A Comparison Between Different Menus: Disorientation When Browsing on WWW

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Abstract: This study investigated disorientation resulted from the visualization of tree-structured menu types in websites. When users searched specific products on a commercial website, they can easily get access to the information through tree-structured menus provided by the websites. However, there is a possible problem that users may get confused with the visualization types of tree-structured menus. Every connection between different hierarchies appeared explicitly may be more rigid than implicitly. Therefore, the present study examined the hypothesis by an experiment of two kinds of visualization types of tree-structured menus showed on a website. At the same time, investigation of the usability of different kinds of menus with the use of questionnaires considering the visual momentum was also administered. For lostness rate, the experiment result showed that there was no significant difference between the two menu structures. After analyzing the questionnaire data, there existed a significant difference in perceived disorientation. We observed a phenomenon that even the subjects followed the instructions and stayed in the correct route, sometimes they didn’t know where they were located. Under such circumstance, perceived disorientation should be a better index to measure the actual disorientation behavior.

1. INTRODUCTION

With the development of the information technology, more and more context would be included in one website, such as texts, graphs, flashes and videos. It becomes an important problem how the web designers integrate all the context into the website. A good website could give users information that is organized and useful. Distracting elements, on the other hand, slowed down the information search. In addition, certain characteristics, such as colors, shapes, size, structure of web pages, might guide users’ attention (Interpreted by Chevalier and Kicka, 2006). A well-designed mechanism would guide the user to get the information that they really want quickly and easily. Therefore, the mechanism of navigation is important for the users to browse the website. However, with the rise of the electronic commerce, thousands of goods were showed in the website and were showed in the various forms. Among these navigation mechanisms, the most popular menu style is tree structure. Yet, not all of the structured menus were well-designed, and ill-designed menus would make users depressed or disappointed when browsing. As a result, users might give up browsing the website and never visit the website again unless the website would become more friendly and easier to use. Thus, finding out factors which would influence the visualization of the tree-structured menus is important. This study, therefore, was to find out the difference between two kinds of the tree-structured menu. One is structured by the continuous and smooth steps, and the other was discontinuously and abrupt display. Furthermore, all the factors which may influence the users’ affect were discussed here.

2. LITERATURE REVIEW

2.1. Information Space

When users stay in the physical environment, the most apparent problem is guide the people to their destination. People recognize the mental presentation of the real world based on three kind of knowledges. They are landmark knowledge, route knowledge and survey knowledge (Wickens and Hollands, 2000). Navigation is important when people moved from one place to another and they will utilize all these cues to build themselves. It is the same with users in the information space (Benyon, 2001). Information space is constructed by large of information sign created by the designers. Users may use the signs to make their decision to move.
2.2. A framework for navigation

Navigation is the process of creation and interpretation of the user’s internal model, included of cognitive activities (Spence, 1999). The process was formed through four cognitive activities consisting of browsing, modeling, interpretation and formulation of the browsing strategy. At first, users browsed and received the presented data. Secondly, users acquired the browsed data, such as places or routes, and then initiated the formulation of the internal model. The following was their interpretation of the internal model as to demonstrate the process of navigation. Last, users formed a browsing strategy. Therefore, different models may compete each other and more than one strategy may exist in users’ mind at the same time.

The navigation of the excellent website must make the user not only conceive the arrangement but also perceived the structure of information in the website organized by the designer (Benyon, 2001).

2.3. Measurement of navigation

In the past, several studies had investigated navigation process. In those studies, several mathematical or quantitative tools were used to measure the influence of the navigation. One quantitative tool was to measure the ‘lostness’ when the user browsed the website (Smith, 1996). Smith asked the subjects to complete the tasks and then calculated the browsed pages. He used lostness rating to evaluate whether the subjects were lost when browsing. It was an efficient tool to measure the performance of the subjects. Therefore, lostness rate was one of the indexes chosen in this study.

2.4. Visual momentum

In order to reduce the problem induced when the user browsed the website, visual momentum would be suggested to diminish the effect. By means of visual momentum, four characteristics must be included, as described later. At first, display elements should be made consistent across displays. Secondly, graceful transitions should be guaranteed because abrupt discontinuities may be disorienting. Thirdly, highlight anchors may be an invariant feature of the display, whose identity and location was prominently highlighted on successive displays. Fourthly, display continuous world maps (Wickens and Hollands, 2000).

2.5. Visual search models

In many websites, the navigating menus are supplied for the users to browse. When people searched for the targets, they may make use of many sorts of strategies as their visual search models. The definition of the structured search is “Any information that might help the user guide searching should be available in the display (Wickens, 2000). Moreover, for multilevel menus, the user must scan level by level until they find the target. They must keep on scanning and searching in the sublevels until the final target was found. Therefore, the structure search might be familiar with the internal model formed when the users browsed.

Integrating the concepts just mentioned, an experiment was designed to find out the factors which would affect the users’ navigation behavior. The same factors may also influence the forming of the structure of the information space. For proving it, we suggested that the visual scanning model may affect the forming of the route of the browsing data.

3. EXPERIMENT

The experiment was designed by the purpose of verifying the difference between tree-structured menu and non-tree structured menu. Objective and subjective methods were used to measure the lostness when the subjects finished the tasks.

3.1. Experiment design
Most websites only show one menu structure, but the main website of Samsung provided two menu structures. One is the tree-structured menu which is located on top of the website and the other one is the pop-up menu on the left side of the screen. These two menu structures were shown in Figure 1;

![Figure 1. The tree-structured menu.](image)

To verify the assumption, Samsung website containing two different menu structures was selected to be the experiment platform. First, the tree-structured menu was hidden from users’ view (Figure 2) and the subjects were asked to do the search task by using pop-up menu. Following was the second stage in which the pop-up menu was covered, subjects were asked to use the tree-structured menu to continue the experiment in this stage. After the two session searching tasks, subjects were asked to fill out the questionnaire.

![Figure 2. The experiment procedure.](image)

### 3.2. Independent and dependent variables

Independent variables: Two different menu structures.
Dependent variables: Total number of hyperlinks.

### 3.3. Experiment procedures

Ten master students (5 females and 5 males) with the habits of using the Internet volunteered to participate in the experiment. Prior to the experiment, the subjects were asked to give the basic personal information. During the experiment, the computer screen is recorded using a recording software for the purpose of calculating the total hyperlink numbers and doing the data analysis. In the first stage of the experiment, subjects were asked to follow the actions with the pop-up menu.
3.3.1. **Stage one.**

(1) Find out the ML-2251N printer for business using the Samsung homepage, write down the print resolution lined in the specifications and then stay in the page.

(2) Continue with question one, find out the digital screen (971P-Black), and write down the native resolution lined in the specifications.

(3) Return to the Samsung homepage.

(4) Find out SGH-t509 (T-mobile) in Samsung homepage, write down the color lined in the specifications, and then turn back to Samsung homepage

(5) Fill out the questionnaire after finishing the first stage.

After finishing stage one, subjects then used tree-structured menu to begin with stage two.

3.3.2. **Stage two**

(1) Find out the SPH-A940 (Sprint) mobile phone using the Samsung homepage, write down the color lined in the specifications and then stay in the page.

(2) Continue with question one, find out the analog screen (740N-Black), and write down the native resolution included in the specifications.

(3) Return back to Samsung homepage.

(4) Find out the ML-2510 printer (For Home & Home Office) using the Samsung homepage, write down the print resolution included in the specifications and then stay in the webpage.

(5) Fill out the questionnaire after finishing stage two.

4. **RESULTS**

4.1. **Lostness**

The average lostness formula are showed below (Smith, 1996),

\[
L = \sqrt{\left(\frac{N}{S} - 1\right)^2 + \left(\frac{R}{N} - 1\right)^2}
\]

L : Lostness index, when L>0.5, we get lost. When L\leq0.5, we do not get lost

R : Number of nodes which need to be visited to complete a task

S : Total number of nodes visited whilst searching

N : Number of different nodes visited whilst searching
Figure 3. Average lostness rate of the two different menus.

The histogram showed average lostness, there was no significant difference between the two menu structures when the average lostness was considered. Its P-value was 0.938 which showed no significant difference between the two menu structures.

4.2. The questionnaires results were showed as below:

(1) Perceived disorientation

Figure 4. Perceived disorientation.

Questionnaire data were collected and summarized and the results was shown in Figure 4. Here one-way ANOVA was used to analyze the data, and P-value was equal to 0.035 which lead to a result that between different menu structures there existed a significant difference in perceived disorientation. The continuous
tree-structured menu lead to better performance and can guide users to the subjective more easily.

(2) Other characteristic assessments

![Figure 5. The comparisons of other assessments.](image)

In Figure 5, the continuous structure menu was better than the non-tree structured menu in all assessments. After One-way ANOVA, we can get the P-value for ease of learning was equal to 0.076, the P-value of confidence was 0.072, the P-value of use consistent representations was 1, the P-value of use graceful transitions was 0.051, the P-value of highlight anchors was 0.067, the P-value of display continuous world maps was 0.002. The different menu structures only have an influence on the display continuous world maps. There are no significant differences in ease of learning, the confidence, the use graceful transitions, and the highlight anchors. And there was no influence on the use consistent representations.

(3) Menu structures, internet experiences and average lostness

The P-value of the menu structure is 0.597, the P-value of the internet experiences is 0.2687. No significant difference was found for the two factors.

(4) Menu structures, gender, and perceived disorientation

As to the relationship between menu structure and gender, it was found that the P-value for menu structure equaled to 0.042, and the P-value for gender equaled to 0.342. Only menu structure had a significant influence on subjective lostness.

5. DISCUSSION AND CONCLUSION

Results from questionnaire showed that subjects considered tree-structured menu significantly better than non-tree menu structure in terms of perceived disorientation. Significant differences were found between the two different menu structures. As to the lostness rate measurement, there was no significant difference among tree-structured menu and the non-tree structured menu. The two methods are used to judge whether subjects get lost in the searching task or not.

The different results in objective and subjective measurements represented that subjects’ feelings were not same with their actual performance. But we observed a phenomenon that even subjects followed the instructions and stayed in the correct route, sometimes they didn’t know where they were located. Meanwhile, users who tended to explore Websites would be rated as disoriented, even though they may be experiencing no disorientation (Smith, 1996). Under such circumstance, perceived disorientation should be a better index to measure the actual disorientation behavior.

The framework of the webpage would direct subjects’ attention to specific parts. For example, the non-tree structured menu would be processed in the three parts which were Top frame, left frame and
bottom frame. In the present experiment, subjects spent more time in non-tree structured menu than tree-structured menu (T= 2.53, P-value< 0.05). Also, they browsed more pages in the non-tree structured menu than in tree-structured menu (T= 3.68, P-value< 0.05). This phenomenon might be resulted from the difference between global processing and local processing (Wickens and Hollands, 2000). For the non-tree structured menu, subjects must search for certain cues in one web, organize the information and then decide their strategy. However, tree-structured menu provided subjects automatically-organized information, and subjects were told explicitly what’s in the next terms. It also enabled the server use less time to refresh the webpage. Moreover, the more time the subjects spent when browsing, the more perceived lostness they got (Pearson γ = 0.676, P-value< 0.05). Also most subjects thought the tree-structured menu were the better navigation tool in terms of ease of use (F= 6.09, P-value< 0.05).

However, learning effect existed in the experiments. The subjects could learn to use the website after browsing several times. Therefore, the orders of the materials were exchanged in the experiments. And subjects were informed how to use the strategy to find out the information of the specific product at the beginning of the experiments and they were given enough practice to make sure they were familiar with the materials. However, still several subjects spent much time pondering the meaning of the term in the menus and the result was they could not build the whole structure of the route. In other words, the ability of the language used most by the subjects would affect their performance. From video analysis, subjects could not immediately understand what the terms meant at the moment when they saw the terms on the menus, but as soon as they saw the product photos they understood what those terms meant. This implied graphics, like landmarks, might help subjects making sure where they currently were.

REFERENCES


