**Course Notes Week 03**

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In the Wildemuth chapter section, to skip to the next chapter, do Ctrl-F ~

**~~Week 03 Overview**

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| **Brief introduction** | **Lecture 01.2** introduced a broad definition of research and many dimensions along which research studies can be classified, with an emphasis on the many reasons why we do research or the purposes that are served by research results.  **Lectures 02.1 and 02.2** were delving deeper into two related kinds of research, *action research* and *assessment research* with a glimpse ahead how research is done  **Lecture 03.1** gives a broad-brush overview of the ways research can be done, laying the foundations for Parts 3 - 5 of the course, which follow Parts 3 - 5 of the Wildemuth book.  All this prepares you for working on the definition of a research topic, which is the beginning of developing a research proposal. **Lecture 03.2** discusses approaches to defining a research topic. |
| **This week's topics**  **Lecture 03.1** | **2 General ways of gaining knowledge. Research approach**  . **2a Underlying basic assumptions guiding the conduct of research**  . . **2a1** Philosophical stance or paradigm  . . . **2a1.1** Positivism  . . . **2a1.2** Postpositivism  . . . . **2a1.2.1** Research focusing on overt behavior  . . . **2a1.3** Post-structuralist  . . . **2a1.4** Phenomenological research  . . . **2a1.5** Interpretivist  . . . **2a1.6** Constructivism  . . . **2a1.7** Transformative  . . . **2a1.8** Pragmatism  . . **2a2 Analytic (as opposed to holistic) vs. holistic approach**  . . . **2a2.1** Analytic (as opposed to holistic) approach  . . . **2a2.2** Holistic approach  . . **2a3 Political stance. Neutral / impartial vs. engaged / partisan**  . . . **2a3.1** Political stance neutral / impartial  . . . **2a3.2** Political stance engaged / partisan  . **2b Research design by basic approach to gaining insight / type of knowledge produced**  **2b1 - 2b3 Focus on empirical research**  . . **2b1** Descriptive studies  . . . **2b1.1** Descriptive study by format  . . . . **2b1.1.1** Case report  . . . . **2b1.1.2** Case series  . . . **2b1.2** Descriptive study by purpose  . . . . **2b1.2.1** Descriptive studies for description  . . . . . **2b1.2.1,1** Comparison, comparative study  . . . . . **2b1.2.1,2** Categorization  . . . . **2b1.2.2** Descriptive studies for monitoring and evaluation  . . . . . **2b1.2.2,1** Surveillance studies  . . **2b2** Relational studies  . . **2b3** Explanatory / causal / analytical studies  . . . **2b3.1** Explanatory / causal / analytical studies by degree of manipulative control  . . . . **2b3.1.1** Explanatory / causal / analytical studies through qualitative analysis  . . . . **2b3.1.2** Explanatory / causal / analytical studies through statistical analysis of data about  people, organizations, cities, etc.  . . . . **2b3.1.3** Quasi-experimental and experimental studies.  . . . . . **2b3.1.3,1** ●Quasi-experimental Studies. W-Ch. 11, p. 91 – 102  . . . . . **2b3.1.3,2** ●Experimental Studies. W-Ch. 12, p. 103 – 113  . . . **2b3.2** Explanatory / causal / analytical studies by function  . . . . **2b3.2.1** Explanatory / causal / analytical studies for explanation  . . . . **2b3.2.2** Explanatory / causal / analytical studies for prediction  . . . . **2b3.2.3** Explanatory / causal / analytical studies for prescription and planning (decision-making)  . . . **2b3.3** Modeling and simulation  **2b4 - 2bx Focus on general methods and thought research**  . . **2b4** Critical reflection  . **2c** Approaches to empirical research  . . **2c1** The qualitative ꟷ quantitative research continuum  . . . **2c1.1** Qualitative research  . . . **2c1.2** Quantitative research  . . . **2c1.3** ●Mixed Methods. W-Ch. 13, p. 114 – 122  . . **2c2** Relationship data collector - data analyst  Primary vs. secondary data analysis  . . . **2c2.1** Primary analysis (analyst = collector)  . . . **2c2.2** Secondary analysis (analyst ≠ collector)  . . . . **2c2.2.1** Meta-analysis  . **2d How close to original data or thought? Direct vs. indirect research**  . . **2d1** Direct research  . . . **2d1.1** Empirical vs non-empirical research  . . . . **2d1.1.1** Empirical research (see 2c)  . . . . **2d1.1.2**Non-empirical research, thought research  . . **2d2** Indirect research  . . . **2d2.1** Literature review. State-of-the-art report  . . . . **2d2.1.1** Systematic literature review  . **2e** **Degree of flexibility of the research protocol**  . . **2e1** Origin of the protocol. Control of the protocol  . . . **2e1.1** Official or widely accepted standard  . . . **2e1.2** Protocol used by another research team  . . . **2e1.3** Protocol used in another study by the same research team  . . . **2e1.4** Protocol developed specifically for the study  . . **2e2** Research protocol by degree of advance specification  . . . **2e2.1** Detailed advance specification  . . . **2e2.2** Develop the protocol as you go  . . **2e3 Research design by strictness of adherence to protocol**  . . . **2e3.1** Research process with strict adherence to protocol  . . . **2e3.2** Protocol adaptation following exact rules specified in the protocol  . . . **2e3.3** Protocol adaptation by researcher judgment  . . . **2e3.4** Local protocol adaptation  . **2f Stage of research stud**y (just one example)  . . **2f1** Stages of Human-Centred Design {6}  . . . **2f1.1** Immerse mode  . . . **2f1.2** Inspire mode  . . . **2f1.3** Imagine mode  . . . **2f1.4** Invent mode  . **2g Research by organizational arrangement**  . . **2g1** Research by number of disciplines involved  . . . **2g1.1** Monodisciplinary research  . . . **2g1.2** Interdisciplinary research  . . **2g2** Research by number of researchers involved  . . . **2g2.1** Small research group, one principal investigator  . . . **2g2.2** Team research. Team science. Collaborative research  . . . **2g2.3** Big science |

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| **This week's topics**  **Lecture 03.2** | **1 Why research? Use of results, research purposes, types of results / knowledge discovered. Research topic.**  **1h Developing a research topic / research problem and research questions**  . . **1h1** Motivation for a research questions  . . . **1h1.1** ●Developing a Research Question. **W-Ch. 2**, p. 11 - 20  . . . **1h1.2** ●Research question originating from theory or researcher curiosity. **W-Ch. 6**, p. 41 – 48.  . . . **1h1.3** ●Research question originating from practice. **W-Ch. 3**, p. 21 - 27, read p. 21-24  . . **1h2** Research question by type of study  . . . **1h2.1** Research questions for descriptive studies.  . . . . **1h2.1.1** ●Descriptions of Phenomena or Settings**.** **W-Ch. 4,** p. 28–33  . . . **1h2.2** Research questions for explanatory / causal / analytical studies  . . . . **1h2.2.1** ●Research questions answered by testing hypotheses. **W-Ch. 5**, p. 34 – 40 |

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| **Part 2. General ways of gaining knowledge** (Some chapters from Wildemuth Part 3) | | |
| **Week 03 09-15 ꟷ 09-21** | | |
| **03.0** | **$1** UBLIS575DS-03.0$1-CourseNotesWeek03  **$2** UBLIS575DS-03.0$2-**GreetingWeek04.pptx**  **$6** ►UBLIS575DS-03.0$6-LearningBlogWeek03.docx |  |
| **03.1** | **General ways of gaining knowledge. Overview**  **$2** UBLIS575DS-03.1$2-**Lecture03.1GenWaysGainingKnowledge.pptx**  **W 2b3.1.3,1** ●Quasi-experimental Studies. **W-Ch. 11,** p. 91 – 102  **W 2b3.1.3,2** ●Experimental Studies. **W-Ch. 12,** p. 103 – 113  **W 2c1.3** ●Mixed Methods. **W-Ch. 13,** p. 114 – 122  **W Read one example paper for each chapter, for Chapter 13 prefer Fidel** |  |
| **03.2** | **$2** UBLIS575DS-03.2$2-**Lecture03.2DevelopingAResearchTopic.pptx**  **$3 ►**UBLIS575DS-03.2$3-Deliverable2TopicDefinition.docx UBLIS575DS-03.2$3-Deliverable2TopicDefinitionGuide.docx  **Wildemuth chapters** |  |
|  | **1h1.1** ●Developing a Research Question. **W-Ch. 2**, p. 11 - 20  **1h1.2** ●Research question originating from theory or researcher curiosity. **W-Ch. 6**, p. 41 – 48.  **1h1.3** ●Research question originating from practice. **W-Ch. 3**, p. 21 - 27, read p. 21-24  **1h2.1.1** ●Descriptions of Phenomena or Settings**.** **W-Ch. 4,** p. 28–33  **1h2.2.1** ●Research questions answered by testing hypotheses. **W-Ch. 5**, p. 34 – 40)  Read one chapter from Chapters 4 - 6  Read one example paper from Chapter. 6 and one other example paper from Ch. 4 - 6. |  |
| **Assignments due** | **$6** ■UBLIS575DS-02.0$6-LearningBlogWeek02.docx |  |

**~~Topic /chapter synopses and comments**

Synopses are given only for topics that are also Wildemuth chapters.

For the other topics, see Lecture 03.1. Could also check

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{GV} refers to perceptive synopses of Wildemuth chapters by Griffin VanOstrand in his UBLIS 575DS synthesis essay.

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| **2b3.1.3,1** | **Quasi-experimental Studies. W-Ch. 11**, p. 91-102  Quasi-Experimental uses the structure of an experimental study in terms of variables and manipulation, but as Wildemuth (2017) notes, “the amount of control exerted on extraneous variables is the primary difference” (Wildemuth, 2017, p. 91). To revisit the experimental example, if the extraneous variables were not accounted for and there was not a control group of in-person classes, then the study would fall more into the quasi-experimental realm. The distinction between experimental and quasi-experimental, from my recollection of my psychology research methods course, is more of a sliding scale. On this experimental sliding scale, when there is more control over the variables there is more validity in the study. {GV}  **W-Conclusion.** Quasi-experimental designs, such as those discussed in this chapter and others described by Campbell and Stanley (1963), can be very useful in situations in which it is impossible to implement a true experiment. In particular, when you want to make comparisons (e.g., between one group’s performance and another’s) but cannot randomly assign research subjects to the two groups, a quasi-experimental design may allow you to address your research question with a balanced combination of rigor and naturalism.{W p. 100} |
| **2b3.1.3,2** | **Experimental Studies.** **W-Ch. 12**, p. 103-113  Experimental studies are the basic bread-and-butter, the stereotype of research involving the manipulation of independent, dependent, and other variables. Often control groups occur in this type of study. The goal is to observe what impacts variables have on each other. In simpler terms, experimental studies are a “competition” of sorts. An experimental study in a COVID-19-era art classroom would be comparing the effectiveness of teaching in  fully-online, hybrid, and fully in-person art classrooms. The effectiveness would be measured by how high the student grades are as a reflection of the teacher’s success in educating students. Since in-person classes are the norm, this environment would be the control group. Like with most experimental studies, the extraneous variables, or other variables that could have an impact, would have to be defined and accounted for. For example, if different teachers are involved, some teachers might be more effective in teaching than others. The study should be adjusted to have either the same teacher or a group of teachers all instruct three different classes in the three different settings. In addition, the ability for the students to perform well might differ from class to class, which is another extraneous variable to note.  {GV}  **W-Conclusion.** The principles of experimentation are relatively simple: randomly assign the subjects to two or more groups and measure the outcomes resulting from the intervention experienced by each group. But once you move beyond this basic characterization of experiments, you will find that there are a number of decisions to make about your experimental design. It is crucial that you understand your research question thoroughly and state it clearly. Then you will be able to identify which independent variables should be manipulated and which dependent variables (i.e., outcomes) should be measured. A dose of common sense, some reading of prior research related to your question, and a bit of sketching and analyzing of the *X*s [treatments] and *O*s [observations] [see p. 104] will go a long way toward a good experimental design for your study. {W p. 113} |
| **2c1.3** | **Mixed Methods. W-Ch. 13**, p. 114-122  Mixed Methods studies are the quantitative and qualitative team up that researchers deeply desired. It combines the use of both types of data collection within the study. In an art classroom, this could be in a yearbook class where an instructor wants to investigate how to effectively convey the student’s ability to learn basic design techniques such as eyeflow, dominance, and negative space. A quiz is completed by students detailing all of the different design techniques that can be used in the creation of a yearbook. The quiz can be numerically scored to give a number. The qualitative aspect involves whether or not a student can produce a demonstration of these techniques in a sample design page. There is a difference between knowing definitions and displaying a product or reflection or opinion. Mixed methods studies work to combine both quantitative and qualitative aspects to reveal more about a subject. {GV}  **W-Conclusion.** Greene (2008) argues that “a mixed methods way of thinking is an orientation toward social inquiry that actively invites us to participate in a dialogue about multiple ways of seeing and hearing, multiple ways of making sense of the social world, and multiple standpoints on what is important and to be valued and cherished” (p. 20). Two aspects of information and library science research suggest that mixed methods research can be a valuable addition to our methodological toolkit. First, phenomena of interest to researchers in our field include a wide array of information behaviors, and mixed methods research is likely to provide new perspectives on these behaviors. Second, our field already welcomes both quantitative and qualitative methods, so the integration of the two is a viable next step. Although mixed methods research has advantages for the field of information and library science, researchers need to exert the effort required to plan and conduct rigorous mixed methods studies: the rationale for using multiple methods needs to be clearly explained, each aspect of the study needs to be carefully designed and rigorously implemented, and the multiple data sets need to be integrated in ways that will lead to valid inferences about the phenomenon of interest. If such precautions are taken, we can reap the full benefits of this new methodological approach. {W p. 121} |
| **1h1.1** | **Developing a Research Question. W-Ch. 2**, p. 11-20  From W-Introduction. "Your research question may come from your own experience or direct observation of some situation or event, through discussion with your colleagues, or through exposure to current topics in the field (Gray, 2004; Locke et al., 2014; Robson, 2002). In other words, a situation you encounter in information and library science (ILS) practice presents a problem that you’re interested in solving." [DS: As Chapter 6 notes, a research question may also originate from the desire to test, improve, or develop a theory or just from curiosity.] Then think about what questions need to be answered to help solve the problem [or elaborate a theory] and explicate your understanding in a problem statement. Next look ahead how your questions can be answered ꟷ the research design, and look for agencies that might fund your idea. |
| **1h1.2** | **Research question originating from theory or researcher curiosity.** **W-Ch. 6**, p. 41 – 48  **W-Conclusion.** One would do well to keep certain guidelines in mind when developing and/or validating theory. First, you should plan to work with theories in the middle range—broad and abstract enough to be useful to the information and library science community generally, but concrete and well defined enough to be applicable to specific questions in the field. As you work on developing your own theory, base it on (i.e., ground it in) the most thorough examination of your data possible. Finally, as a general rule, make modest claims that accurately explain what is in your data set. Perhaps your theory will be applicable in other contexts, and perhaps it will not. That is something for repeated validity studies—not you alone—to decide. {W p. 48} |
| **1h1.3** | **Research question originating from practice. W-Ch. 3**, p. 21-27, read p. 21-24  **W-Conclusion.** As can be seen from these examples and many others not discussed here, it is important for the development of our knowledge base in ILS to study research questions derived from the context of practice. As you consider undertaking a study based on such a question, you might find O’Leary’s (2005) checklist useful:   * Is the question right for you? * Does the question have significance for an organization, an institution, a group, a field, etc.? * Can it lead to tangible situation improvement? * Is the question well articulated? Is the question researchable? * Does the question have a level of political support? (pp. 35–36)   If you responded yes to each of O’Leary’s questions, then you’re ready to embark on the design of your study. Once it’s completed, the dissemination of your results will add to the body of knowledge that we can use to support evidence-based practice. {W p. 26} |
| **1h2** | **Research question by type of study** |
| **1h2.1** | **Research question by type of study** |
| **1h2.1.1** | **Descriptions of Phenomena or Settings. W-Ch. 4,** p. 28-33  **W-Conclusion.** Most often, descriptive questions arise at the beginning of a program of study, when the phenomenon of interest has not yet been fully defined. The goal is for the research to provide a detailed description of the phenomenon of interest and, possibly, its relationships to other phenomena. Eventually, a theory about it may be formed and hypotheses about that theory generated and tested (see Chapter 6). The four studies examined in this chapter show us some of the variety of types of descriptive questions that might be asked. Some of them (e.g., Carlyle, 2001) will originate from professional practices that are in need of improvement. Some of them (e.g., Brown, 2003) will originate in the invention of a new technology. Some of them will arise from the practice literature (e.g., Gross & Saxton, 2001; Rothbauer, 2004a, 2004b) or the research literature (e.g., Brown, 2003; Gross & Saxton, 2001). Some of them (e.g., Rothbauer, 2004a, 2004b) will originate in the personal experiences of the researcher. In all the examples examined here, the first priority was to describe the phenomenon of interest, whether it was the publishing behaviors and attitudes of chemists or the reading behaviors and attitudes of young lesbian women. {W p. 32} |
| **1h2.2** | **Research questions for explanatory / casual / analytics studies** |
| **1h2.2.1** | **Research questions answered by testing hypotheses. W-Ch. 5,** p. 34-40  **W-Conclusion.** Many studies are conducted to test specific hypotheses. These hypotheses may be derived from personal experience (as with the Cheng, 2003, study), from prior research (as with the White & Ruthven, 2006, study), or from a theoretical foundation (as with the Sundar et al., 2007, study). No matter what the source for the hypothesis is, the hypothesis must be stated clearly for it to be tested. Hypotheses may be listed explicitly, as in the Sundar and colleagues study, or they may be stated as research questions and transformed into null hypotheses only for statistical analyses. However, it is critical that each construct or phenomenon under investigation be defined clearly and that each criterion evaluated or aspect examined be characterized in a way that can lead to its valid measurement. {W p. 39-40} |

**~~Wildemuth chapter abridgments**

Each chapter is in its own subsection

Chapters are given in the order in which they are assigned, not by chapter number

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| **~ 3a2.2 Chapter 11. Quasi-experimental Studies** {W p. 91-102} | |
| **Synopsis (repeated)** | Quasi-Experimental uses the structure of an experimental study in terms of variables and manipulation, but as Wildemuth (2017) notes, “the amount of control exerted on extraneous variables is the primary difference” (Wildemuth, 2017, p. 91). To revisit the experimental example, if the extraneous variables were not accounted for and there was not a control group of in-person classes, then the study would fall more into the quasi-experimental realm. The distinction between experimental and quasi-experimental, from my recollection of my psychology research methods course, is more of a sliding scale. On this experimental sliding scale, when there is more control over the variables there is more validity in the study. {GV}  **W-Conclusion.** Quasi-experimental designs, such as those discussed in this chapter and others described by Campbell and Stanley (1963), can be very useful in situations in which it is impossible to implement a true experiment. In particular, when you want to make comparisons (e.g., between one group’s performance and another’s) but cannot randomly assign research subjects to the two groups, a quasi-experimental design may allow you to address your research question with a balanced combination of rigor and naturalism.{W p. 100} |
| **Chapter outline** | * Definition   + Use of quasi-experimental designs in information and library science   + Specific designs     - Time series design     - Nonequivalent control group design     - Counterbalanced design * Risks to design and interpretation   + Selection bias and mortality effects   + History effects   + Testing effects   + Additional threats to validity * Examples   + Example 1: Effects of reductions in library hours on library circulation (time series design)   + Example 2: Effectiveness of bibliographic instruction in reducing library anxiety (nonequivalent control group design)   + Example 3: The benefits of automated search assistance (counterbalanced design) * Conclusion |
| **Chapter introduction** | **W-Introduction.** Experimental methods are used for assessing causal relationships by determining “the impact of an intervention (e.g., a teaching technique, electronic database, or collection development policy) on an outcome or effect of interest” (Lorenzetti, 2007, p. 4). Campbell and Stanley (1963) present and discuss a family of these quantitative, experimental research designs, including pre-experimental designs, true experimental designs, and quasi-experimental designs. This last set of designs is the focus of this chapter. They are used in natural settings, when some control over the experimental conditions can be exerted, yet full control is either not possible or not desirable. To better understand quasi-experimental designs, it is helpful to distinguish first how these differ from those other types of designs: the pre-experiment and the true experiment.  The amount of control exerted on extraneous variables is the primary distinction between quasi-experimental studies and true experimental studies. In particular, it is the lack of control associated with the absence of random assignment that is the focus of any description of quasi-experimental designs (Campbell & Stanley, 1963; Fife-Schaw, 2000; Lorenzetti, 2007; Powell & Connaway, 2004). Typically, quasi-experimental designs involve naturally occurring groups (Lorenzetti, 2007; Powell & Connaway, 2004). Use of more than one group of subjects is a feature shared with true experimental designs (Koufogiannakis & Wiebe, 2006), but only in true experiments are individual subjects randomly assigned to particular experimental conditions. To borrow the words of Campbell and Stanley (1963), quasi-experimental methods are designed for settings “where better designs are not feasible” (p. 34). The “better” designs, true experiments, allow the researcher to control the effects of extraneous variables on the study’s outcomes. However, when it is not possible to exert such control (through random assignment or in some other way), quasi-experimental designs offer an alternative for the researcher.  By employing quasi-experimental designs, the researcher recognizes from the outset of the study that the design lacks complete experimental control (Campbell & Stanley, 1963). Although quasi-experiments are, in some ways, weaker than true experiments (Powell & Connaway, 2004), they are the most appropriate approach for many studies of interest in information and library science (ILS). Often, a quasi-experimental design can be implemented in a more naturalistic setting (rather than in a more controlled laboratory setting), thereby increasing the ecological validity of the study results. Thus, the researcher can be more confident that the effect or treatment under investigation may be attainable in real-world settings, whereas controlled experimentation in a laboratory setting may not translate to success if implemented in less controlled, natural contexts. {W p. 91-92} |
| **Example 1** | **Effects of Reductions in Library Hours on Library Circulation (Time Series Design)** |
| **Text** | **W-Example 1.** A connection between the resources available to a public library and the level of use of that library has long been suspected. Using three years’ worth of monthly data from four public library systems and 23 years of annual data from one of them, Loynes and Proctor (2000) conducted a time series analysis to investigate the possible effect of a reduction in library hours on the number of books circulating from the library.  In the four UK library systems (Sheffield, Ealing, Hereford, and Worcester), monthly circulation statistics were available. These monthly statistics formed the time series of data (i.e., the Os in the study design). Between April 1992 and June 1995, the 26 branches of the four library systems each experienced a one-time reduction in hours of anywhere from 4 percent to 47 percent (although 6 of the branches had no change in hours). In this time series analysis, this point was the event of interest; for the design of the study, this can be seen as the implementation of a “treatment” (i.e., the X in the study design). The data were analyzed, first by examining the trends graphically, and then with standard time series modeling techniques. No clear evidence of an effect of a reduction in hours on number of books circulated was found. The authors provide several possible explanations for this study outcome; in particular, other variables may have affected circulation, the period of observation may have been too short, or the seasonal variations in circulation may have hidden overall trends.  Fortunately, one of the libraries (Sheffield) was able to provide data on both circulation and library hours over a much longer period—23 years, from 1974–1975 through 1996–1997. In addition, this second analysis included data on the library’s budget for collections, so a second library resource was taken into account simultaneously. As with the monthly analysis, both graphical displays and regression were used to understand the data. The regression indicated that a reduction in library hours had a negative effect on book circulation. Specifically, the effect of a 1 percent reduction in library hours could be seen about two years later in a 1.3 percent reduction in book circulation; the long-term decrease was about 2.2 percent.  From just this brief description of the study, some of the challenges of this study design are apparent. First, it’s most likely that you would be dependent on preexisting data collected for some purpose other than the study. In this study, it was data on library hours and book circulation. Because it was collected for administrative purposes, this data set had some problems when it was repurposed for this research study. As you consider the feasibility of conducting time series analysis, the quality and other characteristics of the data are key considerations. The challenge of identifying and collecting appropriate data over a sufficient period of time is likely one reason that there are very few time series studies conducted in ILS. Second, the X (an intervention of some kind) must be positioned within the stream of Os (observations). One approach that might be used is to ignore calendar dates and synchronize all the data streams on the occurrence of the intervention. For example, in this study, rather than using calendar dates to specify the observations, the authors might have considered aligning each library’s reduction in hours, treating it as time zero in the series. All other observations would then be examined as periods of time before and after time zero. For many time series studies, this approach would work, but it was not feasible for this study of library circulation because of the strong seasonal patterns in the monthly data. This problem was addressed in the longer series of annual data from Sheffield, but could not be addressed with the monthly data. Third, this study, like most time series analyses, used a combination of graphical and statistical techniques to fully understand the data. This practice is recommended for any time series design. {W p. 97-98} |
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| **Example paper abstracts start on next page** | |
| **Paper 1.1** | **The effect of reductions in public library opening hours on book issues: A statistical analysis.**  Loynes, R., & Proctor, R. (2000).  J.Doc., 56(6), 605–623.  This paper discusses statistical analyses of the effect of reductions in opening hours on book issues of public library authorities (PLAs). Monthly issue statistics over a three- to four-year period for twenty-six libraries in four PLAs (Sheffield, Ealing, Hereford and Worcester, and Lancashire) were analysed using graphic analysis and time series modelling. The results, with one or two exceptions, showed little, if any, significant relationship between reductions in hours and book issues. There were indications that other variables such as seasonality, patterns of opening hours and the accessibility of other libraries might be masking any impact. Annual issue and book fund statistics over a twenty-three-year period for libraries in Sheffield PLA were also analysed. This latter investigation suggests that reductions in the level of issues, related to both opening hours and materials expenditure, are discernible after a period of about two years. One model showed that the impact of opening hours cuts may be discernible within a year, materials fund cuts after a lag of one to two years. The study demonstrates clearly the difficulties involved in using statistical data to make accurate predictions of the impact of individual reductions in opening hours on book issues. It identifies a number of variables which may affect the impact of reductions. |
| **Example 2** | **Effectiveness of Bibliographic Instruction in Reducing Library Anxiety (Nonequivalent Control Group Design)** |
| **Text** | **W-Example 2.** Van Scoyoc (2003) used a nonequivalent control group design to examine whether library instruction could reduce first-year college students’ library anxiety, that is, the “discomforts many students feel about library research” (p. 330). Library anxiety in three groups was compared: a group receiving in-class bibliographic instruction, a group receiving computer-assisted bibliographic instruction, and a control group receiving no instruction. Because Van Scoyoc could not randomly assign individual students to these three groups, she used a nonequivalent control group design.  The study sample was drawn from the first-year class of a Research I university. All the instructors of the English composition and rhetoric classes “were asked whether they were interested in having their classes participate in the study” (Van Scoyoc, 2003, p. 332). Participation in a library instruction session, using both a face-to-face bibliographic instruction session offered by a librarian and the instructor-assigned, computer-assisted instruction method, was an existing component of the class curriculum, making this a convenient setting in which to conduct this study.  Fifteen of the instructors were willing to have their classes participate (approximately 15 percent to 20 percent of the classes2). Ultimately, 297 students participated, with 238 providing a complete set of usable data. Because intact classes would be involved in the study, it was not possible to assign individual subjects to particular treatments. Thus a quasi-experimental research design was used: the nonequivalent control groups design. Each class was randomly assigned to one of the three groups: in-class instruction (84 students), computer-assisted instruction (58 students), or no instruction (the control group, 96 students). Although this approach to defining the groups was the most rigorous possible, it does not exclude the possibility that a particular group might contain the students with the most previous library experience or the lowest/highest levels of library anxiety. Administering a pretest did allow Van Scoyoc to take prior differences into account during the data analysis phase of the study.  All groups were given a pretest and an identical posttest, incorporating Bostick’s (1992) Library Anxiety Scale as well as measures of library knowledge and prior library experience. The pretest was administered to all groups during the regular English composition and rhetoric class prior to any library-related instruction. The control group was administered the posttest approximately one week after the pretest. The in-class instruction group completed the posttest within one week after participating in their instruction session. The computer-assisted instruction group was to complete the online tutorial within one week following the pretest; the posttest was administered in class at the conclusion of that week.  Both instruction methods entailed lessons in the use of library electronic resources. The in-class instruction was delivered by library staff for a scheduled, 30- to 40-minute period. The computer-assisted instruction was delivered via the Internet in the form of an interactive, online tutorial, expected to take 30 to 45 minutes to complete. The control group received instruction also, but not until after all study data were collected.  The design of the study is depicted in the following diagram. Those receiving in-class instruction are represented as X1, and X2 represents the computer-assisted instruction treatment. Because the control group did not receive treatment, there is no corresponding X to represent this group in the diagram. Thus this implementation of a nonequivalent control group design can be depicted as follows:   |  |  |  |  | | --- | --- | --- | --- | | Experimental group 1: | O | X1 | O | | Experimental group 2: | O | X2 | O | | Control group: | O |  | O |   As noted by Campbell and Stanley (1963), there are several threats to the validity of the findings from this research design. Because the individual subjects cannot be randomly assigned to groups, the groups may not be equivalent. Van Scoyoc (2003) evaluated group equivalency through comparisons of the pretest results. These revealed that the groups were not equivalent, with pretests for both treatment groups (X1 and X2) showing lower levels of library anxiety than the control group. Thus the statistical analysis approach (analysis of covariance) was designed to take this difference into account. Maturation also threatens this design because subjects may change during the period between the pretest and the posttest. In this study, this period was only one week, so we would expect only a minimal maturation effect, if any at all. Van Scoyoc (2003) also did everything possible to ensure that participants did not receive any library instruction other than that planned in the study design, thus avoiding the most problematic type of history effect.  In summary, this is a very good example of a nonequivalent control group design, using a pretest and a posttest to collect data. Results can be compared across groups and across time, allowing the researcher to fully understand the effects of two methods of library instruction on students’ library anxiety. Although this quasi-experimental study design cannot protect the findings from all the possible threats to their validity, Van Scoyoc (2003) was aware of these threats and was careful to guard against them or take them into account during data analysis. {W p. 98-99} |
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| **Paper 2.1** | **Reducing library anxiety in first-year students: The impact of computer assisted instruction and bibliographic instruction.**  Van Scoyoc, A. M. (2003).  Reference and User Services Quarterly, 42(4), 329–341.  This study examines whether computer-assisted instruction (i.e., a computer-based tutorial) and traditional bibliographic instruction sessions led by library staff reduced library anxiety among first-year college students. Students who participated in each method of instruction were surveyed before and after instruction and were compared to a control group consisting of students who did not participate in either type of instruction. Data from 238 student surveys were used for the analyses. Using Bostick's Library Anxiety Scale, this study found that students who took part in bibliographic instruction led by a library staff member experienced significantly less overall library anxiety compared to the control group. The same could not be said for students completing the computer-based tutorial. Controlling for previous library experience and prior knowledge of the library did not alter this finding. This study also separately examined each of the five subscales of Bostick's Library Anxiety Scale. Analyses revealed significant differences between groups for two of the five subscales (the "Barriers with Staff" subscale and the "Affective Barriers" subscale). Discussion focuses on how these findings are important for academic librarians conceptualizing instructional programs. |
| **Example 3** | **The Benefits of Automated Search Assistance (Counterbalanced Design)** |
| **Text** | **W-Example 3.** Jansen and McNeese (2004, 2005) applied a counterbalanced design in their investigation of the potential benefits of automated search assistance. One objective of the study was to determine whether automated search assistance improved search performance. Specifically, searchers’ performance with a system incorporating automated search assistance was compared to their performance with a system offering no assistance.  A total of 40 subjects were recruited from two classes in an information science and technology program at a major U.S. university. Each subject completed a different search (drawn from a pool of six topics) with each of two systems, trying to find as many relevant documents as possible within a 15-minute time limit. The two systems were identical in all aspects—computer systems, browser, retrieval systems, search processing time, and document collection—except that one provided automatic search assistance and the other did not. The automated assistance application used “implicit feedback to build a model of user-system interactions using action-object pairs” (Jansen & McNeese, 2005, p. 1485), providing support for query reformulation and refinement (including reformulation based on similar queries), spelling correction, and relevance feedback. For the automated assistance system, subjects were informed of the automatic feature and shown a screen shot of the assistance button. Subjects were informed of the choice to select or ignore the assistance feature, represented as a clickable button. No other instructions were provided.  In this study, two variables need to be counterbalanced. First, the primary independent variable, which system was used to search, needed to be counterbalanced to avoid so-called order effects (i.e., the possibility that one system would be found to be more effective just because it was always the second system used and the subject had more time to practice). To achieve this counterbalancing, the first subject was assigned to the basic system,3 and the system assignment was then alternated for each subject. Second, the topics assigned for each search needed to be counterbalanced to avoid the possibility that the easy topics were assigned to one system more than the other. There were six topics, selected at random from those used in the Text REtrieval Conference (TREC), volumes 4 and 5. The first subject searched the first topic on the basic system and the second topic on the system with assistance. The second subject searched the third topic on the basic system and the fourth topic on the system with assistance. The third subject searched the fifth topic on the basic system and the sixth topic on the system with assistance. This rotation among the topics was then repeated for the remaining subjects. In this way, each of the topics was searched the same number of times on each of the systems. These two counterbalancing schemes are depicted in the following diagram, with each row representing a different subject (6 of the 40 subjects are shown here), with Xn representing the systems and tn representing the topics:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Subject 1: | X1t1 | O | X2t2 | O | | Subject 2: | X2t3 | O | X1t4 | O | | Subject 3: | X1t5 | O | X2t6 | O | | Subject 4: | X2t1 | O | X1t2 | O | | Subject 5: | X1t3 | O | X2t4 | O | | Subject 6: | X2t5 | O | X1t6 | O |   Although this type of careful counterbalancing scheme approaches the goal achieved in a true experiment, one aspect of the study did suffer from the almost-natural search interactions observed during the study. When subjects were assigned to use the system with automatic assistance, it was still up to the subject to choose when or if to invoke the assistance. To achieve the study’s purpose of understanding when people would seek assistance, it was necessary to allow subjects to choose whether to use the automatic assistance. However, this naturalistic aspect of the study design resulted in 10 of the 40 subjects not interacting with the automated assistance search system at all, threatening the study’s internal validity due to the effects of experimental mortality; that is, the dropout of subjects may contribute to differences in posttest comparisons (or lack of differences).  In summary, this is a very good example of the way in which a quasi-experimental design can straddle the gap between experimental control and a more naturalistic approach. Through a careful counterbalancing plan, significant control was exerted over possible order effects (of treatment exposure) and the effects of differences in topic difficulty. However, subjects were allowed to act naturally in deciding whether to invoke the automatic assistance available in one of the systems. {W p. 99-101} |
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| **Paper 3.1** | **Investigating automated assistance and implicit feedback for searching systems.**  Jansen, B. J., & McNeese, M. D. (2004).  ASIS&T Proc. 2004, 41, 280–286.  Information retrieval systems offering personalized automated assistance have the potential to improve the searching process. There has been much work in this area for several years on a variety of systems. However, there has been little empirical evaluation of automated assistance to determine if it is of real benefit for searchers. We report the results of empirical evaluation investigate how searchers use implicit feedback and automated assistance during the searching process. Results from the empirical evaluation indicate that searchers typically use multiple implicit feedback actions, usually bookmark – copy. The most commonly utilized automated assistance was for query refinement, notable the use of the thesaurus. We discuss the implications for Web systems and future research. |
| **Paper 3.2** | **Evaluating the effectiveness of and patterns of interactions with automated searching assistance.**  Jansen, B. J., & McNeese, M. D. (2005).  JASIST 56(14), 1480–1503.  We report quantitative and qualitative results of an empirical evaluation to determine whether automated assistance improves searching performance and when searchers desire system intervention in the search process. Forty participants interacted with two fully functional information retrieval systems in a counterbalanced, within-participant study. The systems were identical in all respects except that one offered automated assistance and the other did not. The study used a client-side automated assistance application, an approximately 500,000-document Text Retrieval Conference content collection, and six topics. Results indicate that automated assistance can improve searching performance. However, the improvement is less dramatic than one might expect, with an approximately 20% performance increase, as measured by the number of user-selected relevant documents. Concerning patterns of interaction, we identified 1,879 occurrences of searcher–system interactions and classified them into 9 major categories and 27 subcategories or states. Results indicate that there are predictable patterns of times when searchers desire and implement searching assistance. The most common three-state pattern is Execute Query–View Results: With Scrolling–View Assistance. Searchers appear receptive to automated assistance; there is a 71% implementation rate. There does not seem to be a correlation between the use of assistance and previous searching performance. We discuss the implications for the design of information retrieval systems and future research directions. |

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| **~ 3a2.1 Chapter 12. Experimental Studies** {W p.103-113} | |
| **Synopsis (repeated)** | Experimental studies are the basic bread-and-butter, the stereotype of research involving the manipulation of independent, dependent, and other variables. Often control groups occur in this type of study. The goal is to observe what impacts variables have on each other. In simpler terms, experimental studies are a “competition” of sorts. An experimental study in a COVID-19-era art classroom would be comparing the effectiveness of teaching in  fully-online, hybrid, and fully in-person art classrooms. The effectiveness would be measured by how high the student grades are as a reflection of the teacher’s success in educating students. Since in-person classes are the norm, this environment would be the control group. Like with most experimental studies, the extraneous variables, or other variables that could have an impact, would have to be defined and accounted for. For example, if different teachers are involved, some teachers might be more effective in teaching than others. The study should be adjusted to have either the same teacher or a group of teachers all instruct three different classes in the three different settings. In addition, the ability for the students to perform well might differ from class to class, which is another extraneous variable to note.  {GV}  **W-Conclusion.** The principles of experimentation are relatively simple: randomly assign the subjects to two or more groups and measure the outcomes resulting from the intervention experienced by each group. But once you move beyond this basic characterization of experiments, you will find that there are a number of decisions to make about your experimental design. It is crucial that you understand your research question thoroughly and state it clearly. Then you will be able to identify which independent variables should be manipulated and which dependent variables (i.e., outcomes) should be measured. A dose of common sense, some reading of prior research related to your question, and a bit of sketching and analyzing of the *X*s [treatments] and *O*s [observations] [see p. 104] will go a long way toward a good experimental design for your study. {W p. 113} |
| **Chapter outline** | * A definition, and a bit of vocabulary * Three experimental designs   + Pretest-posttest control group design   + Posttest-only control group design   + Factorial design * Randomization * The validity of your experiment   + Threats to internal validity   + Threats to external validity * Additional issues to consider when designing an experiment   + Experimental setting: lab or field?   + Within-subjects versus between-subjects designs   + Ethical issues in experiments * Examples   + Example 1: Users’ preferences and attitudes toward menu designs   + Example 2: Effects of technological affordances on interactions in a virtual museum * Conclusion |
| **Chapter introduction** | **W-Introduction.** “By experiment we refer to that portion of research in which variables are manipulated and their effects upon other variables observed” (Campbell & Stanley, 1963, p. 1). This basic definition provides a strong framework for understanding the primary characteristics of a true experiment. First, some variables (i.e., phenomena that can vary in level or intensity, called independent variables) are manipulated. That means that we must exert control over their variation to be sure that we can understand the effects of their variation. The variable of primary interest is often called the treatment or intervention under study. The independent variables can be understood as the input to the experiment. Second, we will observe those effects on other variables (called dependent variables). The dependent variables can be understood as the output from the experiment. For instance, we may want to know the effects of a new system design on the efficiency with which it allows its users to complete particular kinds of tasks. We will manipulate the system with which the study participants work to complete the task; for example, we might give one group a particular version of the system and another group a different version of the system. Then we will measure (i.e., observe) the efficiency with which the task is performed with each system. As you can see from our definition of experiments, they are appropriate for those research questions with clearly stated hypotheses that can be tested in a well-controlled setting.  Experiments are characterized by control: the idea is that all the possibilities for variation are either controlled (i.e., held the same for all study participants) or they are varied systematically (e.g., the study participants experience either a high level or a low level of a variable of interest). A secondary characteristic of experiments is randomization as a means to exert control. Study participants may be randomly selected from a particular population. Study participants may be randomly assigned to one treatment or another. In each case, the randomization is performed to avoid any bias in the experiment’s outcomes. It should be noted that randomization is a particular statistical process, not just a haphazard process, and procedures for randomization will be described later. Experimental control and randomization allow you to rule out all the possible causes of the observed effects other than the effects of the phenomenon of interest. Thus, it can be argued that experiments are the only form of empirical research that provides leverage for discerning the causes of the phenomenon under study (Haas & Kraft, 1984). {W p. 103-104} |
| **Example 1** | **Users’ Preferences and Attitudes toward Menu Designs** |
| **Text** | **W-Example 1.** To investigate the effects of menu design on the performance and attitudes of users of a shopping Web site, Yu and Roh (2002) used a posttest-only control group design. The posttest in this study consisted of observations of the speed with which the study participants could complete assigned searching and browsing tasks and the participants’ perceptions of the appeal of the Web site and whether they were disoriented when using it. Even though the measurements of time were actually collected during the interactions, they’re still considered part of the posttest.  Although there was no true control group, each of three types of menu designs was compared with the others: a simple hierarchical menu design, a menu design supporting both global and local navigation, and a pull-down menu design. The selection of the posttest-only control group design was a sound one. Because there was no interest in examining how the participants changed during their interactions with the Web sites, there was no need for a pretest. This experimental design is often used to compare users’ reactions to different system designs.  The authors used a within-subjects design, with each of the 17 participants interacting with each of the three menu designs. These three iterations of the research procedures occurred over three separate sessions, each a week apart. The authors chose to space out the research sessions to avoid memory effects (the same browsing and searching tasks were used each time). Unfortunately, this decision did result in some attrition from the sample. Of the original 21 subjects recruited for the study, 4 (almost 20 percent) were not included in the final analysis because they missed at least one of the sessions. An alternative would have been to develop three parallel sets of browsing and searching tasks and administer all of them in a single session, counterbalancing the design so that all tasks were performed on all three systems. The research procedures that were used took about a half hour to complete; if they had been combined into one session, participant fatigue may have been an issue. If a study is planned to be implemented over repeated sessions, it would also be appropriate to recruit a larger sample than needed to ensure that the final sample size is large enough.  With a within-subjects design, the order in which the interventions are presented can become an issue. The authors handled this issue through random assignment. At the first session, each participant was randomly assigned to a particular menu design (represented by a prototype Web site). At the second session, each participant was randomly assigned to one of the two Web sites he or she had not yet seen. At the third session, the participant interacted with the remaining Web site. Through this careful randomization (an alternative to the counterbalancing discussed earlier), the authors could be sure that any effects on the dependent variables were not due to the order in which people interacted with the three menu designs.  In this study, each participant completed 10 searching tasks and 5 browsing tasks with each of the three menu designs. The order in which these tasks were completed could also have an effect on the outcomes (though it’s less likely than the potential for effects from the order in which the systems were presented). To guard against this possible threat, “the task cards were shuffled beforehand to ensure that the sequence of tasks was random” (Yu & Roh, 2002, p. 930). We would not agree that shuffling cards ensures random ordering; the authors could have used a random number generator to select the task order for each participant for each session. Nevertheless, the precautions they took were reasonable, given the low potential risk to the validity of the study results.  In summary, this example of a posttest-only control group design is typical of many studies comparing two or more alternative information systems. It was conducted in a lab, and adequate control was exerted over the procedures so that most threats to the study’s validity were addressed. Although it is somewhat unusual to spread the data collection over three sessions, the authors provided their reasons for this decision. The within-subjects design was very efficient, allowing them to discover differences between the menu designs while using only 17 subjects. {W p.110-111} |
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| **Paper 1.1** | **The effects of menu design on information-seeking performance and user’s attitude on the World Wide Web.**  Yu B, & Roh S. (2002).  Journal of the American Society for Information Science & Technology, 53(11), 923–933.  As the Web becomes more popular, the interest in effective navigation is increasing. Menu design is becoming a central issue of human computer interface design as the focus of computer applications moves from the computer as a machine to the human as a user. The purpose of this study was to investigate the effect of three different Web menu designs (a simple selection menu, a global and local navigation menu, and a pull-down menu) on users' information-seeking performance and attitudes. Three Cyber-shopping mall Web sites were developed for the experiment. These Web sites had the same content and a constant information structure, but each had a different menu design. The results showed different effect of menu design on both searching performance and browsing performance. More specifically, participants' searching performance was superior in the pull-down menu condition compared to the global and local navigation menu and the simple selection menu conditions. Browsing task performance was the fastest with the global and local navigation menu. However, there were no significant differences among three menu designs in terms of users' perception on appeal of the Web site and disorientation. |
| **Example 2** | **Effects of Technological Affordances on Interactions in a Virtual Museum** |
| **Text** | **W-Example 2.** Many museums are now providing their constituencies with a virtual experience of using the museum in some way. Sundar et al. (2015) investigated several aspects of the design of such virtual experiences to see whether particular technological affordances led to a more positive user experience. The three technological affordances were customization (presence or absence of a customizable gallery), interactivity (via live chat with other visitors), and navigability (presence or absence of a 3D navigation tool). Each of these possibilities was available in or added to the Google Art Project version of New York’s Museum of Modern Art (MoMA) Web site.  The experiment was a factorial between-subjects design (2 × 2 × 2). The three factors (i.e., independent variables) were customization, interactivity, and navigability, with two levels of each factor implemented in the Web site variations. Each of 126 participants was randomly assigned to one of the eight variations of the Web site, asked to complete a task, then asked to complete several questionnaires about their perceptions (so it was a between-subjects posttest-only design).  The researchers exerted control over the experimental conditions in several ways. First, they “closely monitored all the participants and restricted them to the use of specified functions” relevant to their assigned system condition (p. 391). This monitoring ensured that each group of participants actually received the treatment appropriate to their group. To ensure that the monitoring had the desired effect, the researchers also conducted manipulation checks: measurements of the participants’ perceptions of the technological affordances appropriate to their group. Second, for the interactivity factor, a confederate was used for the live-chat discussions. Although the study participants knew they were chatting with another user, that other user was a member of the research team and so restricted the types of comments posted during the chat so that they would minimize their influence on the results of the study. The chat sessions were also performed after completion of the primary task so that they would not inadvertently affect task performance.  Each participant was asked to find three paintings in MoMA and then select one of them to recommend to the art council of a school. After completing the task in their assigned system variation, each participant responded to a number of questionnaires, measuring their perceptions of their interactions with the Web site: sense of agency and sense of control, to measure the effects of customization; perceived reciprocity, perceived synchronicity, and social presence, to measure the effects of interactivity; and spatial presence, perceived reality, and perceived usability, to measure the effects of navigability. The researchers provide details about the sources of these measures, as well as their reliability, and all the questionnaire items are included in the appendix. The data analysis focused on the relationships between the three factors of the experimental manipulation (i.e., the eight variations of the Web site design) and the user perceptions measured with questionnaires after task completion. It took into account the participant’s art topic involvement (assessed with a pretask questionnaire) as a covariate, as well as investigating the influence of power usage (i.e., participants’ liking of, skills for, and dependence on technologies in general) as a variable that could moderate the primary relationships of interest.  Clearly, this is a complex experimental design. However, by breaking it down, you can pick up techniques that you will also want to include in the experiments you design. A between-subjects design was used, because exposure to more than one version of this website would have confounded the results of the study. The participants were randomly assigned to a particular variation of the website. The factors to be investigated (i.e., the system variations) were well defined and their implementation within the context of the study was well controlled. The researchers performed appropriate manipulation checks to make sure that their experimental factors were experienced by the study participants (and so might have the potential to influence their perceptions). The posttest measures had been developed and validated in prior studies. Potential confounding factors (art topic involvement and power usage, in this case) were taken into account in the design of the study and in the data analyses. All of these techniques should be applied in every experiment, regardless of its complexity. {W p. 111-113} |
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| **Paper 2.1** | **Communicating art, virtually! Psychological effects of technological affordances in a virtual museum.**  Sundar, S.S., Go, E., Kim, H.-Y., & Zhang, B. (2015).  International Journal of Human-Computer Interaction, 31(6), 385–401.  Museums lean heavily on recent developments in communication technologies to create an authentic experience for online visitors of its galleries. This study examines whether three specific affordances of communication technology—customization, interactivity, and navigability—can provide the personal, social, and physical contexts, respectively, that are necessary for ensuring an enjoyable museum experience. A 2 (presence vs. absence of customizable gallery) × 2 (presence vs. absence of live-chat with others) × 2 (presence vs. absence of 3D navigational tool) between-subjects factorial experiment (N= 126) found that although each affordance is associated with distinct psychological benefits (customization with sense of agency and control, interactivity with reciprocity, and navigability with perceived reality), combining them on the same interface tends to undermine these benefits. In addition, power usage moderates the effectiveness of each affordance on the interface. Theoretical and practical implications are discussed. |

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| **~ 3b3 Chapter 13. Mixed Methods** {W p. 114-122} | |
| **Synopsis (repeated)** | Mixed Methods studies are the quantitative and qualitative team up that researchers deeply desired. It combines the use of both types of data collection within the study. In an art classroom, this could be in a yearbook class where an instructor wants to investigate how to effectively convey the student’s ability to learn basic design techniques such as eyeflow, dominance, and negative space. A quiz is completed by students detailing all of the different design techniques that can be used in the creation of a yearbook. The quiz can be numerically scored to give a number. The qualitative aspect involves whether or not a student can produce a demonstration of these techniques in a sample design page. There is a difference between knowing definitions and displaying a product or reflection or opinion. Mixed methods studies work to combine both quantitative and qualitative aspects to reveal more about a subject. {GV}  **W-Conclusion.** Greene (2008) argues that “a mixed methods way of thinking is an orientation toward social inquiry that actively invites us to participate in a dialogue about multiple ways of seeing and hearing, multiple ways of making sense of the social world, and multiple standpoints on what is important and to be valued and cherished” (p. 20). Two aspects of information and library science research suggest that mixed methods research can be a valuable addition to our methodological toolkit. First, phenomena of interest to researchers in our field include a wide array of information behaviors, and mixed methods research is likely to provide new perspectives on these behaviors. Second, our field already welcomes both quantitative and qualitative methods, so the integration of the two is a viable next step. Although mixed methods research has advantages for the field of information and library science, researchers need to exert the effort required to plan and conduct rigorous mixed methods studies: the rationale for using multiple methods needs to be clearly explained, each aspect of the study needs to be carefully designed and rigorously implemented, and the multiple data sets need to be integrated in ways that will lead to valid inferences about the phenomenon of interest. If such precautions are taken, we can reap the full benefits of this new methodological approach. {W p. 121} |
| **Chapter outline** | * Introduction * Epistemological and ontological underpinnings * Research designs * Evaluating the quality of a mixed methods study * Examples   + Example 1: Relationships between critical thinking dispositions and library anxiety   + Example 2: College students’ searching of online public access catalogs * Conclusion |
| **Chapter introduction** | **W-Introduction.** Mixed methods research is gaining ground in many social disciplines, particularly over the last decade. Two journals dedicated to mixed methods were first published in 2007 (the Journal of Mixed Methods and the International Journal of Multiple Research Approaches), and a conference focusing on mixed methods has been held annually since 2005. However, Fidel (2008) found that “the [mixed methods] approach has not yet established itself as a concept in LIS research” (p. 271). She observed that, although many information and library science (ILS) studies used multiple methods, they only rarely combined both quantitative and qualitative approaches in the same study.  The definition of mixed methods research is still under development; Johnson, Onwuegbuzie, and Turner (2007) analyzed the definitions provided by 19 methodology experts. Based on these, they proposed their own definition: “Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration” (Johnson et al., 2007, p. 123). This definition is based on several themes they identified as running through the experts’ definitions, including what is mixed (quantitative and qualitative approaches), when or where the mixing happens (during data collection, data analysis, or both), and the reasons/purposes for mixing methods.  Mixed methods may be chosen for a number of reasons. Often, a single data source is insufficient to fully address your research question or the problem under consideration (Creswell & Plano Clark, 2011). Sometimes you want to use mixed methods because the “integration of quantitative and qualitative data maximizes the strengths and minimizes the weaknesses of each type of data” (Creswell et al., 2011, p. 5). You might also use mixed methods for confirmation to “verify the findings derived from one type of data with those derived from another” (Small, 2011, p. 61).  Although there are important reasons for using mixed methods, you will also face some challenges. To conduct a mixed methods study, you or your research team will need two different kinds of methodological expertise (Tashakkori & Teddlie, 2010), and the study will often require additional time or financial resources to conduct (Creswell et al., 2011). Given the two different types of data that will need to be integrated, there is great potential for conflicting results, so you will need to develop a strategy for reconciling the potential conflicts (Creswell et al., 2011). At a deeper level, the two methodological approaches often carry with them different assumptions about the world and how to study it. These considerations warrant further discussion. {W p. 114-115} |
| **Example 1** | **Relationships between Critical Thinking Dispositions and Library Anxiety** |
| **Text** | **W-Example 1.** Kwon (2008) investigated the potential relationships between critical thinking dispositions and library anxiety among undergraduate students. Students enrolled in a library skills course were invited to participate, and 137 completed the study protocol. Critical thinking dispositions were measured with the California Critical Thinking Disposition Inventory, developed by Peter Facione and Noreen Facione. It is a 75-item measurement instrument, and responses are collected on a six-point Likert-type scale. It focuses on seven dispositions: truth seeking, open-mindedness, analyticity, systematicity, critical thinking self-confidence, inquisitiveness, and maturity. Library anxiety was measured with the Library Anxiety Scale, developed by Sharon Bostick. It is a 43-item measurement instrument, and responses are collected on a five-point Likert-type scale. It focuses on five dimensions of library anxiety: barriers with staff, affective barriers, comfort with the library, knowledge of the library, and mechanical barriers. The relationship between critical thinking dispositions and library anxiety was evaluated by comparing the mean library anxiety scores of those with strong critical thinking dispositions and those with weak critical thinking dispositions. A negative association was found and was further investigated by analyzing the content of essays the participants wrote, reporting on “a critical incident from their past experience of library use” (Kwon, 2008, p. 120).  This study is an example of a sequential explanatory design. The data collection methods occurred relatively simultaneously, but the study design would still be considered “sequential” because the quantitative data were analyzed first and the qualitative data were then used to understand and explain the results obtained from the quantitative data. The role of the qualitative data in providing a richer explanation of the quantitative relationship discovered allows us to classify this study design as “explanatory.”  This study design is very commonly used among mixed methods studies in ILS. For example, you might conduct a usability study that quantitatively compares two different system designs and use think-aloud protocols to understand the types of specific usability issues that led to the quantitative differences. In interactive information retrieval studies, you might collect quantitative performance data and augment it with qualitative data from follow-up interviews. In general, this study design is one way to overcome the limited richness of the data that can be collected through controlled experiments.  This example can be examined further by taking account of the four dimensions to be considered in designing a mixed methods study: relative priority of the two types of data, sequence of data collection (already discussed), the process of integrating the two types of data, and the scope of the study. The quantitative data were not only collected first, but also can be considered the more dominant of the two data sets because they establish the relationship between critical thinking dispositions and library anxiety. The integration of the two data sets occurred during the later stages of analysis. Once the relationship of interest was confirmed to exist, the second (i.e., qualitative) data set was analyzed in order to understand the attributes of the relationship. The scope of this study was relatively small and it was conducted in a single phase. {W p. 118-119} |
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| **Paper 1.1** | **A mixed-methods investigation of the relationship between critical thinking and library anxiety among undergraduate students in their information search process.**  Kwon, N. (2008).  College & Research Libraries, 69(2), 117–131.  This study investigated the nature of associations between critical thinking dispositions and library anxiety among 137 undergraduate students. The study was conducted by administering standardized survey instruments and by analyzing the contents of student essays on critical incidents of their library use experience. The results of these quantitative and qualitative investigations consolidated each other by revealing negative associations between the two variables. An interactive model of critical thinking and library anxiety emerged from the investigation, showing how they interact with each other during the library use process. Both theoretical and practical implications of the findings were discussed within the frameworks of affective information behavior and information literacy, respectively. |
| **Example 2** | **College Students’ Searching of Online Public Access Catalogs** |
| **Text** | **W-Example 2.** Focusing on the effects of misspellings in searches of online public access catalogs (OPACs), Willson and Given (2010, 2014) investigated the behaviors of college students conducting searches, the students’ mental models of searching, and their perceptions of themselves as searchers. This is a particularly interesting example of a mixed methods study because the qualitative work is couched within the context of an interactive information retrieval experiment, while still maintaining a balance between the quantitative and qualitative aspects of the study design.  Thirty-eight students at the University of Alberta each completed four assigned OPAC search tasks. The participants were randomly assigned to receive search topics that were either difficult to spell (ptarmigan, millennium, Qatar, Michel Foucault) or easy to spell (lemming, civilian, Bolivia, Sigmund Freud). Each of the search topics was read aloud to the study participant. If the participant was unfamiliar with the topic, the researcher read a brief definition of it. Search behaviors were captured with Camtasia, which captures the screen images and also captures an audio recording of the searcher’s comments during each search. In addition to completing the assigned search tasks, each participant completed a pre-search checklist (basic demographic data and ratings of their comfort and experience with searching), and participated in a post-search semi-structured interview.  The quantitative data consisted of responses from the pre-search checklist and the frequencies with which the participants engaged in particular search behaviors. For example, Willson and Given (2010) included tables reporting the number of corrected and uncorrected misspellings that occurred in the searches and the number of participants that searched the Internet to check spelling, among others. Based on the experimental design, behaviors of the difficult-spelling and easy-spelling groups were compared.  The qualitative data consisted of the comments made by study participants during their searches and the semi-structured interviews conducted after the search tasks were completed. The interview guide focused on participants’ experiences while completing the search tasks, their mental models of the searching process, and how they solved any problems they encountered while searching. However, the interviews also yielded data related to the searchers’ confidence in their searching and their images of themselves as searchers.  Let’s examine how Willson and Given addressed the four dimensions of study design. The first dimension is the balance between the two types of data. In this study, the two data types are relatively balanced with each other. Each would be expected to make significant contributions to the study findings. The quantitative data addressed research questions related to search behaviors when the misspelling of query terms is likely; the qualitative data focused on students’ conceptions of themselves as searchers. Second, let’s consider the timing of data collection. In this study, the two types of data were collected simultaneously. Although the interviews were conducted after the search tasks were completed, they were conducted during the same session. Third (and fourth), let’s consider how the data were mixed and the scope of the research (a single study or multiple studies). These two issues are intertwined in this case. The data were collected in a single study, but the findings are reported in two separate articles—one focusing on the quantitative findings and one focusing on the qualitative findings. Thus, this study’s design was not as fully mixed as other designs might be. Interview data were used to elaborate the discussion of the quantitative findings; for example, the participants talked in the interviews about using Google to check their spelling, thus helping us understand the search behaviors recorded during the experiment. However, the quantitative data did not play a significant role in reporting the analysis of the interviews (Willson & Given, 2014).  This study may be an example of some practical barriers to mixed methods research. The first is the time that is necessary to complete a study that incorporates two distinct forms of data collection and analysis. The second is that, as pointed out by Creswell et al. (2011), authors often face page or word limits when publishing their work. When both quantitative and qualitative results must be reported and then discussed in connection with each other, the researcher is likely to be faced with difficult decisions about what to leave out in order to stay within the page limits of the chosen publication venue.  It seems possible that Willson and Given were faced with both these challenges and so decided to report the results in two different publishing venues. Because they divided the results based on two distinguishable sets of research questions, the result was that the quantitative results were primarily reported in the Journal of the American Society for Information Science & Technology, and at least some of the qualitative results were published in Information Research. You may have also noticed that the qualitative results were published several years after the quantitative results, most likely due to the additional time required to analyze the qualitative data. {W p. 119-121} |
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| **Paper 2.1** | **The effect of spelling and retrieval system familiarity on search behavior in online public access catalogs: A mixed methods study.**  Willson, R., & Given, L. M. (2010).  JASIST 61(12), 2461–2476.  Although technology can often correct spelling errors, the complex tasks of information searching and retrieval in an online public access catalog (OPAC) are made more difficult by these errors in users' input and bibliographic records. This study examines the search behaviors of 38 university students, divided into groups with either easy‐to‐spell or difficult‐to‐spell search terms, who were asked to find items in the OPAC with these search terms. Search behaviors and strategy use in the OPAC and on the World Wide Web (WWW) were examined. In general, students used familiar Web resources to check their spelling or discover more about the assigned topic. Students with difficult‐to‐spell search terms checked spelling more often, changed search strategies to look for the general topic and had fewer successful searches. Students unable to find the correct spelling of a search term were unable to complete their search. Students tended to search the OPAC as they would search a search engine, with few search terms or complex search strategies. The results of this study have implications for spell checking, user‐focused OPAC design, and cataloging. Students' search behaviors are discussed by expanding Thatcher's (2006) Information‐Seeking Process and Tactics for the WWW model to include OPACs. |
| **Paper 2.2** | **Student search behaviour in an online public access catalogue: An examination of ‘searching mental models’ and ‘searcher self-concept’.**  Willson, R., & Given, L. M. (2014).  Information Research, 19(3), Sept. 2014.  **Introduction**. This paper presents a qualitative exploration of university students' experience of searching an online public access catalogue. The study investigated how students conceptualise their searching process, as well as how students understand themselves as seekers of information. **Method**. Following a search task, thirty-eight university students were interviewed using a qualitative, semistructured interview design. The interviews explored students' experience of searching, conceptualised aspects of their searches, their information seeking strategies, confidence in searching, and any difficulties encountered. **Analysis**. The interviews were analysed using a grounded theory approach. The analysis involved iterative review and constant comparison of the transcripts, including line-by-line open coding followed by a second round of focused coding. **Results**. The results of the project present an emergent theory that explores a set of conceptual patterns in students' searching mental model of online systems, a typology of searchers' perceptions of their information retrieval skills (i.e., their searcher self-concept), and categorisation of types of searchers. **Conclusion**. With increased knowledge of how students conceptualise their search process and view themselves as seekers of information, educators and information professionals can work more effectively with students to search for the literature of their disciplines. Similarly, system designers can devise interfaces that suit students' needs. |

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| **~ 1h1.1 Chapter 02. Developing a Research Question** {W p. 11-20} | |
| **Synopsis (repeated)** | From W-Introduction. "Your research question may come from your own experience or direct observation of some situation or event, through discussion with your colleagues, or through exposure to current topics in the field (Gray, 2004; Locke et al., 2014; Robson, 2002). In other words, a situation you encounter in information and library science (ILS) practice presents a problem that you’re interested in solving." [DS: As Chapter 6 notes, a research question may also originate from the desire to test, improve, or develop a theory or just from curiousity.] Then think about what questions need to be answered to help solve the problem [or elaborate a theory] and explicate your understanding in a problem statement. Next look ahead how your questions can be answered ꟷ the research design, and look for agencies that might fund your idea. |
| **Chapter outline** | * Introduction * Understanding what it is that you want to ask * Writing a problem statement * The implications of the research question for the research design * Making your project happen   + The role of funding agencies in shaping your problem statement * Examples |
| **Chapter introduction** | **W-Introduction.** The first, and most important, step in conducting a research study is to define your research question. Having a clear statement of your research question in hand allows you to design your study, including your overall strategy and your specific data collection procedures. It guides your selection of a sample for the study, your selection of a research design, your approach to data collection, and how you will analyze your data. A clear statement of your research question will also help you justify the costs of conducting the research, whether to external funding sources or to yourself (Maxwell, 2005). In addition, a clear statement of your research question will help you stay focused through the study’s completion.  But let’s start back at the beginning. Where would an idea for a research question come from? Research questions originate in two general ways. First, your research question may come from your own experience or direct observation of some situation or event, through discussion with your colleagues, or through exposure to current topics in the field (Gray, 2004; Locke et al., 2014; Robson, 2002). In other words, a situation you encounter in information and library science (ILS) practice presents a problem that you’re interested in solving. For example, you may wonder whether college students would learn searching skills if they were taught by their discipline’s faculty, rather than the library faculty (example adapted from Eldredge, 2001). A second source of research questions is the logical gaps that exist in our current state of knowledge of the field (Locke et al., 2014). A recent study may provide some new information about how students interact with online resources, yet not investigate such interactions by faculty. A theory may have been proposed, but you’re not sure of whether it can explain what’s happening in a new situation. Usually, these ideas come from reading or browsing the literature, conversations with colleagues, and your own reflections on your knowledge of the field (Locke et al., 2014). Whichever of these two avenues leads you to your research question(s), the most important consideration is that you’re personally interested in and motivated to answer the question(s).  The process of developing a research question begins with clarifying what problem you are trying to solve. Your primary task at this point is to clarify the meanings of the concepts involved in the problem (Punch, 2014). A good understanding of the problem, as experienced in practice or encountered in prior research/theory, will lead to the research question, defined as “a statement of what you wish to know about some unsatisfactory situation” (Locke et al., 2014, p. 45). In addition, you will want to clarify the purposes or goals of the study—your motivations or intentions for undertaking the study (Locke et al., 2014; Maxwell, 2005). This chapter will guide you in the development of your research question(s). {W p. 11-12} |

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| **~ 1h1.2 Chapter 06. Research question originating from theory or researcher curiosity** {W p. 41-48} | |
| **Synopsis (repeated)** | **W-Conclusion.** One would do well to keep certain guidelines in mind when developing and/or validating theory. First, you should plan to work with theories in the middle range—broad and abstract enough to be useful to the information and library science community generally, but concrete and well defined enough to be applicable to specific questions in the field. As you work on developing your own theory, base it on (i.e., ground it in) the most thorough examination of your data possible. Finally, as a general rule, make modest claims that accurately explain what is in your data set. Perhaps your theory will be applicable in other contexts, and perhaps it will not. That is something for repeated validity studies—not you alone—to decide. {W p. 48} |
| **Chapter outline** | * Introduction * Examples   + Example 1: A typology of relationships between personal growth and internet use   + Example 2: A model of factors affecting sense making within an organizational context   + Example 3: Validating a theoretical concept * Conclusion |
| **Chapter introduction** | **W-Introduction.** When considering a research question related to theoretical concepts or propositions, you’ll first need to figure out what you mean by theory. That term means (a lot of) different things to different people. In everyday speech, theory may describe a casual hunch or assumption about a given phenomenon. Merriam-Webster’s Online Dictionary (http:// www.merriam-webster.com/) defines it as “the analysis of a set of facts in their relation to one another.” To physicist Stephen Hawking (1988), a theory must meet two criteria: “It must accurately describe a large class of observations on the basis of a model which contains only a few arbitrary elements, and it must make definite predictions about the results of future observations” (p. 10). Merton (1968) summarizes the problem when he notes that the term theory refers to many different things, “including everything from minor working hypotheses, through comprehensive but vague and unordered speculations, to axiomatic systems of thought” (p. 39). Yet even such widely cast nets do not ensnare everything that scholars seem to mean when they invoke the T word.  Understandably, at least one researcher has found it easier to say what theory is not. Mintzberg (2005) began his contemplation of the topic by enumerating those things not falling under the rubric of theory. He concluded that theory was, first of all, not true. Instead, theories are simplifications of always-more-complicated realities; they are useful ways of looking at and understanding a world that persistently resists even the most formidable logic. Because theories are not true, it follows that theory development is neither objective nor deductive, according to Mintzberg. Developing theory is, by definition, inductive; it moves from the particular to the general. Testing theory, on the other hand, is deductive. Mintzberg goes on to bemoan the fact that often only theory testing is thought of as proper science. Instead, he encourages young scholars to work at developing new theory by pointing out the satisfaction it brings. “What makes me salivate is induction: inventing explanations about things. Not finding them—that’s truth; inventing them,” he writes. “We don’t discover theory; we create it. And that’s great fun” (Mintzberg, 2005, p. 357). A world where the testing of theory counts as the only real science is also one where progress is not possible. A theoretical model is not defeated by the discovery of exceptions to the theory, but only by the evolution of a better model, or at least one that better answers the questions that scientists are asking at a given time. Kuhn (1996) reinforces this argument by pointing out that there are certain circumstances under which the development of new theories becomes especially appropriate. These circumstances are moreover tied to the process of theory testing and the discovery of anomalies that do not fit in with the currently dominant model. In Kuhn’s formulation, what he calls “normal” science “is predicated on the assumption that the scientific community knows what the world is like” (p. 5). In other words, it is based on the idea that theories are essentially, if not actually, true; they describe whatever phenomenon they purport to describe at least as well as any other existing theory. But because theories are, by definition not true, a theory works only until a critical mass of anomalies and exceptions to it are found, at which point, it becomes untenable and must be replaced by a new theoretical model.  One of the hallmarks of such a new theory is that it is unexpected. “No matter how accepted eventually, theory is of no use unless it initially surprises—that is, changes perceptions” (Mintzberg, 2005, p. 361). Useful theory gives us new ways of looking at phenomena. The process of arriving at a new perspective is, according to Mintzberg, ineffable. Normal science can tell us how to test existing theory; that requires that one look at data and assess how they comport with the theory. But theory formation is the process of generalizing beyond one’s data, moving from the particular to the general, and there are no sure methods for doing that. Another way of putting it would be to say that one can teach rigor, that is, the systematic testing of data; but insight—seeing the broader implications of one’s data—is, at its core, an act of creation. And creativity cannot be taught (though it can be developed).  So when is it most appropriate to develop theory? Should doctoral students and junior scholars, as Mintzberg suggests, busy themselves more with inventing theories and less with testing them? Or are theories really frameworks within which scholars in mature scientific communities work as long as they remain plausible, as Kuhn argues, and therefore something which it is only necessary to revise every generation or so? There is less tension between these two positions than there might at first appear, and a lot of the apparent tension stems from the different definitions employed by Mintzberg and Kuhn. While Mintzberg’s theories comprise everything from simple typologies to full-blown paradigms, Kuhn means only the latter when he writes of theory. He’s talking about the cosmos-defining “grand” theories advanced by Newton, Darwin, Marx, Freud, Einstein, and the like.  Obviously, this chapter will not tell you how to develop such grand theories. Instead, it will focus on the development and validation of what Merton (1968) calls middle-range theories. These theories are at a middle point on the continuum between what he calls special theories, which are applicable only to a very small range of phenomena, and general theories, which are highly abstract and applicable to a broad range of phenomena. Middle-range theories are concrete enough to clearly apply to phenomena of interest to a professional field like information and library science, while simultaneously being abstract enough to apply to settings beyond the context in which they were originally developed (Poole, 1985).  Glaser and Strauss’s (1967) approach to grounded theory development provides some structure for the development of middle-range theories. They argued for “grounding theory in social research itself—for generating it from the data” (p. viii). Methods for developing grounded theory have been developed more fully by Charmaz (2014), taking a strongly constructivist approach, and Corbin and Strauss (2008), with more of a focus on technical procedures. The basic idea behind grounded theory is that theory emerges simultaneously with data collection—it isn’t a separate process. Rather than testing an existing theory, this approach begins to formulate a theory that fits the data as the data emerge. At the heart of the process is an overwhelming familiarity of the researcher with his or her materials. The barest of outlines of grounded theory development would go something like the following. As the researcher reads and rereads the interview transcripts and other raw data, significant theoretical concepts will begin to emerge. The researcher codes (i.e., identifies and defines) these concepts whenever they crop up in the data. During coding, theoretical propositions (i.e., relationships between concepts) will occur to the researcher, and these propositions are written up in theoretical memos. These memos provide a record of the evolution of the theoretical framework, including documentation of conflicting evidence found in the data and the researcher’s questions about the findings. The content of these memos continually sends the researcher back to the raw data, comparing the conclusions being drawn and the current version of the theory to the data from which it has been induced. A final prewriting process— sorting—is then undertaken. During the sorting process, the researcher brings the memos together to assess their relative importance and how they fit together into a (it is hoped) cogent and unified theory.  Unquestionably, the grounded theory approach has given the analysis of qualitative data a level of rigor it previously lacked. Still, it doesn’t quite tell you how to develop theory. It gives you a set of steps to follow that should allow you to develop theory. And the constant comparison and rereading of data that are at the heart of grounded theory are well designed to eliminate, insofar as possible, discrepancies between what different researchers will conclude from a given data set. But even then, the process by which a researcher arrives at those conclusions is conditioned by personal predilection. Thus the process is both subjective and inductive, and every theory must be validated in a variety of contexts. {W p. 41-43} |
| **Example 1** | **A Typology of Relationships between Personal Growth and Internet Use** |
| **Text** | **W-Example 1.** This first example illustrates the development of a typology, a comprehensive list of theoretical concepts or categories, and their definitions. Kari and Savolainen (2007) set out to explain “how exactly information processes relate to their context” (p. 47). Their purpose was to develop a typology of such relationships. More specifically, they addressed the following research question: “What kinds of relationships are there between individual developmental objectives and information searching via the Internet?” (p. 50).  After sending an e-mail asking for study volunteers to five local organizations (e.g., a public library, a computer club for seniors), Kari and Savolainen (2007) obtained 18 suitable participants for their study. These were individuals who simply expressed an interest in using the Internet to facilitate their personal growth; no other criteria were considered. The subjects were mostly female (12 of the 18) but came from a diversity of occupations, educational backgrounds, and ages. The study data came from five sources. The first was a primary interview, during which the researchers ascertained subjects’ “general orientation of a partaker’s self-development, Internet use, and Web searching” (p. 54). There followed a pre-search interview focused on the circumstances that precipitated the participant’s search for personal growth. The third step comprised observing and listening to the participant think aloud as he or she conducted a search. After that, the researchers debriefed the participant about the search results in a post-search interview. Finally, Kari and Savolainen (2007) conducted a last interview via telephone, in which they inquired what information the subjects had ascertained in subsequent, unsupervised searching sessions and how that information had affected their pursuit of personal development.  From these interviews and observations, the researchers identified 11 different kinds of relationships between Internet searching and personal growth. For example, there were “affecting” relationships, where the Internet affected a subject’s personal growth or vice versa (i.e., growth influenced search); “causing” relationships, where the desire for personal growth moved a subject to search the Internet or vice versa; and “illustrating” relationships, where the Internet provided users with examples of how they hoped to grow. While some of the 11 types of relationships appeared to overlap substantially and others appeared not to be relationships at all, it must be concluded that Kari and Savolainen (2007) have taken a major step forward in enumerating every conceivable type of linkage between Web searching and the goals of personal development.  If theirs is not the final word on the relationships they sought to study, this is only to say that Kari and Savolainen’s (2007) article is a true work of theory: not true and highly subjective. As the authors themselves put it, “these findings are not an end in themselves, but an instrument to be utilized in further research . . . The work started here could be continued by testing the relationships with different sorts of information seeking or in different contexts; by measuring the distribution, strength and significance of the connections; or by analyzing each of them in more detail” (p. 57). In other words, they have created a typology that can serve as a spur to further research. This typology must now stand up to testing until it no longer can and a new typology becomes necessary to replace it. {W p. 43-44} |
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| **Paper 1.1** | **Relationships between information seeking and context: A qualitative study of Internet searching and the goals of personal development**.  Kari, J., & Savolainen, R. (2007).  Library and Information Science Research, 29(1), 47–69.  Little research has explored how exactly information processes relate to their context. Context is defined as all those things which are not an inherent part of information phenomena, but which nevertheless bear some relation to these. This article addresses the issue by discussing empirical findings from a study on Internet searching and personal development. The purpose of the article is to construct a general typology for researching the links between information seeking and its context. Grounded analysis of the whole corpus revealed 11 different relationships between Internet searching and the goals of personal development. Because these seem to be quite generalizable to information seeking in other contexts (e.g., parenting or location), too, they were then abstracted into four generic relationships: detachment, unity, direction, and interaction. The classifications are offered as tools for understanding information seeking more contextually and for conducting further research in this area. |
| **Example 2** | **A Model of Factors Affecting Sense Making within an Organizational Context** |
| **Text** | **W-Example 2.** Rather than merely categorizing phenomena, Solomon (1997a) posited relationships among several factors affecting “sense making of participants in the annual work planning of a unit of a public agency” (p. 1097). The unnamed government agency Solomon observed in his study was responsible for “provid[ing] technical assistance on natural resource conservation matters primarily to nonprofit community groups” (p. 1099) but had recently been incorporated into a larger parent organization. His research design was ethnographic, and his data collection methods included “observation, participant logs, interviews, and documentary traces” (p. 1101).  The theory-developing nature of his study is obvious from the beginning, as he wrote, “Research is a creative process that builds on a foundation of interests, ideas, anomalies, questions and intuitions; takes advantage of opportunities; and works around barriers and constraints” (Solomon, 1997a, p. 1097). In this three-part article,2 the author attempts to isolate specific factors—timing, social context, and personal predilections—and how they affect sense making within an organizational context. Although clearly ambitious, Solomon is not trying to present a general theory of information behavior; his focus is narrower than that, and he is presenting what might be called a limited model—one that explains certain aspects of information behavior but doesn’t try to explain everything in a given phenomenological universe.  In the first article of the series, to take just one example, Solomon (1997a) sought to describe the time and timing aspects of sense making over a three-year work-planning process. Specifically, he sought to capture exactly what comprised the work-planning process, how the process changed over time, and whether changes indicated progress or breakdowns. From observing this agency over several years, Solomon drew some conclusions that could be characterized as theoretical propositions. Among them were the following: “it takes time for people to build common ground and develop meaning from uncertain and ambiguous evidence” (p. 1107) and “information has a time value and timing of information gathering has important productivity implications” (p. 1107). He also draws some more specific conclusions with practical implications, such as an “early start may actually limit productivity” because “information systems that support process may help in managing and planning for time” (p. 1107). Yet even the latter types of statements are pitched at a high level of abstraction, a hallmark of theoretical propositions.  Solomon paints with similarly broad strokes in other sections of the articles. In his contemplation of the social, he finds that “participants do not think of information or actions to collect, process, or use information as something separate from the task or problem at hand” (Solomon, 1997b, p. 1125). And in the series’ third article, addressing the person, Solomon (1997c) concludes that different people, often reflecting their role in the organization, also have different sense-making styles. These styles included cognition, “where people develop an appreciation of an object in a way that builds on their previous knowledge and experience” (p. 1128); affect, which connoted the emotional side of sense making, including “outbursts of anger and expressions of frustration,” in addition to “excitement, laughter, and other evidence of satisfaction” (p. 1129); and conation, meaning “action instincts,” or people’s natural preferences in information behavior, whether they be information gathering, information processing, innovation, or following through on an existing plan. Taken together, all these individual insights led Solomon (1997c) to the “fundamental insight . . . that information is embedded in people’s lives” (p. 1137). It follows, therefore, that those of us who create information systems must “ground our designs in an understanding of the variety, uncertainty, and complexity of the role of information in people’s lives” (p. 1137).  In effect, Solomon (1997a, 1997b, 1997c) is calling for more attention to be paid to the context of people’s information behavior, based on the empirically grounded theory developed in this set of articles. As Brown and Duguid (2000) would later point out, the world of information is much richer than some designers of information systems would have us believe. But whereas Brown and Duguid concentrated on the social dimension of information and information behavior, Solomon sees a richer context still, one that also embraces time and personal proclivity. Solomon comes to these conclusions based not on some exhaustive survey of all varieties of information behavior—such a survey would be impossible, in the first place—but on the actions of a small number of individuals within one particular organizational context.  As mentioned at the outset, Solomon’s (1997a, 1997b, 1997c) articles represent a higher level of theory than Kari and Savolainen’s (2007) article because Solomon has attempted to explain the interrelationships among phenomena, rather than just to categorize them. Of course, he has proven nothing, but that is the nature of theory development. The test of his theory will be whether it explains sense making in any of the millions of other organizational milieux in the world. {W p. 45-46} |
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| **Paper 2.1** | **Discovering information behavior in sense making. I. Time and timing.**  Solomon, P. (1997a).  Journal of the American Society for Information Science, 48(12), 1097–1108.  This study used the methods of ethnography of communication to explore the information behavior in sense making of participants in the annual work planning of a unit of a public agency. To capture the dynamic time aspects of the work‐planning task, the study continued over three annual iterations of this work‐planning process. The term sense making is used to convey the participants' characterization of their information behavior. This article explores the sense making that took place from the point of view of time and timing. The analysis revealed broad patterns of repetitive action that structured the work‐planning process and limited or focused future action. Data was repeatedly collected early in the annual process, requiring subsequent and repeated updating and verification. A computer database of project information focused data collection and processing on details that were never used and neglected others that required independent data collection, processing, and display. Such findings suggest the role that time plays in capturing meaning from data that has a time value. Understanding of the role of time suggests some possible approaches for improving information management and the design of information systems. |
| **Paper 2.2** | **Discovering information behavior in sense making. II. The social.**  Solomon, P. (1997b).  Journal of the American Society for Information Science, 48(12), 1109–1126.  This article, the second of three, used the methods of ethnography of communication to explore the social elements of information behavior in sense making of participants in the annual work planning of a unit of a public agency. In particular, this article focuses on the role of information in the sense making that took place from the point of view of the organization and other social communication aspects of work life. The organizational sense‐making analysis considers the instantiation of various properties relating to the organization's strategies for survival (identity), history (retrospect), and relations with its environment (extraction of cues). Taken together, the instantiation of these properties structures and supports what, where, when, why, and how information behaviors are employed in sense making. Also considered is the social role of various communicative events (e.g., meetings, conversations, written messages) in the sense making of the parties to the work‐planning task. Communicative events also provide situations for and constraints on the role of information behavior in sense making. A fundamental finding is that the participants in the work‐planning process did not think of information or actions to collect, process, or use information as something separate from the task or problem at hand. Attention to this fact suggests that information systems that exist to support tasks in social settings need to be integrated into organizational or institutional designs. Otherwise, such systems are likely to exist, consume resources, and divert attention away from the basic issues, problems, and sense making of tasks and situations. |
| **Paper 2.3** | **Discovering information behavior in sense making. I. Time and timing.**  Solomon, P. (1997a).  Journal of the American Society for Information Science, 48(12), 1097–1108.  This study used the methods of ethnography of communication to explore the information behavior in sense making of participants in the annual work planning of a unit of a public agency. To capture the dynamic time aspects of the work‐planning task, the study continued over three annual iterations of this work‐planning process. The term sense making is used to convey the participants' characterization of their information behavior. This article explores the sense making that took place from the point of view of time and timing. The analysis revealed broad patterns of repetitive action that structured the work‐planning process and limited or focused future action. Data was repeatedly collected early in the annual process, requiring subsequent and repeated updating and verification. A computer database of project information focused data collection and processing on details that were never used and neglected others that required independent data collection, processing, and display. Such findings suggest the role that time plays in capturing meaning from data that has a time value. Understanding of the role of time suggests some possible approaches for improving information management and the design of information systems. |
| **Example 3** | **Validating a Theoretical Concept** |
| **Text** | **W-Example 3.** Our third exemplar is not an instance of theory formation, but of theory validation. It is included here to illustrate the connection between the two processes. Fisher et al. (2004) set out to test the validity of Fisher’s *information grounds* concept, which she finally discussed in relation to her study of the ways in which nurses and their elderly patients shared information at a monthly foot clinic (Pettigrew, 1999). As recapitulated in this article, an information ground is defined as an “environment temporarily created by the behavior of people who have come together to perform a given task, but from which emerges a social atmosphere that fosters the spontaneous and serendipitous sharing of information” (Fisher et al., 2004, p. 756). This definition and its applicability in a new context were validated in the 2004 study.  The new context was a set of “programs in literacy and coping skills run by the Queens Borough Public Library (QBPL)” (Fisher et al., 2004, p. 758). Fisher and her coauthors were seeking to understand, in part, “whether these programs might function as information grounds” (p. 758). By looking at whether the information grounds concept works in this specific context, they were evaluating the validity and usefulness of Fisher’s theory. Their data came from three sources: interviews with library administrators about the effectiveness of the programs in gaining desired outcomes, interviews with immigrants about the same, and another round of follow-up interviews with library staff to “assess the efficacy of the survey instrument” (p. 758).  The results of the study “suggest[ed] that the QBPL literacy and coping skills model does indeed function as information ground” (Fisher et al., 2004, p. 762). The participants mostly got the information they needed through “communicating with other program attendees and their families and with program staff ” (p. 762), which constitutes a key feature of information grounds. The QBPL programs also conformed to the proposed defined of an information ground inasmuch as they catered to similar social types, participants came “for the same instrumental purpose,” information sharing was multidirectional and both formal and informal, and attendees obtained “diverse outcomes and benefits (p. 762). Given that the validity of this theoretical concept was being evaluated by its originator, it’s not particularly surprising that the results were positive. Nevertheless, this study is a good example of the ways in which even the early formulations of a theory can be validated empirically. How useful the concept of information grounds remains will depend on its further validation in other contexts. {W p. 46} |
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| **Paper 3.1** | **Information grounds and the use of need based services by immigrants in Queens, New York: A context based, outcome evaluation approach.**  Fisher, K. E., Durrance, J. C., & Hinton, M. B. (2004).  JASIST, 55(8), 754–766.  We elaborate on Pettigrew's (1998, 1999) theory of information grounds while using an outcome evaluation approach enriched by its focus on context to explore the use of need‐based services by immigrants in New York City. Immigrants have substantial information and practical needs for help with adjusting to life in a new country. Because of differences in language, culture, and other factors such as access, new immigrants are a difficult population to study. As a result, little research has examined their predilections from an information behavior perspective. We report findings from a qualitative study of how literacy and coping skills programs are used by and benefit the immigrant customers of the Queens Borough Public Library (QBPL). From our interviews and observation of 45 program users, staff, and other stakeholders, we derived a grand context (in Pettigrew's terms) woven from three subcontexts: the immigrants of Queens, New York; the QBPL, its service model, and activities for immigrants; and professional contributions of QBPL staff. Our findings are discussed along two dimensions: (a) building blocks toward information literacy, and (b) personal gains achieved by immigrants for themselves and their families. We conclude that successful introduction to the QBPL—as per its mission, programming, and staff—can lead immigrants to a synergistic information ground that can help in meeting broad psychological, social, and practical needs. |

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| **~ 1h1.3 Chapter 03. Research question originating from practice** {W p. 21-27} | |
| **Synopsis (repeated)** | **W-Conclusion.** As can be seen from these examples and many others not discussed here, it is important for the development of our knowledge base in ILS to study research questions derived from the context of practice. As you consider undertaking a study based on such a question, you might find O’Leary’s (2005) checklist useful:   * Is the question right for you? * Does the question have significance for an organization, an institution, a group, a field, etc.? * Can it lead to tangible situation improvement? * Is the question well articulated? Is the question researchable? * Does the question have a level of political support? (pp. 35–36)   If you responded yes to each of O’Leary’s questions, then you’re ready to embark on the design of your study. Once it’s completed, the dissemination of your results will add to the body of knowledge that we can use to support evidence-based practice. {W p. 26} |
| **Chapter outline** | * Why ask practice-based questions? * Formulating a practice-based question * Carrying out your study * Examples   + Example 1: An evidence-based marketing plan   + Example 2: Developing a web site’s menu structure   + Example 3: Creating social capital in a public library * Conclusion |
| **Chapter introduction** | **W-Introduction.** As early as 1906, Gerould was encouraging information professionals to use more than their own personal experience to make decisions about how best to provide information services. This call has been taken up in the last decade in the form of the evidence-based information practice movement (e.g., Booth & Brice, 2004) and the related call for evidence-based information systems (Atkins & Louw, 2000). The basic idea of evidence-based information practice is that information professionals should base their decisions on the strongest evidence available. As they make decisions about initiating new services, designing new systems, changing current policies, or a myriad of other issues that arise, they should use the current literature base and conduct their own research to identify evidence that can inform those decisions. As Davies (2002) points out, “what is most important is the intelligent use and interpretation of suitable evidence by those who determine policy, allocate resources and manage” (p. 129). In addition, information professionals should not only react to problems that arise in their professional practice. They should proactively question their current practices, constantly seeking ways to improve the resources and services they provide (Booth, 2006).  Most of the attention in the evidence-based information practice movement is on identifying and using the conclusions of existing studies to inform decisions about information practice. However, the body of research in information and library science (ILS) is small (Haddow, 1997) and will continue to remain small if the creation of new knowledge is seen as the province of only the academic researchers in our findings. To increase the research base of the first practitioners will also need to conduct their own studies and report their results to the wider community (Crumley & Koufogiannakis, 2002). Information professionals “need to start filling the gaps and mending the seams of our professional body of knowledge in order for our profession to advance” (Koufogiannakis & Crumley, 2006, p. 338). Although practitioners face a number of barriers to conducting research (e.g., lack of employer support for research, lack of external funding, lack of training/expertise in research methods, and lack of examples in the current literature), it is critical for them to overcome these barriers if we are to develop a robust knowledge base that can support evidence-based practice (Koufogiannakis & Crumley, 2006).  One way for practitioners to overcome many of these barriers is to team up with researchers in nearby universities. Such an arrangement is advantageous for both parties because the practitioner will get some evidence on which to base a decision and the academic researcher will get access to practical questions that can motivate studies that will have an immediate impact on the field. Even if there is no ILS school nearby, an information professional may collaborate virtually or may team up with a researcher in a related department. For instance, a school librarian might team up with a researcher in education, or the developer of some social software might team up with a sociologist. In these ways, practitioners and academic researchers can, together, strengthen the field’s knowledge base. {W p. 21-22} |
| **Example 1** | **An Evidence-Based Marketing Plan** |
| **Text** | **W-Example 1.** As the Business and Economics Library (BEL) at the University of Illinois at Urbana-Champaign (UIUC) was considering new services to offer, one of the librarians there (Song, 2006) undertook a marketing study “to understand how business students perceived BEL and its current services” (p. 70). It was expected that understanding library users’ attitudes about current services would help the librarians identify new services that would be most valuable to this audience.  The goal of the study was to survey all the graduate business students at UIUC. Two of the three research questions were intended to help the BEL design a general marketing strategy. These were (1) “What services do graduate business students want to receive from BEL?” and (2) “With whom should BEL partner to increase visibility at the College of Business?” (Song, 2006, p. 72). Because over half of the students in the College of Business (the library’s primary target audience) were international students, and approximately 70 percent of those international students were from East Asia, the third research question focused on this subpopulation: “Should BEL develop marketing strategies differently for East Asian business students?” (Song, 2006, p. 72). Both open-ended and closed-ended survey questions were used to generate results that addressed these questions.  This study illustrates the way in which a local library’s planning needs can be addressed, while still conducting a study that will be of interest beyond the local setting. Very concrete results were obtained to provide support to the BEL’s efforts in planning a marketing strategy. At the same time, it is likely that those results would also be applicable to other institutions (i.e., other large universities with a departmental business library that includes a high proportion of international students). By making these results available through publication, Song has added to our knowledge base for marketing academic libraries. {W p. 23-24} |
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| **Paper 1.1** | **Evidence-based marketing for academic librarians.**  Song, Y.-S. (2006).  Evidence Based Library and Information Practice, 1(1), 69–80.  **Objective** - In developing marketing strategies for the Business & Economics Library (BEL) at the University of Illinois at Urbana–Champaign (UIUC), a survey was designed to answer the following questions:   * Should BEL develop marketing strategies differently for East Asian business students? * What services do graduate business students want to receive from BEL? * With whom should BEL partner to increase visibility at the College of Business?   Marketing research techniques were used to gather evidence upon which BEL could construct appropriate marketing strategies. **Methods** - A questionnaire was used with graduate business students enrolled at UIUC. The survey consisted of four categories of questions: 1) demographics, 2) assessment of current library services, 3) desired library services, and 4) research behavior. The data were analyzed using descriptive statistics and hypothesis testing to answer the three research questions. Results - East Asian business students showed similar assessment of current services as non-East Asian **international** business students. Survey results also showed that graduate business students had low awareness of current library services. The Business Career Services Office was identified as a co-branding partner for BEL to increase its visibility. **Conclusion** - A marketing research approach was used to help BEL make important strategic decisions before launching marketing campaigns to increase visibility to graduate business students at UIUC. As a result of the survey, a deeper understanding of graduate business students’ expectations and assessment of library services was gained. Students’ perceptions became a foundation that helped shape marketing strategies for BEL to increase its visibility at the College of Business. Creating marketing strategies without concrete data and analysis is a risky endeavor that librarians, not just corporate marketers, should avoid. |
| **Example 2** | **Developing a Web Site’s Menu Structure** |
| **Text** | **W-Example 2.** Huntington and Nicholas (2006) argue that because “the search terms entered by users reveal their information need” (p. 119), the logs of user searches can be used effectively to design a Web site’s menu structure. The design of a site’s menu structure is a core problem faced by Web site designers in their daily practice; although the authors of this study are not practitioners, they have selected a research problem that has important implications for practice.  From a population of over 4 million searches, the authors analyzed the 1,838 searches that were related to diabetes. These searches included 384 different search expressions, with the top 20 search expressions accounting for 58 percent of all the searches. The search expressions (excluding the single term diabetes) were then classified into 19 broad subject categories. These categories were compared to the menu structures already implemented on three Internet-based diabetes information services (including the British Broadcasting Corporation [BBC] site, from which the transaction logs were collected). None of these menu structures was completely effective in covering the 19 broad subject categories identified from the user searches. The authors concluded by proposing a six-item menu structure that will provide good coverage of the subject categories derived from user searches.  The purpose of this paper was to demonstrate that transaction log data could be used as the basis for the design of Web site menu structures. Using one health-related topic (diabetes) as an example, Huntington and Nicholas (2006) were able to derive a menu structure that provided good coverage of the types of information needs that searchers of the BBC site expressed in their searches. To be applied to a wider range of topics (e.g., all health-related topics, or even more broadly, all topics covered on the BBC Web site) would require a significant additional investment. Nevertheless, the approach they espouse could be taken by designers of well-focused sites and could improve the menu structures on those sites. {W p. 132-133} |
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| **Paper 2.1** | **Improving the relevance of Web menus using search logs: A BBCi case study**.  Huntington, P., & Nicholas, D. (2006).  Aslib Proceedings, 58(1), 118–128.  **Purpose** – The paper seeks to propose a method for selecting menu items based on an analysis of user-entered search terms. Menu pages inform users what is coming next and what questions are going to be answered by an information communication technology service. Menus need to reflect user needs. The paper aims to argue that users reveal the scope of their information needs by the words used in their search expressions and these can be analysed to inform menu titles.  **Design/methodology/approach** – The paper presents an analysis and classification of user search expressions that are automatically collected by the server. The paper examines the search expressions of about 1,000 users of the BBC site related to search expressions on diabetes.  **Findings** – The search expressions were classified, analysed and compared with the diabetes menu of three health sites: NHS Direct (www.nhsdirect.nhs.uk); BBC health (www.bbc.co.uk); and Diabetics UK (www.diabetes.org.uk). Finally, a six-point menu is derived.  **Practical implications** – The practical implication of this paper is development of relevant web menus based on user information needs as revealed in search expressions entered by users.  **Originality/value** – This is the first explanation of how search logs can be used to construct menu lists. Previously menus have been designed at worst to suit producers and site designers based on the information that they have available and at best on interviews with small usability or focus groups who are not necessarily users. |
| **Example 3** | **Creating Social Capital in a Public Library** |
| **Text** | **W-Example 3.** The role of public libraries in their communities is an issue with important local implications. By understanding the library’s potential role in building social capital within the community, the library staff can perform that role more effectively. Thus, although these studies (Johnson, 2010, 2012) were conducted by an academic researcher, the research questions are very pertinent to the practice of public librarianship.  The first study (Johnson, 2010) examined the relationship between use of a public library and perceptions of social capital. Users of three public library branches were invited to respond to a questionnaire as they visited the library. The questionnaire asked about frequency of library use, perceptions of social capital, and perceptions of community-level social capital. Because portions of the questionnaire had been used in an earlier citywide phone survey, the library users’ responses could also be compared with those of city residents in general. There was strong evidence of a relationship between library use and community social capital, and some aspects of this relationship varied by library branch/neighborhood. Although it did provide an initial look at the influence of public libraries on perceptions of social capital, this study did not address the specific influence of library users’ interactions with library staff. A second study (Johnson, 2012) addressed this point. Fifteen library staff members (three branch managers, four other librarians, and eight library assistants) from the same three public library branches were interviewed about their social interactions with patrons, the development of “special relationships” (p. 55) with patrons, and their perceptions of what they and the patrons got out of these relationships. A thematic analysis of the transcribed interviews revealed that relationships and trust were built between librarians and patrons; that various kinds of help were provided to patrons, using resources both within and outside the library; and that patrons had multiple perspectives on the library as place (as an informal meeting place, as a safe place, and as a social place). From this second study, Johnson concluded that librarians’ interactions with patrons do influence the development of social capital.  The public library involved in this research can benefit directly from the results of these studies. Those results will be useful in helping the library staff prioritize services and to further develop those that contribute the most to the development of social capital within the community being served. Although these concerns will need to be considered in combination with concerns for other types of library services, the results of these studies provide strong evidence that the library in this community plays more than an instrumental role in providing direct information services—it also contributes to the development of social capital within the community.  Other public librarians can also learn from these results. One possibility is to replicate this study in their own community to gain an in-depth understanding of their role in developing community social capital. If that is not possible, other public librarians could analyze their services in relation to those that were found to be most significant in developing social capital within the community studied by Johnson, that is, other librarians can apply these findings to their own situations. {W p. 133} |
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| **Paper 3.1** | **Do public libraries contribute to social capital? A preliminary investigation into the relationship.**  Johnson, C.A. (2010).  Library & Info. Sci. Research, 32(2), 147–155.  Public libraries have been held in high regard by communities since they were established in North America in the mid-19th century. Recently, with their diminishing informational role combined with the economic downturn, libraries have had to reassert their relevance to communities in a period of severely reduced municipal budgets. One role that is often assumed but rarely examined in depth is the library as a generator of social capital. This preliminary study investigates the relationship between public libraries and indicators of social capital using a questionnaire survey administered in three branch libraries in a large Midwestern American city. Library users had significantly higher levels of social capital in terms of community involvement and trust than a random sample of city residents. When frequency of library use was correlated with indicators of social capital there were mixed results. Library use was significantly associated with community involvement, but not with trust. Lack of trust in neighbors may be the incentive for people to become more involved in their communities in order to create a safer environment. The findings suggest that there is a strong relationship between public libraries and social capital but that further research is needed to broaden the base of the study and to include interviews with library patrons and staff so as to get a more nuanced view of how social capital is created. |
| **Paper 3.2** | **How do public libraries create social capital? An analysis of interactions between library staff and patrons.**  Johnson, C.A. (2012).  Libr & Info Sci Res, 34(1), 52–62.  In this qualitative study exploring the content of social interactions between library staff and patrons, interviews were held with 15 library staff members in three neighborhood branch libraries in a large American midwestern city. An analysis of the interviews suggests that public libraries may contribute to social capital through the relationships and interactions that occur between staff and patrons. Some of the ways in which these relationships and interactions may contribute to social capital include: building patrons' trust in the library and its staff, connecting people to both community and library resources, providing social support for patrons, reducing social isolation, helping patrons gain skills to function in an increasingly online world, and providing a positive place for neighborhood residents to gather. The kinds of social interactions occurring in libraries that may help to build social capital are highlighted. |

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| **~ 1h2.1.1 Chapter 04. Descriptions of Phenomena or Settings** {W p. 28-33} | |
| **Synopsis (repeated)** | **W-Conclusion.** Most often, descriptive questions arise at the beginning of a program of study, when the phenomenon of interest has not yet been fully defined. The goal is for the research to provide a detailed description of the phenomenon of interest and, possibly, its relationships to other phenomena. Eventually, a theory about it may be formed and hypotheses about that theory generated and tested (see Chapter 6). The four studies examined in this chapter show us some of the variety of types of descriptive questions that might be asked. Some of them (e.g., Carlyle, 2001) will originate from professional practices that are in need of improvement. Some of them (e.g., Brown, 2003) will originate in the invention of a new technology. Some of them will arise from the practice literature (e.g., Gross & Saxton, 2001; Rothbauer, 2004a, 2004b) or the research literature (e.g., Brown, 2003; Gross & Saxton, 2001). Some of them (e.g., Rothbauer, 2004a, 2004b) will originate in the personal experiences of the researcher. In all the examples examined here, the first priority was to describe the phenomenon of interest, whether it was the publishing behaviors and attitudes of chemists or the reading behaviors and attitudes of young lesbian women. {W p. 32} |
| **Chapter outline** | * Introduction * Examples   + Example 1: Library users’ understanding of the relationships among sets of works   + Example 2: Chemists’ perceptions of e-prints   + Example 3: The role of reading in the lives of lesbian and queer young women   + Example 4: Imposed queries * Conclusion |
| **Chapter introduction** | **W-Introduction.** As Punch (1998) suggests in the epigraph, descriptive studies are conducted for the purpose of understanding a phenomenon or setting that is complicated; it is too complex to take in with just a superficial observation of it. When it is important to understand a phenomenon or setting and we do not yet understand that phenomenon or setting, then a descriptive study should be undertaken. The research questions represented by descriptive studies ask such things as, “What is this phenomenon?”, “What occurred at this event?”, “Who participated in it?”, “When and where is this phenomenon occurring?”, or “How frequently is this phenomenon occurring?”  You will have a number of specific reasons for conducting a descriptive study, and often you will be using several of them in your rationale for a single study. The first, and most obvious, is that you need to explore a new phenomenon or construct. For example, not so long ago, there was no such thing as the World Wide Web. When the Web became a reality, it was not at all clear how people might go about searching for Web materials and navigating among Web sites. Many exploratory, descriptive studies have been undertaken to understand these phenomena, and more are needed as the capabilities provided by the Web evolve. A second reason for conducting a descriptive study is that you may wish to understand a phenomenon in more depth. It may be that a particular behavior has been found among a particular group, and you want to find out if another group of interest also displays the same behavior and, if not, how that group behaves differently. For example, previous studies may have found that middle school children read fantasy books as an escape mechanism, and you want to find out if this same motivation holds true for younger children. A third reason for conducting a descriptive study is to understand a particular phenomenon for the particular purpose of using that understanding to improve a system’s or program’s design. For example, you may want to understand your library’s users’ reactions to your summer reading program so that you can make improvements in that program. Or you may want to understand how people formulate their Web search strategies so that you can better support their searching of your new Web-based online library catalog. A fourth reason for conducting a descriptive study is that the study will be the first step in the development of a new theory. Because this purpose takes on some additional dimensions not present in other types of descriptive studies, a separate chapter is devoted to developing research questions related to theory development and validation (Chapter 6). {W p. 28-29} |
| **Example 1** | **Library Users’ Understanding of the Relationships among Sets of Works** |
| **Text** | **W-Example 1.** Carlyle (2001) investigated “the ways in which people group or categorize documents associated with a voluminous work” (p. 677). She defined a voluminous work as “a large group of documents sharing a variety of relationships that evolve out of and are linked to a common originator document” (p. 678). For example, a keyword search on Shakespeare and Romeo and Juliet in my own university’s online catalog today yielded 434 items. That list included the original play in various editions, books about Shakespeare and his plays, audio versions of the play or books about it, recordings of musical compositions inspired by the play, recordings of productions of the play, and modern adaptations of the play. They were not in any order that I could easily discern (e.g., the first occurrence of the actual play was fifth on the list).  The rationale for Carlyle’s (2001) study was based on her desire to improve known-item searching in online catalogs. In particular, she was interested in improving the display of the results of a known-item search (Carlyle, 1997). Most current catalogs list a group of related documents with little or no indication of the relationships between the individual items in the group. Carlyle (2001) argues that “easily scanned, single-screen summary displays that group records or documents by type of relationship” (p. 679) would be more useful. Therefore she asked the research question, “How would library users group the items in a voluminous work?” By understanding how library users would group such works, system designers can match online catalog displays to users’ expectations, thus providing better support for known-item searching in library catalogs. Carlyle (2001) used Dickens’s A Christmas Carol as the voluminous work in her study; it included a set of 47 documents. She asked her study participants to group the actual documents based on how similar they were to each other. Fifty adult participants were recruited in a local mall, and the study was conducted there. The data from the participants were analyzed through cluster analysis, identifying six different clusters: sound recordings, non–English-language versions, paperback versions, video recordings, hardcover versions, and children’s and activity versions. These clusters represent the mental models that people have concerning the items in a voluminous work and the relationships among those items. Carlyle went on to discuss the implications of these results in terms of the design of catalog displays (suggesting a possible way to display voluminous works), in terms of the metadata needed to implement such a display, and in terms of the design of digital libraries. In this way, her results are likely to have an impact on the design of online catalogs and similar systems. {W p. 29-30} |
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| **Paper 1.1** | **Fulfilling the second objective in the online catalog: Schemes for organizing author and work records into usable displays.**  Carlyle, A. (1997).  LRTS, 41(2), 79–100.  An analysis of the requirements of the second objective of the catalog shows that it has two components, a retrieval component and a display component, and that it may be interpreted broadly to include related works and works about a work or author. Two schemes are investigated for their contributions to the creation of online catalog displays that meet second objective requirements. First, the catalog filing rule scheme is analyzed to show that author and work displays in card catalogs have been composed of many groups or classes of materials that may also be used to create organized displays in online catalogs. The groups used, in the filing rule scheme are based on relationships among items. Second, a scheme based on Tillett’s bibliographic relationship taxonomy is proposed to discover additional types of relationships that may be used to group records in online catalog displays. Finally, a new scheme for the creation of organized displays in online catalogs is proposed. It incorporates elements from both the filing rule scheme and the bibliographic relationship taxonomy to create displays that meet the requirements of the second objective more fully than either scheme does alone. |
| **Paper 1.2** | **Developing organized information displays for voluminous works: A study of user clustering behavior.**  Carlyle, A. (2001).  IPM, 37(5), 677–699.  This paper investigates the ways in which people group or categorize documents associated with a voluminous work to guide the construction of organized displays for information retrieval systems (IRSs). Fifty participants completed an unconstrained sorting task in which they were asked to sort into groups 47 documents associated with the voluminous work A Christmas Carol, by Charles Dickens. Participants were asked to group documents based on how similar they were to each other and such that the groups would help them to remember how to find them at a later time. Data collected from the sorting task were summarized using cluster analysis, employed to discover common groupings created by participants. Groupings discovered frequently shared physical format, language, and audience attributes. |
| **Example 2** | **Chemists’ Perceptions of E-Prints** |
| **Text** | **W-Example 2.** Brown (2003) investigated the acceptance of e-prints by chemists. This question originated from two different perspectives. The first was the launch of the Chemistry Pre-print Server (CPS) by Elsevier in August 2000. At that time, it included 20 papers; by the end of 2001, when the study was conducted, it included 362 papers. In addition to allowing authors to post electronic preprints of papers, CPS supported the evaluation (through reader rankings of them) and discussion (through an online discussion board) of those papers. The system provided listings of the most viewed, most discussed, and highest-ranking articles as well as the most recently posted articles. The availability of this novel service was one motivation for trying to describe the ways in which chemists accept and use it. The second motivation was the prior literature on other disciplines in the natural sciences and the ways in which they communicate within their “invisible colleges.” In particular, a number of studies of physicists’ use of electronic preprints have been undertaken, so a comparison of chemists’ and physicists’ scholarly communication behaviors would be of interest.  Given these motivations for the study, Brown (2003) wanted to describe the acceptance of the CPS by chemists, as well as the ways in which they were using it. She analyzed citations to the e-prints included in CPS, as well as their own referencing of electronic preprints. She examined the relationships between the citation data and the usage, ranking, and discussion data from CPS. She surveyed the authors of CPS papers concerning their perceptions of and interactions with CPS. Finally, she surveyed the editors of leading chemistry journals. She found that chemists had come to value the interactions associated with publication of electronic preprints and were “becoming increasingly aware of the utility, versatility, and validity of the e-print mode of communication” (p. 369).  Brown’s (2003) research question was purely descriptive. She was interested in understanding a new phenomenon—the use of e-prints by chemists—in terms of both the chemists’ behaviors and the chemists’ perceptions of the utility of e-prints. This question, although partially motivated by the appearance of a new technology, was well situated within the context of studies of scholarly communication and builds on prior research in that area. Such snapshots of phenomena as they occur can be very useful in the long term for increasing our understanding of those phenomena and how they evolve. {W p. 30} |
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| **Paper 2.1** | **The role of electronic preprints in chemical communication: Analysis of citation, usage, and acceptance [by journals].**  Brown, C. (2003).  JASIST, 54(5), 362–371.  This study characterizes the usage and acceptance of electronic preprints (e‐prints) in the literature of chemistry. Survey of authors of e‐prints appearing in the Chemistry Preprint Server (CPS) at http://preprints.chemweb.com indicates use of the CPS as a convenient vehicle for dissemination of research findings and for receipt of feedback before submitting to a peer‐reviewed journal. Reception of CPS e‐prints by editors of top chemistry journals is very poor. Only 6% of editors responding allow publication of articles that have previously appeared as e‐prints. Concerns focus on the lack of peer review and the uncertain permanence of e‐print storage. Consequently, it was not surprising to discover that citation analysis yielded no citations to CPS e‐prints in the traditional literature of chemistry. Yet data collected and posted by the CPS indicates that the e‐prints are valued, read, and discussed to a notable extent within the chemistry community. Thirty‐two percent of the most highly rated, viewed, and discussed e‐prints eventually appear in the journal literature, indicating the validity of the work submitted to the CPS. This investigation illustrates the ambivalence with which editors and authors view the CPS, but also gives an early sense of the potential free and rapid information dissemination, coupled with open, uninhibited discussion and evaluation, has to expand, enrich, and vitalize the scholarly discourse of chemical scientists. |
| **Example 3** | **The Role of Reading in the Lives of Lesbian and Queer Young Women** |
| **Text** | **W-Example 3.** For her dissertation, Rothbauer (2004a, 2004b)3,4 “explored the role of reading in the lives of self-identified lesbian or queer young women” (2004a, p. 89). Part of her motivation was very personal—wondering whether others shared her “experience of the shock of self-recognition when [she] encountered a lesbian character in a novel for the first time” (2004a, p. 90). Rothbauer is not unique in the way her personal experiences shaped her research interests. It is often true that research questions are derived from the personal experiences of a researcher, for example, an encounter with a troublesome help desk client may lead to a study of help desk services, or an observation of a coworker’s rejection of a new technology may lead to a study of technology resistance among information professionals. Your personal experiences can often launch a particular line of study.  In addition, Rothbauer (2004a) was motivated by a particular thread in the literature of library practice. As she notes, “an argument is often made in the literature for librarians that libraries ought to provide access to a broad selection of lesbian and gay literature, especially for young readers who may turn to library resources as a way to explore what it means to be lesbian, gay, bisexual, trans-, or queer” (p. 90). In an earlier related study, she argued that public libraries, in particular, should provide access to literature for young adults that “reflects the reality of their lives” (Rothbauer & McKechnie, 1999, p.32). Such calls for action in the literature often motivate a research study. As in this case, when somebody argues that libraries should do something, it can lead to a question about whether they actually heed that prescription.  Rothbauer worked her way around this question through a series of studies, first investigating whether Canadian public libraries included gay and lesbian fiction in their collections (Rothbauer & McKechnie, 1999) and subsequently studying how such fiction is reviewed in several of the reviewing tools used by librarians (Rothbauer & McKechnie, 2000). These studies eventually led to the research that is our focus here, an investigation of the role of reading such literature in the lives of young women. Using an interpretive approach to her research, Rothbauer (2004b) “conducted flexibly structured, in-depth, conversational interviews” (p. 62) with 17 young women who self-identified as lesbian or queer. In addition, four of the participants completed writing exercises, and Rothbauer kept field notes and diaries of her work. Her findings help us understand the ways in which this particular population uses reading as an “opportunity to engage with the larger world” (Rothbauer, 2004b, p. 63) and the potential (though currently unfulfilled) role for public libraries in supporting these women’s reading. {W p. 30-31} |
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| **Paper 3.1** | **The Internet in the reading accounts of lesbian and queer young women: Failed searches and unsanctioned reading.**  Rothbauer, P. (2004a).  CJILS, 28(4), 89–110.  In my dissertation research (Rothbauer 2004a), I explore the role of voluntary reading in the lives of self-identified lesbian or queer young women (18–23 years). The larger context of this inquiry concerns the negotiation of diverse meanings of alternative sexualities constructed by young people through the consumption of a range of self-selected reading materials, including lesbian and gay literature. Data collection and analysis were guided by qualitative principles of interpretive and reflexive research, and data are taken primarily from conversational interviews with 17 young women, conducted between November 2001 and February 2003. One area of significant findings encompasses the uses of the Internet by my participants as they sought lesbian and gay reading materials in a computer-mediated on-line environment. In their reading accounts, these young women variously conceived of the Internet as a search medium and as a site of access to digital and paper-based texts. However, their failure to locate desired texts, along with a reluctance to draw attention to unsanctioned reading preferences, invites contemplation of the role of public libraries in the creation of access to lesbian and gay materials. |
| **Paper 3.2** | **“People aren’t afraid anymore, but it’s hard to find books”: Reading practices that inform the personal and social identities of self-identified lesbian and queer young women .**  Rothbauer, P. (2004b).  CJILS, 28(3), 53–74.  This presentation is an overview of findings from my dissertation research into the voluntary reading practices of lesbian and queer young women. Three themes emerged from analysis of in-depth interviews: reading as escape, reading for possibilities, and reading for community. The roles of libraries, bookstores and the Internet are discussed. |
| **Paper 3.3** | **Gay and lesbian fiction for young adults: A survey of holdings in Canadian public libraries.**  Rothbauer, P. M., & McKechnie, L.E.F. (1999).  CB, 18(1), 32–39.  The purpose of this study was to determine if young adults, or others interested in literature for teens, have access through public libraries to novels with homosexual content. A random sample of 40 English language young adult novels with gay/lesbian content was checked against the holdings of 40 medium and large Canadian public libraries having remotely accessible catalogs. The average number of titles held by all libraries was 16.2 (40.4 percent). There was no significant relationship found between library size and number of titles held (r = 0.302; CV0.05 (38) = 0.311). The results of this study suggest that, while some libraries seem to be doing a good job of providing these potentially controversial titles, others are not. Suggestions for further research are included. |
| **Paper 3.4** | **The treatment of lesbian and gay fiction for young adults in selected prominent reviewing media.**  Rothbauer, P. M., & McKechnie, L.E.F. (2000).  CB, 19(1), 5–16.  Content analysis was used to determine how a sample of 32gay and lesbian novels for young adults were treated in 158reviews from five prominent reviewing journals. Findings indicate that most reviews (84.8 percent) were favorable, many (79.7 percent) contained clear reference to the homosexual content, and there were few differences between the individual reviewing journals. Some reviews contained cautions and warnings about the gay and lesbian content, some denied or downplayed it, some justified the content if it was used to teach a lesson, and most described these stories as ``problem'' novels. Analysis also showed that gay and lesbian fiction is now regarded as a distinct genre of young adult literature. While librarians wishing to identify gay and lesbian fiction for collection development will be able to do so through the reviewing media, ambivalence about this literature and the young adults it represents was also evident in the reviews. |
| **Example 4** | **Imposed Queries** |
| **Text** | **W-Example 4.** Gross and Saxton (2001) position their research question within the context of the field’s quest for an understanding of the ways in which public libraries are used. Specifically, they are interested in understanding imposed queries in a public library context. But the interest in public library services is only one of the roots of this question. The other starting point is in Gross’s (1995) earlier work, developing the concept of an imposed query. An imposed query is defined as “a question that is developed by one person and then given to someone else who will receive, hold and transact the query for that person” (Gross & Saxton, 2001, pp. 170–171). For example, a student might be pursuing a question assigned by his or her teacher, or a husband might be pursuing a question originally raised by his wife. In each case, the information need is imposed on an agent, who will search for a response and communicate it to the original imposer of the question. Gross (1995) argues that the concept of the imposed query complements the concept of a self-generated query, augmenting our understanding of the information needs of library users and others.  In this study, Gross and Saxton (2001) want to find out the extent to which such queries are brought to public library reference desks, the characteristics of the agents bringing the questions, and the characteristics of the persons initially posing the questions (i.e., the imposers). This type of question can be traced back to Gross’s (1995) observation that “it is unclear with what frequency people seek information on the behalf of others, and the types of situations that elicit this behavior have not been fully enumerated” (p. 241). Here, Gross and Saxton (2001) begin to build our understanding of imposed queries addressed to public libraries. Additional descriptive studies in other library and information settings will be needed to more fully understand this phenomenon. In addition, researchers can begin to study the differences between user behaviors associated with self-generated queries and those associated with imposed queries. The findings of such studies will have important implications for providing reference services, as well as designing computer-mediated library services. {W p. 31-32} |
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| **Paper 4.1** | **The imposed query**.  Gross, M. (1995).  RQ, 35(2), 236–243.  The acquisition of information in service to or on behalf of someone else is an information-seeking behavior that is already present in the literature of library and information science in an implicit way. This paper seeks to make this process explicit by naming it and providing a model through which its special nature can be discussed. Key features of the model are presented and questions concerning implications for research and practice are examined. |
| **Paper 4.2** | **Who wants to know? Imposed queries in the public library.**  Gross, M., & Saxton, M. L. (2001).  Public Libraries, 40(3), 170–176.  It is often assumed that the library user and the person with the information need are one and the same. However, information professionals know that they serve agent users who are gathering information for others, a fact isolated byte-imposed query model. Yet, because the extent of this behavior in libraries is unknown, it is difficult to gauge the relative importance of imposed queries when planning and designing information programs and services. This study identifies the relationships between agents and imposers that motivate reference desk use and describes agent users in terms of their self-reported education levels and frequency of library and reference desk use. It indicates that approximately25 percent of the reference transactions conducted -at the adult reference desk in public libraries are reported to be for someone else. |

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| **~ 1h2.2.1 Chapter 05. Research questions answered by testing hypotheses** {W p. 34-40} | |
| **Synopsis (repeated)** | **W-Conclusion.** Many studies are conducted to test specific hypotheses. These hypotheses may be derived from personal experience (as with the Cheng, 2003, study), from prior research (as with the White & Ruthven, 2006, study), or from a theoretical foundation (as with the Sundar et al., 2007, study). No matter what the source for the hypothesis is, the hypothesis must be stated clearly for it to be tested. Hypotheses may be listed explicitly, as in the Sundar and colleagues study, or they may be stated as research questions and transformed into null hypotheses only for statistical analyses. However, it is critical that each construct or phenomenon under investigation be defined clearly and that each criterion evaluated or aspect examined be characterized in a way that can lead to its valid measurement. {W p. 39-40} |
| **Chapter outline** | * Definition of a hypothesis * Sources of hypotheses * Testing hypotheses * Examples   + Example 1: People’s desire for control of information retrieval interactions   + Example 2: The effect of a workshop on clinicians’ information-seeking behaviors and attitudes   + Example 3: Effects of peripheral cues on people’s evaluations of newsbot displays * Conclusion |
| **Chapter introduction** | **W-Introduction.** Kerlinger (1986) defines a hypothesis as “a conjectural statement of the relation between two or more variables” (p. 17). Thus, when we say that we will test a hypothesis, we mean that we have made a statement that we assume, for the sake of argument, to be true. But the research study itself will be designed to test the truth of the statement. In Kumar’s (2005) words, it must be “capable of verification” (p. 76). So, as Huxley (1907) points out, it is the task—and the great tragedy—of research to be obligated to test our hypotheses against reality.  In most cases, hypotheses in social science research make a statement about the relationship between two variables. For example, you might hypothesize that the amount a person uses an information system is related to his or her satisfaction with that system. This example is typical in that the hypothesis states that the two variables are related but does not state that one causes the other. In this example, more use may cause an increase in satisfaction, or higher satisfaction may cause increased use, or there may be some other (as yet unknown) variable that leads to both more use and higher satisfaction. We often want to find out whether one phenomenon causes another. As Punch (1998) points out, “the concept of causation is deeply ingrained in our culture, and saturates our attempts to understand and explain the world” (p. 51). To move from testing for the existence of a hypothesized relationship to concluding that one of the phenomena causes the other, we usually must rely on additional data or forms of reasoning. {W p. 34} |
| **Example 1** | **People’s Desire for Control of Information Retrieval Interactions** |
| **Text** | **W-Example 1.** White and Ruthven (2006) developed their research question based on past empirical studies in information retrieval and, particularly, studies of the ways in which people reformulate their queries through relevance feedback. They were especially interested in three aspects of people’s interactions with search systems: formulating and reformulating queries, indicating that particular items are relevant to the information need motivating the query, and deciding whether to stop or continue with a search. Their purpose in conducting the study was “to establish how much control users actually want” (p. 934, emphasis in original) over these three aspects of their search interactions.  The research question is embedded within the assumption that it is worth pursuing the use of relevance feedback for improving search effectiveness. This assumption is based on past studies of information retrieval on “batch” systems, in which relevance feedback has proved effective. To inform the design of this study, the authors reviewed past studies of the ways in which people formulate and reformulate queries, provide relevance feedback by identifying relevant documents, and indicate that a search should continue rather than stop. This literature provided some background information on people’s behaviors, but it did not answer the question of how much control people would like to exert when conducting a search.  To address this question, the authors developed three different systems, each allocating control for search processes to the user or to the system in different ways. The “manual” system allowed the user to fully control relevance indication, query construction, and query execution. The “assisted” system delegated relevance indication to the system; the system assumed that if the user interacted with the representations of a particular document, that document should be considered relevant, even though the user did not explicitly mark it as relevant. In the “assisted” system, responsibility for query construction and query execution were shared by the user and the system. A third system, the “automatic” system, placed control for all three activities with the system.  Given these three systems, the next challenge for the authors was to decide on the criteria that should be used to compare the systems. Because they were interested in people’s desire for control rather than user or system performance, they chose to evaluate people’s affective responses to the systems. Each study participant interacted with each system and then rated their reactions to those interactions through a series of questionnaires. The primary question investigated by this study can thus be stated as the null hypothesis that there is no difference in users’ attitudes toward and preferences for these three systems. If a difference was discovered (leading the researchers to reject the null hypothesis), we would infer that future systems should delegate control of the search interaction to the user or the system in a way that mimics the preferred system in this study. Overall, White and Ruthven (2006) found that the participants wanted the system to infer relevance from their interactions, but that they wanted to retain control over the query formulation and query execution processes.  This study is a good example of how a research question can be derived from prior empirical studies and can lead to further research questions. The research question was based on the many studies of relevance feedback in so-called batch retrieval systems that preceded this study, as well as the many studies of how people interact with search systems. These prior studies helped the authors narrow their focus on the question of how much control of the search process should be allocated to the searcher and how much to the system. Furthermore, the authors argued persuasively that it was necessary to understand people’s desire for control before investigating the particular interface mechanisms that would provide them with that control. Their study leaves us with a clear path to these future interface-oriented research questions.  The authors developed an experiment, based on their research question, to test the (null) hypothesis that there was no difference between the systems in terms of their ability to support people’s desires for control of the search process. Although this research question could have been framed in a way that led to another type of research design, it was very appropriate for the authors to develop the three systems with clearly articulated differences in level of user control and to formally test the differences in users’ attitudes toward them. Both the types of control that might be delegated to the system and the measurement of users’ attitudes toward system effectiveness were relatively well understood. The first dimension (i.e., level of control) could be manipulated to set up the needed comparisons. The second dimension (i.e., user perceptions) could be reliably measured. This is the ideal situation in which a formal hypothesis can be tested. {W p. 36-37 |
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| **Paper 1.1** | **A study of interface support mechanisms for interactive information retrieval.**  White, R.W. & Ruthven, I. (2006).  JASIST, 57(7), 933–948.  Advances in search technology have meant that search systems can now offer assistance to users beyond simply retrieving a set of documents. For example, search systems are now capable of inferring user interests by observing their interaction, offering suggestions about what terms could be used in a query, or reorganizing search results to make exploration of retrieved material more effective. When providing new search functionality, system designers must decide how the new functionality should be offered to users. One major choice is between (a) offering automatic features that require little human input, but give little human control; or (b) interactive features which allow human control over how the feature is used, but often give little guidance over how the feature should be best used. This article presents a study in which we empirically investigate the issue of control by presenting an experiment in which participants were asked to interact with three experimental systems that vary the degree of control they had in creating queries, indicating which results are relevant in making search decisions. We use our findings to discuss why and how the control users want over search decisions can vary depending on the nature of the decisions and the impact of those decisions on the user's search. |
| **Example 2** | **The Effect of a Workshop on Clinicians’ Information-Seeking Behaviors and Attitudes** |
| **Text** | **W-Example 2.** Cheng’s (2003) research question was motivated by her own prior research and her experiences in her information center. Her dissertation research (Cheng, 2002) suggested that clinicians’ success in problem solving was related to both their satisfaction with electronic databases and other resources and their use of those resources. In addition, usage statistics from her own institution, the Hong Kong Hospital Authority, indicated that use of electronic resources increased after the Knowledge Management Unit offered workshops on searching these resources. She then put these two links together to form a chain of reasoning from the offering of workshops, to greater use/satisfaction with electronic resources, to improved clinical problem solving. Her study was intended to find out whether these relationships actually exist, as she hypothesized.  In this study, Cheng (2003) is relatively explicit in her desire to establish a causal relationship between the workshops on searching and improved problem solving. It is much easier to establish that there is some kind of relationship than it is to establish that one phenomenon causes another. Nevertheless, Cheng’s study design largely succeeds in doing so. She had a pool of clinicians (doctors, nurses, and allied health professionals) who were interested in a workshop on searching. She randomly assigned half of them to attend a workshop in the first month the workshops were offered (the experimental group, n = 257 out of the 400 participants originally recruited for this group) and delayed the other half until the next month (the control group, n = 287 out of the 400 participants originally recruited for this group). After the workshop, the experimental group answered a questionnaire about their preferences for and attitudes toward electronic resources and their knowledge and skill in selecting appropriate electronic resources, formulating appropriate queries, and conducting searches. The link between the workshop and physician problem solving was weaker; the physicians did provide a self-assessment of whether “the problem in hand” (p. 25) had been solved, but it is not clear what exactly was asked in this questionnaire. The control group responded to the same questionnaires before they attended the workshops. As the knowledge test was scored and the attitude questionnaire was analyzed, those evaluating the clinicians’ responses did not know which were in the experimental group and which were in the control group (i.e., they were blinded to the participants’ group assignments).  The random assignment of the participants to the two groups and the blind review of their responses support Cheng’s (2003) claim that the workshops caused the effects observed. Often, claims of causal relationships rest on the researcher’s ability to rule out all other possible causes of those effects. In Cheng’s study, one possible cause for differences in the groups would be if the groups had been different before attending the workshops; for example, one group might have had more experience with electronic databases than the other. Through random assignment, this possibility can be ruled out. The only weakness in this argument being applied to Cheng’s study is the attrition between the time people signed up for the workshops and when the data were collected. For the experimental group, one had to have attended the workshops and completed the questionnaires to be considered a study participant; for the control group, one only needed to have completed the questionnaires. So it would be worthwhile to confirm that those who participated in each group were similar to those in the other group in terms of such characteristics as professional experience, occupational category, years of search experience, frequency of searching, and so on. If Cheng carried out these analyses, she did not report them, possibly due to lack of space.  If we accept the argument that there were no important differences between the experimental group and the control group, then the case for the workshops causing any differences discovered between the groups’ attitudes and knowledge/skills is quite strong. This was, in fact, what happened in this study. Cheng (2003) found quite large differences between the groups. Her null hypothesis—that there would be no effect from attending the workshops—was rejected. {W p. 37-38} |
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| **Paper 2.1** | **Measuring Electronic Information Services: The Use of the Information Behaviour Model**.  Cheng, G.Y.T. (2002).  Canberra, ACT: University of Canberra.  This study focused on measuring the importance and contribution of information obtained from the library, particularly electronic information services (EIS), to success in solving clinical problems in hospitals. Three research questions with three main hypotheses were advanced and tested on clinicians in 44 hospitals in Hong Kong. The findings were tested against the framework from Wilson's (1996) existing general information behaviour model, from which a new extended model for clinicians was built. Measures of EIS were then derived from the new model. The research was broadly divided into a series of five studies in two stages: nominal group, quantitative survey, and interviews in the first stage, and randomized controlled study as well as the analyses of statistical data and computer transaction logs in the second stage. The key results in Stage I led to the studies in Stage 11. The randomized controlled study in Stage 11 attempted to reduce the barriers identified in the information environment, with a view to test the results of an educational intervention, and to confirm that the hypotheses were true given reduced barriers and the presence of enabling conditions. The effects of the interventions in this experimental study were validated and verified by statistical data and transaction logs. Corroborative evidence from the two-stage studies showed that the three main inter-connected hypotheses were supported: success in problem-solving is related to the information sources used; user satisfaction is related to success in problem-solving; and EIS use is an indicator of user satisfaction. EIS use is determined by a number of factors: the preference for EIS, the use of the library, the skills and knowledge in searching, the profession of the user and the characteristics of the work environment. Educational intervention was found to improve success in problem-solving, the attitudes, skills and knowledge in searching, the satisfaction with and use of EIS, and is an important enabling condition. The research rejected part of the first hypothesis posed that success in problem-solving is related to clinical question posed and suggests that further research is needed in this area. The study supported the extension of the general model to clinical information needs and behaviours and found new relationships. The study found an additional determinant of EIS satisfaction, the satisfaction with the information obtained. EIS satisfaction would not be changed by educational intervention alone if the information obtained was not satisfactory. On the other hand, education can improve EIS satisfaction regardless of whether the problem has been solved. Of critical importance is the time factor in determining the use (or non-use) of EIS. There is new evidence that the awareness of the user of an answer in literature is a determining factor for active searching. Borrowing the concept of opportunity cost from economic theory, the researcher relates it with the differing levels of self-efficacy and postulates a model for planning EIS and related library services. From the new extended model of information behaviour, sixteen main measures or indicators were tested on a proposed framework in developing performance measures to diagnose information behaviours and predict EIS use, satisfaction and success in problem-solving. In measuring EIS, the researcher suggested the holistic approach in assessing traditional (non-electronic) library and information services as part of information behaviours of clinicians. The study pointed to the imbalance between self-efficacy and the actual skills and knowledge of users in their searching mentality and activities and the implication for library practice. Qualitative aspects that require further research on measurement were suggested. The study has important ramifications for theory and practice for the information professional. The new extended model of information behaviour for clinicians establishes deterministic relationships that help explain why an information search is pursued actively, continuously, or not at all. Measures that have been derived from these relationships can help diagnose and predict information behaviours. The study highlights the flexibility and utility of the general model of information behaviour. Also, this is the first time that such a methodological approach has been adopted to derive EIS measures. The application of the randomized controlled study methodology in information science was proven to be feasible and yielded definitive results. The researcher proposes that further development of information behaviour model should incorporate the element of knowledge generation process in an organization. |
| **Paper 2.2** | **Educational workshop improved information seeking skills, knowledge, attitudes and the search outcome of hospital clinicians: A randomised controlled trial**.  Cheng, G.Y.T. (2003).  Health Information and Libraries Journal, 20(Suppl. 1), 22–33.  A double-blind randomised controlled trial was conducted on a group of Hong Kong hospital clinicians. The objective was to test if a three-hour educational workshop (with supervised hands-on practice) is more effective (than no training) to improve clinical question formulation, information-seeking skills, knowledge, attitudes, and search outcomes. The design was a post-test-only control group; recruitment by stratified randomization (by profession), blocked at 800. End-user training was more effective than no training in improving clinical question formulation, in raising awareness, knowledge, confidence and use of databases, but had made no impact on preference for secondary databases. It changed the attitude of clinicians to become more positive towards the use of electronic information services (EIS). Participants had higher search performance and outcomes (satisfaction with information obtained (NNT = 3), EIS satisfaction (NNT = 3) and success in problem solving (NNT = 4)). The workshop improved knowledge and skills in evidence-based searching, but this effect gradually eroded with time. Search logs confirmed that follow-up is required if effects are to be sustained. Longer effects on search behaviours appear to be positive. A randomised controlled trial is valuable in identifying cause-and-effect relations and to quantify the magnitude of the effects for management decision-making. |
| **Example 3** | **Effects of Peripheral Cues on People’s Evaluations of Newsbot Displays** |
| **Text** | **W-Example 3.** Sundar et al. (2007) based their hypotheses on two theories. The first of these is information foraging theory (Pirolli & Card, 1999), which postulates that people use proximal cues about the relevance of distal information to make decisions about whether to pursue that information. For example, you might use the text of a hyperlink (a proximal cue) to make a decision about whether to click and go to the page at the far end of the hyperlink (the distal information). Using a biological metaphor, the theory postulates that if the information scent of the proximal cue is strong enough, a person will follow that scent to the distal information. Part of the motivation for the Sundar and colleagues’ study is to find out whether the proximal cues provided in result lists from Web-based news aggregators (e.g., http://news.google.com) have enough information scent to influence people’s interpretations of the credibility of the news story listed.  The second theory relevant to the current study is a dual-route theory of persuasion (Petty, 1994). This theory postulates that there are two different processes by which someone might be persuaded to take an action: through the careful scrutiny of issue-relevant arguments or through the processing of peripheral cues. The proximal cues defined in information foraging theory fit the definition of peripheral cues in this dual-route theory of persuasion. The idea is that the cue (i.e., the hyperlink anchor) persuades the person to follow it. This second theory provides much more detail about how people cognitively process peripheral cues, either individual cues or combinations of cues. Because Sundar et al. (2007) wanted to examine the influence of three types of cues, and those influences may be cumulative, they relied on this theory to formulate their hypotheses.  The two theories that provide the foundation for this study are both fairly abstract. They have been applied to many different specific contexts, each of which encompasses specific instances of the abstract concepts in the theory. For instance, information foraging theory has been applied to people’s navigation behaviors on the Web; in that context, the proximal cues are always link anchors and the distal information is always the Web page to which the link is connected. When study hypotheses are derived from theories, as in this case, it is almost always the case that the researcher wants to know whether the abstract concepts in the theory (and the postulated relationships between them) will hold true in a particular context of interest to the researcher. The context under study by Sundar et al. (2007) is news aggregators. Although Web-based news aggregators, like other contexts examined from the perspectives of one or both of these theories, are also different because they offer different forms of proximal cues beyond the link anchor (i.e., the title of the news story), specifically, Sundar and colleagues wanted to study the potential influences of the source of the story (i.e., which news organization posted it on the Web), the recency of its posting, and the number of related articles that had been posted. They formulated five specific hypotheses about these influence (1) the effect of source on the story’s credibility, (2) the effect of the number of related articles on the story’s credibility, (3) the effect of the number of related articles on the perceived newsworthiness of the story, (4) the effect of the number of related articles on the likelihood that someone will click through to the story, and (5) the effect of the story’s recency on its perceived newsworthiness. In addition, they used the dual-route theory of persuasion to conduct a more exploratory investigation of the ways in which these three types of proximal/peripheral cues affect people’s perceptions and behaviors.  Sundar et al. (2007) carried out their study by having people review result listings of news stories, which systematically varied on each of the three types of cues. For example, some of the stories were described as having been posted just minutes ago, while others were described as having been posted almost two days ago. Each study participant was exposed to the descriptions of 12 stories and then responded to a questionnaire about each story’s credibility, its newsworthiness, and the likelihood they would click on the description to read the full story. In summary, this study is an example of the way in which a theory (with well-defined constructs and relationships) can be used to generate specific hypotheses that can be tested for their applicability in a new context. {W p. 38-39} |
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| **Example paper abstracts start on next page** | |
| **Paper 3.1** | **News cues: Information scent and cognitive heuristics**.  Sundar, S. S., Knobloch-Westerwick, S., & Hastall, M. R. (2007).  Journal of the American Society for Information Science and Technology, 58(3), 366–378.  Google News and other newsbots have automated the process of news selection, providing Internet users with a virtually limitless array of news and public information dynamically culled from thousands of news organizations all over the world. In order to help users cope with the resultant overload of information, news leads are typically accompanied by three cues: (a) the name of the primary source from which the headline and lead were borrowed, (b) the time elapsed since the story broke, and (c) the number of related articles written about this story by other news organizations tracked by the newsbot. This article investigates the psychological significance of these cues by positing that the information scent transmitted by each cue triggers a distinct heuristic (mental shortcut) that tends to influence online users' perceptions of a given news item, with implications for their assessment of the item's relevance to their information needs and interests. A large 2 × 3 × 6 within‐subjects online experiment (N = 523) systematically varied two levels of the source credibility cue, three levels of the upload recency cue and six levels of the number‐of‐related‐articles cue in an effort to investigate their effects upon perceived message credibility, newsworthiness, and likelihood of clicking on the news lead. Results showed evidence for source primacy effect, and some indication of a cue‐cumulation effect when source credibility is low. Findings are discussed in the context of machine and bandwagon heuristics. |
| **Paper 3.2** | **Information foraging**.  Pirolli, P., & Card, S. (1999).  Psychological Review, 106(4), 643–675.  Information foraging theory is an approach to understanding how strategies and technologies for information seeking, gathering, and consumption are adapted to the flux of information in the environment. The theory assumes that people, when possible, will modify their strategies or the structure of the environment to maximize their rate of gaining valuable information. The theory is developed by (a) adaptation (rational) analysis of information foraging problems and (b) a detailed process model (adaptive control of thought in information foraging [ACT-IF]). The adaptation analysis develops (a) information patch models, which deal with time allocation and information filtering and enrichment activities in environments in which information is encountered in clusters; (b) information scent models, which address the identification of information value from proximal cues; and (c) information diet models, which address decisions about the selection and pursuit of information items. ACT-IF is instantiated as a production system model of people interacting with complex information technology. |