# The Effects of Different Types of Site Maps on User's Performance in an Information-Searching Task

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## ABSTRACT
This study examines the effects of different types of site maps on user's performance in an information-searching task for three web sites. Forty-two participants (22 males and 20 females) participated in the study. The results showed significant effects on the types of site maps used. It was found that participants found the correct answers more often, required less time, visited significantly fewer web pages, and required fewer clicks to complete the task when the site map was visible. However, it was found that the participants had a lower success rate in finding the correct answers when the site map had hyperlinks. In addition, the results showed significant performance differences among the three web sites and the effects of a site map were found to be more prominent for a larger web site.

## Categories & Subject Descriptors: H.5.4
[**Hypertext/Hypermedia** ]: *Navigation, User issues.*

## General Terms: Experimentation, Human Factors.

## Keywords: Site map; web navigation; hypertext.

## 1. INTRODUCTION
Numerous design and usability guidelines suggested that a site map is necessary for every web site [4, 6]. A site map that mirrors the site structure well can help the user to reduce the feeling of being lost during navigation [1], to understand the organization of the site, and to search for required information quickly and accurately [3, 5]. However, site maps were not as successful as they had been expected, and users often overlooked site maps or were reluctant to use them [6]. This may be due to the fact that most site maps were hidden within the web site and users were required to locate the hyperlink to access the site map page before they could use the site map. Also, users were required to switch between the site map and the web site when using the site map to navigate. It has been shown that a constant site overview is beneficial for users when performing information-seeking tasks [2]. Providing users with a visible site map, therefore, may encourage users to use it and to take advantage of it. Another advantage of using the site map page during navigation is that it provides shortcuts to the important pages of a site so that one can have access to those pages easily with just a single click [4]. However, a heavily interlinked site may cause disorientation [3].

In this study, the effects of these two characteristics of a site map were examined. It is expected that users will perform better with a visible site map rather than with a hidden one, and with a site map with hyperlinks than one without hyperlinks. Also, it is expected that the effects of a site map on users' performance will be greater for a larger web site than a smaller one.

## 2. METHOD
### 2.1 Participants
Forty-two students (22 males and 20 females) of the PSY100 class at the University of Toronto participated in the study.

### 2.2 Apparatus
The experiment was conducted with a Pentium III desktop computer, equipped with the logging software, ErgoBrowser®.

### 2.3 Design
Participants were assigned to one of the five conditions: visible site map with hyperlinks (V_L), visible site map without hyperlinks (V_NL), hidden site map with hyperlinks (H_L), hidden site map without hyperlinks (H_NL), and the control condition of no site map (C).

All participants were asked to perform an information-searching task on three web sites of three companies: AW, CS, and SV. The web sites have 45, 109, and 24 individual web pages respectively. The web sites were mirrored into the testing computer. Participants had to find answers to nine questions for each web site. The questions for the web sites were similar, and required navigation to different parts of the web site. Participants always started from the 'Home' page of the site for each question. Most of the answers were 1 to 4 clicks away from the start page. The order of the web sites was counterbalanced to minimize possible learning effects.

The response variables were the participants' performance in the information-searching task, measured by the percentage of correct answers, the task-completion time, the total number of pages visited, and the total number of clicks required.

### 2.4 Procedures
Participants received instructions depending on the experimental condition they were in. All participants were told not to use any 'search' or 'find' functions throughout the experiment. The set of questions for each web site was given to the participants in print, with only one question printed on each page, so that only one question could be seen at a time.

**Table 1. Mean values (standard deviation) of the dependent measures on the three web sites for the five site map conditions**

| Cond. | N | % of correct answers | | | Task-completion time (s) | | | # of pages | | | # of clicks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AW | CS | SV | AW | CS | SV | AW | CS | SV | AW | CS | SV |
| V_L | 6 | 94 (6) | 81(13) | 94 (9) | 49 (18) | 73 (30) | 34 (14) | 5 (2) | 7 (2) | 3 (1) | 6 (2) | 9 (4) | 4 (1) |
| V_NL | 12 | 87 (7) | 93 (7) | 99 (3) | 37 (18) | 56 (32) | 24 (7) | 4 (2) | 6 (2) | 3 (1) | 5 (2) | 6 (3) | 3 (1) |
| H_L | 6 | 92 (6) | 72 (17) | 87 (11) | 35 (12) | 96 (42) | 31 (21) | 5 (2) | 10 (4) | 4 (1) | 6 (2) | 12 (7) | 5 (1) |
| H_NL | 12 | 95 (6) | 81 (16) | 94 (9) | 46 (18) | 92 (30) | 38 (15) | 7 (2) | 13 (4) | 5 (1) | 8 (4) | 15 (6) | 6 (2) |
| C | 6 | 92 (6) | 68 (13) | 94 (9) | 31 (7) | 93 (21) | 33 (19) | 5 (1) | 14 (5) | 5 (3) | 6 (3) | 17 (6) | 5 (3) |

All participants were asked to read the question out loud, and click the 'Start' button when starting the task. They were asked to click the 'Task Track' button to stop when they found the answer to the question. These procedures were repeated until all the questions were completed. The participants were then debriefed.

## 3. RESULTS

The mean values of the response variables for the five conditions were showed in Table 1.

A repeated measure analysis was performed, with the five site map conditions as a between-subject factor, and the three web sites as a within-subject factor. Significant main effect was found for the types of site map and for the three web sites. Significant interaction effect was also found between the types of site map and the three web sites.

Post-hoc analyses showed that participants in the V_NL condition had a significantly higher rate of finding the correct answers than those in the H_L and the C condition. It was also found that the V_NL condition required less task-completion time than the H_NL condition. In addition, the V_L condition visited fewer web pages than the H_NL condition. The V_NL condition also visited significantly fewer web pages and required fewer clicks than the H_NL condition and the C condition.

## 4. DISCUSSION

The results confirmed the hypotheses that a visible site map can enhance performance in an information-searching task [2].

However, the results found no significant effects of hyperlinks, except for the percentage of correct answers, where users were found to perform better when the site map did not have hyperlinks. One possible explanation is that users spent more time studying the site map and understanding the organization of information on the site when the site map did not have hyperlinks. This better understanding of the site may improve the chance of finding the correct answer to the questions.

The significant interaction effects found between the three web sites and the five site map conditions suggested that the positive benefit of a site map is greater for a larger and more complicated site. Larger web sites are more likely to be disorienting and a site map, especially a visible and an immediately accessible one, may be most helpful in such circumstances.

## 5. CONCLUSION

The results implied that it is important to make the site structure explicit, and providing a visible and easily accessible site map can enhance user's performance. Also, hyperlinks can sometimes affect the success rate of finding the correct information. In addition, the role of a site map becomes more important when the web site increases in size. Web design guidelines should take all of these into consideration.

## 6. ACKNOWLEDGMENTS

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