Exploring the role(s) of culture and cognition in online information searching behavior?

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Introduction

The Internet, as no other communication medium, has given an international dimension to the world. It has increasingly become a universal information source and communication channel for millions of people, at home, at school, and at work. With such an extensive and diverse user population, it is indispensable to study how different web users browse and use online information in order to provide a cognitive basis for interface design. Hence, the field of information studies has a long tradition of studying user information seeking (IS) behavior in digital environments (Bates, 2010; Fisher, Erdelez, & McKechnie, 2005; Pirolli & Card, 1999). However, little is known about the impact of end-user culture on the tactics employed by users themselves to find, retrieve, and use information (Komlodi, 2005).

Based on the information foraging theory, people's strategies for exploring, finding and ultimately "consuming" information within information resources are driven by a cost-benefit analysis which is similar to their ancestors' exploration tactics in the task of finding food (Pirolli & Card, 1999). Thus, the question arises of whether people from different cultures share the same cost-benefit strategy in finding, preparing and consuming foods in their real life. Do people from different parts of the world have the same appetite and preference for food? How does Indian cuisine differ from French cuisine and why? Continuing with the diet analogy, similar questions can be asked for the strategies that people with different cultural

backgrounds may use to seek and consume online information. How does users' culture effect their online information searching behavior? This is the question that I intend to address in this study.

Purpose

The purpose of this study is to identify if cultural differences affect information-searching behavior of online information seekers on Google. Several cognitive psychologist and anthropologists believe that people of different cultures tend to have different cognitive processing styles (e.g. Han et al., 2013; Riding & Rayner, 1998; Nisbett et al., 2001; Chen & Macredie, 2002; Nisbett & Norenzayan, 2002; Kitayama et al., 2003; Chua et al., 2005; Masuda & Nisbett, 2006; Marcus, 2006; Varnum et al., 2010). The results of Nisbett's studies on cognitive processing differences between Western and East Asian cultures demonstrate that Westerns tend to have more analytical cognitive style whereas East Asians tend to have more holistic or contextual cognitive style (Nisbett et al., 2001). The cognitive differences between East Asians and Westerns have been the focus of several cultural cognitive studies since Nisbett introduced his theory of cultural cognition in 2001. However, there are only a limited number of studies that investigate cognitive differences between Middle Eastern, East Asians, and Western online information seekers.

On the other hand, even though cultural differences have been the main concern of several information behavior studies in the last 10 years, there is only one study that has examined the differences in information seeking behavior from the cultural cognitive perspective (e.g. Dong & Lee, 2008). The current cross-cultural studies of information behavior

are conducted based on Hall (1966, 1976) and Hofstede's (1991) framework of culture (e.g. Komlodi & Carlin, 2004; Komlodi & Hercegfi, 2010; Kralisch & Berendt, 2004; and Marcos et al., 2013). The Hall and Hofstede cultural tradition is derived from the behaviorism perspective where they assume that culture manifests at the surface, at the behavioral level. Even though the proposed framework is useful and explanatory, they described the culture as a product of combinations of simple and similar behavioral units that are the result of rather neutral and universal cognitive processes. However, from the cognitive psychology perspective, behavioral distinction is the product of cultural behaviors, which are embedded in cognitive processes (Faiola & Matei, 2005).

With that said, this study examines the differences between information searching behavior of American, East Asian and Middle eastern online information seekers from the cultural cognitive perspective. The results will address the following overarching research question: How does culture impact online searching behavior?

Significance

Understanding how users' online information browsing tactics differ from one culture to another and knowing the situations that bring about such strategies paves the way towards providing a cognitive basis for interface design. Knowledge about the strategies users employ to navigate webpages is of utmost importance as it allows us not only to predict interactive behavior, but also to evaluate the design and architecture of a web page (Bates, 2010). This area of research is becoming increasingly important as at present, some two and half billion people from all over the world are interacting with online information systems. Those two and

half billion Internet users often have to use the same interface, drawing on their cognitive and evolutionarily shaped behaviors (Bates, 2010; Komlodi, 2005).

This study is the first academic research that examines users' "natural" information behavior from Nisbett's cultural cognitive perspective. Also, it is the first study that compares American, East Asian and Middle-eastern users online information seeking with the use of eye tracking and mouse tracking technologies. The recording applications that will be used in this study can record real-time data as users search and navigate the web. This way we can examine and compare natural information seeking behavior of the participants while performing the assigned tasks.

Research design

Most of the studies that have been conducted in the field of IS behavior of online users have used mouse-tracking applications to track users' activities on the web (Bates, 2010). Even though the findings of mouse-tracking studies are necessary and very important in understanding user's online browsing behavior, it reveals little about unintentional and cognitive behaviors of users, which I propose can be directly influenced by their cultural context. Therefore, it is important to observe and interview users to understand why they have performed a certain behavior. Interviewing users retrospectively after completing tasks provides valuable insights into their thought processes and behavior, but still the answers are consciously filtered explanations. One reliable technique to identify online user's unconscious information behaviors is eye-tracking (Granka, Joachims, & Gay, 2004). Eye-tracking's test results can provide additional insights into what the searcher is doing and reading before

actually selecting an online document and why--which are important questions in studying influence of cognitive factors on user's browsing behavior. Based on the eye-tracking records we will be able to understand what abstracts a user is indeed viewing and reading, for how long, and in what order. By employing eye-tracking technology we can identify behaviors that users are not able to articulate (Pan et al., 2004). Though useful, there are only a few studies that used eye-tracking technology as a central data gathering method in investigating user's web navigating behavior. In this study, in addition to interview, I propose employing eye-tracking technique in conjunction with mouse-tracking technique in order to investigate user's cognitive behavior (eye-gaze trails or what they look at) and browsing behavior (action or what they click) at the same time. By combing these three methods I believe that we will be able to get a complete set of data about user's browsing behavior. Cultural dimensions are perceived as the controllers of cognitive behavior in this study that will be examined during interview.

Participants

I will select fifty students (aged 20-35) from different nationalities and cultural backgrounds who extensively use the Internet to find the information they need at home, work, or at school (10-20 hrs/ week). Non-American participants will be selected from the international students at University of South Carolina who have been living in the US for no more than two years in order to control the effect of adopting new culture. The participants need to have a very good level of proficiency in English; however, they will be asked to use their mother language in performing some tasks.

Approach

Preparation

Since human's subjects are the main actors of this study, Institutional Review Board (IRB) approval has been sought prior to commencement of research. Participants will be canvassed through invitations at various USC International Student Association events; postings around USC campus; and e-mails. At the end of each experiment participants will receive $20 as a token of appreciation for their participation in this study.

Data Collection

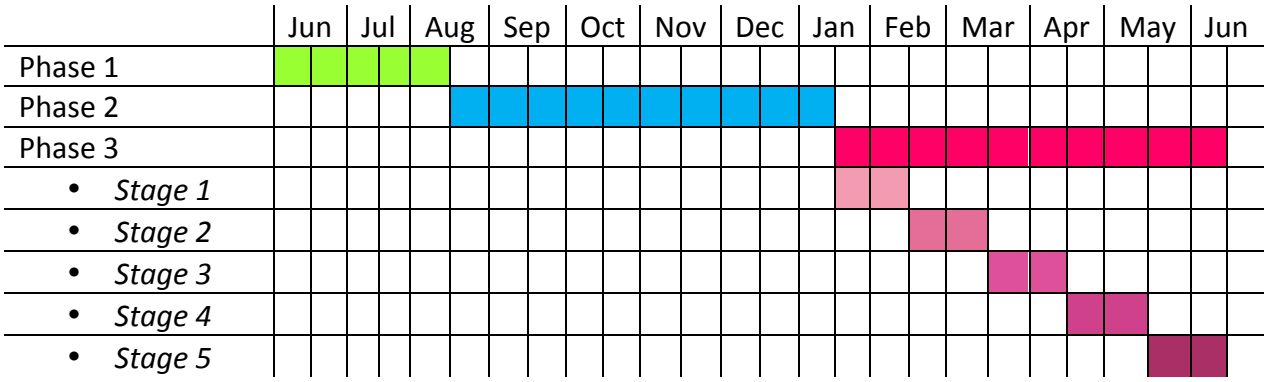
Data will be collected through three channels: questionnaire survey to gather demographic information; TechSmith Morae application and MyGaze eye-tracking plugin to record and manage the users' browsing activities including the participants' eye movement and eye gaze; and, personal interviews with participants to elicit the cultural background of the participants. Each participant will be given two types of tasks; searching for familiar information and searching for unfamiliar information. They will be asked to perform the above tasks both in English and their mother language.

Data Analysis

Both qualitative and quantitative data analyses approaches will be employed to examine the data that will be gathered through different channels. Through eye tracking and click metrics, and eye tracking visualizations such as gaze plots and gaze replays, results can be interpreted in order to answer to questions such as what is looked at but not clicked on? Or what does the decision making process of culturally similar participants look like? Also, qualitative data analysis will be used for interview questions to support the findings of the mouse-tracking and eye-tracking experiments.

In general, this study has three phases. The first phase is to acquire IRB approval, purchase the required applications, and recruit participants. The second phase is to run the study and gather data. The third phase is to analyze the data which includes five other stages. The first stage is to visualize and then analyze participants' browsing data based on the data that will be gathered by a mouse-tracker application. The second stage is to analyze participants' eye movements based on eye's fixations (brief stops that is associated with individual's attention), saccades (rapid bursts), and Pupil dilation (that is associated with individual's interest) data that will be recorded by an eye-tracker. The third stage is to sort the relevant comments and answers that will be gathered during observation and interview based on the above categories. The fourth stage is to map user's browsing pattern (retrieved from mouse-tracking and eye-tracking) to his/her category of culture. The last stage is to elicit the difference and similarities in user's browsing behavior with regards to their cultural category and write up the discussion. The table below is an illustration of the procedure of this study in 12 and half months.

Timeline



Budget and Budget Justification

I am applying to the Thomson Reuters Scholarship because I need financial support for the following three purposes:

1- To provide $20 incentives for my participants; I will need at least 50 subjects to participate in this study. Human's subjects are the most important elements of this study and without having enough number of subjects the results of this novel study would not reliable. I hope that the $20 incentive provides an encouragement for the students to participate in this study (50 * $20 per person = $1000).

2- To consult with a statistician for the quantitative data analysis part; I will need someone who is expert in statistical analysis to assist me with the analyses of the statistical data that will be gathered through the survey, mouse tracking and eye-tracking methods. Even though I have a good background in statistic, I still need an expertise consultation for advance data analysis in order to draw the correct and accurate conclusion. I believe that I will need 20 hours of statistical consultation (20 * $10 per hour = $200).

3- To consult with an eye-tracking data analyst for analyzing the gathered data from the experiment; although I have been involved in several eye-tracking studies, I believe that eye-tracking data analysis requires a high level of experience which is beyond my expertise and specialties. Consulting with an expert will provide me with a great insight into the data and better understanding of human's cognitive behavior. I believe that I will need 30 hours of consultation with an eye-tracking analyst (30 * $10 per hours = $300).

Significance of This Funding to Graduate Experience

I am a third year PhD student and a Cultural Heritage Informatics Leadership (CHIL) fellow at the School of Library and Information Science (SLIS) at University of South Carolina. I received the CHIL fellowship that was offered by MLIS in January 2012. As a CHIL fellow I work as a graduate assistant at the SLIS where I am involved in research and teaching activities. My research interests lie in the field of human-information interaction and particularly user's information behavior. As a multicultural student, I have a strong passion in cross-cultural studies.

The required applications (TechSmith Morae and MyGaze eye-tracking plugin) that will be used in this study are purchased through the University of South Carolina Office of the Vice President for Research award. With the Thomson Reuters Scholarship I will be able to recruit 50 participants for this study and include experts' insight into my data analyses for a rigorous conclusion. The Thomson Reuters funding will provide me the opportunity to run my study and move toward finishing my doctoral dissertation. Without funding to recruit participants, this study will not be possible. The findings of this study will promote designers' understanding of differences between online browsing behaviors of users from different cultures. It is necessary to understand the human IS process, including the strategies people employ when engaged in search to characterize this complex cognitive process in order to design successful search user interfaces.

Dissertation Advisor

Dr. Samantha Hastings is my advisor and the chair of my dissertation committee.

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