

WEBSITE NAVIGATION: AN EXPLORATORY STUDY OF THREE NAVIGATION TOOLS FOR SIMPLE WEB TASKS

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Keywords: Website Navigation, Search, Menu, Tag Cloud, User Experience, User Study, Mixed Methodologies.

Abstract: The purpose of this study is to compare how users perceive and use three navigation tools (search, menus and tag clouds) on websites to find information. Furthermore, the study compares two variations of tag clouds, one where the tags are created by a single author and the other where the tags are created by a community of authors. Using mixed methodologies, data was captured and analyzed for effectiveness, efficiency and enjoyment. The results show that overall search and tag clouds are more effective and preferred among users. Tag clouds, where the tags are created by a single author are more efficient than those created by a community of authors. The findings from this study provide recommendations for future research in improving navigation on websites.

1 INTRODUCTION

Today there are estimated to be over 600 million websites on the Web (Netcraft, 2012) with approximately 266 million users in North America alone (Pingdom, 2010). Navigation on the Web can be broken down into two main components: navigating to the website and navigating to a specific content on the website (Lazar, Bessiere, Ceaparu, Robinso and Shneiderman, 2003). Search engines such as Google, Yahoo and Bing, help users navigate to websites. Users also find websites by following links from other web pages or directly using URLs. Users visit websites for a variety of different tasks; from quickly finding a restaurant to more in-depth tasks in planning. Regardless of the reason for visiting a particular website, users need to be able to navigate the site even if they are just browsing serendipitously. Even though websites offer different navigation tools to aid users in finding information such as search, menus, tag clouds, and breadcrumbs, navigation within a website is one of the main causes of user frustration on the Web (Lazar et al., 2003).

The effectiveness of search, as a navigation tool on websites, depends on the user's ability to form an appropriate query and search engines effectiveness to retrieve relevant results. Other tools are based on set of links that are either created dynamically or pre-determined. These links are often grouped and

placed together on a web page usually in a form of a menu or a tag cloud. When a user clicks on a link, they are directed to another page or file on the web. These tools can be problematic as information may be located deep in the website or difficult to find. Link based features depend on the quality of categorization and the fit between the categories and the user's task and level of understanding. To help users better navigate a website, it is important to understand how users perceive and use current navigation tools. This understanding will identify ways to improve website navigation.

2 BACKGROUND

While there has been research on navigation, many of these studies revolve around navigating to sites on the Web rather than navigating within a website itself. Research that has examined website navigation has demonstrated that navigation on sites can be improved by providing multiple navigation techniques or paths to the same content (Tullis, Connor, LeDoux, Chadwick-Dias, True and Catani, 2005); however, less research has been conducted on how users perceive and use these navigation tools on websites. In this study, we want to understand user behavior and perception of three navigation tools on websites: search, menus, and tag clouds, shown in Figure 1.



Figure 1: Three navigation tools on many eyes.

2.1 Search

Search allows the user to enter a query into a text box and retrieve results based on their query. The search text box is typically accessible from all pages of the website. Problems associated with search include: ability of users to form an appropriate query, effectiveness of the search engine used on the website, and the frequency at which the pages are crawled/indexed by the search engine.

2.2 Menus

Menus can be found on most websites. They present categories of links in a list format, where each item in the list is a hyperlink to another web page. The categories are usually created by a website designer/owner. They often appear consistently across all pages of the website and are typically displayed either horizontally or vertically or both. They are often used in hierarchical drop down navigation menus, where the first level is presented in a horizontal fashion and the second level presented in a vertical fashion, also referred to as expandable menus. A study, conducted by Zaphiris, Shneiderman and Norman (2002), compared expandable and sequential menus, and found that reducing the depth of hierarchies improves performance in terms of speed and search efficiency. Problems associated with menus include: appropriate categorization and vocabulary used for labeling the items in the menu must reflect the user's task and context.

2.3 Tag Clouds

Tag clouds, are a visual presentation of weighted

keywords, labels or tags that link to content on a website. Tag clouds were first seen in 2004 on Flickr. The tags in a tag cloud are typically presented in alphabetical order, however, different approaches such as random or weight based arrangements have been used (Schrammel, Leitner and Tscheligi, 2009). Tag clouds usually co-exist with other navigation tools including menus and search. They are now found on a wide variety of different types of websites including personal and commercial websites, blogs, and social information sharing sites.

The creation of the tags is often a user-generated process, where users manually label items on web pages with related keywords. Depending on the type of the website, tags may get assigned to items by the website owner/author or by a community of authors/users. Tag clouds can also be automatically created by algorithms based on content. Problems associated with tag clouds include: reliable tagging of content, the understanding between the user assigning the tag and the audience using the tag, and the tag having a number of different meanings to different people.

Tagging has been studied extensively in the past few years and is considered one of the successful discovery tools, where discovery involves the usage of social tools to find information (Shneiderman, 2011). Improvements for tagging media objects have been explored by recommending tags based on personalized and social context (Rae, Sigurbjornsson and Zwol, 2010). Zubaiga, Korner, and Strohmaier (2011), examined automated classification of content, based on social tagging and user behavior.

Most of the previous research on website navigation has explored navigation tools individually. However, Sinclair and Cardew-Hall (2008) studied the usefulness of tag clouds versus search for different types of tasks and found that tag clouds are useful for non-specific information seeking tasks and search is useful for specific information seeking tasks. Their research did not include other navigation tools, such as menus, nor how users perceive and use navigation tools.

3 OBJECTIVES AND RESEARCH QUESTIONS

The first objective of this study was to examine how users find information on websites using three navigation tools (search, menu and tag cloud) for simple information seeking tasks, as measured by effectiveness (task completion) and enjoyment (user

preference). The second objective of this study was to compare differences in efficiency (time and number of clicks to complete the task) between the three navigation tools and then the two types of tag clouds; one where the tags are created by a single author (SA) and the other where the tags are created by a community of authors (CA). The research questions are:

1. How do users use three navigation tools (search, menu and tag cloud) when presented with all three for simple information seeking tasks?
2. Which of these three navigation tools are more effective in finding information for simple information seeking tasks?
3. Which of these three navigation tools do users prefer for simple information seeking tasks?
4. Which of the two types of tag clouds (SA or CA) is more efficient for simple information seeking tasks?

4 METHODOLOGY

This study was conducted using mixed methodologies, where both qualitative and quantitative data was collected and analyzed. Qualitative data was captured using questionnaires and interviews, whereas quantitative data (time and number of clicks) was collected using the Morae software.

4.1 Participants and Study Design

Fourteen Computer Science students (thirteen males and one female) participated in this study. The study was conducted in a lab environment where participants used Firefox 3.6 to accomplish the tasks.

Participants filled out a background questionnaire consisting of demographic questions and previous experience of using navigation tools on websites, followed by a training session on the three navigation tools in random order. Participants were then asked to conduct four tasks. The websites along with their tasks were presented in random order. For tasks 1 and 3, participants could use any (or all) of the three navigation tools. For tasks 2 and 4, participants were allowed only the tag cloud. After each task, participants completed a post-task questionnaire and after all four tasks, they completed a post-study questionnaire. The study concluded with an interview session, where participants were asked a series of questions to elaborate on their experience of using the three navigation tools.

4.2 Websites and Tasks

The study required four websites, consisting of the three navigation tools (search, menu and tag cloud) and the tag cloud of type SA or CA. A focus group was used to select the four websites and tasks. The websites and tasks are illustrated in Table 1.

Table 1: Websites, tasks and the type of tag cloud.

Website	Description	Type of Tag Cloud
Professional on the Web	Companies/professionals create their profile and also create tags for their own services. Task: Find two companies that you would consider hiring to redesign a website.	CA
URL: http://www.professionalontheweb.com/		
Many Eyes	Users create/share visualizations. Users assign tags to their own visualizations. Task: Find two visualizations beneficial for your project on alcohol consumption and its effects.	CA
URL: www-958.ibm.com/		
Web Designer Wall	A blog of web design ideas, trends and tutorials. Maintained by a single author who tags the blog entries. Task: Find two posts on how to design a website for mobile devices.	SA
URL: http://webdesignerwall.com/		
Technology Education Know-How	A blog to help teachers use technology. Maintained by a single author who tags the blog entries. Task: Find two posts to assist your friend (4th grade teacher) with resources to supplement his teaching.	SA
URL: http://www.techedknow.com/		

5 SUMMARY OF FINDINGS

The analysis from both qualitative and quantitative data suggests that search and tag clouds, especially where tags were created by a single author, were effective, efficient and enjoyable. Table 2 provides a summary of the findings.

Additional findings from the interview session revealed participants' likes and dislikes on the three navigation tools.

Search: Participants preferred the flexibility of forming a search query based on information need. Furthermore, they found it easy to use. They disliked the time it required to enter the query (keywords)

Table 2: Summary of findings based on research questions.

Research Questions	Search	Menu	Tag Cloud
1. How do users use these tools?	32%	11%	11%
2,3. Perception on:			
Effective:	43%	14%	43%
Easiest:	50%	14.29%	35.71%
Preferred:	42.86%	28.57%	28.57%
Efficient:	28.57%	28.57%	42.86%
4. Which of the two types of Tag Cloud (SA/CA) is more efficient?			
Time to Complete (ANOVA):	SA Tag Clouds are efficient than CA Tag Clouds at significance level 0.075		
Number of Clicks (ANOVA):	SA Tag Clouds required fewer clicks than CA Tag Clouds at significance level 0.002 (statistically significant)		

and the retrieval of sometimes non-relevant results.

Menus: Participants found menus helpful due to their structured format. They were familiar with the tool and thought menus were easily accessible, due to its prominent location on most websites. They disliked using menus when they are poorly labeled or when they are not exhaustive.

Tag Clouds: Participants thought tag clouds were efficient when the appropriate tags (pertaining to their goal) are present in the tag cloud. They also thought that tag clouds are well suited for certain types of websites, such as news and blog websites. They also indicated that tag clouds are not effective on their own and should co-exist with other navigation tools on websites. None of the participants understood what the tag cloud represented; majority stated that it might be the most searched keyword or the most popular content. Participants disliked similarity between the tags and tags that are too small to read.

6 RECOMMENDATIONS AND FUTURE WORK

Search was perceived to be the easiest and preferred, whereas tag cloud was perceived to be efficient. This suggests an integration of the two (search and tag clouds) to allow users the ability to search within a tag. For example, a user selects a tag and a search text box is displayed next to the tag to enter a search keyword(s). Moreover, it might be useful to allow users to select multiple tags within a tag cloud to form a search query.

To eliminate the issue of similarity between the tags in a tag cloud, selecting a tag from a list of

recommended tags during the tagging stage should be considered. In addition, it would be interesting to explore the effects of having the community participate in the selection of the tags. This approach to tagging could be presented in a tag cloud format and the use of appropriate algorithms.

Menus were not ranked as the most useful navigation tool in any category and this opens up possibilities for more dynamic construction of menus, where menus would be updated in real-time based on the website's activity (Google Analytics) or community input (Twitter and Facebook).

7 CONCLUSIONS

Navigation tools within websites should be easily accessible and lead to relevant information quickly. The findings from this study, both qualitative and quantitative, reveal that users perceive tag clouds as useful as search in finding information. Tag clouds where the tags are created by a single author are more efficient (in terms of number of clicks) than tags created by a community of authors. The study provides sufficient evidence to investigate and improve navigation on websites including tag clouds, especially where websites rely on community driven content and tagging.

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