

# CHAPTER 5

## NEW COGNITIVE DIRECTIONS

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### 1. INTRODUCTION

This chapter explores cognitive issues relating not only to the use and effectiveness of information retrieval (IR) systems, but also to the generation of new research knowledge relevant to enhancing such use and to the development of improved systems. There is still much that we do not know about how effectively, or not as the case may be, current IR systems support different individuals and groups of people in effectively acquiring the knowledge they need to help them in the tasks in which they are engaged. We need greater levels of knowledge of how we might optimize the symbiotic interactions between IR systems and people working in different contexts, and of the directions we might most profitably take in the development of new systems.

The chapter begins by establishing working definitions of “knowledge”, “information”, “understanding”, and related concepts including “information retrieval” and “information behavior”. Such definitions are necessary if we are to achieve any clear focus on what are important issues for the evaluation and development of IR systems and practices. *Knowledge* is defined here as a conceptual system that enables its possessor (whether human or machine) to act in the world (e.g. in the form of autonomous activity or response to stimuli). *Information* is defined here as potential knowledge, and *understanding* as the process of transforming information into knowledge. Perceiving an information need represents the realization that one is in a situation for which one’s existing knowledge is not adequate. Information is needed to generate, via understanding, appropriate new knowledge.

However, the *need for knowledge* is broader than the *information need* in that the former entails defining the nature of the sought-for knowledge, as opposed to the type and nature of the information which may be used to generate it. Importantly in this context, functionally the same knowledge may be generated via the processing of alternative items of information. The realization and specification of the knowledge need, along with the evaluation of information behavior in terms of its contribution to satisfying the knowledge need, are termed here *knowledge behavior*.

*Information behavior* comprises those activities entailed in the acquisition of information that may be transformed into knowledge. It subsumes *information encountering* and *information seeking*, the latter subsuming *searching* and *retrieval*. Although *information retrieval* is often used narrowly to denote the latter activity taking place within information seeking, a broader definition is used here to include the development, use and evaluation of systems designed to support the range of activities denoted by the term information behavior.

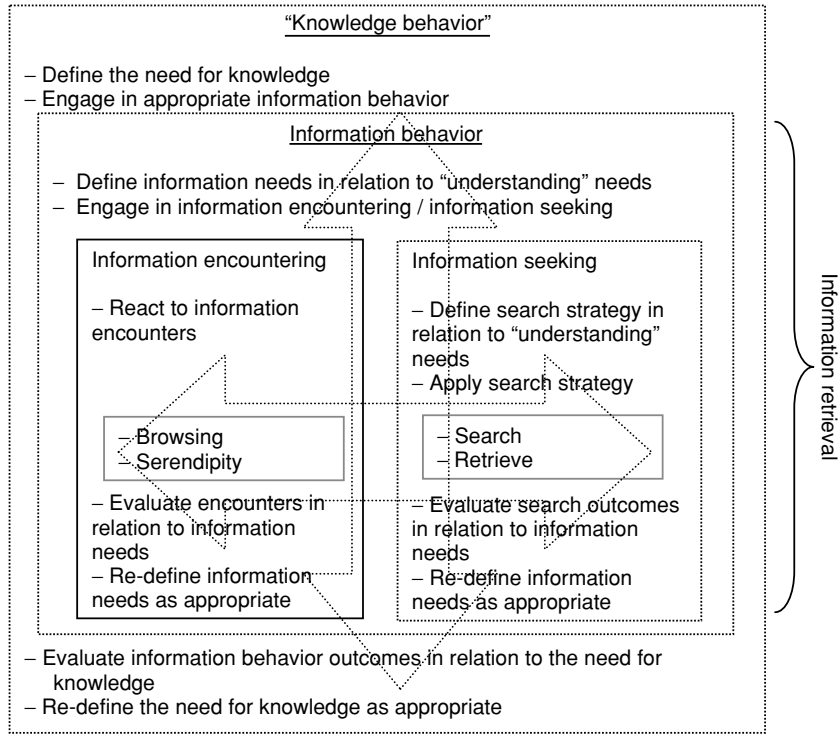


Figure 1: Information retrieval as defined here

These concepts are depicted in Figure 1. The dotted arrows signify that, as argued below, there may be fluid movement of intellectual and behavioral activity across the areas indicated.

*Research* is defined here as the generation of knowledge via systematic inquiry (e.g. to explain and/or predict some phenomenon). *Information retrieval research* is defined here as the generation of information designed to be helpful for the development, use and evaluation of systems for supporting information behavior.

*Cognitive* aspects of IR are defined here to encompass those aspects of the development, use and evaluation of information behavior support systems that explicitly reference the thought processes entailed in that behavior. “Cognitive” is often used, particularly in education, to denote logical thought as opposed to attitudes and feelings which are referred to as “affective”. No such distinction is observed here, and “cognitive” is used in its broader sense to refer to both logical and affective thought processes.

2. THE “DARKNESS TO LIGHT” RATIO

Inability to move beyond the relatively modest recall/precision plateau of IR system performance, and failure of user models apparently to have much to say to information