

Comparing the Usability of the Icons and Functions between IE6.0 and IE7.0

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Abstract. Microsoft has presented the newest net browsing interface, Internet Explorer 7 (IE7) in 2007. The purpose of this study was to compare the design of icons and functions between IE 7.0 and IE 6.0 for the effect of operating performance. Thus, we designed two experiments and a program which was constructed in Builder C++ 6.0. Participants were given missions, and then we recorded the mission completed time as operating performance. The results showed that the difference of icon design and functions between IE 7.0 and IE 6.0 do affect the operating performance.

Keywords: Interface Design, Usability, Browser.

1 Introduction

With the rapid development of the Internet, its usage has been on increase since World Wide Web popularized. According to the data published by comScore Media Metrix and collected by FIND (Foreseeing Innovative New Digiservices), there were about 750 million people who used Internet globally in January 2007 at a growth rate of 10% comparing to the previous year [1]. Among the twenty three million people in Taiwan, the ratio of population using the Internet is over sixty percent [1]. Therefore, the Internet has been part of daily life for people. The Internet users navigate the page with the browser, and interact with the page, document, image, and other information. Currently there are several browsers available to choose from, including Internet Explorer (IE), Firefox, Mozilla, and Opera, among them the usage ratio of Internet Explorer (IE) is the highest, as shown in Table 1.

Table 1. Market share of Internet browsers [8]

	IE	Firefox	Mozilla	Opera	Safari	Other
2007	78.59	14.95	0.14	0.52	4.85	0.95
2006	83.15	11.46	0.29	0.57	3.43	1.1

Microsoft published a new browser (Internet Explorer 7), and there are many differences between IE6 on the user interface. Among them, the buttons are divided into several groups and arranged to different places (Fig. 1), which differs far from IE6. In addition, on the same basis of display pixels, the button of IE7 becomes smaller obviously, and increases new functions of Tabbed browsing and Quick tabs (Fig. 2). Therefore, the purpose of this research is to firstly, examine how icon design and location influence users when they surf the net with IE6 and IE7 and, secondly, inspect how tabbed browsing would influence users when switching between sites.

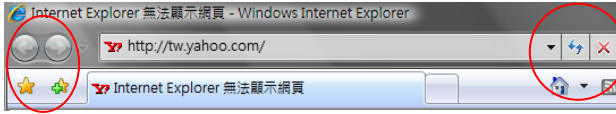


Fig. 1. Tool bar in Internet Explorer 7



Fig. 2. Quick tabs (left) and Tabbed browsing (right) in IE7

2 Literature Review

Psychologists consider that people do not only think by simple words, but sometimes recall the memory in mind by icon or space place [3]. The meaning which icons contain in the interface of human-computer interaction is more extensive than what the words contain. Wickens [6] and Weidenbeck [7] thinks icons are better to comprehend completely and easier to memorize than words. This is the reason why icons are applied extensively. Among the current developed application programs, functional icons have been the basic elements, however, the icons on the tool bar in most application programs may appear too small and the spacing too narrow. Lindberg and Näsänen [3] think the size and spacing of icons have significant influence on user performances. They pointed out that the preferred spacing to use between icons (interface elements) is 1/2 to 1 icon (interface element) width, and the icon width ought to be bigger than 0.7 degree visual angle. In other words, the efficiency will be promoted when the icon width is about 0.5 cm at the viewing distance of 40 cm, or when the icon width is about 0.9 cm at the viewing distance of 70 cm. The final

purpose for icon design is to allow the user to control more directly, reduce the user's burden for memorizing, and reduce the complication and errors of operation. Norman [4] addresses four principles to help designing for the sake of making up the gap between the designers and the users, visibility, good mental model, good mapping, and feed-back. Norman hopes that the user-centered design by these four principles can reduce the blind spots of the designers. The eight golden rules of interface design proposed by Shneiderman and Plaisant [5] contain some concepts similar to Norman's principles. The eight golden principles put more emphasis on the design of interactive systems. They are: 1. Strive for consistency. 2. Cater to universal usability. 3. Offer informative feedback. 4. Design dialogs to closure. 5. Prevent error. 6. Permit easy reversal of actions. 7. Support internal locus of control. 8. Reduce short-term memory load. The icon design is involved in human's psychology and physiology, and it has to express the meaning correctly.

Horton [2] addresses the principles for icon design as follows:

1. Understandable: The icon should be presented in an easy way to comprehend, and the content should be connected directly. When designing the icon, it is better to apply the familiar and easily recognized visual icon for the users to reduce the burden of learning and memorizing.
2. Importance: The icons of the same character should be collected in the same block.
3. Distinct: There has to be frames and shadow surrounding the icons to differ from other icons. In addition, there has to a great difference form the similar icon and avoid designing the familiar icons confuse the users.
4. Memorable: The usage has to be continuous in the documents, and attractive.
5. Size: The size of icon will affect the users' recognition and operation. The too big icon will occupy too much space; the too small icon is hard to attract users' attention, and cost users' concentration to click.
6. Attractive: The designers should pay attention to the balance of visual sensation and the coordination of the size, color, and interface.

This study contains two experiments. The first experiment is based on Horton's principles to evaluate how icon design and location influence users when they surf the net with IE6 and IE7. The second experiment inspects how tabbed browsing would influence users when switching sites.

3 Method

3.1 Experiment 1

There are ten subjects, including 7 males and 3 females, aged from 24 to 35 years old, all right-handed, and are without the disease of eyes and hands. In addition, they all have the experience of using the Internet over one year. Among them, there are 7 subjects using IE7 for over one year; the rest still using IE6. The experiment hypothesis is that the buttons of IE6 are bigger and centralized. Therefore, the merit of using IE6 is better than using IE7. The major measure lies in the spending time for using the buttons of the different interfaces. The independent variable is the two different browser interfaces, including five buttons, previous/next, stop, refresh, my

favorites, and home. The dependent variable is the time which the subjects need to finish the tasks.

Experiment Environment and Procedures. A personal computer, with 19-inch LCD monitor, and an interface written in Builder C++ 6.0 were prepared for the study. Before starting the tests, there were thirty minutes for the subjects to practice the experiment interface. The experiment adopts the within subject design. For each subject, there were ten trials, five on each experimental interface simulating either IE6 or IE7. To avoid tiredness, subjects were asked to take 5 minutes break between two trials and do not end until the experiment finishes. When the subject presses the “Enter” button, the time starts to be counted, and at this time the page will turn to the IE interface to ask the subject to carry out the instructions. In every experiment, there will be instructions for each task, such as “press previous button, please”. When the subject completed the click on the target, the time will be recorded.

3.2 Experiment 2

The same subjects were used as the experiment 1. Among them, there are 7 subjects using IE7 for over one year and the rest still using IE6. The experiment hypothesis is the speed to switch different pages by using the function of Quick Tabs in IE7 is faster than in IE6. The independent variable is the function of Quick Tabs (Fig. 3.) and the traditional window types (Fig. 4.). The dependent variable is the time which the subjects need to finish the task.



Fig. 3. Quick Tabs

Experiment Environment and Procedures. The study prepared two computers with the same standards, with 19-inch LCD monitor, and pixel size of 1280*1024. Among them, one browser is IE7 and the other is IE6. Nine different pages were opened at the same time. When the subjects were familiar with the experiment interface, the experiment started. Each subject performed two trials. Each task trail is to have the subjects randomly picked an interface and later upon instruction clicked on the target page. The time was recorded between the subjects obtaining the instruction and finishing choosing the target. After finishing one experiment, there will be a ten-minute break before the next experiment. Before starting the traditional interface

experiment, this study will shrink all the pages to the lower task row and put the cursor of mouse at the center of the monitor. And before the new Index Tabs experiment starts, this study will also shrink all the pages to the upper task row and ask the subjects to open the function of Quick Tabs.



Fig. 4. Traditional window types

4 Results

4.1 Result of Experiment 1

After analyzing the data from experiment 1 with ANOVA, we can find the interface has significant influence on operation performance ($F=8.49, P =0.004$), and the operation time using IE6 is less than IE7 (Fig. 5). The function key has significant influence on operation performance ($F=5.06, P =0.001$) The time with which the subjects click the “Page Up”/“Page Down” is less than other function keys and the time to click “Homepage” is more than other function keys (Fig. 6). The order has significant influence on operation performance ($F=13.98, P =0.000$). The time the subjects spend in first order is more than other orders (Fig. 7). There is significant interaction between the interface and the function keys, and the difference of the two function keys “Homepage” and “My Favorites” is greater in IE6 and IE7(Fig. 8).

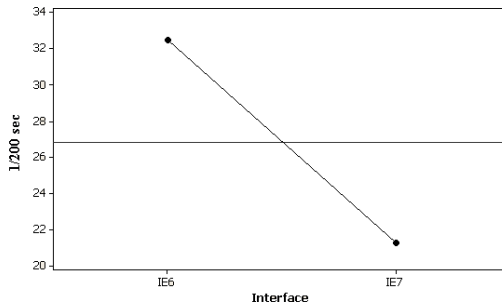


Fig. 5. Mean time for IE6 and IE7 in experiment 1

4.2 Result of Experiment 2

After analyzing the data from experiment 2 with ANOVA, we can find the interface has significant influence on operation performance ($F=25.65$, $P =0.001$), and the operation time which the subjects use in IE7 is less than in IE6 (Fig. 9).

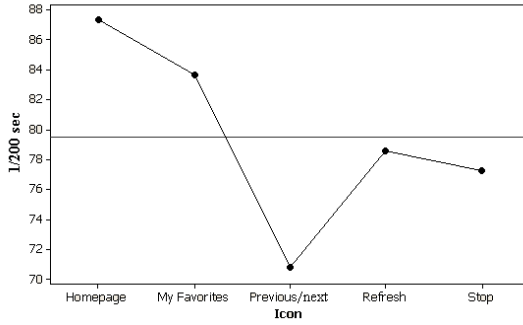


Fig. 6. Mean time for different icons

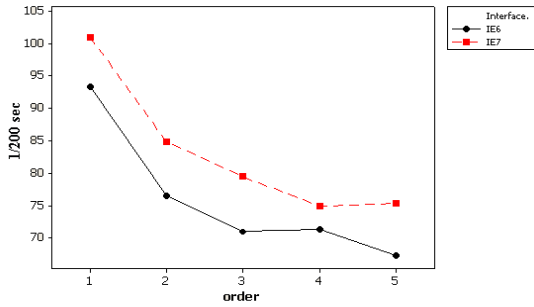


Fig. 7. Interaction plot for time between interface and order

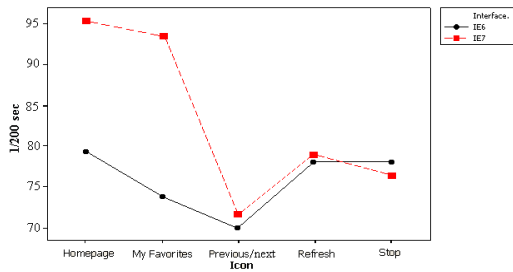


Fig. 8. Interaction plot for time between interface and icon

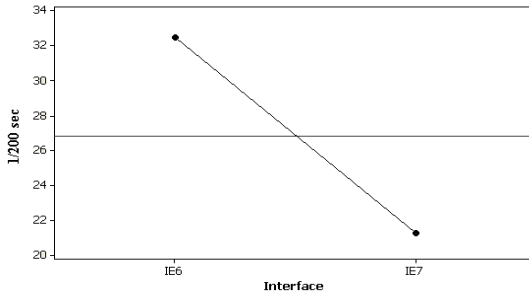


Fig. 9. Mean time for IE6 and IE7 in experiment 2

5 Discussion

5.1 Experiment 1

Total Time. The time which the subjects need to finish the task in IE7 is obviously more than IE6. The reason might be the distribution of keys, for IE6 adopts centralized distribution and it is easier for the subjects to find the key they need. However, there is not significant difference on the time of every key (Fig. 8), the result will be discussed separately as follows.

“Page Up”/“Page Down”. Although in the two different browsers, the color is different and smaller in IE7, yet the time is not significantly different. The speculation is that both the two interfaces use the bright color. Besides, the place and the shape of the arrow are almost the same; therefore, it might increase the memorable, and the understandable of the icon. That can also explain why this key can perform the best among these five keys.

“Stop” and “Refresh”. In different browsers, there is no difference on the key “Stop” and “Refresh”. The speculation is that the color and the icon are totally the same in IE6 and IE7. Although the keys are smaller in IE7, yet the subjects can search the keys they need by the bright colors. In addition, these two keys stand side by side in the two interfaces, and increase the importance and memorable of message.

“My Favorites”. There is significant difference on searching in the two interfaces. The speculation is that the size is the most different so that it takes the subjects more time to search.

“Homepage”. There is significant difference on searching in the two interfaces. The speculation is that the color of the icon is similar to the color of the background in IE7, and the size is smaller so that the subjects cannot find this key in the first moment. The size seems to neglect the principle of attractive making the subjects spend more time to search in IE7.

5.2 Order and Interface

After analyzing the experiment order and the interface time, we find that interface time decreases with the experiment order; in other words, there are learning effects. However, the operation time in IE7 is still longer than that in IE6 with the learning effects. Interestingly, for the four subjects who are previously used to IE7 still finished the tasks in IE7 longer than in IE6. Therefore, the performance of subjects using IE6 is better than IE7.

5.3 Experiment 2

This experiment focuses on the new function in IE7, and the research finds that the searching time for using Quick Tabs to switch the pages becomes shorter obviously. Because Quick Tabs can present all the browsing pages in one window without clicking each window individually. Therefore, Quick Tabs does really work on browsing.

6 Conclusions

The new products should be designed to be more convenient and faster for the users to use. When designing the product, visibility is a very important principle. The controls to be operated correctly should be obvious and the system should provide the users visible information (Norman, 2000). In this research, we find that some icon designs in IE7 are not referenced with the principle of visibility. Therefore it is hard for the users to browse pages fast and conveniently. The performance was worse than the old browser in most keys tested in this study. However, the function Quick Tabs in IE7 does really increase the performance of browsing the pages for the users. This research finds that the size, color, and place of the icon do really influence the users' performance. Accordingly, the designers should think over this factor. Future user-interface designers should be aware of the importance of these findings and take them into account when designing new products so as to enhance users' efficient performance on Internet usage.

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