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A New Integrated Model for Multitasking during Web Searching

Peggy Alexopoulou, Anne Morris, Mark Hepworth

Loughborough University, Information Science, Loughborough, LE11 3TU, Leicestershire, UK

Abstract

There have been many studies in the field of information behavior. Recently Du and Spink (2011) presented a model, which simulates multitasking, cognitive coordination and cognitive shifts on web. However, this model does not incorporate personal variables and the impact of task or web design. This research addresses this gap. Information and psychological scientists have shown that information behavior (IR) is affected by: the affective domain, cognitive attributes, psychological factors, personality dimensions and sociological factors. This study investigates how IR is affected by working memory (wm), cognitive coordination, cognitive shifts and various artifacts and task variables influenced by the PAT model (Personal, Artifact and Task characteristics) of flow. The research is exploratory and takes a pragmatic, mixed method approach. Thirty University students will participate. The research tools include: pre and post questionnaires, working memory tests, Flow State Scale test, think aloud data, observations, audio-visual data, web search logs and use of the Critical Decision Method. The qualitative data will be coded and analyzed thematically and will be related to the quantitative data. This study is expected to identify the impact of all these variables on multitasking IR in the web and provide a new integrated framework, which is not only going to help information scientists to better understand this behavior but also web companies to develop more effective web products.

1. Introduction

   People use web and web search engines in order to investigate and retrieve information. As web seeking becomes increasingly necessary for information access across the world, there is a need for more effective models describing people's interaction with web systems.

   Web searching usually characterized as multitasking information seeking behavior, described as " the process of searches over time in relation to more than one, possibly evolving, set of information problems (including changes or shifts in beliefs, cognitive, affective, and/or situational states)" (Spink A, Ozmutlu HC, Ozmutlu S. 2002). A number of factors are involved when people multitask using the web: the affective, the cognitive,

psychological states, personality dimensions and sociological factors. However these factors affect multitasking information behavior at different levels in the searching process and further research is needed to explore them more in a multitasking environment on web.

This study is expected to identify:

- The impact of cognitive factors on multitasking information behavior when using the web. It is expected that this study will expand the previous model of web searching considering people's cognitive variables (Du JT, Spink A. 2011). The investigation of working memory should also throw light on multitasking information behavior particularly in relation to cognitive coordination, cognitive shifts and their sub levels.
- Relationships, if any, between cognitive shifts and coordination levels for each participant according their working memory capacity. Patterns of cognitive coordination and shifts will be investigated.
- The impact of web artifact and tasks characteristics, according to the PAT model of flow. Multitasking in previous models consist of task switching between original and evolving information problems, and of multiple web search sessions and windows browsing. This study is going to involve tasks and web artifacts characteristics according the PAT model of flow because this model identifies the importance of separating the task from the artifact within a computer-mediated environment. The impact of web artifacts and tasks characteristics will be compared to flow, cognitive shifts and cognitive coordination.
- The relationship between flow, during the whole multitasking information behavior event, to cognitive coordination, cognitive shifts and web seeking procedure. The results of flow tests will be compared to working memory results, enabling correlations to be investigated and their impact on multitasking information behavior to be explored.

2. Background Research

2.1 Information behavior

Information behavior has been explored for many years. Many information scientists have provided models, in which they tried to illustrate the strategies and mechanisms of this behavior (Wilson TD. 1981, Ellis D, Cox D, Hall K. 1993, Du JT, Spink A. 2011, Ellis D. 1989, Kuhlthau CC. 1991, Ellis D, Haugan M. 1997, Dervin B. 1983, Hepworth M. 2004, Hepworth M. 2001, Sutcliffe AG, Ennis M. 1998).

Information Retrieval (IR) is about searching, filtering and finding the information that people desire (Ingwersen P, Järvelin K. 2005). Different approaches have been used to depict the process. The system approaches highlight the importance of the system (Larsen B, Ingwersen P. 2005). The user approaches, on the other hand, focus, as expected, on the user and their main role. Other approaches concentrate on the cognitive factors involved in the processes between the user and the system (Larsen B, Ingwersen P. 2005).

The term Interactive Information Retrieval (IIR) has been coined to describe information retrieval in relation to web searching (Ingwersen P, Järvelin K. 2005). Several model exist which attempt to describe this process, (Bates NJ. 1989, Saracevic T. 1996, Saracevic T. 1997, Belkin NJ. 1996, Ingwersen P. 1992, Spink A. 1997); however, they do not adequately describe the cognitive mechanisms involved. For completeness, some of these models are described in the following sessions.

2.2 Web searching

Many models have been developed to depict factors that may affect web use, performance and selection of web search engines and tools (Wang P, Hawk WB, Tenopir C. 2009, Wang P, Hawk WB, Tenopir C. 2005, Knight SA, Spink A. 2008, Ford N, Miller D, Moss N. 2005, Du JT, Spink A. 2011, Shneiderman B, Byrd D, Croft WB. 1997). Du and Spink (2011), for example, in their model linked multitasking with cognitive