From Multistage Information-Seeking Models to Multistage Search Systems

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ABSTRACT

This extended abstract summarizes research from [1].

The ever expanding digital information universe makes us rely on search systems to sift through immense amounts of data to satisfy our information needs. Our searches using these systems range from simple lookups to complex and multifaceted explorations. A multitude of models of the information seeking process, for example Kuhlthau's ISP model, divide the search process for complex search tasks into multiple stages. Current search systems, in contrast, still predominantly use a "one-size-fits-all" approach: one interface is used for all stages of a search, even for complex search endeavors. The main aim of this paper is to bridge the gap between multistage information seeking models, documenting the search process on a general level, and search systems and interfaces, serving as the concrete tools to perform searches.

1. Multistage Information Seeking Models Various temporally-based information seeking models differentiate search stages over time, based on empirical evidence. During these stages, the information sought, the relevance, and the search tactics and strategies evolve. Authors like Kuhlthau and Vakkari have accurately pinpointed the issue of stage-specific search support, but provide less concrete pointers to implementation in search systems and interfaces. Many information seeking models, as Tom Wilson has indicated, focus on higher-level aspects of information seeking (the *macro* level), while information system designers usually focus on the support for concrete actions of a searcher (the *micro* level). However, indications for the provision of search stage support in search systems can be determined from the theory, not only at the interface level (providing specific features supporting stages), but also at the system level (for example providing search stage adaptive ranking). Our main conclusion from this conceptual analysis is that a good general understanding of the information seeking stages exists at the macro level, but that the translation into system and user interface design choices at the micro level remains unsolved.

2. SUI Support for Information Seeking To get more insights into the Search User Interface (SUI) features that could support complex, information-intensive search tasks, the second part of the paper analyzes concrete SUI features using Max Wilson's framework for interface features, which differentiates between *input*, *control*, *informational* and *personalizable* features. We argue that there is an abundance of interfaces which support information *search*, but that few systems provide explicit support for the higher-level information *seeking* process in the context of complex tasks. However, some overarching interface paradigms have similarities with temporal search stages. *Exploratory search*, though slightly different in nature due to the open-endedness of the tasks, could fit in the early 'prefocus' stages of Kuhlthau's and Vakkari's models, and elements of *sensemaking* could fit in the more advanced 'postfocus' stages of search. There is, however, no integrated system, and various authors point at the complexity to understand the impact of design choices on the overall usability, and the complexity of creating a seamless and effortless flow of interaction. This part of the paper concludes that there is a good understanding of search user interface features at the micro level, but that our general understanding of behavior at the macro level is fragmented at best. This suggests a way to reconcile these two views: what if we utilize the understanding of information seeking models at the macro level as a way to understand the flow of interaction at the micro level?

3. Interface Features and Search Stage In this section, we analyze the influence of search stage on the flow of interaction. We observe different use of features over time, based on previous literature and an analysis of eye tracking and system data from a small-scale user study. Some *informational* features (results lists and details) are generally used in all stages of the search, albeit in different depths, and therefore could be considered stage insensitive. However, the use of a subset of search features varied over time, like the gaze towards the query box (an *input* feature), and the use of the basket (a *personalizable* feature). Especially, we observe variations in the use of interface features in the beginning and end of a complex search task. This provides indications of different usage patterns of search user interface features in different search stages, which could be informative for the design of search systems.

4. Conclusion The main contribution of this paper is that it conceptually reconciles macro level information seeking stages and micro level search system features. We highlight the impact of search stages on the flow of interaction with SUI features, providing new handles for the design of multistage search systems. Based on our analysis of information seeking models, search user interfaces and search feature use over time, we hypothesize that there are differences in the interaction flow of SUI feature use at the micro level, depending on the current stage of search at the macro level. This suggests interface elements which are search stage sensitive, and we could customize the way search system features are shown during task progression. This customization may be performed in different ways: depending on the search stage, one could adaptively show SUI features, adjust the shown details of features, or change their prominence, position and size. In follow-up research we investigate whether this approach can be naturally integrated in the user's flow, for different complex tasks and contexts.

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REFERENCES

[1] H. C. Huurdeman and J. Kamps. From Multistage Information-seeking Models to Multistage Search Systems. In *Proceedings of the 5th Information Interaction in Context Symposium (IIiX)*, IIiX '14, pages 145–154, 2014. ACM. http://dx.doi.org/10.1145/2637002.2637020.

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