

An Investigation of Older Persons' Browser Usage

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Abstract. This paper reports on a study comparing Microsoft Internet Explorer 7 and Mozilla Firefox 2 with 18 participants aged 60 years old and over. The participants performed six groups of tasks related to browsing, navigation, navigation enhancement, bookmark, information transfer, personalization and technical manipulation. The study covers their performance, problems, and comments. This study found that menu bar is an important feature for supporting browsing activity. The participants performed the navigation tasks well but less so for personalization and technical manipulation tasks.

Keywords: web browser, ageing, performance, user interface.

1 Introduction and Background

In 2003 there were 20 million people aged 50 and over in the UK. It is projected that the number will increase by a further 36% in 2031, when there will be 27.2 million people aged 50 and over [1]. The number of older people using the Internet had also increased dramatically in the past decade. A survey performed in February 2006 revealed that 54% of 55-64 year olds living in the UK and 15% of 65 years olds and older went online [2].

Studies on Internet and ageing had shown that the Internet can potentially help older persons maintain their independence and improve their quality of life [3]. When it comes to web browsing, most older persons use either Microsoft Internet Explorer (IE) or Mozilla FireFox as their web browsers [4]. In October 2006, Microsoft released a new version of IE: IE7. The user interface of IE7 is quite different from the earlier version (IE6), as shown in Figure 1. As Microsoft is currently distributing IE7 as a high-priority update via Automatic Updates [5], users might unintentionally install it. Furthermore, Microsoft will integrate IE7 as a part of Windows Vista. This forms the motivation of this study. We are interested in investigating how older persons would react to this new browser.

A few days after Microsoft released IE7, Mozilla Foundation also released its new version of browser, Mozilla Firefox (FF) 2. The user interface of FF2 does not differ much from the earlier version, Firefox 1.5 (see Figure 2). The detailed features and improvements of both browsers are available on their developer websites. This study will use this new version to compare users' opinions, performance and problems with those experienced when using IE7.

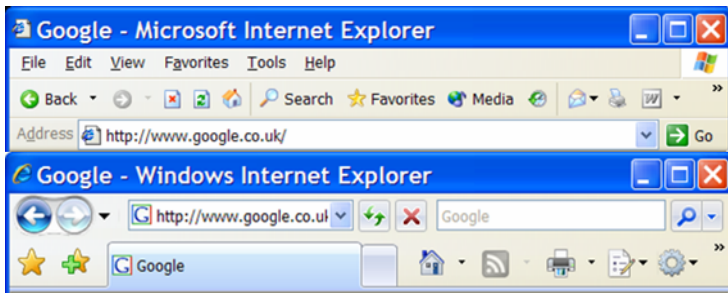


Fig. 1. Internet Explorer 6 (above) and 7 (below) user interface



Fig. 2. Mozilla Firefox 1.5 (above) and 2.0 (below) user interface

It should be noted that one major difference between IE7 and FF2 is that in IE7 the menu bar is hidden by default while in FF2 the menu is displayed and can not be hidden. The design chosen by IE7 results in a less cluttered screen, but also results in an added effort for users to guess where particular functions are located. The design chosen by FF2 is more cluttered, necessitating users to read through a series of texts, but might result in less effort in guessing where certain functions are located. This leads into an interesting research question of the effect of hidden vs. displayed menu bar on older persons' performance and opinions.

2 Method

2.1 Demographic Questionnaire

The participants were asked to fill a short questionnaire that gathers background information. The questionnaire includes questions on demographics such as age group and gender, Internet and computer usage, duration of computer and Internet use, and the browser they normally use. The inclusion criteria for participating are that they are familiar with computer, windows system and web browsers and that they were 60 years old or older at the time of study, and that they had never used IE7 or FF2 before.

2.2 Performance Test

The performance test consists of six groups of task: Navigation, Navigation Enhancement, Bookmark, Transfer, Personalization, and Technical Manipulation. The task groups were adapted from our previous work [4]. The participants were asked to perform the same browsing tasks using IE7 and FF2. The websites used were cached for offline browsing to reduce the difference in Internet connection speed. To counter balance, participants were divided into two groups: half of them performed the tasks using FF2 first and IE7 second; the rest performed the tasks using IE7 first and FF2 second.

During the performance test, the steps and time the participants took were recorded for each unique activity on the task list. Task time is defined as the elapsed time between the time the tester (one of the authors) finished reading the task and either the time the participant finished the task successfully or the time s/he gave up. There was no time limit for each task.

2.3 Participant Debriefing

After testing each browser, participants were asked to complete a post-test satisfaction questionnaire that consists of 10 product satisfaction questions derived from a usability testing of Netscape Navigator and IE [6]. The questions were listed in Table 3. In this questionnaire, they ranked each product on 5-point Likert scales, from strongly agree to strongly disagree with the statements. After finishing this questionnaire, the participants were interviewed on the problems they experienced or any comments they made in the task session to understand the underlying cause of the problems or to clarify the researcher's observation.

3 Results

3.1 Participants Demography

In total, 18 older adults participated in this study. Most of participants were familiar with computer and Internet, only one participant had used computer for less than a year (but more than six months) and two participants had used the Internet for less than six months. Table 1 shows the participants' profile.

3.2 Performance Test

The participants were asked to perform six groups of browsing tasks individually, with the researcher observing from a nearby location (within the same room). The detailed performance comparison is shown in Table 2.

3.2.1 Navigation Tasks

Expectedly, all participants were able to go to a website by entering the website name and go back to the previous page within a very short time. The numbers of participants that were able to go to a website in favourite/bookmarks list and reload a web page using FF2 are higher than those using IE7 (15 vs. 9 participants). They also

Table 1. Participants' profile

	No.	%
Age		
60-64	1	5.6
65-69	6	33.3
70-74	7	38.9
75-79	1	5.6
80 or above	3	16.7
Gender		
Male	6	33.3
Female	12	66.7
Education		
Less than high school	4	22.2
High school	11	61.1
Post graduate	3	16.7
Length of Computer use		
6-11 months	1	5.6
12-23 months	3	16.7
2-5 years	4	22.2
More than 5 years	10	55.6
Length of Internet use		
Less than 6 months	2	11.1
6-11 months	3	16.7
12-23 months	5	27.8
2-5 years	4	22.2
More than 5 years	4	22.2
Web browser used		
Internet Explorer	16	88.9
Mozilla Firefox	1	5.6
Other (AOL)	1	5.6

Table 2. Participants' performance using IE7 and FF2. # = number of participants successfully performed the tasks. The averages of trials and times in seconds are only for successful tasks. In cases where only one participant completed the tasks, standard deviations were omitted.

	Internet Explorer			Mozilla Firefox		
	#	Trials(S.D.)	Time(S.D.)	#	Trials(S.D.)	Time(S.D.)
Navigation						
Go to a website by entering the website name	18	1(0)	31.4(22.7)	18	1(0)	25.4(12.9)
Go to a website in Favourite/Bookmarks list	9	1.6(1.1)	65.2(34.9)	15	1.1(0.4)	17.7(10)
Go back to previous page	18	1(0)	3.6(1)	18	1(0)	4.1(2)
Refresh/Reload a web page	8	1.4(1)	42.9(62.9)	11	1(0)	23(18)
Go to browser home page	10	1(0)	8.9(6.7)	8	1.1(0.4)	11.2(11.6)

Table 2. (Continued)

	Internet Explorer			Mozilla Firefox		
	#	Trials(S.D.)	Time(S.D.)	#	Trials(S.D.)	Time(S.D.)
Navigation						
Enhancement	1	1	61.7(0)	5	1(0)	50.2(27.3)
Search within a web page	5	1(0)	33.1(19.1)	5	1(0)	7.3(5)
Change displayed language encoding	8	1(0)	30(30)	17	1(0)	7.3(5)
View history	8	1(0)	97.7(27.8)	18	1(0)	38.2(18.1)
Using browser help						
Bookmark						
Set browser's home page	4	2(2)	132.8(74.3)	2	1(0)	48.1(42.4)
Add a website to Favorite/Bookmarks list	10	1.1(0.3)	27(8.8)	16	1(0)	19.7(11)
Rename a website in Favorite/Bookmarks list	5	1.8(1.1)	47.8(37.6)	4	1.75(1)	124.5(50)
Delete a website in Favorite/Bookmarks list	6	1.2(0.4)	12.35(4.9)	11	1.4(0.7)	21.2(13.5)
Transfer						
Copy a part of web page to other program	14	1.1(0.4)	62.5(34.1)	17	1.1(0.2)	46.2(22.6)
Save a web page	9	1.2(0.4)	47.3(28.7)	18	1.1(0.5)	27.9(14.2)
Print a web page	17	1(0)	17.7(14)	18	1(0)	19.6(11)
Setup a web page printing	16	1.7(1.3)	41.3(38.1)	16	1(0)	16(6.2)
Preview a web page printing	15	1.1(0.4)	10.8(5.2)	18	1.11(0.5)	12(12.5)
Personalization						
Adjust the text size	11	1.18(0.4)	45.4(38.4)	13	1.23(0.6)	40.8(36.6)
Change text and background colour	1	5	420(0)	1	2	222(0)
Hide images	1	1	48.5(0)	3	2(1.7)	130.5(40.4)
Technical						
Show or hide toolbars	8	1.13(0.4)	97.7(27.8)	1	1	17.7(0)
View HTML source	1	1	48.1(0)	2	1(0)	21.1(10.5)
Set the proxy server	0			0		
Set a security option	0			0		

took longer performing this task when using IE7 than when using FF2 because they needed to search for Favourite icon. Around half of the respondents were able to go to home page using home icon (10 participants using IE7, 8 participants using FF2). The problem when using IE7 is that many participants cannot understand the yellow star icon that IE7 uses to represent the Favourite Center. Some participants also cannot associate the Refresh/Reload and Home icons of both browsers with their intended meaning.

Most of tasks in this group were done using browser icons except to go to a website in bookmarks list, which most used the menu bar for FF2.

3.2.2 Navigation Enhancement Tasks

Most participants were able to view history and search for help in FF2 but less than half could do so in IE7. The reason is that both the help and history functions are easily accessed from FF2's menu but were hidden in IE7. Five participants were able to search a word within a web page using FF2 but only one participant was able to do so using IE7. The rest of participant were not aware of this function or have never used this function before and were therefore unable to complete the task. Five participants were able to change display language encoding using both IE7 and FF2. More time was taken when using IE7 because many participants could not associate this function with its super ordinate function, which was the 'Page' function (some did not even understand the meaning of the icon used to represent the 'Page' function).

Most of tasks in this group were done using menu bar or mouse's right-click except using help and searching for history in IE7.

3.2.3 Bookmark Tasks

Adding a website to favourite/bookmarks list is the most successful task in this group. Respectively, 16 (FF2) and 10 (IE7) out of the 18 participants were able to complete this task. They completed this task using FF2's menu and IE7's Add to Favorites icon. It should be noted that Add to Favorites icon is a yellow star with a green '+' sign on the top of the star – we could argue that even if the participant did not understand that the star represents 'favourite list', the '+' sign might help association, and therefore more participants successfully added a website to favourite/bookmarks list than those who successfully went to a website in favourite/bookmarks list. More participants were able to delete a website in the favourite/bookmarks list in FF2 than in IE7 again because of problem associated with finding the favourite/bookmarks list. Interestingly, more participants were able to rename a website in favourite/bookmarks list using IE7 than using FF2. One possible cause is that, once the participants were able to open the favourite list in IE7, they just needed to right-click the mouse button to find the 'rename' function. In FF2, the 'rename' function was located under the 'properties' menu, which arguably was less intuitive. Very few of participants were able to set the browser's homepage, arguably because it is an activity that only needs to be performed once or considered unnecessary (many users would probably pay very little attention to the default homepage of the browsers).

3.2.4 Transfer Tasks

All transfer tasks related to printing were highly successful using both browsers, possibly because all printing-related menus are easily accessible from FF2's menu and IE7's Print icon toolbar. Copying a part of a web page to other program is also highly successful, with most users using FF2's menu and IE7's Page icon. Please note that the times used in this task include the times to open Microsoft Word 2003. Saving a web page was successfully done by all participants using FF2 but only by half of the participants using IE7, indicating the difficulty in understanding where this function is located.

3.2.5 Personalization Tasks

Two thirds of the participants were able to change text sizes using FF2's menu bar and IE7's Page icon. The rest of participants reported that they were either not aware of this function or never used this function before. Only one participant was able to change text and colour background using each browser (and not the same person). Very few participants were able to hide images using both browsers. In general, the findings show that personalizing web browser is difficult for older persons, in line with the finding reported in [7].

3.2.6 Technical Manipulation Tasks

Eight participants were able to show and hide menu bars using IE7, while only one participant was able to do so using FF2. None were able to set proxy server and security options and very few participants were able to view HTML source. Arguably, these highly technical tasks are highly complex and were not normally done by regular users (young or old).

3.3 Participants Debriefing

After testing each browser, the participants were asked to complete a post-test satisfaction questionnaire. Table 3 shows results from the questionnaire.

In general FF2 received more positive ratings than IE7 did (an interesting finding as only 1 participant used FF as their browser before the study). The results of t-test suggest that there are no significance difference in terms of functions, users efficiency and effectiveness (in task completion), errors recovery and browser preference.

Observing participants' interaction with IE and recording their comments, the problems that they experienced seem to be centred on the new interface that was quite different from the one they use currently. The most common complaint was related to the fact that the menus were hidden. Some literally stated that they needed the menus to be visible at all time even if they clutter the screen. They also suggested that the help icon be more visible and centrally located. The new design of icons caused many problems, even for experienced IE users. The Page icon was considered unintuitive at first sight. Moreover for the Stop and Refresh icons, only highly experienced users were able to associate the icons with the functions they represent. Nearly half of participants thought the Stop icon meant 'close' (due to its similarity with a standard Windows OS 'Close' icon) and the Refresh icon meant 'scroll the page up and down'. Figure 2 shows IE7's Refresh and Stop icons.

Only few participants commented on FF2. Most of them stated that they were new to it and therefore were hesitant to comment. However, those who commented stated that the icons in FF2 were quite similar to earlier versions of IE and therefore helped them associate the icons with the functions they represented. In contrast with IE7's Stop icon, FF2's Stop icon was considered very intuitive as it resembles the Stop traffic sign. The only icon that the participants complained about was the Reload icon. Some of them thought that this icon represents 'forward navigation'. One participant suggested reversing the direction of the Reload icon to reduce confusion (the rightmost figure in Figure 3). Figure 3 shows FF2's Reload and Stop icons. One participant stated that for her there was little difference in these two browsers as she only used very basic functions, and therefore could easily remember where those functions were located.

Table 3. User rating for each browser. Number show Mean (S.D.) Options: 1 = Strongly agree, 2 = Agree, 3 = Average, 4 = Disagree, and 5 = Strongly Disagree. * $p < 0.05$; ** $p < 0.01$.

	Internet Explorer	Mozilla Firefox	t
The functions I expected to complete the tasks were available	2.4 (1.4)	2.2 (0.9)	0.77
The browser was intuitive	3.2 (1)	2.4 (0.9)	2.96**
I was satisfied with how the browser works	2.9 (1.1)	2.1 (0.9)	2.25*
The browser was simple to use	3.4 (1)	2.7 (1)	2.40*
I could effectively complete the tasks	3.1 (1)	3.1 (0.8)	0.00
I could complete the tasks quickly	4.1 (1)	3.1 (0.8)	3.57**
I could complete the tasks efficiently	3.5 (1.2)	3.2 (1)	1.46
I thought the "look" of browser was pleasant	2.9 (1.4)	1.9 (0.7)	2.67*
I could easily recover from errors	3.3 (1.1)	2.9 (0.8)	1.64
I really liked using this browser	3.1 (1.6)	2.9 (1.3)	0.35



Fig. 2. Internet Explorer's Refresh and Stop icons



Fig. 3. FF2's Reload and Stop icons and the Reload icon suggested by a user

Four participants who used FF2 for the first time in this study stated that they were very happy with this program and expressed the wish to change their browser. They stated that they liked the plain and simple design of FF2 but suggested adding some other basic icons, e.g. print, save, copy and paste.

4 Discussion and Conclusions

Almost all participants were able to use all necessary basic functions (e.g., going to website by entering the website name, going to previous page, printing a web page, etc) using both browsers, which was good news. Arguably, this means that, if the participants recruited in this study are representative of the older web browser population in general, that older web browsers were able to perform basic operations that are needed to access information on the Web regardless of whether IE or FF was installed in their computers.

In addition to providing statistical evidence of the performance and opinion differences between the two tested browsers, this study has shed light into older persons' strategies in going around tasks they were not able to do. For example, many of the respondents were not able to recognize the Home icon as the easiest way to go to the browser's home page. The researcher's observation and the interview show that in general the participants solve this problem by performing two strategies to go to browser's home page: 1) closed and re-opened the browser and 2) click the back

button multiple times until they reached the home page. However, this study also revealed that older persons were fast in learning new techniques. After the researcher informed them about the Home icon, they adopted the technique immediately. This result is not new; many studies on older adults and computers had shown that with appropriate training, tutorial or assistance, older persons were able to pick up new skills [8].

The study shows very low success rate in searching within a web page, which is unfortunate. Searching within a web page allows user to get the information required efficiently. The problem is due to the complexity of operation. IE7 search function is accessed by clicking at search engine selection and choosing to find in this page or by accessing a hidden menu bar which is not easily visible. FF2 search is easily accessed through its menu bar but the search box appears at the bottom of the screen, which makes it difficult to notice. This low success rate indicates that older users require a more noticeable and simpler way of accessing this function.

The participants performed very well the transfer tasks except saving a web page. As explained earlier, in IE7, this function is placed under the 'Page' icon which is apparently unintuitive for some users.

Changing text and background colours will greatly help older adults when browsing low contrast web pages. However, this task requires many steps to complete. Even when users were able to select preferred text and background colours, they are also required to set the browser to ignore web the original colour schemes of the displayed web pages. This extra step was the main cause of failure of this task. Hiding images also required advanced technical skill especially in IE7. The setting is located in the multimedia part of the advanced setting menu. FF2 puts this option in a better position but the phrase 'Load images automatically' does not best represent what most users would understand as hiding images.

The technical manipulation tasks were rarely performed successfully by the participants (except show menu bar in IE7). It is difficult to remedy, except that it points to a need to ensure that web browsers that are used by older persons should come in the default settings that are ageing-friendly, thereby minimizing the requirement for older users to personalize the browsers.

This study sets out to understand the difference between two new versions of the most common web browsers: IE7 and FF2. While the study reveals findings that are expected, such as that basic browsing activities are reasonably performed by older web browsers and highly technical activities are more difficult, one important outcome of this study is the fact that readily available and visible list of functions, even at the cost of cluttering the screen, seems to help older persons perform more difficult browsing tasks. This study also shows that there is a need to maintain a consistent representation of functions in icon design (in relation to previous versions), rather than presenting 'pretty' and 'artistic' new icons, as this means that older persons have to relearn the association between icons and functions they represent again. Finally, this study also indicates that even though some studies suggest that older persons are hesitant to change the computer applications they use, they are actually willing to change when they like a certain application.

In summary, although this study has not arrived to the point of being able to crystallize the findings into design requirements of web browsers for older persons, it

is a starting point in understanding how older persons perceive and perform with new web browsers.

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