

CHAPTER 2

INTERACTIVE INFORMATION RETRIEVAL: BRINGING THE USER TO A SELECTION STATE

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1. INTRODUCTION

There have been various approaches to conceptualizing interactive information retrieval (IR), which can be generally divided into system and user approaches (Hearst, 1999; cf. also Spink, 1997). Both system and user approaches define user-system interaction in terms of the system and the user reacting to the actions or behaviors of the other: the system reacts to the user's input; the user to the output of the system (Spink, 1997). In system approach models of the interaction, e.g., Moran (1981), "[T]he user initiates an action or operation and the system responds in some way which in turn leads the user to initiate another action and so on" (Beaulieu, 2000, p. 433). In its purest form, the system approach models the user as a reactive part of the interaction, with the system taking the lead (Bates, 1990). User approaches, on the other hand, in their purest form wish to insert a model of the user in all its socio-cognitive dimensions, to the extent that system designers consider such approaches impractical (Vakkari and Jarvelin, 2005, Chap. 7, this volume). The cognitive approach to IR interaction attempts to overcome this divide (Ruthven, 2005, Chap. 4, this volume; Vakkari and Jarvelin, 2005 Chap. 7, this volume) by representing the cognitive elements of both system designers and the user in the interaction model (Larsen and Ingwersen, 2005 Chap. 3, this volume).

There are cognitive approach researchers meeting in a central ground from both the system and user side. On the system side, are computer scientists employing cognitive research to design more effective IR systems from the point of view of the user's task (Nathan, 1990; Fischer, Henninger, and Redmiles, 1991; O'Day and Jeffries, 1993; Russell et al., 1993; Kitajima and Polson, 1996; Terwilliger and Polson, 1997). On the user side are cognitive approach researchers applying methods, concepts and models from psychology to design systems that are more in tune with how users acquire information (e.g., Belkin, 1980; Ford (2005, Chap. 5, this volume); Ingwersen (Larsen and Ingwersen, 2005, Chap. 3, this volume); Saracevic, 1996; Vakkari (Vakkari and Jarvelin, 2005, Chap. 7, this volume)).

One cognitive meeting ground between user and system orientations is the conceptualization of the user-system interaction in terms of agents representing the user and the system acting on behalf of each actor in the transaction. The agents also have some sort of effect the one on the other that is not negligible. For example, Human-Computer Interaction (HCI) researcher Storrs (1994, p. 173) defines interaction as the

“exchange of information between participating agents through sets of information channels (interfaces) for the purpose of altering their states.”

The agent for the IR system is evolving but is centered on the results list, summaries of the results list, visualizations of the results list (Hook and Borner, 2005, this volume; Markoff, 2005), or any other representation of documents, Web sites, etc. contained in the system’s database and deemed by the system to match the user’s information need as it is represented to the system by the user’s agent in the transaction, the query. The user’s query represents the user’s information need in system approach IR research. However, this view of information need as the conceptual basis for the user’s agent in the user-system interaction has been questioned by cognitive approach research.

In this chapter, after describing the problem the cognitive approach has with information need, we propose a model of the user-system interaction that eliminates the user’s information need as the basis for the user’s initial request statement to the system. Instead, we reconceptualize the interaction using terms that are common to both user and system approaches to interactive IR design, such as *state* and *selection*. The term *state*, to represent some state of the user’s mind or thinking, has often been used in cognitive approach IR system research. Selection or selecting is an even older term in considering the user in the design of IR systems. In the pre-Internet, library environment, the trend towards open stacks and self-service in the late 19th century (Cutter, 1891–1893, p. 5) caused catalogers, indexers and classificationists to devise systems that assisted the user to (i) find, (ii) identify and (iii) select needed information while using the library’s IR system (the card catalog). The three objects as they were called (i.e., objectives) were expressly codified in 1876 by Cutter (1876/1904) in the introduction to his *Cataloging Rules for a Dictionary Catalog*.

(A 4th object, the obtaining object, was added in 1997 by the International Federation of Library Associations and Institutions (IFLA); and for the interactive technology era, Svenonius, 2000, has recently added a 5th, the navigation object. We discuss the 5th “navigation” object in Leide et al., 2003. The 2nd object, the collocation or identification object is discussed in Cole et al., 2005.)

The 3rd object, the selection object, is the subject of this chapter. In the next section, we discuss the weakness of information need as the conceptual basis for the user’s agent in IR interaction.

1.1. Information Need as a Basis for User’s Agent in Interaction

While both user and system approaches have the same goal—to maximize the utility to the user of the information found by the system—user oriented researchers have long believed (since for example, Belkin, Oddy, and Brooks, 1982) that the problem with current IR systems is their unidimensional model of the user as he or she is represented in the interaction between user and IR system, particularly the assumption that the user’s request statement to the system encapsulates the user’s information need.

In system approaches, the user’s agent in the interaction, the query, is assumed to be an apt representation of the user’s information need. Based on this assumption, modification of the need statement as a result of system feedback to the user (via interim results, thesauri, or other search aids offered by the system to help the user reformulate