

How do cultural differences and cognitive styles affect online information searching behavior? A case study of American and Iranian graduate students.

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Abstract

The purpose of this ongoing doctoral study is to identify if cultural differences affect information-searching behavior of Google users. Even though cultural differences have been the main concern of several information behavior studies in the last 10 years, there is only one study (e.g. Dong & Lee, 2008) that examined the differences in webpage information perception from Nisbett's cultural cognitive perspective (Nisbett et al., 2001; Nisbett & Norenzayan, 2002). Also, there are only a limited number of studies that investigate cognitive differences between Middle Eastern (mainly Arabs) and Western online information seekers. This study aims at addressing this gap by comparing Americans and Iranians online information searching behavior through the lens of cultural cognition with the use of eye tracking and mouse tracking technologies.

Keywords: Information behavior; culture; cognitive behavior; cross-cultural; human information interaction

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1 Introduction

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 (mainly Arabs) 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 webpage navigation 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 & Hercegi, 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 pilot study examines the differences between information searching behavior of American and Iranian online information seekers from the cultural cognitive perspective. The results will address the following overarching research questions:

- a) Does cognitive style of American graduate students differ from Iranian graduate students? And how?
- b) Does online information behavior of American graduate students differ from Iranian graduate students? And how?

1.1 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 Americans and Iranians 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.

1.2 Research Design

1.2.1 Participants

For this pre-dissertation pilot study, I selected my participants (age 22-34) from two different groups (10 subjects per group): American graduate students at the University of South Carolina (USC) and Iranian senior graduate students at the University of South Carolina (more than 3 years residency in the United States). However, for the main dissertation study, I will include two more groups of participants: Iranian graduate students at the University of South Carolina who have recently joined their program (less than 6 months residency in the United States) and Iranian graduate students at a university in Tehran, Iran. The main reason for having different sample groups is to examine the effect of language proficiency and cultural adaptation on information behavior of the participants.

1.2.2 Data collection

Data are collected through three channels: questionnaire survey to gather demographic information; TechSmith Morae application and MyGaze eye-tracking plugin to record and manage the users' searching activities including the participants' eye movement and eye gaze; and, personal interviews with participants to elicit the cultural background of the participants. 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 information 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. Also, by employing eye-tracking technology we can identify behaviors that users are not able to articulate (Pan et al., 2004).

1.2.3 Tasks

Each participant is given four different tasks with different levels of cognitive complexity (from low to high). The participants were presented with questions that included the following cognitive processes (Arguello et al, 2012): remembering, understanding, analyzing and evaluating. All participants received similar information seeking tasks and they were asked to use Google to search for information. The initial project plan was to request all the USC Iranian participants to search both in English and their mother language (Persian), because studies show that language is an influential factor in cultural studies of human cognitive behaviors. But, in their pre-questionnaire responses, the senior Iranian students stated that they did not feel comfortable to search in Persian, because English is the only language that they have used for online information seeking purposes for the past several years.

Additionally, for the actual dissertation project, the Iranian participants who live in Iran will be asked to conduct their search only in Persian. Also, the newly admitted Iranian students at the USC will be divided into two sub groups: a group to conduct their search in English and a group to conduct their search in Persian. By having the participants to search in their mother language as well as English we can examine whether people's search strategies differ if they use different languages.

1.2.4 Data analysis

Both qualitative and quantitative data analyses approaches were employed to examine the data that were gathered through different channels. The key research questions driving the data collection and analysis are:

- How do users formulate their information need (top-down vs. bottom-up approach)?
- How often do they reformulate their search query?
- What type of information does user look at? (e.g. headlines, tags or descriptive information)
- What type of information resource does user use? (e.g. wikis or books)
- How long does it take for users to decide where to click?
- How much time they spent on browsing? And how much time they spent on thinking/reading?
- What is the visual pattern of web navigation (holistic vs. analytic)?

Unfortunately, three of the Iranian’s mouse-tracking and eye-tacking datasets and four of the American participants’ datasets were not usable for data analysis, because of the technical errors that occurred during the recording processes. As illustrated in Figure 1 and Figure 2, the Iranian participants show a different eye gaze pattern on Google search results pages than the American graduate students. The Iranians’ eye movements tend to be scattered over the search results pages, whereas the American participants show a cluster-like gaze pattern. Qualitative data analysis showed that none of the participants went to the second page of the search results pages. Instead, they immediately changed their search query when they felt they could not find the information that they were looking for. Quantitative data analysis showed that, in average, the Iranian participants have spent approximately 11 minutes longer than the Americans to complete the given tasks (Table 1). Also, the Iranians have performed more activities (i.e. mouse movements, mouse clicks, eye-movements and query changes) than the American participants during the experiment (Table 1).



Figure 1. Iranian Participants' Eye Gaze Pattern

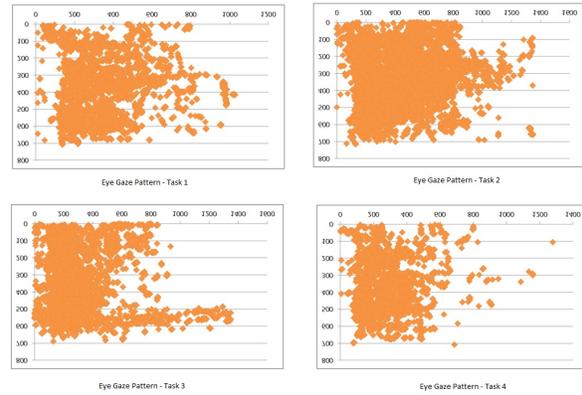


Figure 2. American Participants' Eye Gaze Pattern

	American Graduate Students	Iranian Graduate Students
No. of Participants	6	7
Average Activity Counts	3000	4200
Average Time Spent in Total (s)	900	1550
Average Time Spent on Google (s)	411.6	596
Average Mouse Clicks (Count)	22	66

Table 1. Quantitative Data

2 Discussion and Conclusion

Currently, there are ten American and ten Iranian senior graduate students at the University of South Carolina who have participated in this ongoing study. The preliminary analysis of the eye-tracking and mouse-tracking data show clear differences in the visual browsing patterns as well as search strategies. The eye movement scatter plots (Figures 1 and 2) suggest that the Iranians tended to have a distributed and exploratory gaze pattern, whereas the Americans tended to be focused on a specific region of the search results pages. Also, early results (Table 1) suggest that the Iranians were more active than the Americans in the entire search process. These preliminary findings suggest that the Iranians' information behavior is more like the holistically-minded people as they employed more exploratory techniques and spent longer time on searching and thinking. On the other hand, the Americans acted more like the analytically-minded people as they have showed less exploration and more concentration on the pieces of information they encountered. More participants will be invited and further descriptive evaluation will be done to elicit the query formation strategies and the frequency of query changes for the two groups of participants. Also, I am in the process of recruiting participants from the newly admitted Iranian graduate students group. I will present the eye movements' heat-maps and the latest findings at the iConference 2015 poster presentation sessions.

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