

Usability News is a free web newsletter that is produced by the Software Usability Research Laboratory (SURL) at Wichita State University. The SURL team specializes in software/website user interface design, usability testing, and research in human-computer interaction.

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Cascading versus Indexed Menu Design

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If there is one basic truism about the Web it is that every designer has their own opinion concerning the best method for presenting menu items on a web page. Two common ways to present menus are to either hierarchically cascade the menu items upon mouse-over, or to simply place most, if not all, of the menu items in a categorical index. Cascading menus have the advantage of requiring little screen real estate. However, they have been much maligned for several reasons. First, it is sometimes difficult to use for the reason that users must precisely control their mouse movements in order to select the correct menu item. It becomes increasingly difficult with the number of levels a user must navigate. Second, cascading menus hide menu information until the user positions the mouse over the menu level above it (see Walker, 2000).

Index menus, on the other hand, tend to take up valuable real estate. They also can present an overwhelming amount of menu information at one time. Unfortunately, there has been very little empirically validated research comparing different types of menu layouts since the advent of the Web (see Norman, 1991). In response to this lack of research, this study sought to compare user performance and satisfaction of two basic types of cascading menu layouts to a categorical index menu layout.

In addition, since users have different reasons for searching on the web, this study also sought to examine user performance for two types of searches: the direct search, where the item being searched for is explicitly known, and the implicit search where the subject material being searched for is known, but the specific item is not.

METHOD

A Pentium II based PC computer, with a 60 Hz, 96dpi 17" monitor with a resolution setting of 1024 x 768 pixels was used. The participants' performance was tracked using ErgobrowserTM software.

Participants were instructed to search three types of menu layout conditions. In one condition, the menu items were arranged in accordance to a categorical index menu layout (Index, see Figure 1). Another condition arranged the items in accordance to a drop-down or "horizontal" cascading menu layout (Horizontal, see Figure 2). A third condition arranged the items in accordance to a vertical cascading menu layout (Vertical, see Figure 3). The menu links were the same size (10 pt. Verdana) in all three conditions. There were no delays in the presentation of the submenu for both the Horizontal and Vertical cascading menus. In addition, both cascading menus had one level of depth and had the same submenu items cascade from it. These menu items corresponded to the items that were presented in the categorical index menu.





Figure 1. The Index menu layout for an electronics website condition



Figure 2. The Horizontal menu layout for an electronics website condition



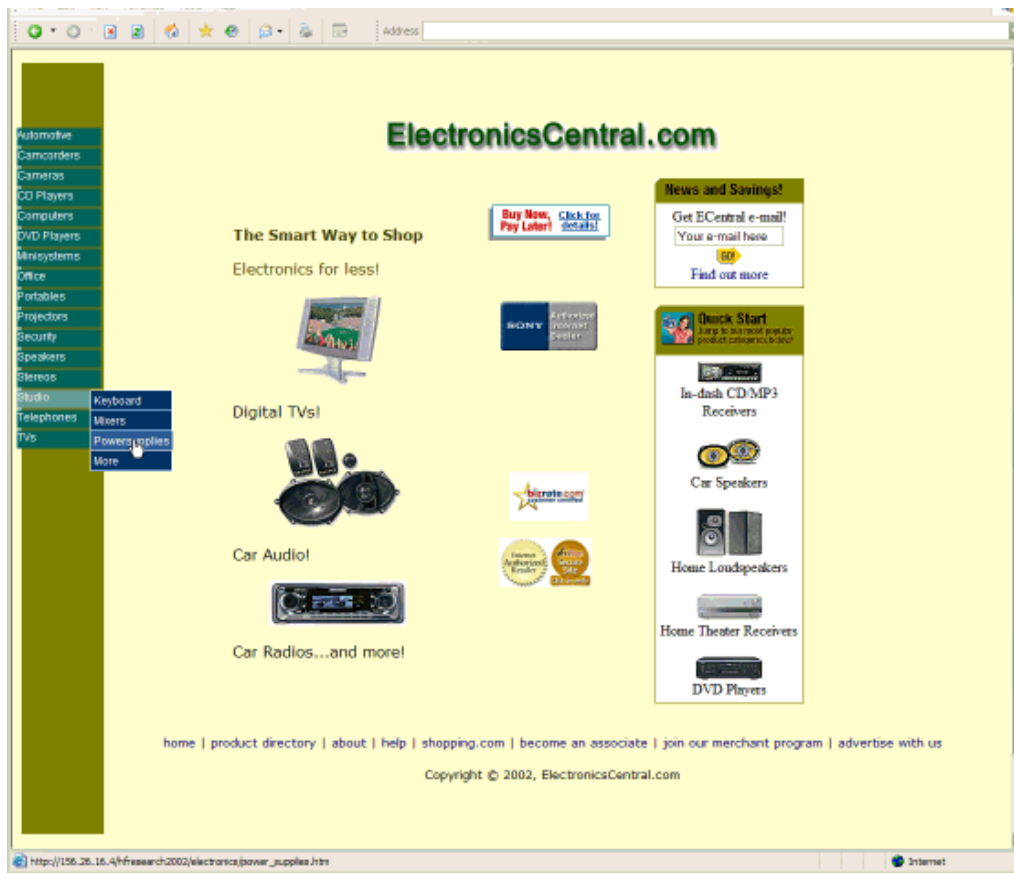


Figure 3. The Vertical menu layout for an electronics website condition

Participants

Eighteen participants (8 males and 10 females) volunteered for this study. They ranged in age from 20 to 49, with a mean age of 32.6 (S.D. = 8.1 years). Eighty-nine percent for the participants use a computer daily, and most (72.2 %) use the Web 25 hours or more per week.

Procedure

Participants were presented with three web sites, each with a different menu item layout condition. The website domains consisted of either an online electronics, general merchandise, or a children's toy store.

In order to present a realistic search environment, participants were presented with both directed search and browsing questions. For each condition, participants were instructed to search for specific information pertaining to six explicit and six implicit task questions. The explicit task questions directly stated in the question the specific merchandise item to be searched (such as, "You want to buy a Nikon 8-mm camcorder"). The implicit tasks required participants to search for an item that was implied in the task question, but was not explicated stated (such as, "Your parents are having their 40th anniversary and you would like to give them a gift. They always talked about going down the Mississippi River and viewing the plantation homes"). Each question had to be properly answered within five minutes to be considered correct. Participants could repeatedly search until they found the correct information by selecting the Back button, or until the time expired. The menu layout conditions, the web domain, and the task questions were counterbalanced by means of a Latin square design.

After finishing all the questions for each condition, participants answered a satisfaction questionnaire. The questionnaire consisted of a 6-point Likert scale, with 1 = "Disagree" and 6 = "Agree" as anchors. The questions were as follows: "I felt lost/disorientated while searching for information," "The site was easy to navigate," "The menu structure was frustrating to use." After participants answered the

respective questionnaires for each condition they ranked the four link arrangements for general preference.

RESULTS AND DISCUSSION

A within-subject ANOVA was used to investigate actual performance (mean task completion time and search efficiency) and perceived performance for four types of menu item conditions. Post hoc comparisons were done using the Bonferroni test. The preference for each condition was measured by means of a Friedman χ^2 .

Task Completion Time

Assessing the time needed to complete the search tasks found a significant layout main effect [$F(2, 34) = 5.39, p < .01$] in that participants searching in the Index condition found task information more quickly than the other two conditions. Participants searching with explicit task questions found the information significantly faster than searching with the implicit task questions for all three conditions [$F(1, 17) = 25.42, p < .001$]. There was no task by menu item layout interaction (see Figures 4, 5, and 6 for means and standard deviations).

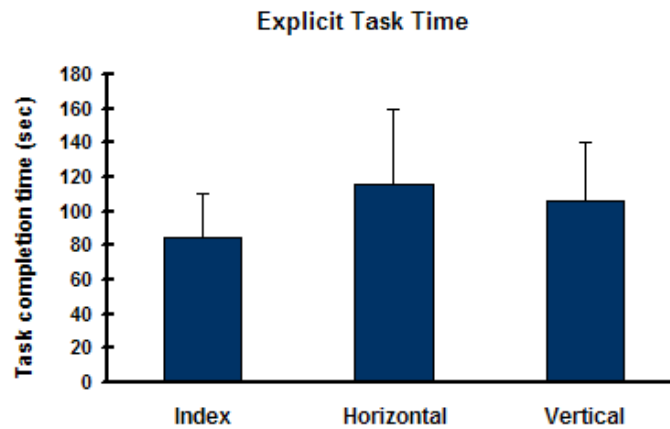


Figure 4. Explicit task completion time (S.D.) for explicit task questions

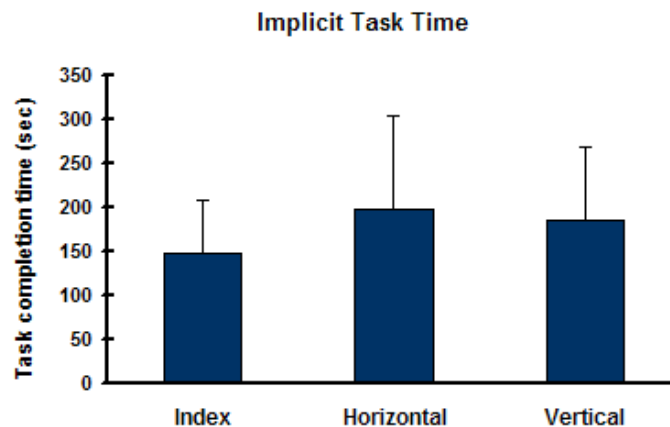
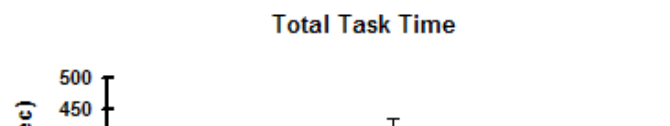


Figure 5. Implicit task completion time (S.D.) for implicit task questions



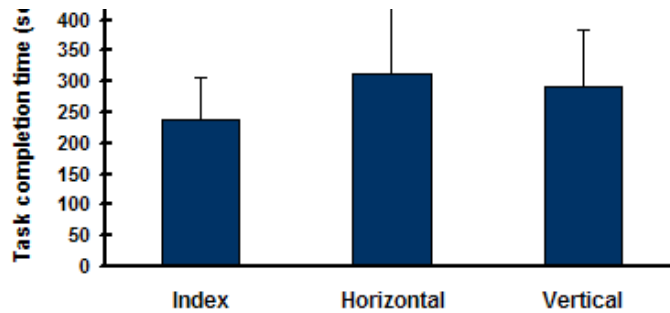


Figure 6. Task completion time (S.D.) for both implicit and explicit questions

It is somewhat surprising that the task completion time differences were so great. That is to say, the results revealed a 6.4 second, average per-task time difference between the Index and the Horizontal conditions. Moreover, the average completion time difference between the Index and the Horizontal conditions increased to 8.5 seconds per task when participants searched using implicit task questions. These differences can obviously be quite considerable over an extended period of time. For example, according to the Nielson/Net Ratings (2003), the average home Internet user accesses 40 pages during a typical surf of the Web. Thus, the difference in time between these two menu arrangements would be 4.27 minutes for an average search.

Perceived Disorientation

Examining perceptions of search-related disorientation revealed a marginal main effect approaching significance [$F(2, 34) = 2.84, p = .072$], suggesting that the Horizontal menu layout was perceived as being the most disorientating of the three menu item layouts (see Table 1 below for means and standard deviations).

Perceived Ease of Navigation

Examining the perception that a specific menu layout was easier to navigate found no significant differences between the three layout conditions (see Table 1 below for means and standard deviations).

Perceived Frustration

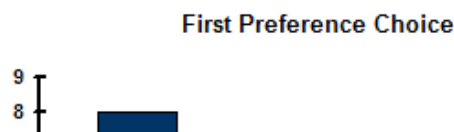
Examining the perceived frustration of the participants with regard to the use of a specific menu layout conditions found no significant differences between them (see Table 1 below for means and standard deviations).

Table 1. Impressions of Link Locations - Mean (S.D.) (1 = "Disagree" and 6 = "Agree")

Subjective Evaluation	Index	Horizontal	Vertical
Perceived Disorientation	2.50 (1.04)	3.89 (1.18)	2.11 (0.96)
Perceived Ease of Navigation	4.44 (1.20)	4.22 (1.40)	4.44 (1.20)
Perceived Frustration	2.38 (1.42)	2.50 (1.50)	2.39 (1.24)

Link Arrangement Preference

Analysis of the participants' preference for each menu layout revealed no significant differences in ranking. However, examining the number of times a participant chose a particular menu layout as a first preference choice did indicate that the Index layout was particularly favored over the other Horizontal menu item layout (see Figure 6).



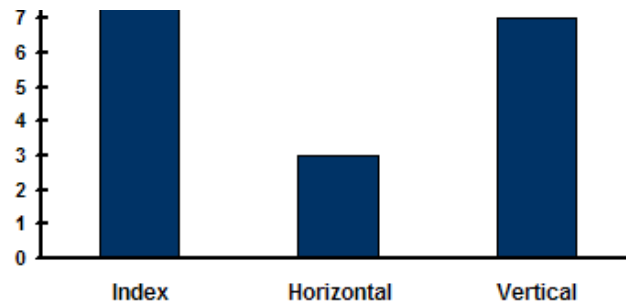


Figure 6. First preference choices of participants.

CONCLUSIONS

Several observations can be made from this study. First, significant search time differences between the three menu conditions were detected that strongly favored the Index menu layout. In addition to the reasons mentioned above, other possible reasons for this outcome could be that the menu items in the Index condition were simply closer together, thus resulting in faster menu selection times (Fitts, 1954). Another reason could be that the Index menus were centrally located on the screen, and thus were easier to see and acquire. This is bolstered by anecdotal comments supporting this notion. For example, participants stated that with the Index layout, "all of the subcategories are visible," and the menu was "located at the center of the screen, where [I] would typically look first." Moreover, participants selected the Index as their first preference choice more than the other two layouts.

The poorest performer, both objectively and subjectively, was the Horizontal layout. Participants in this condition took longer to find the task information, and they had the opinion, though non-significantly, that this layout was more disorientating than the other two layouts. It is possible that the distance this layout was from the center of the screen contributed to its poorer participant performance. In fact, one participant commented that this layout "was more difficult to see and reach than the others because of its height on the screen."

It is plausible that substantially deeper menu structures may produce different objective and subjective outcomes. Consequently, an up-coming study, which will be reported in a future edition of Usability News, will examine these menu layouts with deeper hierarchical levels.

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