

# Position paper: User interactions with results summaries

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## ABSTRACT

This position paper on web information seeking and interaction draws on information seeking models to broadly describe the searcher's interactions and the functionality of the retrieved results page as supporting a process of concept forming. Viewing search as developing an information need enhances the supporting function of the presentation of the search results, beyond the more traditional function of relevance spotting. User studies to investigate the effectiveness of novel interfaces supporting search are essential, but there is a need for basic research into the nature of search and its relation, specifically, with results presentation.

**Keywords** Search Interface, Summary Presentations, Information Seeking

## 1. INTRODUCTION

This position paper relates to the workshop's theme and to the author's research on modeling users' conception of search and the design of system components to support users' interaction during information seeking. Various student projects (carried out in the Department and its associated Research Institute of Information Research during 2006-07) have provided indication that the web environment and search engines are giving rise to new styles of interaction and information seeking, especially among the student population. New styles are reported in published research projects such as Nicholas et al [1] whose logs analysis showed a dynamic form of information seeking behaviour (isb) with information gathered horizontally moving from site to site. The authors termed this as bouncing or flicking. The reported use and students' preference for search engines [2], especially Google, when seeking course related information has, however, prompted some alarm

among academics. The concern is that students may not be required to employ critical thinking skills in finding information, resulting in the retrieval of superficial information and/or

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information that does not connect to anything else [3]. Google's popularity is unsurprising given its widespread use for personal queries, for example of a transactional nature, and its familiar 'minimal' interface of search box and ranked results offering easy access. The concern surrounding students' usage lies primarily with the need to judge the quality of the information retrieved but also, it would seem, with the possibility that its ease of use influences the student's perception of and approach to search. Yet some of our earlier research exploring students' mental models of search engines revealed that a fairly sophisticated model of search - as a process - was held by the participants [4]. Further, more recent interviews with students (albeit a small number) indicated their use of Google as only one of several tools and, its strategic use at the early stages of search to learn about the topic and/or to increase confidence in ability to search on other databases. It is in this context that it seems important that further research aims to better understand the users' conception of search and the possible impact of the systems' conceptual interface in supporting search processes.

## 2. SEARCH AND THE INTERFACE

The challenge for the design of novel interfaces to support users' interaction during information seeking is posed by the fact that search rarely is a single interaction, but a process, and is exacerbated by the diversity of the user population and tasks. In modern retrieval environments it is likely that the search tool is used at any point in this process, possibly for which the system was not purposefully designed. It is possible to derive this from a brief overview of some of the key models in isb [5-8] which in common describe (pre web) information seeking as a process involving sub processes of: the recognition of a information need, its definition, selection of a source, formulation of the query, examine results, reflect/iterate or stop. Interfaces are, in the main, designed for the input of the query and the output of the results on which the user identifies item(s) sought and/or makes some relevance judgment, possibly to modify the query with the intention to retrieve better results from the collection. Within this model, empirical data on users' information seeking behaviour (query formulation and relevance assessments) has informed the design of the supporting search interface. For example, back in 1997 significant use was made of different windows in the DLITE interface [9] recognising the need to provide different functionality and to make distinct the user tasks of controlling the search process and reading detailed bibliographic information about the retrieved documents. Further interfaces designed to support sub processes in the interaction have focused on the visual presentation of the retrieved results. The Nirve interface

[10], for example, displays in a 3D format query term frequency and co-occurrence and Tilebars [11] further displays query term distribution in the retrieved results. Thus the display of the retrieved items could be seen to have the aim of directly assisting the user in the use of results pages, in both *retrieving*: the user is identifying appropriate or interesting items, and *relevance spotting*: the user is seeking to determine the relation between the query and the retrieved item.

## 2.1 Concept forming on the results page

Search in the web environment and on search engines, as has been touched on, would relate more to Bates' berry picking model [12] or Kuhlthau's seven stages [13] which characterise search as a fluid and dynamic process in which the searcher may start in a very uncertain state, with limited knowledge and is expected to learn about the topic and the query itself as the search progresses. Kuhlthau's model delineates a stage of exploration where the user is seeking information in a stage of uncertainty as the information need is not yet identified. Similarities can be drawn to the search plan stage which forms part of the traditional search intermediaries' training. Although this takes place at a later stage where the need has been identified it involves the identification and conceptualization of the query. This is taught as a process of concept forming or a concept dialogue requiring the searcher to identify the concepts of the query, the terms and the aspects to use in the subsequent implementation and manipulation of the online search. The web and search engine environment appears to be used for this purpose, and its interactivity possibly facilitates searchers in concept forming and query identification. The extent to which this represents a new style of users' interaction remains to be explored. Nevertheless support for such interaction at the interface does present a greater significance to the functionality of the results page as a tool used to identify and formulate a query. Search interface design, with regards to the presentation of search results and for certain types of queries, may also target the function of *concept spotting*: the summaries provide, in the mind of the searcher, a relation between the assimilated results and the information need expressed in the query.

Search interfaces generally provide little support for the dynamic 'middle' interactive stage of search in which the user is engaged in *relevance spotting* and *concept spotting*. Furthermore until recently few studies have evaluated the effectiveness of different search results presentations. White et al [14] found query biased summaries were more effective than general summaries in assisting users gauge document relevance. Tombros & Sanderson [15] had similar findings and attributed this to fact that they indicated the context within which potentially ambiguous query terms were used. Clustering of search results also goes some way to prompting the user to think about the impact of their query and to disambiguate or refine it in selecting a folder of grouped results. The presentation of clustered retrieved results or its variation in the form of diversification (effectively displaying results from each possible cluster) in the ranked page of retrieved results appears to close the gap between the computer and user model of search working as the human brain on the lines of "like" and "different from", without always achieving consensus. Whether these developments are intended or actually achieve an information seeking dialogue in the mind of the searcher, early indication is that they have a positive effect in supporting the user's evolving query. Further evaluation of the effectiveness of these interfaces is called for. Joho and Jose [16-18], for example,

compare the effectiveness of an interface to present faceted groupings from the surrogate record of a selected item as an alternative to clustering. They also investigated the effect of additional representations in the search results presentation, such as top ranking sentences and thumbnail images, and a browsing interface in which each of the three top ranked sentences (trs) for a document could in turn be supplemented by new trs from the top 30 urls. These interfaces offer the users different functionality and the users were reported to have welcomed this. The researchers also indicated a positive effect on the users' query reformulation and search results browsing (relevance judging and viewing of retrieved documents) but called for careful consideration in the selection of additional representations.

This brief review serves to demonstrate the theme of the workshop that styles of user interaction during information seeking behaviour has an important (possibly reciprocal) impact of the design of the features and functionality of the search interface. As a position paper it serves to highlight the need for further investigation of the users' conceptions of the search activity during interaction. The search environment, the user perspective and search models indicate the emerging requirement for search engines to support the user in some form of a concept dialogue. Our further research aims towards this end in the investigation of the functionality of the results page and the summary presentations during search.

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