

# The Case Study Method: A Case Study

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The case study method was used to systematically develop a pattern model of online searching behavior. In this method, the study design is flexible, data gathering and analyses are largely determined by the subject matter, and specific procedures are decided upon while the study progresses. This article takes the reader behind the scene of a case study. It describes the procedures followed and the type of analyses performed in a study of online searching behavior. Problems typical of the case study method and the measures taken to reduce their effect are briefly discussed. This is the first time that the case study method has been used in library and information research to differentiate broad patterns of behavior.

## INTRODUCTION

Case studies are performed for various purposes. In the most limited sense of the concept, cases themselves may be of interest such as when one studies an organization with the aim of improving its functioning. When applied as a research method, case studies are usually carried out to generate findings of relevance beyond the individual cases. As a research method, case studies seem to be appropriate for investigating phenomena when (1) a large variety of factors and relationships are included, (2) no basic laws exist to determine which factors and relationships are important, and (3) when the factors and relationships can be directly observed.

Case studies have been used in library and information research to suggest various types of findings. The application of this method to systematically develop a comprehensive model describing patterns of behavior, however, was first carried out in the study of online searching styles which is described here. By providing an annotated description of the procedures and analyses applied, researchers may develop a sharper awareness of both the special problems and the variety of insights that may be gained in the application of this method to library and information research.

Manuscript submitted, July 1983; Manuscript accepted, October 1983.

## 1. THE CASE STUDY METHOD

The case study method is a specific field research method. Field studies are investigations of phenomena as they occur without any significant intervention of the investigators. Becker (1970) explains that case study refers to a detailed analysis of an individual case supposing that "one can properly acquire knowledge of the phenomenon from intensive exploration of a single case" (p. 75). The case study attempts, on the one hand, to arrive at a comprehensive understanding of the event under study but at the same time to develop more general theoretical statements about regularities in the observed phenomena.

Case studies are not rigorously planned. When investigators plan a field study without predefined structure for the observations and analyses, they assume that the conduct of the study will be guided by what they see in the field. The flexibility introduced into the case study is an important and useful attribute as explained by Becker (1970):

It prepares the investigator to deal with unexpected findings and, indeed, requires him to reorient his study in the light of such developments. It forces him to consider, however crudely, the multiple interrelations of the particular phenomena he observes. And it saves him from making assumptions that may turn out to be incorrect about matters that are relevant, though tangential, to his main concerns. This is because a case study will nearly always provide some facts to guide those assumptions, while studies with more limited data-gathering procedures are forced to assume what the observer making a case study can check on. (p. 76)

The activity in the field centers on data gathering. The techniques of data collection are largely determined by the nature of the subject matter. Investigators usually look for a large variety of sources to supply the collected data. Direct observations, interviews, or available documents are recorded as completely as possible.

The analysis of the data is performed throughout the duration of the study. New data are constantly analyzed and results of previous analyses direct future investigation. During the process of data analysis, the investigator identifies the problems that appear to be of major importance. The selection of problems, hypotheses, and concepts is guided by the concrete findings and the attempts of the investigator to identify possible theoretical implications. This process reveals the relevant aspects of the phenomena studied.

The selection of the individual events to be observed follows a special method of sampling which is different from those used in experimental studies. Glaser and Strauss (1967) explain the methodological rationale for this procedure.

Library and information researchers new to field research methods may hesitate to apply such methods because of the flexibility typical of the

study design. When they believe that a field study method is appropriate for investigating the phenomenon in which they are interested, they still may be discouraged by the lack of specific guidelines for conducting research. The question of *when* to apply field research methods is an important but different issue and it is not discussed here. Although answers to specific questions may not exist, the literature provides general guidelines for carrying out these studies. Bogdan and Taylor (1975), for example, published a "how-to" handbook for qualitative methods, and a collection by McCall and Simmons (1964) includes valuable writings by various field researchers about a large range of methodological issues.

Participant observation was the technique chosen for data gathering in this study of online searching styles. Although the concept of participant observation is commonly used to describe studies in which the observer participates fully with the system under study, the concept is also used to describe studies in which observers utilize a different relationship with the system under investigation. (Gold (1958) differentiates four participant-observer roles.)

Participant observation in its various forms is not new to library or information research. In some studies, a prestructured construct has been adapted for observation or analysis. Wilson and Streatfield (1977) observed employees of a social service department during full working days, recorded communication events on a predesigned form, and analyzed the data to provide quantitative description of the nature of these communication events suggesting characteristics of information behavior. In a study by Hitchingham (1979), presearch interviews were recorded and qualitatively analyzed using a given content analysis scheme. Her findings cite relations such as: the relation between question-asking by the searcher and information-giving by the user, and question-asking by the user and information-giving by the searcher. An example of a more exploratory, essentially descriptive study is the work of Carlson (1964) who observed reference librarians (without predetermined structure for the observation or the analysis) and outlined a descriptive flowchart of the search process.

A method of controlled comparison was chosen for data analysis in this study of online searching styles. The case study attempts to arrive at a comprehensive understanding of the individual under study but at the same time to develop more general statements about regularities in the observed phenomena.

This goal of accounting for both ends in analyzing data gives rise to two problems that require special attention. On the one hand, generalization from a few cases is not reliable because one cannot determine which regularities are general and which are unique. On the other hand, general statements about regularities may be too general to explain a specific case. As Diesing (1971) explains, the method of *controlled comparison* helps the investigator to avoid these problems:

The basic solution is to move from the particular to the general and back in small steps rather than in one grand jump. One first compares one's case with a similar case, then to another and another, then to one somewhat more different. Potential generalizations discovered in the first case can be tested against the other cases. The generalizations that survive these tests are not claimed as universally valid, but valid only for cases similar to those studied. Gradually one moves to still wider generalizations and a more heterogeneous range of cases, though the scope of previous generalizations may also be narrowed in this process. This is the comparative method, which is always used in case studies to produce or to apply generalizations. Comparison is not postponed until the individual case study is completed, but occurs continuously during study and is an essential part of it. (p. 183)

As with any other research method, the case study method needs to establish its scientific credibility. Two criteria are considered to be important for assessing the quality of research results: reliability and validity.

Reliability refers to the extent to which repeated employment of the same research instrument, under conditions taken to be constant, produces the same result. Case studies cannot claim reliability in the commonly accepted sense because they cannot be repeated under constant conditions: the observer records events as they occur. Though events that recur may be observed again, the conditions under which they recur are never the same. In fact, in the case study method it is precisely the different ways in which an event recurs that are usually relevant to the purpose of the observation. Moreover, two of the major advantages of this method are not compatible with the common notion of reliability. That is, an observational study is of particular value when the observer "sees" what other investigators have ignored. Further, the personal relations between the investigator and the persons studied provides the essential source for understanding.

Validity refers to the degree to which the researcher has investigated what he set out to investigate. Because case study research relies on subjective understanding, validity is an issue of concern. The investigator should institute controls to test whether a theme or interpretation is valid. Several methods of validation are suggested by the methodological literature. One of the methods recommended by Diesing (1971) compensates for bias in an interpretation by requiring each interpretation to be based on several kinds of evidence. Interpretations are rechecked and validated through comparisons of the different kinds of evidence. This method was systematically applied in this study.

## 2. CASE STUDY OF ONLINE SEARCHING STYLES

The description of the method as applied to a study of online searching styles follows the chronological order in which steps are supposed to be

taken in any empirical study. In practice, however, deviation from this strict order may be necessary: a later step may be initiated before the previous one is completed, and earlier steps can sometimes be completed only after the later ones have progressed. This lack of linearity may cause difficulties in describing the study in a sequential manner. Since the different elements in the study process should be clearly distinguished, they are described separately.

The present study was planned to investigate the skills employed by experienced intermediaries in the process of heuristic iteration to improve search results. Described are the pattern of observations and analyses that eventually led to the discovery of two distinct styles employed by the observed searchers: the "operationalist" and the "conceptualist" styles (Fidel, 1982). The description of the two styles is related to searching behavior by examining the moves that are made by the individual searchers and the manifestations of general approaches. The model covers all the stages of the search process and describes the typical nature and dynamics of a search performed by searchers using one or the other style.

Briefly, operationalist searchers aim at optimal strategies to achieve precise retrieval. They use a large range of system capabilities in their interaction; they preserve the specific meaning of the request and the aim of their iterations is a set of citations which represents the request precisely. Conceptualist searchers analyze a request by fitting it into a faceted structure. They first enter the facet that represents the most important aspect of the request. Their search is then centered on retrieving subsets from this primary set by introducing the additional facets. In contrast to the operationalists, they are mainly concerned with recall, and during the interaction they preserve the faceted structure, but may change the specific meaning of the request.

### A. Study Design

The subject matter, the subjects to be observed, and a tentative structure for analyzing search protocols were incorporated into the study design for the investigation of the online searching styles. At the very beginning of the observation period, however, it became clear that the "process of heuristic iteration to improve search results" cannot be isolated from the planned search strategies and from the criteria used by the searcher in evaluating the retrieval. As a result, the subject matter was extended to include the entire search process. The tentative structure for analyzing search protocols was abandoned after it was applied to the searching behavior of the first searcher. It had been designed to analyze each search in a chronological overview, event by event (e.g., issuing a command), and each event would be analyzed for certain categories. However, the procedure proved to be unhelpful; it isolated categories that should not have been separated and concentrated

on categories that did not seem to be significant for analyzing a particular search. For example, two of the categories were: the “stimulating element” (the part of the output to which the searcher is reacting), and “subject information” (whether or not subject knowledge was employed). When searches performed by the first searcher were analyzed, it became clear that what creates a pattern is the sequence in which the stimulating elements are looked for by the searcher rather than the relationship between the type of the event and the type of the stimulating element. Breaking up the search into isolated events would have obscured this pattern. The category of subject information proved to be irrelevant. Although searchers differed in the depth of their knowledge of the subject, they employed subject knowledge throughout the search; whether subject knowledge was used in a particular event seemed insignificant.

**Preparation.** The first step in a case study requires the researcher to familiarize himself with the subject matter to be investigated. For this study, surveys, experiments, and theoretical analyses of online searching were examined for interpretations that might guide the investigations and to identify factors to be looked for during the observation. In addition, five experienced searchers other than the ones who were actually observed in the study were interviewed in order to supplement or confirm the points established by the literature reviewed, and possibly, to identify patterns of searching already known to online searchers.

**Selection of the subjects.** The five searchers selected for the study itself had to meet two requirements: they must be experienced searchers and must come from the same type of setting. Experienced searchers were considered to be those who had been searching in the present setting for at least two years. The nature of the setting was determined partially by theoretical considerations and partially by practical reasons. Since there is some evidence that the pressure of cost considerations may influence searching behavior, this factor was eliminated by choosing institutions which: (1) are not-for-profit organizations; (2) provided online services free of charge; (3) are limited in the scope of searching activity to one field of science; (4) provided online services on a regular basis; and (5) served only their own employees.

The health science field was chosen because a large number of searchers was available. The employees-only requirement limited the user group to persons whose work and actual use of information was known to searchers and likely to influence their searching behavior.

The selection of the individual searchers was not made by any statistical method of sampling. In the early stages of the study, any searcher who met the set of requirements and agreed to participate in the study was accepted. The searchers were approached through personal contacts and I had met

none of the searchers before the study begun. No typology of searching behavior was developed until the searching behavior of the first three searchers had been analyzed. The selection of the additional two searchers, as described later, was guided by the proposed model developed from the analysis of the first three searchers.

## B. Data Gathering

The topic and method of the study were explained to searchers when they were first approached. No specific kind of information was mentioned as being of particular importance for the study, nor was any information about the study concealed from them. They were assured that the study required them to spend very little extra time, although any additional time or information that they might be willing to volunteer would be more than welcome.

The study was conducted in the searchers' work setting and the data were collected by observation with no attempt to control or influence the search process. The searchers were observed, one by one, performing their regular job-related searches. An average of ten searches was observed for each searcher.

The searchers were asked to think aloud but only to the extent that such verbalization would not interfere with their searching. This verbalization was recorded and transcribed on the search protocol. Searchers were usually not questioned during the search process. Only in a few instances, when some elements were not accessible to observation and it was assumed that a specific question would be nonobtrusive, was a searcher questioned during the search. Questioning during the observation period was kept to the minimum in order to avoid any possible influence on searching behavior. Most searchers, however, initiated conversations about their searching and about specific searches. Questions during these instances attempted to keep the conversation alive and were meant to be as nondirective as possible.

At the end of the observation period, when the first version of the description of a searcher's searching behavior was drafted, the searcher was interviewed. The interviews took the form of informal conversation which was the natural thing for searchers to do after spending a period of time with a microphone and an observer. I asked many questions to clarify issues that arose during the observation period but could not be asked then. In the interview, searchers were also asked about aspects of their searching not accessible to observation. For example, searchers were usually asked to describe the history of their professional careers, and to explain their general approach to searching, users, and the profession. In many instances, searchers were asked why they had chosen a certain move in a particular search. Answers to such questions were not taken at face value; it was not expected that searchers would remember the specific reason but rather that their

recollection would express a general approach to specific problems. Some regularities that had been observed were described to the searchers and their comments sought. The interviews were transcribed.

Another source of data were casual conversations held under somewhat informal circumstances such as lunches. These conversations were never systematically recorded nor analyzed. A large variety of subjects were discussed on those occasions and most of them did not relate directly to on-line searching. When professional subjects were dealt with, I showed my curiosity but was nonjudgmental. These casual talks supported my intuitive understanding of the searcher's behavior, and in a few instances even provided some solid clues.

The recorded verbalizations of the searchers' thought processes during the actual searches, the search protocols, the transcribed interviews, the written forms of the requests (when available), the written formulations of search strategies, annotations on the search protocols, or messages to users were the data collected for analysis.

### C. Data Analysis

The actual data analysis was made by the method of controlled comparison. The "similarity" characteristic was the type of control decided upon during the study. The procedures and nature of data analysis performed in the study are described below.

The initial step in the data analysis was to trace the searching behavior of the first searcher. The first draft of the description of her searching behavior was written immediately after the observation period was over and before the interview took place. Although certain themes emerged quite clearly, no systematic analysis of data was performed during the observation period. It was assumed that a thorough analysis of the data and exploration for regularities in the searcher's behavior would result in questions and issues which might need further clarification and validation. It was decided, therefore, to draft the description of the searching behavior of the first searcher before conducting the interview. This draft description was read by judges who commented on it, e.g., pointing out instances where the searcher was "wrong," and suggested questions to the searcher. After the interview, the description was rewritten in an expanded form.

This procedure of writing a description of the searcher's searching behavior was repeated for each individual searcher. The descriptions include: personal and environmental data; descriptions of general approaches to online searching (e.g., online vs. manual searching); typical procedures used in analyzing requests (e.g., sources of information and aids used); typical approaches, procedures, and moves during the terminal session (e.g., reliance on indexing, types of elements displayed and their sequence;

moves to increase precision or recall), and the construction of the answer set (e.g., the point during the terminal session at which a tentative answer set is first retrieved).

The next step was to describe the searching behavior of the second searcher, and to develop a model which would describe the searching behavior of both searchers. However, the first draft of the model was developed only after the third searcher was observed. The decision to postpone the construction of the model was supported by a methodological reason. The searching behavior of the first two searchers seemed to reflect two distinctive styles of searching. Because I felt that this clear difference might have been influenced by personal bias, I decided to gather more evidence before writing a general description.

The nature of the analysis, i.e., identifying meaningful regularities, did not change during the study. The types of regularities looked for, however, changed according to the particular phenomenon described and the stage of the study.

To describe the behavior of a particular searcher, each search was considered to be a case. Through the use of Venn diagrams each search was analyzed to identify its conceptual strategy. The explanations given by the searcher during his preparation to search, while he searched, and after the searchers were over, were added to the conceptual analysis of the searches and supported the development of the description.

Data analysis identified searching behavior, moves and approaches that recurred, while moves that seemed to be atypical were given special attention. An example may best illustrate the process of constructing a description of searcher behavior from the analysis of individual searches. Most of the requests that were submitted to the first searcher during the observation period were straightforward and could be translated quite easily into query formulations. A large proportion of the requests dealt with effects induced by certain chemicals. Therefore, the formulation of all the requests into the structure: "the effect of A on B in C" (e.g., the effect of food preservatives on hepatitis in children) seemed to be determined by the individual requests. The first searcher also consulted medical dictionaries in preparation for most of the searches, apparently to improve her understanding of the requests.

One request shed new light on these observations. A user had asked for material about the histochemistry of a certain chemical. The searcher claimed that she did not always understand what people meant when asking for "histochemistry" and looked the term up in a medical dictionary. This searcher has a strong subject background, was actively interested in the research projects carried out in the organization, and seemed to be quite knowledgeable about the subject of the requests. The need to look up a dictionary definition of a term that seemed to me to be clear and well defined was surprising and required special attention. The answer to the puzzle was found

in the way the searcher used the actual words of the definition to analyze the request. After consulting the dictionary, the searcher reformulated the user's request as: the effect of the (required chemical) on the chemical make-up of cells and tissues. In other words, she had factored the concept "histochemistry" into "chemical make-up" and "cells and tissues."

The searcher's reformulation clearly suggested to me that her procedure was to break down requests into facets. Further, the usual three-part request structure observed earlier was determined not only by the individual requests, but was a permanent structure to which she referred when analyzing any request. Rechecking the previous requests, I found that the dictionary look-ups were usually performed to provide concepts for the facets which were missing in the request. If, for example, the name of a disease were given to her, she might look for the sites which were affected (the element C). A recheck of all her searches validated the observation that each request had indeed been translated into that particular faceted structure. In the interview I asked the searcher to describe the way in which she analyzed requests. Not only did her description confirmed my observation, but she even gave definite reason for her use of the observed structure.

A parenthetical note is in order here. Since the aim of the study was to describe searching behavior and not psychological processes (e.g., cognitive processes), the reasons and explanations given by searchers were important to my understanding of their searching behavior but were not further investigated. For example, the first searcher explained that she always integrated the affected site into a search formulation because NLM indexers always index a disease under the affected site. Her statement supported two observations: first, that she indeed translated each request into a faceted structure in which the element C (the "system facet") was always present; and, second, that she took into consideration the policy and practice of indexing. However, I did not ask questions such as: how much was this choice influenced by the nature of the requests and to what degree by the practices of indexing, or why did she take into consideration indexing practices. Two issues provided the motive for avoiding this kind of inquiry. First, I was looking for clues that might enhance a better understanding of searching behavior and my analysis of the many-sided data available was constrained by this subject matter. Second, my questions to searchers were designed to be as nonthreatening and nonjudgmental as possible; questions for which they may not have had answers might have put them in an uncomfortable position.

**Emergence of the model.** After the searching behavior of the first three searchers had been described, the first draft of a general model of online searching styles began to emerge. This was prompted by the observation that the searching style of the first searcher differed from that of the

second and the third. Therefore, the searching behavior of the first searcher was compared to that of the other two searchers taken as a group. A typology of searching styles was constructed by rechecking individual searches and the descriptions of the behavior of the individual searchers, noting elements of behavior that were observed to be different, as well as those that seemed to be similar. This analysis supported the identification of each style and its description as well as a better understanding of each particular searcher. The following example demonstrates the nature of the process used in building the model.

In one of the informal conversations the second searcher mentioned that she was rather cynical about the process of online searching. Later on, in the final interview, I asked her what she meant by "cynical." She explained that because the process of online searching involves so many variables and so much human intervention, searches were far from being perfect and she felt that she never provided a complete answer through her searching. The first searcher, on the other hand, claimed very categorically that if the material was indexed in the database and was also relevant, she would be able to retrieve it. This difference of opinion suggested different approaches to recall. The comments of the third searcher supported this observation. She claimed that she never attempted to cover the whole literature unless she was specifically requested to do so. She maintained that her answer sets provided only an entry to the literature.

These approaches were interpreted to reflect the observation that searchers of the conceptualist style (the first searcher) are concerned with recall, while searchers of the operationalist style do not consider recall to be a major attribute of retrieved sets. This distinction between styles was further supported by several other observed behaviors. For example, the first searcher constantly integrated moves to increase recall while the second and third searchers tried to improve recall only when it seemed to them that something had been missed, but they did not attempt to do so when they thought that enough (about 20-30) documents had been retrieved.

Once the initial version of the model was drafted, it was used to guide subsequent investigations. The first process to be affected by the draft model was the selection of the next two searchers to be observed. Since only one of the first three searchers was a conceptualist searcher, another conceptualist searcher was tentatively identified and then observed. In keeping with the method of controlled comparison which requires ever wider generalizations, the subject area in which searching was done was expanded at this point. Although each of the first three settings was different, the searchers considered themselves to be medical librarians and searched mainly the medical literature on MEDLINE. Consequently, the searchers next selected still qualified for the study, but did not search predominantly in the MEDLINE database.

Examining the searching behavior of the fourth searcher in the light of the draft model prompted the question of whether the searcher would fit one of the two already observed patterns or show a third pattern instead. The method of controlled comparison described by Diesing (1971, p. 187) provided a means for approaching this problem. The two already identified styles of searching behavior offered a framework for preliminary observation of a fourth searcher, and she was tentatively tagged as a conceptualist searcher. Later, the description of searching styles served also as a guide for analyzing her searching behavior. Features of her behavior that were similar to features in the conceptualist style reinforced the assumption that she fitted the expected style. Features that were different demanded further investigation, and this investigation, in turn, broadened the model and gave a more general description of the conceptualist style.

For example, the draft model's description of the conceptualist style (based on observing one conceptualist searcher) reported that conceptualist searchers consult technical dictionaries in order to complete the elements in the faceted structure that they use. The fourth searcher rarely consulted technical dictionaries, but she never searched a request without talking to the user beforehand. However, when I analyzed the information she was seeking in her interrogations of the user, I discovered that her purpose was the same as the conceptualist searcher who utilized technical dictionaries. As a result, the broadened description of the conceptualist style reported that conceptualist searchers are actively looking for additional information to complete the elements in the faceted structure they use, and that they have preferred sources for acquiring this information.

Generally speaking, the tentative identification of the fourth searcher as a conceptualist searcher might not have withstood the further investigations. The fourth searcher might well have turned out to be an operationalist searcher, or indeed, to have been searching in yet a third style.

This procedure of tentative identification of a searching style based on clues provided by the draft model, with further comparison and analysis of observed searching behavior, was also used with the fifth searcher. As a result, some elements in the draft model were further generalized, and the structure of the model was slightly changed. For example, unlike the first three searchers, the last two were searching a relatively large number of databases. Thus, the model was expanded to describe searching styles regardless of the number of the databases searched. In addition, the draft model, created after the first three searchers were observed, contained within each of the two described searching styles elements of searching behavior that were common to both styles. My examination of the searching behavior of the last two searchers further emphasized these elements. As a result, in the modified version of the model, these common elements were grouped together in a separate section.

The study described here was arbitrarily concluded after five searchers had been observed. This model of online searching styles, however, is by no means complete but it can guide further examination of searching behavior. It is significant because it provides a solid base which can be gradually expanded to describe online searching styles in fee-based information services, and in various scientific fields. Eventually, it may prove to be useful in describing searching behavior of nonbibliographic databases.

### 3. PROBLEMS

In this study, the nature of the data collected and the type of analysis performed introduce problems that do not exist in the same form in studies performed by other methods, and they are widely discussed in the literature on research methods. Some typical problems in this study, and the measures taken to reduce their effect, are briefly described below.

**Getting in.** The first problem in field studies is to get permission to study what one needs and to gain access to the people one wants to observe. Presuming that searchers would be more willing to cooperate when a person they already knew asked them to do so, I approached searchers through people who knew them. This measure of caution may not have been necessary: out of the 12 searchers contacted, only two searchers showed obvious signs of reluctance to participate in the study after the first meeting. Later, some of the searchers expressed great interest in the study and said that they found it to be important to them because after reading the online literature, they felt that "people in the academic world" do not really know what actual online searching is all about. They were appreciative that a person from an academic setting showed interest in trying to understand what they were doing.

**Study effect.** The frequently mentioned problem of validity due to the presence of an observer has less of a bias effect in field studies than in other types of research. In this study, for example, there was the question that searchers may have changed their way of searching because of the presence of a microphone and an observer. However, the main concern of a searcher is to provide an answer set to the particular user. The user's reaction to this set is more important to the searcher than what the investigator thinks about his searching. Nevertheless, I kept this problem in mind, and did decide not to observe two available searchers because it seemed that in the presence of an observer, they would *demonstrate* a search rather than perform it. While it cannot be ascertained whether the observed searchers would have performed exactly the same search if an observer were not pres-



ent during their searches, they themselves did not think that their searching was constantly biased by the observation.

**Searchers' bias.** Verbal information from searchers may be biased, and this type of bias should be given special attention when an investigator is aiming to construct an "objective" description of a group of individuals based on their opinions. In the study of online searching styles, the bias of the searchers was, in fact, an important source of information. It is plausible to assume that the searchers talked about subjects which they thought I would find significant. I did not specify any subject to be of special interest and claimed that I was interested in everything. Since I was actually interested in any subject they cared to talk about, it was presumed that subjects heavily discussed by the searchers were also the subjects that they perceived to be important. This special bias provided an important clue to the identification of the styles of searching. For example, the fact that certain searchers elected to provide lengthy and thorough descriptions of the advantages and usage of system features, helped me to identify the nature of operationalist searchers. In other words, it was the searchers' bias that supported an understanding of their searching behavior.

**Observer bias.** Since case study is among the less "controlled" research methods, observer bias is frequently considered to be the main problem with observation. Because it can occur in several ways, the first step toward reducing its effect is to identify the observer bias in its various forms.

The first sources of observer bias are the different theories, hypotheses, and perceptions that the observer takes into the field. With these in mind, the observer may see only those things that fit his preconception. However, for this particular study, the confused state-of-the-art in online retrieval research could scarcely induce such a bias. The large number of factors which are considered to affect online retrieval (Fidel & Soergel, 1983) and the lack of evidence as to which are really important—as well as the diversity and isolation of the existing theoretical models—hardly serve to form explicit hypotheses. Thus, no specific theory or hypothesis from the online retrieval literature was considered to have an impact on the observation.

The background and experience of the observer may also introduce bias. If the observer who studies the process of online searching is himself an experienced searcher, he may carry his personal approaches to searching into the process and consequently bias his observations. The impact of such bias was reduced in this study because no experience in real-life online searching preceded the observations. I was aware that I perceive the conceptualist style to be more elegant, but since elegance is not always useful, this bias may not be considered a serious impediment. However, I did attempt to

counteract my personal attraction to elegant processes by trying to better understand the reasoning and rationale behind operationalist searches.

Another source of bias is the involvement of the observer:

The observer, interacting with those he studies on a long-term basis, comes to know them as fellow human beings as well as research subjects; thus, he can hardly help acquiring feelings of friendship, loyalty, and obligation, which may make him wish to protect some members of the group by not seeing those events which would render them liable to criticism. (Becker, 1977, p. 77)

Compared with social processes, online searching is a relatively observable process in the sense that searchers have very little to hide in order to protect themselves. They are usually judged by the quality of their services and the searching process itself is rarely criticized. As a nonsearcher observing experienced searchers, I approached this study with a strong perception that experienced searchers know what they are doing and I found nothing to alter this perception. When I encountered a move or an approach that did not seem "right," I assumed that I did not understand the move or the approach. As a result, events that seemed to be peculiar demanded special attention. For example, when a user submitted a request about a certain spice causing a certain disease in children in a certain country, the searcher decided to retrieve all references to documents in the database dealing with this spice and submitted them to the user. On the surface, such a decision might be interpreted to reflect the searcher's unwillingness to bother with a complex search. Indeed, analyzing only the search protocol might lead investigators to just such a conclusion. I assumed that the searcher had a reason other than pure laziness for her approach. I discovered that the searcher knew that very little had been published on the specific spice in which the user was interested. She also knew the user's project and she assumed that he might be interested in reading somewhat general information.

During the observation and the data analysis periods, I never encountered a situation in which I tried to avoid seeing something in order to protect the searchers from criticism. It may be that all the searchers observed were "good" searchers, whatever that means.

#### 4. CONCLUDING REMARK

Research in library and information science is to a great degree quantitative in nature. As demonstrated here, much insight can be gained through qualitative research, particularly in systematic analysis of qualitative data to construct models delineating patterns of behavior. Although the conduct of qualitative research depends on the subject matter, general literature on



research methods can provide guidance for qualitative investigations in library and information research. The procedures followed in designing this study, collecting and analyzing the data, or in solving its particular problems are not recommended as general guidelines for research. They seemed to be appropriate for the study of online searching styles, but investigations into other subjects may require different procedures. It is hoped, however, that this study experience will be found useful by researchers interested in employing the case study method in their investigations.

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