Productivity in the Information Age

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DO USER CHARGES AFFECT ONLINE SEARCHING BEHAVIOR?

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Abstract. While there is tentative evidence that charging user fees for online searches encourages efficient searching, it is not clear whether searching behavior itself is essentially affected by user charges. A comparison of searching behavior of searchers in fee-charging settings with their counterparts in free settings suggests that while fees may encourage users to take part in the search process, searching behavior of online searchers is not affected. The impact of user charges on productivity varies with the factors selected to measure productivity.

Charging users for online searching in publicly supported institutions has advocates and opponents. The issue under debate is whether costs of online searching should be transferred to users of tax-supported facilities that provide other information services for free. Members of both camps recognize, however, that in reality, a considerable number of information providing facilities charge end-users for online searches. Leaving aside the administrative and political concerns involved, the question is, do user charges affect the "quality" of searching processes? More precisely: (1) do searchers search differently when they know a user is paying the cost than they would if searching were free of charge; and (2) if they do, how does it affect their searching behavior?

The Effect of User Charges on Online Searching Behavior

Very little research has been carried out to investigate the effect of user charges on the search process, and the evidence established by these studies is not conclusive. Pioneers in this area were Cooper and DeWath [1], who analyzed time sheets filled out by searchers at four public libraries in California as they performed various tasks associated with each search. They collected data during a first period of time, when searches were free, and during a second period, when users paid for their searches. By contrasting mean values of the studied variables for free and pay periods, they determined the effect of user fees on the cost of online searching, as well as variables relating to the search process itself. Another large scale study was conducted by Cannell and Mowat [2], who surveyed charges for online searches with data collected through questionnaires returned by roughly 60 British academic libraries. In this questionnaire, librarians were also asked to assess the impact of charging on the quality of the searches performed in their libraries.

Although both studies conclude that the practice of charging seems to increase searching efficiency, all authors point out that this conclusion is only slightly supported by their findings. While they found some statistical evidence for that relationship, the large variability of the data indicates that different libraries (and searchers) may be affected differently by online charging procedures, and that other factors that were not accounted for in the studies had possibly affected online searching behavior. Cooper and DeWath found, for instance, that while the average total time required to process a request had decreased slightly during the fee period, one library almost doubled the total time spent on a search. Cannell and Mowat revealed that some of the libraries in their study suggested that imposing fees leads to more efficiency, others claimed that it had no effect on the quality of searches, and still others provided arguments to support the notion that charging may lead to less effective searching.

Analyzing searching behavior is a complex task by itself. Identifying the impact of charging on searching behavior is even more complex because of two particular problems. First, the distinct procedure used for charging users may have impact on searching behavior. As summarized by Rice [3], information providing facilities charge for online searches according to numerous fee-schedules. By trying to keep user fees as low as possible, searchers may adapt their searching behavior to a specific fee schedule. For example, when users are charged a flat fee, searchers may not be as anxious to maintain low connect time as they might be when users pay the direct costs of their searches. This variability in fee-schedules may make it difficult to discover general characteristics of searching behavior that are affected by user charges.

Second, searchers may establish a particular searching behavior after searching for a period of time in a particular setting. Fenichel [4] observed, for example, that despite the fact that users were not charged

for the test searches used for her study, subjects who were accustomed to working in fee-charging libraries seemed to continue to perform the test searches in their habitual cost-conscious manner, with low scores for recall and search effort variables. The idea that searchers follow a certain pattern of searching behavior which is not sensitive to changing test conditions may obstruct our ability to conduct experiments in which the same searchers are observed performing searches under fee and free situations.

One approach to overcoming these obstacles is to compare the searching behavior of a number of similar searchers in various types of settings. In an ongoing observational study, applying the case study method, a model of patterns of online searching behavior has been developed [5]. Experienced searchers working in health-related information services are systematically observed performing their regular, job-related searches. Of the seven searchers observed up to this time, five work in not-for-fee information services and two work in services where users are charged for their searches. Noting the similarities and differences of searching behavior of searchers of the two groups can suggest elements of searching behavior that are affected by user charges.

The analysis of the data led to the development of a pattern model which describes two distinct searching styles which were named *operationalist* and *conceptualist* searchers. The comparison of searching behavior of searchers in the free setting with searchers in the fee setting suggests that while users are required to be more involved (directly or indirectly) in decision making in fee settings, searching styles are not affected by user charges. A few examples from the description of searching behavior of conceptualist searchers may clarify this conclusion.

Conceptualist searchers were observed to be intolerant to ambiguities in requests and to actively look for information in the strategy formulation stage. They use this information to place the request in a broad context and sometimes beyond what is seemingly required for a direct query formulation. They persistently use descriptors in their query formulations and frequently enter broader or related descriptors to express concepts. In contrast, operationalist searchers are seemingly more efficient in query formulation: they limit their information gathering by what is needed for the translation of a request into a Boolean expression; they elect to enter a descriptor when they are able to identify the one that corresponds closely to the concept, and enter a free-text term when such a descriptor is not found. While in free settings conceptualist searchers may be inclined to explore the context of requests on their own (e.g., by consulting technical dictionaries) and involve users only when they failed to do so, such searchers in fee settings are more likely to get most of the needed information from users. Conceptualist searchers in free settings were observed to display online entries in auxiliary databases (that provide information about terms), while in fee settings searchers of this style always consulted only printed manuals. Thus, the process is the same in both types of setting but the sources are different.

Another example of users' involvement in decision making is the selection of the databases to search. All observed searchers used MEDLINE as their primary database. They based their query formulations on the structure of its vocabulary, and always searched it first even if another database was likely to provide a better coverage and might be searched later. Unlike operationalist searchers who most often follow their initial plan about which databases to search, conceptualist searchers may modify their decision during the terminal session after they review the retrieval from the primary database. Searchers who were observed in fee settings did not search additional databases, which they identified during the initial terminal session, without the approval of users.

In both types of settings, conceptualist searchers start their searches with a broad definition of the request by introducing only one or two concepts or broader terms; it is during the terminal session that they narrow it down to be more specific. In comparison, operationalist searchers first enter the combination of all the concepts in a request and during the terminal session they attempt to improve precision and recall of retrieved sets. Their primary concern is precision. The primary concern of conceptualist searchers is recall, and while searchers in free settings were observed to incorporate additional moves to increase precision or spent time on post-search editing, searchers in fee settings leave more of the weeding-out to be performed by users.

While operationalist searchers aim at specific answers for requests, conceptualist searchers attempt to provide users with a comprehensive coverage of the literature relating to their requests regardless of the type of setting. To achieve this end, they may sometimes decide to construct an answer set that consists of subsets, each representing a different approach to answering a request. When searches resulted in such heterogeneous answer sets, searchers in fee settings were observed always to make certain that users were given a detailed explanation about the nature of the retrieved citations.

These examples lead to the observation that although operationalist searches may seem to be more efficient than conceptualist ones (no extraneous information is sought, the specific request is answered), searchers in

fee settings may still exhibit the conceptualist style of searching. As with their counterparts in free settings, they try to explore the full context of a request before formulating queries, they start a search from a broad approach, and try to achieve a comprehensive coverage of the literature. In comparison to free setting searchers, they are more likely to seek user involvement in decision making.

The Effect of User Charges on Searching Productivity

Productivity usually denotes the relationship between output and connected inputs. When applied to online searching, this notion of productivity raises several basic questions: what is the output of online searching? What are the inputs? Which inputs do we want to account for when assessing the productivity of online searching? These problems are heavily discussed in the information science and library literature and various factors and operational definitions are suggested and used. It seems, however, that the effect of user charges on searching productivity varies with the definitions selected for inputs and output.

Suppose we define the output of an online search as update of a user's image of a particular situation. Let us also assume that the primary effect of user charges on searching behavior is greater user involvement in the search process. To evaluate the impact of user charges on search output, we may test, say, whether users who are involved in the search process are more likely to update their images than users who are less involved. Suppose our test confirms the assumption that charging users increases search output. The effect of user charges on productivity still depends on our selection of the inputs that are connected with a search. If the user's time is taken as an input factor, charging users increases input as well, and the change in productivity may not be easily ascertained.

Varying ideas of what constitutes inputs and output of online searches complicate the examination of the impact of user charges on searching productivity at a general level. Further investigations, however, of the effect of charges on searching behavior may reveal fee-related changes that occur in factors that have been selected for consideration in productivity assessment.

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