

OPERATIONALIST AND CONCEPTUALIST SEARCHERS:  
A CASE-STUDY-BASED PATTERN MODEL OF ONLINE SEARCHING STYLES (1)

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**Abstract.** Using the case study method, a pattern model of searching styles was constructed. Three searchers were observed while doing regular, job-related searches and their searching behavior was analyzed. The model describes two styles: operationalist and conceptualist searchers. Searchers of the first type seem to base their search formulations and interactions mainly on the manipulative power which is provided by the systems. Searchers of the second type seem to formulate and modify their searches mainly by performing conceptual analyses. Some implications of these observations for online research are discussed.

### 1. INTRODUCTION

This paper describes styles of searching that were observed to be employed by experienced online searchers. Identifying searching styles facilitates a better understanding of the search process, and better understanding of interaction during online searching may have direct importance for three major problem areas. First, it can form the basis for improved design of online systems. Second, it may help searchers to improve their own performances. Third, it may support effective evaluation if searchers are fitted into a model that recognizes their special and individual characteristics. Other possible applications will be briefly discussed at the end of this paper, after the method and the patterns are described.

### 2. THE METHOD

The following description is based on observing three experienced online searchers doing regular, job-related searches, and on analyzing 11 to 13 searches conducted by each of them. The searchers were observed systematically one after the other. They verbalized their thought processes to the extent that such verbalization did not interfere with their searching. This verbalization was recorded, and together with available writer material (e.g., the search protocol, the request) served as the basis for the analysis. At the end of the observation period, each searcher was interviewed. The searchers are professional librarians who search the medical-related literature. The settings are not-for-profit organizations that provide their employees online searching free of charge. The users of these services are involved in clinical work and/or research in medical-related areas.

The pattern model was constructed using the case study method (2). Each searcher is regarded as a single case of searching style. The model first describes the style of a certain searcher. Next, another searcher is observed, and the model is modified (and generalized) to describe the searching styles of both searchers. Building a pattern model is a cumulative process; the more searchers observed and the more searching processes analyzed, the more inclusive the model. Further observations will be performed; this will result in a modified description. However, it seems important to report these interim findings because of their explanatory potential, and because they provide a new approach to research in online searching.

Because of space limitations the following description is very brief; it only highlights some themes in the patterns.

### 3. OPERATIONALIST AND CONCEPTUALIST SEARCHERS

Moves to formulate and reformulate search statements are made on two different levels: the operational and the conceptual one. An operational move is defined as a move that uses the system features in order to modify a retrieved set without changing the conceptual meaning it represents. Examples are: to limit the retrieval to English documents, to add synonyms and variant spellings, and to explode terms. A conceptual move modifies a retrieved set by modifying the meaning of the concept it represents. Examples are: to combine a set retrieved by a relatively broad descriptor (i.e., a controlled vocabulary term) with more specific free-text terms, to enter the next higher descriptor in the hierarchy, and to add descriptors that are related terms.

The observed searchers are familiar with most moves in online searching. However, they usually rely on a well-established repertoire of moves that they employ frequently, and they tend to consistently choose their moves at one of the two levels. The predominant nature of a searcher's moves characterizes his searching style. Searchers who choose most of their moves at the operational level might be called "*operationalists*"; those who interact mainly at the conceptual level, "*conceptualists*." Operationalists interact mainly by using system features. The conceptualists' interaction is usually based on conceptual analysis and they most frequently modify their retrieval by changing the conceptual representations of retrieved sets.

#### 3.1 Strategy Formulation

When the observed searchers plan a search, they try to understand the request, decide which files to search, formulate the initial search statements, and consider alternative formulations. They believe that they can always learn more about the topic and the relevant literature after seeing displayed citations.

The observed conceptualists "understand" a request by fitting it into a conceptual structure (e.g., faceted structure). In order to identify the different elements of the structure they may need information that was not provided by the user, and they use all the sources available to them (e.g., professional dictionaries) to acquire this information. They

persistently search for descriptors to be incorporated into the initial search formulation; they may use broader or related descriptors to represent an element in the conceptual structure if a specific one cannot be identified. During the formulation process they decide which elements of the conceptual structure are most important for the specific request, and they investigate these thoroughly. Most often the preparation continues after logging on, and some planning is performed online.

The observed operationalists "understand" a request by translating it into search statements. They use the thesaurus as the main source for clarification and frequently as the only one. They usually look for terms submitted by the user; after they find the appropriate descriptors and know the category to which they belong, they are ready to formulate the search. If they cannot find a descriptor to represent the concept, they do a free-text search of the original terms.

### 3.2 The Dynamics of the Search

At a certain point the observed searchers are ready to enter search statements that would retrieve documents considered to be candidates for the final set. At this moment the "search proper" starts.

The observed conceptualists always start the search by establishing the primary set. This set results from entering only the most important elements in the conceptual structure. It is always expressed with descriptors, and in the first part of the search the searchers carefully examine its quality. Different elements of sampled citations (e.g., titles, descriptors) are constantly displayed to support the modification of the primary set. At this point the conceptualist searcher is mainly concerned with the recall of the set, and during this process may modify the set conceptually. When the conceptualist searcher considers the primary set to be satisfactory he starts to select subsets from it to form the final set. In the selection process the observed searchers are performing a series of trials to introduce different approaches. During this process they try to introduce the remaining elements of the conceptual structure. Depending on the specific request, they may try to introduce some or all of them, or they may try to modify the primary set without introducing explicitly any of the remaining elements.

The observed operationalists frequently start the search at the beginning of the terminal session, and they approach the search with the actual request translated directly into a Boolean expression. The "status" of the terms in this expression may vary: some are well-defined; others are suggestive, intended to elicit feedback that may help to improve the formulation. The first step is to combine all elements of the request and to display some citations. Before displaying the citations, the observed searchers may try to reduce the number of postings (if it seems too high). The operationalist searcher is concerned first with the relevance of the retrieved articles. At this point the iteration process starts. The

searchers attempt to modify the retrieval to improve its quality as a final set.

### 3.3 Some Other Points of Comparison

The invariant of the iterations. During the search, the observed searchers usually modify the initial search formulation several times. However, there is always one quality that they try to keep unchanged. The operationalists preserve the conceptual meaning of the request, while the conceptualists preserve the conceptual structure of it. For the operationalists, each set represents a concept (which may be simple or compound) whose meaning should be preserved. For the conceptualists, each set represents elements in the conceptual structure (e.g., the combination of the agent facet with the system facet). If needed, they may change the specific meaning of the elements in the structure (e.g., choose a narrower term for the agent facet and a broader one for the system facet, or eliminate the system facet from the combination).

Type of access points. All the observed searchers prefer to search with descriptors. However, while conceptualists try to avoid using free-text terms, operationalists feel comfortable with free-text searching. In fact, for operationalists, the differences between these two modes of searching serve as the main vehicle for their iterations.

System and commands. The observed operationalists use a large variety of commands and system features in their searching. They prefer to approach systems that provide manipulative power (e.g., BRS): the one that provides a large variety of capabilities, the one that differentiates between the various elements of the unit record, and the one that provides easy access to these elements. While the observed conceptualists are usually familiar with a large range of system features and commands, their searches are generally limited in the variety of commands used. They prefer to approach systems in which descriptors are entered straightforwardly, or in which information about the controlled vocabulary can be displayed (e.g., ELHILL).

The final set. The observed operationalists submit to the user a homogeneous set in which each relevant element is supposed to provide the specific information that is needed. The observed conceptualists may submit to the user a set composed of various subsets. Each subset represents a different approach to answering the request, and elements in it may not specifically answer the request.

## 4. IMPLICATIONS OF THE MODEL

A pattern model of online searching styles is a first attempt at a deep understanding of the search process. As such, it may explain previous experiments. For example, since no satisfactory measure to assess the quality of retrieval exists as yet, some investigators choose to measure also the "sophistication" of a search (sophisticated search being one in which a large variety of commands is used). From the pattern model it

can be seen that the use of a large variety of commands is typical of an operationalist searcher, regardless of the common independent variables (e.g., experience, education, training).

A pattern model of online searching can support theoretical analyses. For example, it can suggest a structure for developing a typology of requests. Three groups could be selected: requests for which an operationalist search is the best approach, those for which a conceptualist search is more promising, and those for which no particular approach is preferable *a priori*. Identifying the characteristics of the requests in each group might serve as a basis for typology of requests.

A pattern model of online searching can suggest guidelines for future experiments. The variable "subject knowledge" comes immediately to mind. Professionals in the field fall into two distinct groups: those who maintain that subject knowledge is necessary for performing a reliable search, and those who believe that a searcher with no formal education in the subject matter can perform a successful search. From the pattern model it is seen that an operationalist search can be conducted satisfactorily by a searcher with no systematic subject background. An experiment could be designed to find out whether subject knowledge is necessary for a searcher to adopt the conceptualist style.

Finally, a pattern model can provide a new approach to general issues in online searching. For example, the question of whether the role of the intermediary will eventually disappear is debated in the literature. Developing systems to be more user-friendly facilitates easier operationalist searches. Supporting end-users in conceptualist searching requires user education. Investigations along these lines may further clarify the role of the intermediary and the consequences of its elimination.

#### REFERENCES

- (1) This paper describes research in progress towards the author's doctoral dissertation (advisory Professor Dagobert Soergel).
- (2) DIESING, PAUL. Patterns of Discovery in the Social Sciences. Chicago: Aldine-Atherton, 1971.