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Amanda Spink

Information Behavior

An Evolutionary Instinct

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Dedicated to Peter for his love and support

Foreword

This book is a synthesis of the information dimension of human behavior from an evolutionary perspective. It is based on a premise that information behavior is a crucial everyday human activity for all humans since the early days of human evolution. It addresses a number of fundamental questions not only scientific but also philosophical and hypothetical. In that sense, the book is an invitation for further research in a number of fields.

Of course, any discourse about human information behavior raises the obvious question: *But what is information to start with?* It is a basic question on the same level as: *What is energy? What is matter? What is life?* As such, the question is very hard to answer, although it was addressed in numerous fields from physics, biology, neuroscience, cognitive science, electrical engineering and psychology to philosophy, economics, and humanities. Each field brought its own context and orientation to sought answers. Dictionary definitions, such as “Information: Knowledge communicated concerning some particular fact, subject, or event; that of which one is apprised or told; intelligence, news. *spec.* contrasted with *data*” (or even “Divine instruction, inspiration”) provide a lexical description of the meaning of the word, but not answers to the basic question (Oxford English Dictionary, 2nd edition).

Thus, the question about *what is information* in those different fields was not answered directly – dictionary-like – but with investigation of information behavior, manifestations, and effects. This is exactly the same way the questions about energy, matter, and life were and are investigated in numerous fields. This is also the way the question about information is addressed here as well: through investigation of information behavior. It is the broader context for matters dealt with in this book.

The notion of information is of fundamental interest to information science, a field of professional practice and scientific inquiry dealing with effective communication of information and information objects, particularly knowledge records, among humans in the context of social, organizational, and individual need for and use of information. The interpretation by Jean Tague-Sutcliffe fits well the context and orientation of information science:

“Information is an intangible that depends on the conceptualization and the understanding of a human being. Records contain words or pictures (tangibles) absolutely, but they contain information relative only to a user. . . Information is associated with a transaction between text and reader, between a record and user.” (Tague-Sutcliffe, 1995, pp. 11–12)

Historically, information science emerged in the aftermath of the Second World War, as did a number of other fields, addressing the problem of information explosion and using technology as a solution. By 1950s investigations of human information behavior became an integral and important part of information science. Of course, information behavior was investigated in many other fields, as demonstrated in the book, but the evolution of the area of study, including major concepts and theories, are closely connected with information science. Thus, the rest of the foreword provides a brief historical perspective of the study of human information behavior in information science as reviewed in Saracevic (2009). In general, social and individual question were addressed: *How do people relate to, seek and use information?*

As can be seen in this book, human information behavior refers to a wide range of processes which people employ when engaged with information and to related cognitive and social states and effects. In his work that comprehensively covers research on information behavior (with over 1,100 documents cited, most since 1980), Case defines that information behavior:

“encompasses information seeking as well as the totality of other *unintentional* or *passive* behaviors (such as glimpsing or encountering information), as well as purposive behaviors that do not involve seeking, such as actively *avoiding* information. (Case, 2007, p. 5) (emphasis in the original).

As can be imagined, human information behavior, as many other human behaviors, is complex, not fully understood and of interest in a number of fields. As with the notion of information, a great many studies and a number of theories address various aspects related to human information behavior in psychology, cognitive science, brain sciences, communication, sociology, philosophy and related fields, at times using different terminology and classifications. Under various names, scholarly curiosity about human information behavior is longstanding, going back to antiquity.

Of particular interest in information science are processes, states and effects that involve *information needs and use* and *information seeking and searching*. The order in which these two major areas of human information behavior studies are listed represents their historic emergence and emphasis over time.

Historically, the study of information needs and use preceded information science. Many relevant studies were done during the 1930s and 1940s in librarianship, communication and specific fields, such as chemistry, concentrating on use of sources, media, systems, and channels. Already by the 1950s this area of study was well-developed in information science – for instance, the classic *Proceedings of the International Conference on Scientific Information* (1959) had a whole area with a number of papers devoted to the topic. The *Annual Review of Information Science and Technology* had regular annual chapters on “information needs and use” starting with the first volume in 1966 and ongoing through 1978. Thereafter, chapters covering this area were broadened to cover in addition various aspects or contexts of information behavior, including information seeking. This change illustrates how

the emphasis in topics studied significantly changed over time. Studies in human information behavior are evolving and slowly maturing.

In information need and use studies questions are asked: *Who are the users of a given information system or resource? What information objects do they use? What information channels are used to gather information?* Or in other words: *Who uses what? How? For what purpose?*

In information seeking and searching studies questions are asked: *What do people actually do when they are in a quest for and pursuit of information? How are they going about and how are they changing paths as they go about? What are they going through on a personal level? What information channels are used to gather information? How?*

Information seeking, as is the case with most human information behavior, is highly dependent on context. While context may be everything, the very concept of context is ill defined, or taken as primitive and not defined. The contexts may involve various motivations for information seeking, various cognitive and affective states, various social, cultural or organizational environments, various demographic characteristics, values, ways of life, and so on. A number of information-seeking studies were indeed directed toward various contexts. Thus, there is a wide range of such studies regarding context, accompanied by difficulties toward generalization.

The book provides a broader framework than that offered by studies of human information behavior in information science. The context is much wider and covers numerous other fields. The fundamental questions about behavior and effects of the notion of information have indeed a wider context. So does the question: *How do people relate to, seek and use information?*

Newark, NJ

Tefko Saracevic

References

- Case, D. O. (2007). *Looking for information: A survey of research on information seeking, needs, and behavior* (2nd ed.). New York, Amsterdam: Academic Press, Elsevier.
- National Science Foundation, National Academy of Sciences, American Documentation Institute, National Research Council. (1959). *Proceedings of the international conference on scientific information* (2 volumes). Washington, DC: The National Academies Press. Retrieved November 21, 2009, from <http://books.nap.edu/openbook.php?isbn=NI000518&page=R19>
- Saracevic, T. (2009). Information science. In M. J. Bates & M. N. Maack (Eds.) *Encyclopedia of library and information science* (pp. 2570–2586). New York: Taylor & Francis.
- Tague-Sutcliffe, J. (1995). *Measuring information. An information service perspective*. San Diego, CA: Academic Press

Preface – Information Behavior Challenge

From childhood through our senior years, humans engage in information behavior or the ability to find, gather, organize and use information. Humans enjoy the benefits of their information behavior on a daily basis but also face the challenges that this presents, including many of the difficulties inherent in how to find information, where to find it amongst a plethora of sources, how to organize the information they do find and what information to use for different purposes. The daily challenges and struggles of information behavior are common to everyone. For example, let's look at some typical examples of people confronting the daily challenge of information behavior:

A stressed Wall Street business analyst uses his information finding abilities to gather information quickly about a competitor company to complete an industry report for a client company – which information system does he use to find the information;

A mother with a sick child uses a Web search engine to look for treatments for her child's cold – she wants to understand how accurate the information is that she finds on medical Websites;

A chef has thousands of recipes to organize – what classification system should she use;

A schoolchild works on a class paper on the ancient Egyptian pyramids, scans the school library and uses a Web search engines to find a relevant Website;

And an early human, to learn more about hunting techniques and herd locations, scans paleoart in a local cave.

Each person in the examples above is using their information behavior abilities for different purposes, tasks and goals, but all are going through some challenging processes. As we learn throughout this book, all humans do have a capacity for engaging their instinctive socio-cognitive abilities, including their information behavior abilities, on a daily basis. These human abilities have been shaped over the centuries by social and cognitive forces. However, in their daily lives the people in the examples above may not realize that they are using their information behavior abilities.

They are also using their information behavior instinct and intelligence. Humans have an information behavior instinct and intelligence that guide them in their

information finding, organizing and using abilities. Like many other behaviors, such as food foraging, language, etc, our information behavior abilities are critical to our human survival. But like many human instincts and innate abilities, we don't often realize how instinctive these abilities are and don't often analyze our own cognitive abilities, such as information behavior – we just use them.

To learn more about our instinctive information behavior abilities, we can ask the questions.

Where does our information behavior ability come from and how does it develop within us as an instinctive socio-cognitive ability? How did our information behavior originate, evolve and develop in early humans?

This book addresses these very basic and fundamental questions. Information behavior is a crucial everyday human activity for all humans. Imagine a world where humans had no information behavior ability – no ability to engage in information gathering, organizing and using. This would be quite a strange world to comprehend. But we currently have quite a limited understanding of our own information behavior, where it comes from and how it develops during our lifetime. Thus, we need to know more about these important fundamental issues that affect us everyday.

Information behavior is a core human capacity that provides a basic structure for humans to learn and control aspects of their environment. To be without information behavior for a human being would be similar to a form of cognitive disability such as Autism or Alzheimer's which restricts our cognitive abilities. Without information behavior abilities it's unlikely humans' would have evolved to become the dominant species on the planet Earth. Understanding more about this key instinct is critical.

We also often take our information behavior for granted. Humans are portrayed everyday in the media as "information beings" living in "information societies", and therefore our information behavior is a key driver of our humanness and our society.

Yet, behind the media hype we know so little about our information behavior. Despite the important universality of information behavior, people have little understanding of many aspects of this important ability. People may say they seek information, or they forage for information, or even gather information, but most people are not clear about these behaviors or understand how they can be more effective.

The nature and vocabulary of our information behavior is also not clear or immediate to most of us. The psychologist Sigmund Freud and others, through their writings, made the language of human psychology more available to people so we can now discuss their emotions and psychological traits. People understand that they have emotions, personalities, psychological traits and can analyze the psychology of others. In the same vein, a major goal for the field of information behavior is to develop a vocabulary that people can use to understand and talk about their own information behavior.

To reach a greater understanding of our information behavior, its instinctive nature and use a vocabulary to describe our information behavior, we first need to build a stronger understanding of the origins and nature of information behavior by first going back to human beginnings to explore the development of information

behavior over the history of human evolution. We need to ask the following key question.

How did information behavior emerge in early humans as an instinctive socio-cognitive predisposition for information finding, gathering, organizing and using?

Then building on a greater understanding of information behavior as an evolved behavior over the centuries of the millennium, we can also explore how information behavior develops over a human lifetime. We can ask the question.

How does information behavior develop in children and over a human lifetime?

To begin the process of building a theoretical framework for information behavior, we begin to explore what is currently known about information behavior from a broad range of evolutionary and behavioral scientific fields. Drawing on the recent research in developmental psychology we also explore how humans develop information behavior over their lifetime. We examine the complex intellectual issues related to information behavior by drawing on research and thinking from the broad cognitive, evolutionary and behavioral sciences. By building such a theoretical framework the book provides a broad exploration of the information dimension of human behavior from an evolutionary perspective.

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The author thanks the many people who contributed to the development of this book. My goal was to write an original research monograph and engage in fundamental thinking about information behavior. However, bringing an original research monograph to fruition is a long and intellectually complex process. So the author first thanks her husband Peter Spink for his love and support in commenting on the book and editing later versions during the long book gestation period.

Secondly, the author thanks the faculty from the School of Communication and Information at Rutgers, The State University of New Jersey for my intellectual training. My years as a Rutgers PhD student from 1990 to 1993, and my subsequent research career, was fundamentally influenced by the Rutgers world class scholars, including Tefko Saracevic, Nick Belkin, Carol Kuhlthau, Ron Rice, Brent Rubin and others.

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Many readings and conferences contributed to my framework for the book. My thinking was influenced by many scholars from various scientific fields including information behavior, evolutionary psychology, cognitive archaeology, cognitive psychology, social psychology and developmental psychology. The published works and conference presentations by many scholars from the evolutionary and cognitive scholarly fields strongly influenced my work, including papers by Richard Alexander, Mark Blumberg, David Buss, Fred Coolidge, Leda Cosmides, David Geary, Stephen Mithen, Stephen Pinker, John Tooby and Thomas Wynn.

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Leicestershire, UK

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Amanda Spink is a leading Professor of Information Science. She has a B.A. (Australian National University); Graduate Diploma of Librarianship (University of New South Wales); M.B.A. in Information Technology Management (Fordham University), and a Ph.D. in Information Science (Rutgers University). Amanda's research focuses on theoretical and empirical studies of information behavior. The National Science Foundation, the American Library Association, Andrew R. Mellon Foundation, Amazon.com, Vivisimo.com, Infospace.com, NEC, IBM, Excite.com, AlltheWeb.com, AltaVista.com, FAST, and Lockheed Martin have sponsored her research.

Amanda has published over 330 scholarly journal articles, refereed conference papers and book chapters, and 6 books. Many of her journal articles are published in the *Journal of the American Society for Information Science and Technology*, *Information Processing and Management*, and the *Journal of Documentation*. Amanda's research has been published at many conferences including *ASIST*, *IEEE ITCC*, *CAIS*, *Internet Computing*, *ACM SIGIR*, and *ISIC Conferences*.

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Professor Spink was ranked as the 8th Most Highly Cited Author in the Field of Information Retrieval (Ding, Y., Yan, E., Frazho, A., & Caverlee, J. (2009). PageRank for ranking authors in co-citation networks. *Journal of the American Society for Information Science and Technology*, 60(11), 2229–2243) and in 2008 had the second highest H-index citation score in her field from 1998 to 2008 (Norris, M. (2008). *Ranking Fellow Scholars and Their H-Index: Preliminary Survey Results*. Loughborough University, Department of Information Science Report).