Conversing with Online Catalogs: Mental Models of Information Retrieval Systems

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A million years ago in computer time, Charles Hildreth described the arrival of online public access catalogs (OPACs): "Expanded access and increased functionality alone cannot convey a understanding of the quantum, discontinuous leap to a new world of information retrieval undertaken when one replaces a card catalog with an online, interactive retrieval system" (1982, p. 32). Unfortunately, while access expands and functions increase, the leaps humans must make in conceptualizing an online retrieval system are still little understood.

Since the 1980s, experts have published guidelines for useful interfaces and research has shown that users are unsuccessful and unsatisfied at finding what they want. Librarians express frustration with vendors and are turning towards open-source software so that they can customize their catalogs. That brings one more responsibility on the shoulders of understaffed, underfunded libraries. And even if library staff can modify their own catalogs, in what way should they? Usability testing results are only now coming available and universal definitions of an OPAC and user expectations do not yet exist.

A brief history of user interface design for library catalogs displays a consistent call for researching users' conceptual understanding of information retrieval systems. A review of current research shows how insight into mental models can improve online catalogs in ways that open-source modularization, "Web 2.0" technology, or new cataloging protocols alone cannot.

In the Beginning

Borgman, C.L. (1986). Why are online catalogs so hard to use? Lessons learned from information retrieval studies. *Journal of the American Society for Information Science, 37*(6), 387-400.

Online catalogs have been around a bit by this time. Librarians are excited to offer Boolean searches to patrons and the patrons don't get it. Borgman cites studies showing users quickly learn the "mechanical aspects of searching" for other retrieval systems while "many online catalog users probably remain 'permanent novices.'" The catalogs are unforgiving of errors and users are ignorant of the "conceptual aspects (the 'how and why' of searching)."

Borgman describes potential solutions, although, as she cautions, most address the mechanical realm, rather than the conceptual. She says the information is available to form the right research questions and it's time to get started.

Hildreth, C.R. (1982). Online public access catalogs: The User Interface. Dublin, Ohio: OCLC.

In 1981, Hildreth and his team studied ten online public access catalogs and this book reports their findings of a brand-new world to librarians of the 1980s. This "state of the art review" is a powerful reintroduction to technology that has become an everyday part of life.

Hildreth carefully explains user interfaces to people who may be encountering computers for the first time. Chapter 5 is a detailed debate on what it means to interact with the computer. He lists the five basic guidelines for a user-oriented interface: easy to use, friendly and cordial, protective and forgiving, reliable and responsive, and adaptive and flexible. His five pointed star diagram is the grandfather of Morville's User Experience Honeycomb (2010). Here are early warnings that "users are frequently unable or unwilling to take advantage of these powerful retrieval systems" (p. 33) and that "mere common sense would seem to dictate that any model of information retrieval should incorporate both the actions of the user and the various components of the system as variables...[yet] this 'sensible' approach to, and

basis for, the design of interactive retrieval systems has not been the common ground on which most existing systems have been built." (pp. 34–35)

...Ten Years Later...

Borgman, C.L. (1996). Why are online catalogs still hard to use? *Journal of the American Society for Information Science, 47*(7), 493-503.

Ten years later and Borgman asks the same questions. She describes several promising research areas, and says none of them are being investigated by commercial vendors. She wishes online catalogs supported the iterative searches that information seekers use and harks back to the card catalog as a model. She reminds readers that a conceptual understanding of searching will empower users more than mere procedural steps.

...And Now...

Calhoun, K. (2006 , March 17). The changing nature of the catalog and its integration with other discovery tools. Retrieved from http://www.loc.gov/catdir/calhoun-report-final.pdf.

Calhoun presents a market analysis of a product dealing with declining demand: the research library catalog. Along with a wide-angle look at the current business environment, the report provides strategies to reincorporate libraries into the supply and demand equation (extend, expand, and lead in the information retrieval business) and summarizes interviews conducted with librarians across the country.

After addressing various implementation issues, Calhoun offers libraries a "Blueprint for Phased Implementation" with "practical steps to be carried out over the next two years" (p. 16). She wants catalogs to support browsing and "improve the user experience." Unfortunately, the suggestions all begin with "enrich" and "enable" without giving any specific technological advice on how to make that happen. Another useful

starting point with yet another call for more research. Most helpful in this document are the key findings from the interview, especially those surrounding vendors. The comments expand beyond the usual complaints found on blog posts.

Dougherty, W.C. (2009, August 20). Integrated library systems: Where are they going? Where are we going? *The Journal of Academic Librarianship, 35*(5), 482–485.

Dougherty details the current state of integrated library system vendors and how mergers and investment companies are limiting competition and innovation. He then compares vendor systems to hybrid, "mashup" options and fully open-source software.

Emanuel, J. (2009). Next generation catalogs: What do they do and why should we care? *Reference & User Services Quarterly, 49*(2), 117-120.

Emanuel places the next-generation catalogs in helpful perspective: they focus on the interface and not the back-end, to mixed success; they employ user-friendly terminology and searching; they are able to combine data from many sources in many ways.

She goes on to report her findings from testing the usability of the next-generation catalogs VuFind and WorldCatLocal. Users appreciate the interface speaking their language but are not inclined to participate in any social media aspects of the catalog, like tagging items or writing reviews. Emanuel also expresses concern about the search results: library search engines have more work to do to match commercial search engines and should address problems in the data sources.

Morville, P. and Sullenger, P. (2010) Ambient findability: Libraries, serials, and the internet of things. *The Serials Librarian, 58*(1), 33-38.

A summary of the concepts in Morville's book *Ambient Findability,* based on a presentation he gave to librarians. Prominently featured is his User Experience Honeycomb, listing his seven qualities of a successful web design: useful, usable, valuable, desirable, findable, credible, and accessible (two more qualities than Hildreth [1982] but nothing new). He may be playing to the crowd when he says that librarians will lead the way in solving information retrieval problems.

Pace, Andrew K. (2004, February 1). Dismantling integrated library systems. *Library Journal, 129*(2), 34-36.

Pace concisely describes the issues resulting from the increasing modularity of library systems. Many references are already outdated but the issues remain the same: problems in the interface versus problems in the databases, vendors' inflexibility versus open-source non-standardization and demands on resources, and as always, money.

Research in Mental Models

Ahmed, S.M.Z., McKnight, C., and Oppenheim, C. (2009). A review of research on human-computer interfaces for online information retrieval systems. *The Electronic Library, 27*(1), 96-116. doi:10.1108/02640470910934623

The authors review research on information retrieval systems, focusing on how users form search queries and conceptualize the system itself. They highlight optional ways of depicting Boolean queries and offering feedback for correcting and narrowing queries, question the need to support browsing, and emphasize that interfaces must come closer to the users' mental models and individual characteristics.

Although at times the authors sound like they are describing monkeys rather than humans ("naive users could learn to perform simple searches on command language interfaces" [p. 99]), they are concerned that online systems are still not considering

the user in their design. Again, they call for more user-centered research and more implementation of already existing research.

Keshavarz, H. (2008). Human information behaviour and design, development and evaluation of information retrieval systems. *Program, 42*(4), 391-401. doi: 10.1108/00330330810912070

Finally, we become human. Keshavarz traces the history of information retrieval system design: from system-oriented through user-centered and then interactive to present-day research into cognitive behavior. Keshavarz encourages further research in the realm of human information behavior, which looks at all aspects of the human environment surrounding information, instead of viewing the behavior of "users" in an information world.

Novotny, E. (2004). I Don't Think I Click: A Protocol Analysis Study of Use of a Library Online Catalog in the Internet Age. *College & Research Libraries, 65*(6), 525-537.

Novotny used a thinking aloud protocol, screen captures, and observation to study a group of novice and experienced users attempting to fulfill tasks on a newly redesigned academic online catalog. In addition to being a well organized study (apart from neglecting to collect user satisfaction statistics, as noted by Novotny), the focus on how users compare an online catalog with general Internet searches is insightful. Interfaces and information retrieval systems don't have to operate exactly like an Internet search engine as long as they can accurately convey their structure in a way that melds with the users' preconceived notions.

Pisanski, J. and Zumer, M. (2010). Mental models of the bibliographic universe. Part 1: Mental models of descriptions. *Journal of Documentation, 66*(5), 643-667. doi: 10.1108/00220411011066772

Pisanski, J. and Žumer, M. (2010). Mental models of the bibliographic universe. Part 2: Comparison task and conclusions. *Journal of Documentation, 66*(5), 668-680. doi: 10.1108/00220411011066781

The authors asked a group of non-librarians to show how they relate a variety of items (based on edition, language, format, etc.) through card sorting and concept mapping. The study attempted to match the participants' "mental models of the bibliographic universe," to the Functional Requirements for Bibliographic Records (FRBR) conceptual model. Whatever a reader's feelings about FRBR, this method of divining the user's vision of the information system should be a part of usability testing on prototypes during the interface design process.

Sadeh, T. User experience in the library: a case study. (2008) *New Library World, 109*(1/2), 7-24. doi:10.1108/03074800810845976

The author works for Ex Libris, a vendor of library services, including Primo, "a discovery and delivery solution." This paper wants to sell their product Primo. Its value is in revealing the type of usability testing a vendor conducts before releasing a product. Through testing in conjunction with the University of Minnesota revealed general satisfaction with the product and results. Interestingly, the author describes the "needs and expectations of today's users" but does not test what those expectations are.