *Proceedings of the 2009 Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists* (SAICSIT '09). ACM, New York, NY, USA, 96-103.

Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods* (2nd ed.). Newbury Park, CA: Sage Publications, Inc.

Savolainen, R. (1993). The sense-making theory: reviewing the interests of a user-centred approach to information seeking and use. *Information Processing and Management.* 29(1):13-28.

Savolainen, R. (1995). Everyday life information seeking: approaching information seeking in the context of way of life. *Library & Information Science Research* 17 (3) : 259-294.

Sonnenwald, D. & Iivonen, M. (1999). An integrated human information behavior research framework for information studies. *Library & Information Research,* 21 (4): 429–457.

Spink, A. (2004). Multitasking information behavior and information task switching: An exploratory study. *Journal of Documentation. 60* (3): 336-345.

Stonier, T. (1990). *Information and the Internal Structure of the Universe*. London: Springer-Verlag.

Saussure, Ferdinand de ([1916] 1983): *Course in General Linguistics* (trans. Roy Harris). London: Duckworth

Taylor, A. (2004) *The Organization of Information*. Boston: Libraries Unlimited

Vakkari, P. & Hakala, N. (2000) Changes in relevance criteria and problem stages in task performance. *Journal of Documentation.* 53(5): 497-519.

Wheeler, L., & Reis, H. T. (1991). Self-recording of everyday life events: origins, types, uses. *Journal of Personal Social Psychology*. 59: 339-54.

Wilson, T.D (2002) Alfred Schutz, phenomenology and research methodology for information behaviour research. *Fourth International Conference on Information Seeking in Context*, Universidade Lusiada, Lisbon, Portugal, September 11 to 13, 2002.