

Research on the Charm Factors of Web Browser for Design Professionals

Ying Liu^{1 a *} and Peng Lu^{1 b}

¹ Xi'an Academy of Fine Arts, No.100, south section of Hanguang Road, Yanta District, Xi'an City, Shaanxi Province, China

^a27069139@qq.com; ^b417884366@qq.com

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Abstract: Browsers are windows for designers to search for source materials. There are many kinds of browsers, and the choice of them is different from man to man. The purpose of this paper is to explore the behavior preferences of designers using browsers to explore the potential charm of browsers. First of all, 6 browsers often used by the design group are obtained as research samples by interview, and then the charm factors of Evaluation Grid Method are used to extract the charm factors of the browser, and the user's charm evaluation is obtained by the questionnaire. Finally, a quantitative- I theory is used to analyze the number of questionnaires. From the experience requirements of designers, this study builds the correlation between the specific features of the browser and the intention of the experience, which can be used as a reference for the designer to choose the browser, and also to enlighten the interactive design of the browser.

Introduction

Nowadays, with new technology and invention becoming more and more difficult, the design field gradually pays attention to the design output guided by consumers' perceptual needs, and the focus of competition also shifts from practical function to perceptual level [1]. Therefore, it is helpful for the development and design of new products to accurately grasp the potential perceptual experience needs of designers. As we all know, since the advent of Microsoft operating system, browser has become a window of the network, through which users can get what they need in the virtual cyberspace. For designers, browser has become an indispensable web tool for searching information. In the early stage of design behavior, designers need to search through browser for all kinds of materials that are conducive to divergent design thinking, including pictures, news, policies and regulations, patents, etc. Therefore, the quality of browser user experience will affect the efficiency of the whole design behavior to a certain extent.

Miryoku engineering is an effective tool to study the potential emotional needs of users. Miryoku engineering belongs to the category of perceptual engineering, which aims to create attractive products. It was proposed by Japanese scholars in 1985 to capture individual cognitive concepts and present them in tabular form [2]. In 1991, Masato Ujigawa, a Japanese scholar, convened a number of scholars to study together, aiming at "creating attractive products, space technology and knowledge" [3]. In 1998, the society of perceptual engineering was established in Japan, in which charm engineering was incorporated. This paper mainly uses the concept of charm engineering, starting from the real psychological demands of the design practitioners, combined with the evaluation construction method to deeply mine the potential charm factors of the browser, so as to establish the correlation between the design characteristics of the browser and the needs of the designer.

Determination of Study Samples

Browser is regarded as the window of network, and web page is the basic medium of browser interaction. With the development of programming technology, Ajax and MVC framework for web pages can make the content of web pages more colorful. The realization of "software experience"

enables designers to do any operation in web browser that can only be completed by software in the past. Up to now, there are fewer and fewer software that need to be installed in the local computer. Only those very complex creative software are left, including graphic design, 3D modeling, video editing, performance design and program coding [4]. In addition, there are different types of websites in the same browser, and users' experience will be different with different browsers. According to statistics, the mainstream browsers in the Chinese market include IE, Google Chrome, Firefox, QQ, Baidu, Sogou and 360 security browsers. Since the 1990s, Microsoft's IE browser market share is the highest. In recent years, Firefox, Google Chrome and 360 security browser have developed rapidly and have occupied a place [5]. Through interviews with teachers, students of design major and designers, six browsers are selected as the sample of this study according to the frequency of selection, which are Google Chrome, Firefox, Baidu, QQ, IE and 360 security browser, as shown in Figure 1.



Figure 1. Filtered browser samples

After the research samples are determined, considering the need to unify external factors to study variables, five browsers are installed on the same computer to eliminate unnecessary factors affecting the accuracy of the experiment. This study mainly tests the design professionals who have rich experience in using browser, and finally selects four men and four women as the subjects of in-depth interview. Eight interviewees are teachers, students and designers related to the design major.

Operation Flow of Evaluation Grid Method (EGM)

Evaluation grid method is an important research method in charm engineering, which is developed by Japanese scholars on the basis of Kelly square method [6]. Let users pairwise compared the research objects, then combine in-depth interviews to capture users' cognitive concepts, question the similarity or difference relationship of the research objects, and finally summarize the answers of the interviewees, so as to build the charm factor system of the research objects in the three levels of original evaluation (middle layer), abstract reason (upper layer), specific characteristics (lower layer). The specific operation flow is shown in Figure 2.

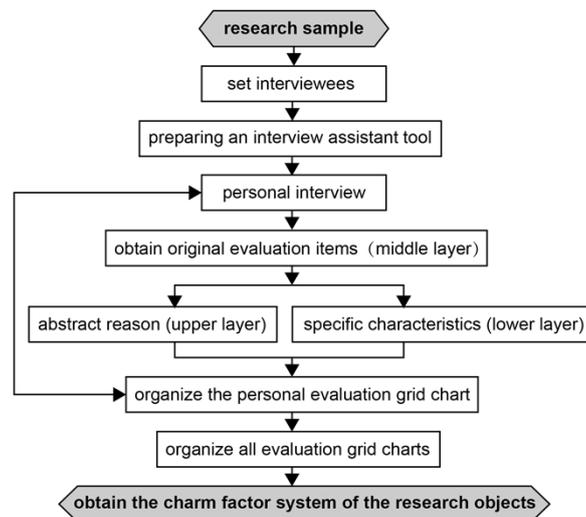


Figure 2. Interview process of evaluation grid method

EGM in depth interview of browser. According to previous experience, after 8 interviewees used 6 browsers on the same computer, the experimenters interviewed 8 interviewees in turn. During the

interview, paper and pen are used to record the interview content. In addition, a recording pen can be prepared to avoid missing information. First of all, the interviewees are required to make a pairwise comparison between the six browsers, and describe the preferred characteristics based on the criteria of "good or bad" or "likes and dislikes". These characteristics are the original evaluation items (middle layer). Take 360 security browser and Google Chrome for example. "Clear at a glance" in the following Q & A is the original evaluation item.

Question 1: which do you prefer when using 360 security browser or Google Chrome browser?

Answer 1: I prefer Google Chrome!

Question 2: what are the features of Google Chrome that make you feel better when you use it?

Answer 2: Clear at a glance!

Then, according to the original evaluation items (middle layer), continued to ask for abstract reasons (upper layer). "Comfort" in the following answers is the abstract reason (upper layer) of the original evaluation items (middle layer) "clear at a glance".

Question 3: why do you think it's good to be "clear at a glance" and how do you feel?

Answer 3: because "clear at a glance" gives me a sense of "comfort".

Finally, according to the original evaluation item (middle layer), continued to ask for specific characteristics (lower layer). "Simple page layout" in the following answers is the specific feature of "clear at a glance". Through this kind of interview, we can get each interviewee's evaluation information system in three levels: original evaluation item (middle layer), abstract reason (upper layer) and specific feature (lower layer).

Question 4: in the process of your experience, what are the specific aspects of "at a glance"?

Answer 4: let's say "page layout is simple"! (The interviewee may list several specific characteristics.)

Build browser evaluation structure chart. In this study, there are two steps to build the evaluation structure chart of the browser. The first step is to sort out the individual evaluation structure chart of the interviewee, and the second step is to build the evaluation structure of all the interviewees. After the completion of the test for all interviewees, the statistical results showed that 9 upper items, 22 middle items and 39 lower items were obtained.

In order to further simplify the structure chart, according to the overlapping times of abstract reasons in the voice recording of the interviewees, firstly, five upper level items with more occurrence times are obtained. Then 11 middle level items can be obtained by combining the items with the same meaning in the specific features. Finally, several lower level items related to the middle level can be sorted out according to the recording capacity, and then the simplified evaluation structure chart as shown in Figure 3 can be sorted out. This figure reflects the real needs of the designer's user experience, and has an important reference value for the improvement of browser interaction.

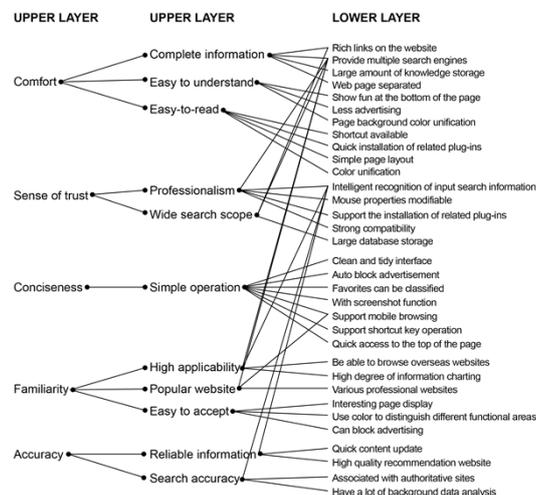


Figure 3. Evaluation structure chart of all respondents

Quantification-I Theory

Brief Introduction of Quantification-I Theory. Quantification theory is a method of qualitative data research developed from 1950s [7]. The quantification-I theory is to study the relationship between a group of qualitative independent variables X and a group of quantitative dependent variables Y, and use multiple regression analysis to establish their mathematical models to achieve the prediction of dependent variable Y [8]. In this study, based on the evaluation structure map sorted out in the early stage, a user questionnaire (see Figure 4) was set up and distributed to the students, teachers of design major and designers. 104 questionnaires were received, of which 84 were valid. By using the quantification-I theory to analyze the questionnaire data, we can get the influence weight of the charm of browser user experience and provide the basis for its improved design.

CHARM FACTOR OF WEB BROWSER: SENSE OF ACCURACY

1. For the "accuracy" feature of web browser, please rate the following conditions according to its importance. (the least important item is 1 point, the most important item is 5 points.)

	1	2	3	4	5
Reliability of content information	<input type="radio"/>				
Accuracy of search information	<input type="radio"/>				

2. Which of the following items is the most important for a web browser with a sense of accuracy in its "reliable content information" feature?

- Provide multiple search engines.
- Quick content update.
- High quality recommendation website.

3. Which of the following items is the most important for a web browser with a sense of accuracy in its "search information accuracy" feature?

- Intelligent identification input search information.
- Associated with authoritative websites.
- Large amount of data analysis in the background.

Figure 4. Questionnaire investigation

Quantification-I Theory Analysis of Web Browser. This stage aims to establish the correlation between independent variable x and dependent variable y through multiple regression analysis, so as to judge the impact of "specific evaluation items (lower layer)" on browser user experience (upper layer). First, the specific feature (lower layer) in Figure 3 is set as independent variable X, and the importance of the original evaluation item (middle layer) is set as dependent variable Y after being accentuated. Then, through multiple regression analysis, we can establish the correlation between them (table 1-5), and then use it to analyze the impact of "specific evaluation items (lower)" on the charm of browser user experience.

In this study, we use partial correlation coefficient to judge the impact of specific evaluation items on user experience. The results show that the partial correlation coefficient of "sense of comfort" is: $X1 > X3 > X2$, which indicates that the specific characteristics of higher category "large knowledge reserve" and "with shortcut" can create a comfortable experience for designers. In the "sense of trust", $X1 > X2$, which indicates that the specific feature "supporting the installation of related plug-ins" with higher category points can give users a sense of trust experience. In "simplification", the specific features of higher category "favorites can be classified" and "with screenshot function" can give users a simple experience. In "intimacy": $X2 > X1 > X3$, which indicates that "providing multiple search engines" and "high degree of information charting" can give users a cordial experience; in "accuracy": $X1 > X2$, which indicates that "high quality of recommended website" can give users an accurate experience.

According to the decision coefficient, it can be judged that the predicted values of "sense of comfort", "simplification" and "amiability" are correlated, while the predicted values of "sense of trust" and "accuracy" are low correlated. Therefore, for the interaction design of specific designer users in

the browser, we can focus on the above items with high partial correlation coefficient, and give priority to the items with high category. In addition, designers can choose the right browser according to their own experience needs to improve work efficiency.

Table 1 Sense of comfort

Project	Item	Item score	Partial correlation coefficient
X1 Comprehensive information	1 Rich links on the website	0.0617	0.3276
	2 Compatible with multiple search engines	-0.7830	
	3 Large amount of knowledge storage	0.4247	
	4 Separate web pages	-1.1614	
X2 Easy to understand	1 Interesting page display	-0.3579	0.1287
	2 Less advertising	-0.0967	
	3 Page background color unification	0.4598	
X3 Stick out a mile	1 Shortcut available	1.0643	0.2041
	2 Quick installation of plug-ins	-1.9146	
	3 Simple page layout	0.3149	
	4 Color unification	-0.0374	
Constant term		13.6905	
Complex correlation coefficient		0.3918	
Coefficient of determination (Square of complex correlation coefficient)		0.1535	

Table 2 Sense of trust

Projec	Item	Item score	Partial correlation coefficient
X1 Professionalism	1 Compatible with multiple search engines	-0.0838	0.1555
	2 Intelligent identification search information	-0.0772	
	3 Mouse properties can be modified	0.1486	
	4 Support related plug-in installation	0.2635	
	5 High compatibility	-0.4019	
X2 Wide search scope	1 Large database storage	0.0010	0.0243
	2 Rich links on the website	0.0373	
	3 Provide multiple search engines	-0.0557	
Constant term		9.1905	
Complex correlation coefficient		0.1564	
Coefficient of determination (Square of complex correlation coefficient)		0.0245	

Table 3 Simplification

Projec	Item	Item score	Partial correlation coefficient
X1 Simple operation	1 Clean and tidy interface	0.1441	0.3233
	2 Can automatically block advertising	-0.0714	
	3 Favorites can be classified	0.3333	
	4 With screenshot function	0.3333	
	5 Support mobile browsing	-0.4666	
	6 Support shortcut key operation	0.0833	
	7 Quick access to the top of the page	-0.1666	
Constant term		4.6667	
Complex correlation coefficient		0.3233	
Coefficient of determination (Square of complex correlation coefficient)		0.1045	

Table 4 Intimacy

Projec	Item	Item score	Partial correlation coefficient
X1 Widely applicable	1 Access to overseas websites	0.2540	0.2831
	2 Intelligent identification search information	-0.4493	
	3 High degree of information charting	0.6829	
	4 Simple interface layout	-0.6084	
X2 Popular website	1 Support mobile browsing	-0.1540	0.3420
	2 There are various professional websites	-1.2698	
	3 Provide multiple search engines	1.5497	
X3 Easy to accept	1 Interesting page display	1.3083	0.2336
	2 Differentiate functions by color	-0.1635	
	3 Can block advertisement	-0.0053	
Constant term		13.2619	
Complex correlation coefficient		0.4667	
Coefficient of determination (Square of complex correlation coefficient)		0.2177	

Table 5 Accuracy

Projec	Item	Item score	Partial correlation coefficient
X1 Accurate information	1 Quick content update	0.0946	0.2035
	2 High quality recommendation website	0.1834	
	3 Provide multiple search engines	-0.2727	
X2 Search accuracy	1 Associated with authoritative websites	0.0077	0.0659
	2 Intelligent identification search information	0.0707	
	3 Background big data analysis	-0.0528	
Constant term		9.7262	
Complex correlation coefficient		0.2251	
Coefficient of determination (Square of complex correlation coefficient)		0.0507	

Conclusion

The evaluation construction method in charm engineering is a scientific and rational research method. This research integrates qualitative evaluation construction method and quantitative quantitative analysis, and applies it to the user experience of browser. Then, the specific designer is used as the user to carry out the research and build the correlation between the specific characteristics and the experience needs in the browser experience process, which has reference value for the development and design of the browser and the browser that the designer chooses. In this process, in-depth interview is an important stage in the research process. Interviewees should select senior users in relevant fields to ensure the comprehensiveness of the research. In addition, the simplified process of evaluating the construction map can be negotiated with the members of the research team, and the open discussion is helpful to the authenticity of the research.

In conclusion, considering that people pay more and more attention to the perceptual demand experience of products in the world, this paper takes the experience demand of the designer for the browser as an example to analyze. This process is applicable to the development and design of all kinds of interface interactive products, and can also be applied to the improvement design of traditional products.

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