A Pilot Cross-Cultural Comparative Study on Users' Perception of the Webpage: With the Focus on Cognitive Style of Chinese and French

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ABSTRACT

Based on Nisbett and his colleagues' theoretical model "Holistic" and "Analytic" which show the differences in cognitive style of Eastern Asian and Westerners, the author hypothesized that the differences in cognitive style of people from diverse cultural backgrounds may influence their perception and usage of webpage. An experiment was carried out and the Eye-gaze device was used to assist to explore the relationship. The results revealed the relationship between cognitive style and webpage design: different cognitive style results different viewing pattern on webpage. Chinese people are more likely to have a holistic view of the whole page first and then focus on detail, while French people tend to read the heading information first and then proceeding down the page. Chinese emphasized the background as well as the whole look and feel of the webpage more, while French noticed the independent contents and element designs more on the webpage.

Keywords: Cognitive style, Eye tracking, cross-culture study

1. Introduction

The World Wide Web (WWW), which was created around late 1980's, now has become the most popular medium of communication around the world. With the creation of the World Wide Web Consortium (W3C) in 1994, great attention has been given to the design and usability of website. How to design an accessible website to satisfy users is becoming more and more important. Especially for some businesses that provide services to international audience (e.g. Yahoo), the localization of the website is not neglectable. Simply translate an interface into another language version is not a recommended way to customize the website in order to serve cultural audience. Thus, a good website needs to consider many factors which reflect people's different usage of website, and to be designed accordingly. Anthropologists proposed a number of cultural theories which are used widely in many research fields including web usability research. A term "Culturability" which coined by Wendy Barber and Albert Badre emphasizes the importance of the relationship between culture and usability in web design. Nisbett combined culture and cognition perspectives which enrich the aspects of cultural influence in web usability research, and probably create a new approach in this field.

2. Literature Review

2.1. Nibett's Cultural Cognitive Theory
Nisbett proposed a powerful cognitive perspective on culture and behavior. He pointed out that the style of thought of Easterners and Westerners differ greatly, and the different styles of thoughts were summarized as Holistic vs. Analytic thought. Holistic thoughts are represented by Eastern Asian, such as Chinese, Korean, and Japanese and so on. While Analytic thought are represented by Westerners, including people from North America, and some European country. Propositions are such as: Holistic people tend to perceive the context or field as a whole, and pay attention to the relationship between objects and field, While Analytic people tend to detach the object from its context and more likely to focus on the attributes of the objects in order to assign it to categories.

2.2. Eye Tracking in Usability Testing

Eye tracking has been successfully used in perception and visual search research as well as human factors. Combined with conventional techniques that gather data based on users' overt behavior (e.g. mouse clicks), eye tracking provides another layer of insight into how users process the visual information to which they respond when interacting with systems. The process of visual perception is an essential part of user's interaction with web interface. Modern eye tracking equipment now makes it possible to track and analyze important parts of this process. Where do users look first? What do users look most? Which elements are not seen? Researchers can check iteratively whether the webpage design fits users' visual scan patterns.

3. Research Questions

As mentioned above, people with different cognitive style think and behave differently. The author questioned that "Do people with different cognitive style have different perception and usage of webpage? Thus the webpage should be designed according to user's certain using pattern?"

The purpose of this study is trying to discover the relationship between culturally cognitive aspects and webpage perception. Thus the findings could be concerned when designing a webpage.

Agnieszka Bojko. Using Eye Tracking to Compare Web Page Design: A Case Study. Journal of Usability Study. Issue 3, Vol.1, May 2006,pp.112−120

4. Methodology

An experiment was carried out in order to achieve the goal of this study. The details are as follow:

4.1. Participants

In the experiment, 15 Chinese (Holistic thought) and 10 French people (Analytic thought) are recruited. All of them are either graduate students or exchange students in KAIST. Their ages are within the range 22−29. Participants came from a variety of majors. All participants have long time experience of internet, and they browse webpage nearly everyday.

4.2. Prototype

A real worked Yahoo website is chosen as prototype in this experiment. The idea of using 'real' prototype is that it is easy to generalize findings to real interfaces designed by real designers for real end−users. Hong Kong Yahoo (http://hk.yahoo.com) and France Yahoo (http://fr.yahoo.com) homepage were used for Chinese and French participants, respectively.

Except the differences of language and the localized contents, the webpage design style of each country is similar to each other. The design elements such as colors, icons, frames, layout, and information structures are identical.

4.3. Tool

The hardware part of the "Eyegaze Development System" which was developed by LC Technologies Inc was used in this experiment. The software "EMT tracker" was used to record users' eye movement data. The advantage of "EMT tracker" is that it can work on a dynamic interface. "EMT analyzer" is used to review and analyze the recorded eye tracking data.

4.4. Procedure

The experiment was carried out in lab environment. Participants were informed the requirement for them before the test. They were shown how eye tracking device would work and were asked to keep the head stay still for better eye tracking. In the experiment, participants were asked to browse the webpage freely without any clicks. As soon as the webpage appeared on the screen, the experimenter started to record the eye movement data by using "EMT tracker". After finishing browsing, experimenter stopped eye movement data recording as well as closed the webpage. Participants then were asked to recall the webpage and their impression of that webpage.

5. Analysis and Results

5.1. Analysis Metrics

Some eye tracking analysis metrics need to be introduced in order to understand the recorded eye movement data. Some main analysis metrics are listed bellow:
Fixation: A relatively stationary eye position over an object lasting from 100 to ~500 ms
Spatial Density of Fixations: The spatial distribution of fixations on the page whilst completing a task
Scan Path: Spatial arrangement of a sequence of fixations
Area of Interest: Area of a display or visual environment that is of interest to the research or design team and thus defined by them (not by the participants)

5.2. Analysis from Eye Tracking Data

In order to compare the viewing pattern of Chinese and French people, to visualize eye tracking data is essential. Deal to the quality of recorded eye movement data, finally 9 Chinese and 9 French's data were used for the comparing work. Figure5−1 bellow shows an example of the visualized eye tracking map. The map shows the eye moving pattern clearly:

the first area visited; reading pattern in the middle box; the sequence of visited webpage elements, and so on.

Figure5-2 and Figure5-3 show examples of eye tracking map of French and Chinese. French showed more sequential viewing pattern and more focus on the center area. Some French even only browse the upper part of the webpage; while Chinese showed a non-sequential viewing pattern and distributed focuses on the webpage.
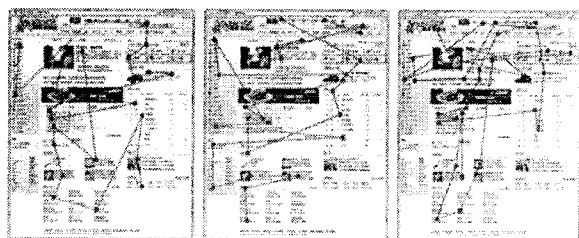
Another analysis method was tried in this study. A diagram was designed to show the eye moving pattern in
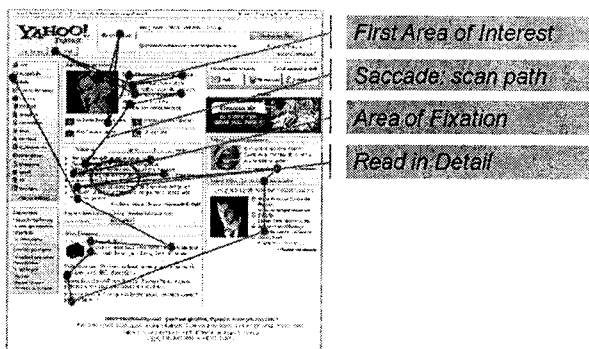
[Figure5-1]Analysis metrics on Eye tracking map
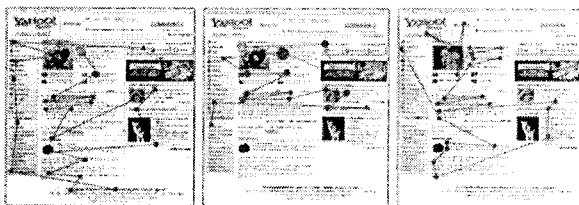
[Figure5-2] Eye tracking map from French

[Figure5-3] Eye tracking map from Chinese

two dimensions: time and area. As the example of this approach is showed bellow, x axis stands for the time duration, and y axis stands for areas on the webpage. The eye movement data were located in and showed a jigsaw-shaped line. The black color means the first reading behavior on the webpage.
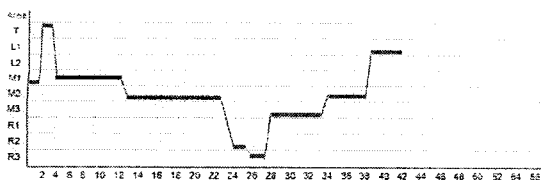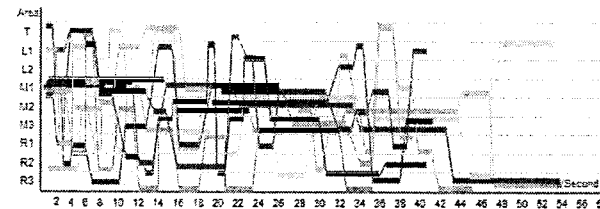

[Figure5-2] Viewing pattern by showing area visited and time duration. (Data is from French participant)

By overlapping Chinese and French participants' tracked date respectively in the same manner, some differences were showed:
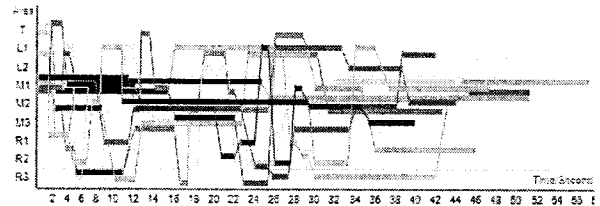
[Figure5-3]French participants' eye movement data

[Figure5-4]Chinese participants' eye movement data

Findings derived from above methods are as follow:

78% French began to read detail contents within 10 seconds, while 33% Chinese began to read at the beginning.

French spent lots of time in reading the detail contents, while Chinese spent more time in browsing than reading.

French paid more attention on category area (L1) than Chinese did.

Conclusions are listed bellow:

[Table5-1]Differences of webpage viewing pattern

Analytic people: Westerners	Holistic people: Eastern Asian
Centralized focus on webpage	Distributed focus on webpage
Sequential reading pattern (Linear)	Jump reading pattern (Non-linear)
To gain the big picture of the website by getting information from navigation bar.	To gain the big picture of the website by scanning the whole page.

5.3. Analysis from Debriefing

A debriefing session was carried out after participants finishing browsing the webpage. Findings are as bellow:

Chinese evaluate the webpage by mentioning the background, while French mentioning the detail design on the webpage.

Chinese claimed that the webpage was simple and easy to use, while French felt in lost on the webpage. They said there is too much information

French are more prefer webpage with big categories which are easy for finding information.

6. Conclusion

The study finally showed the relationship between the cognitive style and the webpage perception. The different viewing patterns of these two groups indicate the potential influence on webpage usage, thus require the webpage should be designed accordingly to match users' cognitive style in order to enhance the webpage usability. Some recommendations for designing webpage are listed bellow:

When designing webpage for Holistic people (e.g. Chinese), the harmony between foreground and background as well as the relationship among all contents areas should be taken into account.

In order to cater to the Holistic people's way of browsing webpage, contents design should show the whole context of the website, e.g., the hidden contents may not be suitable for Chinese users.

For Analytic people, the webpage design should be as much as clear. Big categories and highlighted contents on webpage may cater to their usage. The webpage layout should clear enough to lead users to focus on each information group. The page division and frame design should be more emphasized.

Further work for this study is to prove those findings in a statistical way, and more practical question such as "which detail aspect in webpage design could be influenced by people's cognitive style" need to be addressed.

7. References

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