Available online at www.sciencedirect.com
ScienceDirect
Int. J. Human-Computer Studies 65 (2007) 170–182
International Journal of Human-Computer Studies
www.elsevier.com/locate/ijhcs

A cyclic model of information seeking in hyperlinked environments: The role of goals, self-efficacy, and intrinsic motivation

Prabu David*, Mei Song, Andrew Hayes, Eric S. Fredin

Ohio State University, School of Communication, 3016 Derby Hall, 154 North Oval Mall, Columbus, OH 43210, USA

Received 31 January 2005; received in revised form 23 August 2006; accepted 23 September 2006
Communicated by P. Zhang
Available online 9 November 2006

Abstract

To examine the emergent properties of information seeking in hyperlinked environments, in this paper we developed a cyclic model. Using this model as a framework, the relationships among perceived goal difficulty, goal success, and self-efficacy were examined. Self-efficacy was conceptualized as a mediating mechanism and intrinsic motivation (IM) in the task was examined as a moderator. Data were collected as repeated measures over 20 cycles during an hour-long session of information seeking when students were given that task of designing a travel plan for a trip to China. The findings suggest that success in meeting information goals in one cycle resulted in an increase in self-efficacy, which in turn reduced the perceived difficulty of information goals in the upcoming cycle. At the same time, self-efficacy from previous cycles seemed to provide the impetus for formulating more challenging information goals in subsequent cycles. Besides this dual role of self-efficacy, the moderating role of IM was also evident. For participants relatively high in baseline IM for the task, the link between self-efficacy and goal success was weaker. However, for participants with relatively low levels of baseline IM for the task, goal success has a stronger effect on self-efficacy.
© 2006 Elsevier Ltd. All rights reserved.

Keywords: Computer self-efficacy; Information search; Goal-setting; Human–computer interaction; Information seeking; Information retrieval; Intrinsic motivation; Social cognitive theory

0. Introduction

Hyperlinked information environments provide various avenues for information search. While some links lead to the information sought by the computer user, other links lead the user down paths that are not profitable. With the emergence of search engines, such as Google, searching and browsing for information through this method of trial and error is becoming the norm. Despite the increasing popularity of information seeking in hyperlinked environments, our understanding of the cognitive processes underlying this critical activity is limited. While researchers from different disciplines have noted that information seeking should be studied over a number of cycles (Debowski et al., 2001; Fredin and David, 1998), few studies have rigorously addressed the cyclic aspects of search behavior. Even when longitudinal designs have been employed (e.g., Debowski et al., 2001), the number of cycles has been limited. To address this gap, first we begin by developing a general cyclic model of information seeking. Second, we apply this general model to a specific research question: how does self-efficacy affect perceived difficulty of goals during an information-seeking session. Third, we address the above research question using cyclic data generated over multiple cycles in a laboratory study.

1. Information seeking

The search for information can take on different forms. At one end, information search can be directed toward a very specific goal, such as finding a friend's phone number. In this type of specific or closed search, the user operates with a static goal and has a clear idea of what is an

*Corresponding author. Tel.: +1 614 2927438.
E-mail address: david.15@osu.edu (P. David).

1071-5819/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.ijhcs.2006.09.004

acceptable answer at the beginning of the search (Marchionini, 1987). Performance on closed tasks can be evaluated by objective criteria such as the accuracy of the information and the speed to complete the task (de Vries and de Jong, 1997). While the closed task is characterized by the specificity of the goal, the open task is characterized by the vagueness of goals (Cove and Walsh, 1998), also referred to as ill-defined goals (Marchionini and Sniederman, 1988). In open tasks, which can be characterized as browsing, the user begins with loose and general information goals. Criteria for such goals cannot be clearly articulated before the search, but are fine-tuned during the search process (Bates, 1989; Marchionini, 1987). The extreme case of the open task is the random search, which is characterized by very poor goal specificity and is beyond the scope of this paper.

A number of typologies have been advanced, primarily by scholars in the information sciences, to capture the different types of information search. Rice et al. (2002) present three search categories: directed search, semi-directed search and random search. Other researchers have presented variations of this typology. For example, Cove and Walsh (1998) offer search browsing, general purpose browsing, and serendipity browsing, while Carmel et al. (1992) present search-oriented browse, scan browse and review browse as part of their taxonomy.

Without getting into the nuances of the differences between browsing and searching, in this paper we focus on information seeking behaviors in general. Our goal is to develop a general framework to capture directed and semi-directed information seeking. Information seeking activities bordering on random behavior with little strategic thought are beyond the scope of this formulation, as are highly structured information searches with clear, predetermined correctness criteria.

The proposed model is a multi-step process model that shares some attributes with Information Search Process (ISP) proposed by Kuhlthau (1991). The model is ideally suited for information seeking situations in which goals are emergent, which means that at the beginning of the information seeking task, the user has vague goals, which are refined during the process of the search. For example, the user may be interested in finding "interesting sightseeing in a city." Using this broad goal as a starting point, the user seeks out different types of online information, perhaps beginning with the results from a search engine. With emergent goals, the definition of success in finding the right information evolves during the search process and the criteria for success vary by different levels of fit between information sought and information found. The user may evaluate the information as "this is not exactly what I was looking for, but it seems interesting," or "I will keep this in mind and continue looking for something that fits more precisely into what I am looking for." Such emergent goals in information seeking can be analogized to berry picking (Bates, 1989) or information foraging (Pirolli and Card, 1999). The changes and evolution of information goals during the course of a session and the regulatory mechanisms that keep the search process on track are of focal interest. In contrast, consider a search for a phone number through the online white pages. In this case, only two outcomes are possible, "number found" or "number not found." Such searches with rigid outcome criteria are beyond the scope of the model.

2. Cyclic models of information search and human–computer interaction

The cyclic and emergent nature of information seeking highlights the critical role of the temporal dimension. Such cyclic models of interaction have been influential in cognitive psychology and human–computer interaction. For example, the Test-Operate-Test-Exit (TOTE) (Miller et al., 1960) model of human perception and cognition is premised on a cybernetic approach with cascading loops of tests and operations that keep the system in equilibrium. Goals-Operations-Methods-Selection (GOMS) (Newell and Simon, 1972), an influential AI model for representing human procedural knowledge in production systems, also employs a similar approach with a strong hierarchy of goals. In the GOMS models, broader goals are decomposed into manageable sub-goals, leading to the choice of appropriate operations. The operation stage triggers appropriate methods, which contain specific instructions to accomplish the goal. Sometimes a selection rule is invoked to determine which among several operations is best suited for the achieving the goal. Although the GOMS model has been applied successfully in computer programs to emulate human problem solving, it has been criticized for its highly deductive approach to cognition.

As an alternative to GOMS and other deductive models, models of situated cognition (Suchman, 1987; Winograd and Flores, 1986) tend to be more inductive and experiential and offer a better account of the environmental contingencies in which human–computer interaction unfolds (Monk, 1998). Situated cognition seems to be a more apt metaphor for capturing the loose and elastic characteristics of information seeking modeled in this paper. For example, at the beginning of an information seeking session, usually the user cannot articulate goals, sub-goals or a clear plan. However, based on what the user finds during the first few cycles, sub-goals and plans are created and adjusted dynamically. One approach that captures the situated properties of information search is the sense-making approach presented by Dervin (2003), Dervin and Nilan, (1986), which is based on the premise that when faced with information discontinuities or information needs, humans attempt to bridge this gap by defining and making sense of the situation and then devising appropriate information processing approaches to bridge the gap.

A cyclic approach to human–computer interaction has also been advanced by Monk (1998, 1999) who argued for

دریافت فوری ← متن کامل مقاله

ISIArticles
مرجع مقالات تخصصی ایران

✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
✓ امکان دانلود نسخه ترجمه شده مقالات
✓ پذیرش سفارش ترجمه تخصصی
✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
✓ دانلود فوری مقاله پس از پرداخت آنلاین
✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات