

Webpage Designs for Diverse Cultures: An Exploratory Study of User Preferences in China

Yin Su¹, David Liu², Xiaomeng Yuan², Justin Ting², Jingguo Jiang³, Li Wang² and Lin Gao²

¹ Lenovo (Beijing) Co., Ltd, 6 Shangdi West Road, Haidian District, Beijing, China
suyin86@126.com

² Microsoft Co., Ltd, 5 Danleng Road, Haidian District, Beijing, China
{davli, xiyuan, justtin, applewang, lingao}@microsoft.com
³ Zhejiang University Hangzhou, China
firjjg@163.com

Abstract. A wealth of studies has revealed a cross-cultural difference in the user preference on webpage designs. Users from other cultures often criticize a widely accepted webpage design in one culture. Designs for diverse cultures are thus expected to be specific to address diverse user preferences. This study investigated the preferences of Chinese users on four essential design elements related to the readability of texts of the result pages of search engines. The results suggested that the search result pages of the Bing search engine designed for typical ‘US users’ did not satisfy Chinese users. Chinese users, in general, preferred huge-sized texts for titles, a more compact layout of the search result pages, and keywords to be highlighted in red. The findings of the study contributed to webpage design guidelines for Chinese users, and may serve as a catalyst in exploring user preferences in designing for diverse cultures.

Keywords: webpage design, cross-culture, diversity, Chinese users

1 INTRODUCTION

As the number of Internet users in China increases (up from 11,100 (8.5% of the population of China) to 56,400 (42.1%) in the last 7 years), some international companies that offer online services have realized the potentially huge business opportunities and rushed into the Chinese market. Designs of websites of these companies usually follow the ones that have been accepted in the respective homeland of the company, with language the only difference. Chinese users are sometimes not satisfied with a mere translation of the content. The question may be asked as to why a websites with good “pedigree” may not be successful in China.

1.1 Cross-cultural Difference in Preferences of Webpage Design

A wealth of studies has revealed a cross-cultural difference in user preferences and judgments on the webpage design [1-6]. For instance, Simon [6] found that Asians

disliked triangles and squares on webpages, whereas North Americans and Europeans preferred combinations of those shapes. Faiola, Ho, Tarrant, and MacDorman [7] suggested that the U.S. and South Korean people perceived the aesthetics of home pages differently. These findings suggest that designs that are blindly copied or slightly modified from other cultures may actually not be satisfying.

Attempts have been made to provide explanations for the cross-cultural difference in preferences on the webpage design. Many studies suggested that the cognition and communication styles in diverse cultures influence how people learn and interact with online information [6, 8-12]. This learning process, in turn, influences how users interpret a website's aesthetics [13-15]. For instance, in low-context cultures (e.g., Germans and Swiss), communication occurs predominantly through explicit statements in text and speech. In high-context cultures (e.g., Japanese and Chinese), messages include other communicative cues such as body language and the use of silence [16]. Previous studies showed that the high-context people browse information faster and prefer fewer links to find information than the low-context users [15]. The high-context users appreciate the webpages with a compact layout more, while the low-context ones prefer the pages that looked more open. These studies provide theoretical evidence for the cross-cultural differences in the judgments and preferences of webpage designs.

1.2 Motivations for the Present Study

Considering the cross-cultural differences in the judgment and preference of webpage designs, it may be advantages for the international companies to provide specific designs to cater to the preferences and requirements of the users from diverse cultures. However, there are only a few theoretical or empirical studies that provide detailed guidelines for designers. Accordingly, some webpages, which were specifically designed for Chinese users, were found not to be satisfying due to the limitation of the degree to which the designers understood the preferences of Chinese users.

Our study was performed to investigate the specific preferences of Chinese users, aiming to make attempts to enrich the guidelines of the webpage design for Chinese users and to act as a catalyst for future studies that explore the specific preferences of users from diverse cultures on the designs (i.e., not limited to the webpage design alone).

1.3 Design Elements Tested in the Present Study

Numerous studies have been conducted to explore impact factors of readability of texts on computer screens, indicating that many essential design elements do have an effect on the readability of computer-displayed texts [21-26]. For instance, the font-size and font-color were indicated as having effects on both of the readability of English and Chinese texts, which reflected in accuracy and reading speed [21-22]. Chan and Lee [24] suggested that the line-spacing also influence an individual's reading speed, as well as the comprehension of offered information. A similar finding regarding to the impact of line-spacing on readability indicated that texts with wider line

spacing lead to better accuracy and faster reaction times [26]. Researchers also found the line-length of text on websites to influence its clarity and comprehension [25].

Based on these observations, our study examined whether and how four design elements that have been suggested to relate to the readability of texts (i.e., the font size, style of keyword-highlighting, line height, and search result margin (SR-margin)), influenced Chinese user preferences on the webpage design. Specifically, a search result was composed of a title, an attribution, and a snippet. The SR-margin referred to the space between search results, while the line-height was a combination of the space between the title and attribution, the space between the attribution and the snippet, and the space between lines within the snippet. The terms of the line height, the SR-margin, and the title, attribution, and the snippet of search results are illustrated in Fig. 1.



Fig. 1. An illustration of the terms of the line height, the SR-margin, and the title, attribution, and the snippet of search results

2 Methods

A total of 1009 participants (roughly 50% female; 90% white collared workers and 10% students; 59% aged from 25 to 30, 12% aged from 18 to 24, and 29% aged from 31 to 35) were recruited by iResearch, a professional consulting company (www.iresearch.com), from cities of Beijing, Shanghai, and Guangzhou. All participants randomly completed no more than 3 prepared tasks. Participants in each task ranged in number from 318 to 361.

Four kinds of font-size, six kinds of keyword-highlight, six kinds of line-height, and six kinds of SR-margin were separately tested using four tasks. Detailed parameters of all designs of these elements are summarized in Table 1, including the parameters of the designs of the Bing search engine (www.bing.com) for typical ‘US users’ (the so-called US designs). A set of search result pages (SERPs) that contained exactly the same contents with the only difference in only one of the four design elements was prepared in each task.

Table 1. The detailed parameters of all designs of the four elements tested in this study.

	Font-size (T/A&S)	Keyword-highlight (T/S)	Line-height (T/A/S)	SR-margin
A	13px/13px	Red/Red	1px/1px/16px	17px
B	16px/12px	Red/Red	3px/1px/18px	19px
C	<u>16px/13px</u>	Blue/Blue	4px/1px/19px	<u>21px</u>
D	20px/13px	Blue/Blue	<u>5px/3px/21px</u>	23px
E	-	Orange/Orange	7px/5px/23px	25px
F	-	Red/N/A	9px/7px/25px	27px

Note. T, A, S denoted the title, attribution, and snippet. Underlined parameters indicate the design of the Bing search engine for typical ‘US users’.

In each task, participants were side-by-side presented with two random SERPs from the SERP set and were required to indicate their preferences. After that, the “loser” SERP disappeared and a new “competitor” from the SERP set showed up. The participants were required to indicate their preferences again. Then another new “competitor” replaced the “loser”, and so on. After all SERPs in the set have shown up, the final winner was recorded as the page with the most preferred design.

3 Results

We separately calculated the percentages of total participants that preferred each kind of design for each of the four design elements. We aimed to find out which kind(s) of design(s) were most preferred by participants. Further, with respect to each design element, we separately analyzed whether and how participant preferences were influenced by the individual gender, age, and occupation. We did not analyze the interactions between gender, age, and occupation on participant preference due to the limitation of the sample size.

3.1 Font-size

Four kinds of font-size combinations, as listed in Table 1, were tested in this study. A chi-square test revealed a significant font-size effect on the percentage of participants that preferred each kind of combination most ($\chi^2(3) = 29.70$, $p < .01$). The popularity of these designs increased with the increasing size of the font of titles. That is, overall,

a significant majority of participants (34.77%) preferred the design with the largest font-size (20px) of titles most ($p < .001$), while the design with the smallest font-size (13px) of titles was the least preferred one (13.54%). The results indicated that the percentage of Chinese users that most preferred the font-size combination (16px/13px) in the so-called US design (25.51%) was significantly less than the percentage of users that preferred the ‘largest one’ (20px/13px) ($p < .01$). Further analyses revealed no significant effects of gender ($\chi^2(3) = .52$, n.s.), age ($\chi^2(6) = 7.04$, n.s.) and occupation ($\chi^2(3) = 2.34$, n.s.) on the distribution of participants that favored each kind of font-size.

3.2 Keyword-highlight

Six kinds of keyword-highlight design were prepared for testing in this study. A chi-square test revealed a significant difference between individual preferences on SERPs with these designs ($\chi^2(5) = 52.23$, $p < .01$). Most participants preferred either the red-normal design (25.79%) or the red-bold design (22.64%) of keyword-highlight most. No significant difference was observed in the individual preference between these two kinds of design, n.s. Participants most dislike the blue-normal and the blue-bold designs. Specifically, only 5.66% of participants indicated that they preferred the blue-bold design most, which serves as the so-called US design of the Bing search engine. The percentages of participants that favored the orange-normal design (19.50%) and that favored the red-N/A design (19.18%) were in the middle of these two extremes. Further, neither individual gender ($\chi^2(5) = 3.61$, n.s.), age ($\chi^2(5) = 14.44$, n.s.), nor occupation ($\chi^2(5) = 3.24$, n.s.) was observed to have a significant impact on the distribution of participant preferences on kinds of keyword-height design.

3.3 Line-height and SR-margin

We compared the participant preferences on six kinds of line-height combinations. A chi-square test revealed a significant difference between individual preferences on SERPs with these combinations of line-height ($\chi^2(5) = 14.68$, $p < .01$). The combination preferred by the most participants (21.88%) was as follows: 3px wide between the title and the attribution, 1px wide between the attribution and snippet, and 18px wide between lines in snippet. The popularity of the combination roughly increases as the layout of search results was designed to be more compact. In particular, only 16.41% of participants preferred the line-height combination of 5px wide between the title and the attribution, 3px wide between the attribution and snippet, and 21px wide between lines in snippet, which serves as the so-called US design of the Bing search engine ($p < .05$). Further chi-square tests revealed that there were no gender ($\chi^2(5) = 7.52$, n.s.), age ($\chi^2(10) = 8.22$, n.s.), and occupation ($\chi^2(5) = 7.82$, n.s.) effects on participant preferences on each kind of the line-height combination.

We prepared six kinds of SR-margin, which ranged from 17px to 27px with intervals of 2px for testing in this study. A chi-square test revealed that there was a significant difference in participant preferences on the six kinds of the SR-margin design ($\chi^2(5) = 15.57$, $p < .01$). Take a closer look at the preference data, we found that a

significant majority of participants (22.56%) favored SERPs with 19px SR-margin, $p < .01$. Specifically, among the four SERPs with the SR-margin that was wider than 19px, the popularity roughly decreased with the increasing of the width of the SR-margin. A total of 19.51% of participants preferred the design for typical ‘US users’ with 21px SR-margin, which was significantly less than the percentage of participants that preferred the design with 19px ($p < .01$). No significant effects of individual gender ($\chi^2(5) = 7.99$, n.s.), age ($\chi^2(10) = 7.09$, n.s.), and occupation ($\chi^2(5) = 4.68$, n.s.) were observed on the distribution of the participant preferences on SR-margin designs. These findings were generally consistent with those of the line-height design, suggesting that participants more appreciate SERPs with a relatively compact layout.

4 General Discussion

Our study tested Chinese user preferences on four essential design elements of the search result pages. Overall, the results revealed that most of the search result pages that were designed for ‘US users’ actually did not satisfy Chinese users. The four main findings are summarized below.

First, Chinese users consistently preferred the huge-sized texts for titles to the medium-sized ones used in the designs for typical ‘US users’. Previous studies have suggested that enlarging the font-size can improve the readability of texts [17, 23-24]. When viewing search results, Chinese users were used to fixating on the titles of search results and almost ignored the attributions and snippets. Chinese users mainly focus on the good readability of search result titles, but pay less attention to the aesthetics of the whole pages.

Second, Chinese users consistently preferred keywords to be highlighted in red. We reasoned that Chinese users might be used to first fixating the texts around keywords when judging the value of a search result. They desired one way of highlighting that could help them distinguish keywords among texts immediately. Therefore, the reason why Chinese users preferred keywords to be highlighted in red is probably because the keywords in a more distinguishing color were more legible than those in bold.

Third, Chinese users consistently favored a relatively compact layout of the search result pages. For the pages that were designed on the basis of the favorite combination of SR-margin and line-height of Chinese users, the amount of information displayed on one screen was approximately twice as much as that offered by the pages that were designed for ‘US users’. We proposed that Chinese users were sometime prone also to view some of other information that seemed to be irrelevant to their original target search. For example, consumers with the aim of purchasing clothes would also like to view promotion information concerning other goods. Therefore, they would not reject pages containing a great deal of information.

These findings indicate that when designing webpages for Chinese users, the following general guidelines should be followed: (1) try to use a relatively large font; (2) highlight the keywords in red; and (3) make the layout of the webpage compact with a relatively great deal of information.

This study added to the wealth of evidence that users from different cultures can perceive webpages differently and often prefer different designs [1-6, 25-26]. We suggested that designers should understand the preferences of users from diverse cultures and provide specific designs to address their preferences. The findings of this study may assist to enrich the guidelines of the webpage design for Chinese users, and are expected to act as a catalyst for future studies that explore the specific preferences of users from diverse cultures on the designs.

Two limitations of this study should be acknowledged. Firstly, the experimental design should be more rigorous. We examined the main effects of the four design elements on user preferences, but we did not take the interactions between these elements into account due to the limitation of the sample size. Secondly, using the paradigm of the current study, we can measure the user preferences on the design of webpages, but we cannot determine the exact reasons behind their judgments and the actual influences of the webpage design on user information search and processing. Considering both aspects, we suggest that a larger participant pool, a more rigorous experimental design and various methodologies to measure individuals' unconscious information search and processing (e.g., think aloud and eye-tracking) to be used in future studies.

References

1. Badre, A. N.: The effects of cross cultural interface design orientation on World Wide Web user performance. Retrieved from <http://www.cc.gatech.edu/gvu/reports/2001/abstracts/01-03.html/>, (2000)
2. Chau, P. Y. K., Cole, M., Massey, A. P., Montoya-Weiss, M., O'Keefe, R. M.: Cultural differences in the online behavior of consumers. Communications of the ACM, 45, 138–143 (2002)
3. Faiola, A., Matei, S. A.: Cultural cognitive style and web design: Beyond a behavioral inquiry into computer-mediated communication. J. Comput Med. Commun., 11, 375-294 (2005)
4. Kampppuri, M., Bednarik, R., Tukiainen, M.: The expanding focus of HCI: Case culture. Proceedings of the 4th Nordic Conference on Human-Computer Interaction: Changing roles, pp. 405–408. ACM press, New York, NY (2006)
5. Shen, S., Woolley, M., Prior, S.: Towards culture-centred design. Interact. Comput., 18, 820–852 (2006)
6. Simon, S. J.: A cross cultural analysis of Web site design: An empirical study of global Web users. Retrieved from <http://marketing.byu.edu/htmlpages/ccrs/proceedings99/simon.htm> (1999)
7. Faiola, A., Ho, C-C., Tarrant, M., MacDorman, K.: The Aesthetic Dimensions of U.S. and South Korean Responses to Web Home Pages: A Cross-Cultural Comparison. Int. J. Hum. Comput. Interact., 27, 131-150 (2011)
8. Marcus, A., Gould, E. W.: Crosscurrents cultural dimensions and global web user interface design. Interactions, 2, 32–46 (2000)
9. Nisbett, R. E.: The geography of thought. The Free, NewYork, NY (2003)
10. Norman, D.: Emotional design: Why we love (or hate) everyday things. Basic Books, New York, NY (2004)

11. Picard, R. W., Papert, S., Bender, W., Blumberg, B., Breazeal, C., Cavallo, D., . . . Strohecker, C.: Affective learning: A manifesto. *BT Technology Journal*, 22, 253–269 (2004)
12. Tractinsky, N.: Towards the study of aesthetics in information technology. *Proceedings of the 25th Annual International Conference on Information Systems* (pp. 771–780). ACM press, New York, NY (2004)
13. Karvonen, K.: The beauty of simplicity, *Proceedings of the ACM Conference on Universal Usability*, pp. 85-90. ACM press, New York, NY (2000)
14. Lavie, T., Tractinsky, N.: Assessing dimensions of perceived visual aesthetics of Web sites. *Int. J. Hum. Comput. Interact. St.*, 60, 269-298 (2004)
15. Plocher, T., Patrick Rau, P.-L. Choong, Y.-Y.: Cross-cultural design, in *Handbook of human factors and ergonomics*, Fourth Edition (ed G. Salvendy), John Wiley & Sons, Inc., Hoboken, NJ, USA (2012)
16. Würtz, E.: Intercultural communication on web sites: A cross-cultural analysis of web sites from high-context cultures and low-context cultures. *J. Comput Med. Commun.*, 11, 274-299 (2005)
17. Huang, D. L., Rau, P. L., Liu, Y.: Effects of font size, display resolution and task type on reading Chinese fonts from mobile devices. *Int. J. Ind.*, 39, 81–89 (2009)
18. Bernard, M. L., Chaparro, B. S., Mills, M. M., Halcomb, C. G.: Examining children's reading performance and preference for different computer-displayed text. *Behav. Inform. Technol.*, 21, 87–96 (2002)
19. Boyarski, D., Neuwirth, C., Forlizzi, J., Regli, S. H.: A study of fonts designed for screen display. *CHI 98 Conference Proceedings*, 87–94 (1998)
20. Tullis, T. S., Boynton, J. L., Hersh, H.: Readability of fonts in the windows environment. *Conference Companion on Human Factors in Computing Systems*, pp. 127–128. Denver, Colorado, United States (1995)
21. Garcia, M. L., Caldera, C. I.: The effect of color and typeface on the readability of on-line text. *Comput. Ind. Eng.*, 31, 519–524 (1996)
22. Dyson, M. C., Kipping, G. J.: The effects of line length and method of movement on patterns of reading from screens. *Vis. Lang.* 32, 150–181 (1998)
23. Bernard, M. L., Chaparro, B. S., Mills, M. M., Halcomb, C. G.: Comparing the effects of text size and format on the readability of computer-displayed Times New Roman and Arial text. *Int. J. Hum. Comput. St.*, 59, 823 – 835 (2003)
24. Chan, A., Lee, P.: Effect of display factors on Chinese reading times, comprehension scores and preferences. *Behav. Inform. Technol.*, 24, 81-91 (2005)
25. Zahedi, F., Van Pelt, W., Song, J.: A conceptual framework for international web design. *IEEE Transactions on Professional Communication*, 44, 83–103 (2001)
26. Ling, J., van Schaik, P.: The influence of line spacing and text alignment on visual search of web pages. *Displays*, 28, 60-67 (2007)