

# A Study of Design Attributes for Website-Shortcut Interface in Browser

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**Abstract:** Most browsers provide website shortcuts, which vary from types to types for users to surf the Internet. Owing to the shortcuts are necessary doorways to access web pages, whether a website shortcut interface with better Usability will cause users to choose the browser more willingly. This study proposed four website shortcut interfaces design cases. To evaluate the appropriate attributes for website shortcut interfaces design, there are 40 participants and one researcher recruited for implementing user tests. After the participants completed all the tasks in their experiments, the participants and one researcher filled in two different parts, which are QA and QB, of questionnaires immediately. In the first part, the QA questionnaires, which are related to the participants' subjective perceptions, are done by participants. Meanwhile, the other part is QB, which are concerning participants' objective behaviors observed by expert during user tests. Then, there was a final analysis of two different design attributes, which are operation mode and image display. The research results reveal that the icon interface design of case 4 has a higher score in all aspects due to the familiar operation mode and briefer content of the image. Finally, the appropriate attributes for website shortcut interface are discussed.

**Key words:** *Browser interface, User-center design, Usability, Satisfaction, design attribute*

## 1. Introduction

In the virtual environment, consumers access websites looking for specific information (Sismeiro & Bucklin, 2004). Recent researches in different issues of website interface focus on user experience. Sicilia and Ruiz (2010) mentioned that the individual's need for cognition moderates the influence of the amount of information on both consumer information processing and attitudes. Decision quality increases as the amount of information increases, but, on reaching a certain point, decreases as the amount of information increases. Therefore, we realize that the amount of information on the website may influence a user's choice. Furthermore, there is a research discuss with the design attributes of interface. Szekely, Luo, and Neches (1992) discussed with the design attributes of interface design and proposed a user interface design tool. They concluded 4 dimensions of design attribute, which are presentation, manipulation, sequencing, and action side effect.

Nielsen and Hackos (1993) defined the usability of a computer system in terms of five attributes: learnability, efficiency, memorability, errors and satisfaction. In general, the evaluation of system usability requires that these attributes be measured during or after people have actually used the system (Fu & Salvendy, 2002).

We believe that proper user interface design is efficient for users to seek and absorb information. In recent years, there are many website browsers blooming for users to enter and view the websites. For example, Internet Explorer, Google Chrome, Firefox, Safari, and Opera are the five most popular browsers and have their own group of consumers. Most of these website browsers have the advantage that they provide for the users their record of websites most frequently visited. Thus, they all have different user interface styles of arranging the most frequently visited websites; they may be arranged with columns of websites names or address, or they may be shown in a full-screen size matrix filled with website shortcuts.

In this study, among the five popular browsers, we extracted several design attributes of website-shortcut interfaces and of some different operation modes in order to design four experimental cases of website-shortcut interfaces. Participants had different experiences during the four experimental cases. A brief interview and two aspects of questionnaires which are subjective and objective were performed at the end of the experiment. In the result of the experiment, we found out the appropriate attributes of website-shortcut interface and gave relevant suggestions to designers.

## **2. Method**

### **2.1 Analysis of design attributes**

In this research, the design attributes of website-shortcut interface are discussed. We chose two parts of the most important attributes, which are operation mode and image display.

#### *Operation mode*

Most of the operation mode of existing browsers provide the users just “clicking” on the list of image in a full screen and enter the website which they would like to visit. In this research, we regard this “clicking” operation as the first operation mode of our experimental case design.

Another is the “scrolling”, which is generally used in every beyond-screen size content for users to read easily. The scrolling mode usually reveals the absolute position of the content by using the scroll bar. Claypool, Le, Wased, and Brown (2001) indicated that there are two kinds of scroll bars, which are vertical scroll bar and the horizontal scroll bar. In this study, we used the vertical scroll bar on the right side of the designed interface of the browser.

The other is the “moving” mode in which users could only move the cursor on the image without clicking to change the image of websites. It’s different from the traditional concept that images overlap each other, and only one of them shows up at a time.

#### *Image display*

Based on the browsers in reality, there are two kinds of attributes to represent the button of the website for users to click on and enter. One is screenshot, which shows the image of the front page (the initial or main web page of the website). The other is an icon, which is designed by the website designer. There is an original definition of an icon as a sign which exhibits its object to an interpretant (Burks, 1949).

## 2.2 Designed cases

Based on the design attributes mentioned before, there are 4 designed cases created. Then, we selected 15 websites popular and well-known for students in NCKU, and we let the participants complete tasks in experiments of 4 designed cases. Here is a table of the selected websites showing below:

Table 1. Selected websites for the experiments

Number	Websites
1	Yahoo!
2	Google
3	Facebook
4	Flickr
5	Google Map
6	YouTube
7	104 Job Bank
8	NDLTD
9	Twitter
10	Wretch
11	Mobile01
12	Vimeo
13	Books.com
14	Apple
15	NCKU

The hypotheses were tested with four cases designed for this study. They are based on the two parts of design attributes, which we would like to discuss. case 1 is that there are many small-sized screenshots arranged in a full-screen and three-by-five arrangement (Figure 1). case 2 is that there are medium-large-sized screenshots arranged as four in a roll that the participants have to scroll to view all the screenshots (Figure 2). case 3 is that there is only one image shown on the screen; when the participant moves the cursor on the image, the image will change from one website screenshot to another (Figure 3). case 4 is that we replace the screenshots of websites by icons of websites arranged in a three-by-five arrangement (Figure 4). When the website needs to be chosen in the task, the participant will find out and click on the object to enter the website.

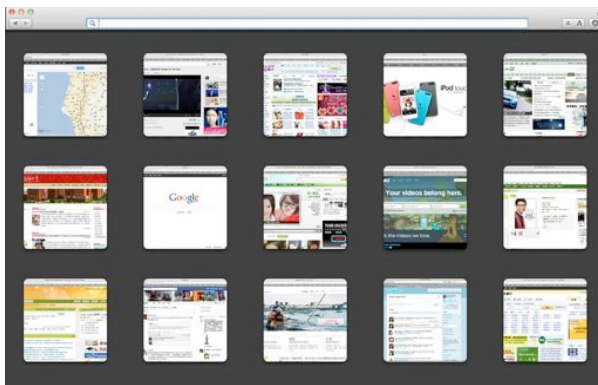


Figure.1 Case 1

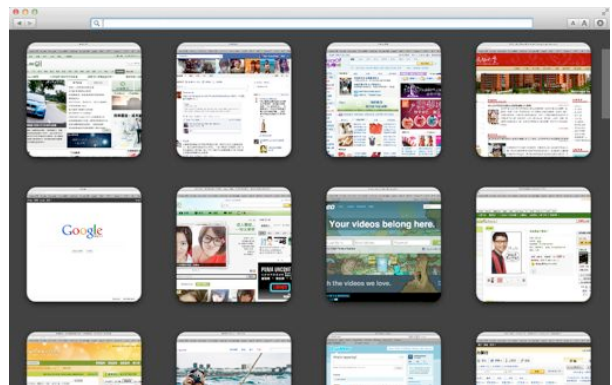


Figure.2 Case 2

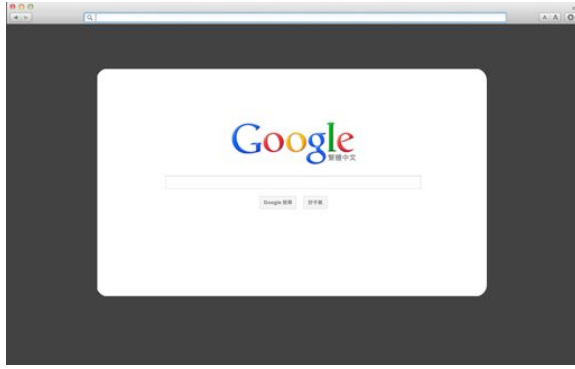


Figure.3 Case 3

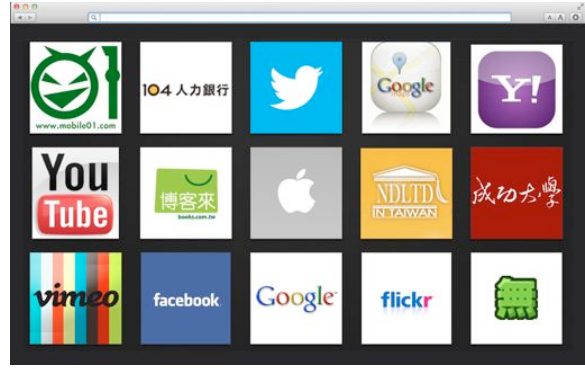


Figure.4 Case 4

### 2.3 Research model

The research model is illustrated in Figure 5. As Shown in Figure 5, the study was constructed in five steps.

In the first step, design attributes were analyzed and separated into two parts, which are operation mode and image display. The second step was experimental case design, in which four relevant cases were developed. Then, experiments were implemented. 40 participants were required to obtain 40 data for the following step, data analysis. We used the ANOVA and T-test to estimate the satisfaction and complexity score of those experimental cases. Finally, we got the result and discussed the appropriate design attributes.

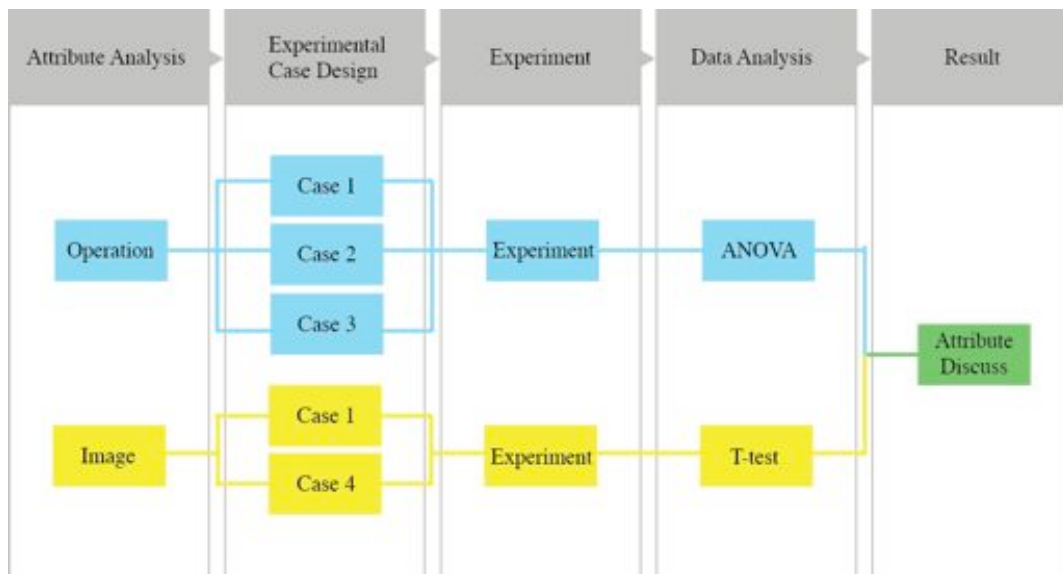


Figure.5 Research model

### 2.4 procedure and measurement

There were four kinds of designed experimental case for participants. We expect to see the best-designed experimental case in which participants can finish tasks most efficiently and accurately.

The website-shortcut interface evaluation was based on three different aspects following the study of Martelli, Nofrini, Vendruscolo, and Visani (2003):

1. Evaluation of user satisfaction through subjective sense with the cases using experience, through QA questionnaire.
2. Evaluation of the interface's complexity through objective observation of the user's ability and behavior using experimental cases, by an independent researcher following QB questionnaire.
3. Evaluation of the time, as an index of experimental cases efficiency.

In this study, in order to make sure the experiment results are useful and authentic to the browser interfaces design, 40 experiment volunteers (22 male and 18 female of NCKU students aged 23 averagely) and one researcher were recruited as experiment participants who used to surf on the Internet more than 40 hours per week. The questions in both subjective and objective questionnaire were used with the five points Likert-type scale. The structures of experiments are illustrated in figure 6.

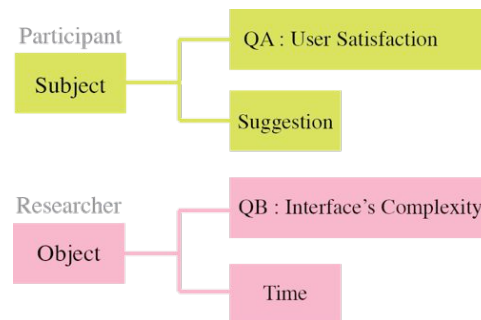


Figure.6 Experiment model

In this experiment, 15 daily highest visited websites were arranged randomly on the user interface. There are four parts of the experiment, case 1, case 2, case 3, and case 4. In each case, subjective data and objective data were gathered from 40 participants, and one expert. Before the experiment started, the participants had glanced each of the 15 chosen websites for three seconds, which let the participants have basic impression on the looks of websites. During the experiment, the mission only mentioned about names of the websites rather than icons or screenshots. The participants followed the mission to click the correct websites. After the participants had finished the mission, they had to fill in QA, and the user satisfaction was realized. At the end of the questionnaire, participants were requested to rate the experimental cases they had just used. Finally, there was a brief interview with participants to gather the suggestions for experimental design cases.

In each task, the researcher observed the participant using the system and filled in the questionnaire reported in QB; this questionnaire aimed at evaluating objective features (e.g. participants' behavior) and the complexity of the interface. Researcher also recorded time taken of accomplishing each task.

### 3. Result

The procedure of experiment repeated for each experimental case, and the results were discussed in two aspects of design attributes, which was mentioned before.

#### 3.1 Operation mode

In this section, the three relevance experimental cases will be compared, which are case 1, case 2, and case 3. Because there are more than two independent data, the significance of the results was analyzed by the one-way ANOVA to determine the relationship among scores of three designed experimental cases, due to differences in the performance of the prototypes.

### *User satisfaction*

Figure 7 illustrates that the average values of subjective scores were 26.45, 25.85, and 17.48 for case 1, case 2, and case 3 respectively. Furthermore, the ANOVA analysis revealed a significant difference of 3 cases ( $F(2,117)=25.3$ ,  $p=.00 <.001$ ). It confirmed that different operation modes provided different experiences for participants. Besides, the operation modes influenced the satisfaction of participants. We also found that the case 3 got the lowest satisfaction score from user because it displayed the image randomly, which let many participants feel frustrated with finding the right object precisely. Whereas in Post Hoc analysis, the case 3 was significantly different from case 1 and case 2 ( $p=.00 <.001$ , and  $p=.00 <.001$ , respectively). However, the scores of case 1 and case 2 were not found to be significantly different ( $p=.905 >.05$ ).

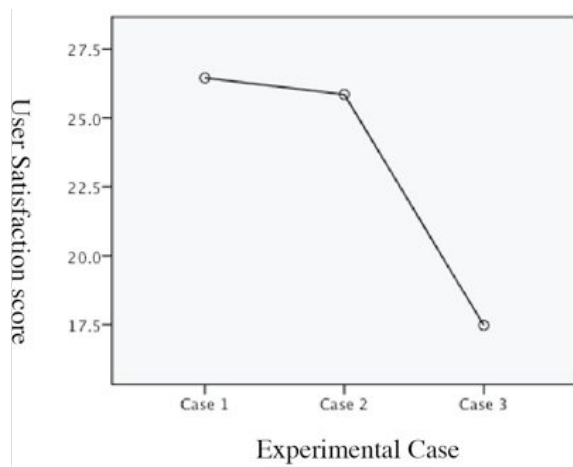


Figure .7 The mean value of user satisfaction score

### *Interface's complexity*

The average values of objective score were 6.58, 6.63, and 2.60 for case 1, case 2, and case 3 respectively. In Figure 8, we can easily find out that there was a quite difference in case 3. The result of ANOVA also revealed a significant difference in 3 cases ( $F(2,117)=19.7$ ,  $p=.00 <.001$ ), since the Post Hoc analysis of case 3 with case 1 was  $p=.00 <.001$ , and case 3 with case 2 was  $p=.00 <.001$ . The result of Post Hoc analysis couldn't tell the significant difference with case 1 and case 2 ( $p=.735 >.05$ ). It meant that the complexity did not have a significant difference with case 1 and case 2, though case 2 required participants to scroll the interface up and down to search the specified website screenshot.

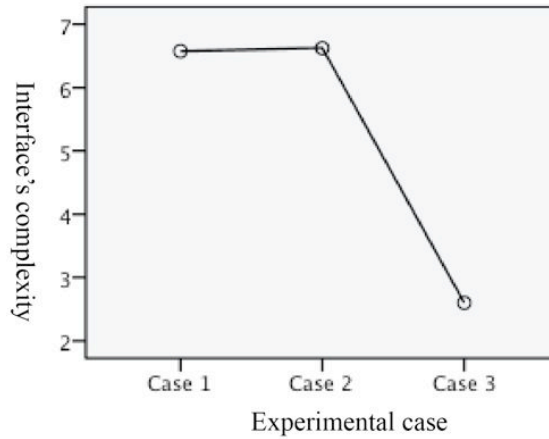


Figure.8 The mean value of interface's complexity score

### Time

ANOVA was used to compare the time spent. The average values of time spent in the case 1, case 2, and case 3 were 18.66, 22.42, and 43.47 seconds. Furthermore, there was a significant difference among case 1, case 2, and case 3 ( $F(2,117)=47.7, p=.00 <.001$ ). In the Post Hoc analysis, the difference was significant between case 1 and case 2 ( $p=.017 <.05$ ). Moreover, it was significant not only for case 3 and case 2, but also for case 3 and case 1 ( $p=.00 <.001$ , and  $p=.00 <.001$  respectively). It could tell that case 1 provided the most smooth and fast experience for participants so that it got a better score in satisfaction aspect (compared to case 3).

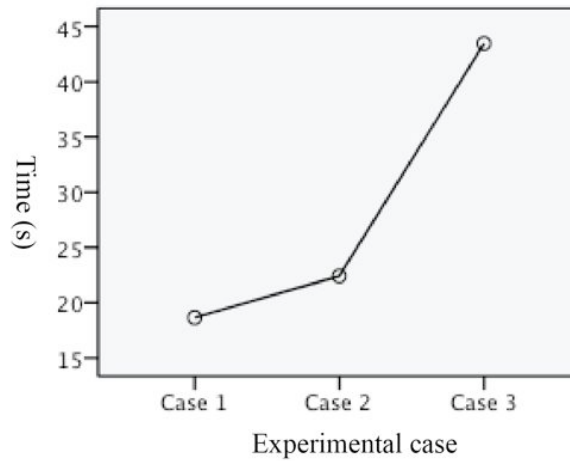


Figure.9 The mean value of execution time

## 3.2 Image display

We discussed the attributes of images, which are screenshot and icon in this section. The T-test analysis was used to compare the mean scores of two experimental cases.

### User satisfaction

The mean scores of the user satisfaction were 26.45 and 35.60 (case 1 and case 4, respectively), which were illustrated in Figure 10. The score of case 4 was significantly high compared to case 1 ( $t(72)=-8.83, p=.00 <.001$ ),

therefore the result showed that icon images, which provided concise and simple information, offered better experiences for participants to recognize and select.

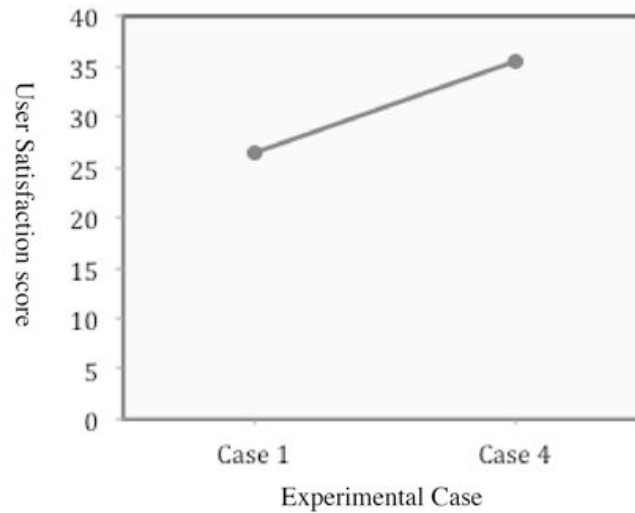


Figure.10 The mean value of user satisfaction score

#### *Interface's complexity*

The image display showed the same result in complexity of interface ( $t(66)=-4.877, p=.00 < .001$ ). The mean values of complexity scores were 6.58 and 9.15 (case 1 and case 4, respectively). Thus, the case 4 also had a better performance of complexity and that the participants could use the shortcut interface easily without moving the head closer to check the information of the image. Moreover, the tasks in the case 4 were also completed accurately by participants during the experiment.

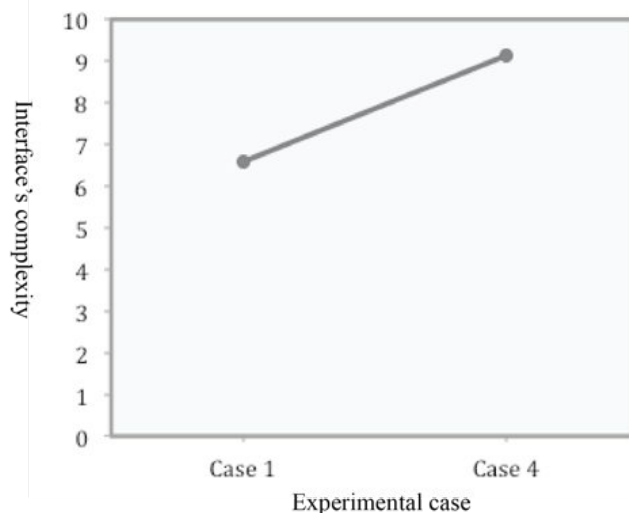


Figure.11 The mean value of interface's complexity score

#### *Time*

In result of T-test, it also showed a significant difference between case 1 and case 4 ( $t(78)=2.99, p=.004 < .001$ ). The average time spent for task completing of case 1 and case 4 are 18.66 and 15.38 seconds, illustrated in Figure



12. We could easily find that the choice efficiency of icon is better than screenshot. Whether the satisfaction, complexity, and time aspect of comparing, case 4 got better feedback from participants. Therefore, we could tell that icon was appropriate as a design attribute for website-shortcut interfaces of browsers.

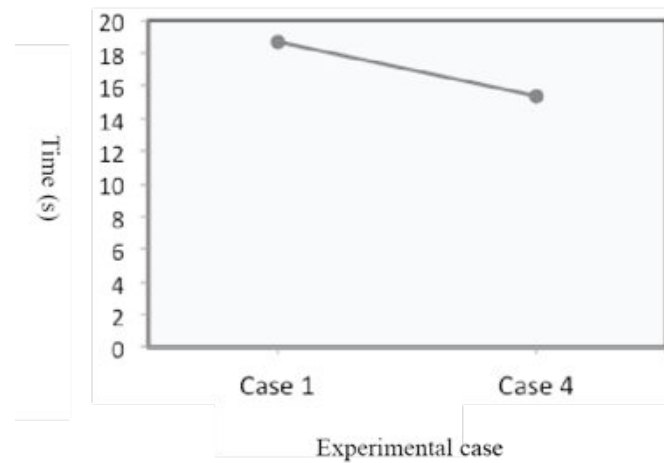


Figure.12 The mean value of execution time

#### 4. Discussion

In this study, in accordance with three aspects, user satisfaction, interface's complexity, and time, the design attributes can be judged if it is good or not.

In the operation mode part, case 3 has the worse performance even in three aspects. In spite of it provided biggest size of image for participants, participants didn't appreciate the interface of case 3. Many feedback from participants indicated that they were not familiar with the concept of overlapped image. Therefore, the operation mode of design attributes should be chosen precisely. With the result of this study, designers were suggested to choose the operation mode, which was frequently applied in computer interfaces. Though the result of case 1 and case 2 seemed to be closed, there were distinctly two parts of participants' feedback. One was a part of participants, who preferred the bigger size of image so that they could recognize objects easily. The other part of participants considered that the scroll function would cause users to get lost in the interface.

In the image display part, whether in the user satisfaction, the interface's complexity or time of interface questionnaires, the research results show that the icon interface design in case 4 has the highest score in all feedback. Consequently, the icon design attribute provides concise and simple information without scrolling down the page. In the future, when designing the shortcuts of web browser interfaces, the designed icons may replace the homepage screenshots of websites.

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