

Navigation Configuration and Placement Influences the Visual Search Efficiency and Preference

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ABSTRACT

As the basic and ubiquitous elements of interfaces, navigation is used to search target information items. Many prior research has shown that how does the navigation placement influence users' visual search efficiency and preference, and owing to the format of navigation is hierarchical navigation in most of e-commerce websites today. So designers need to consider about the navigation configuration. To investigate the effects of navigation design on users' experience in e-commerce websites, we performed an experimental study to better understand what kind of two-level hierarchical menu layout users preferred, and two factors we controlled were configuration and placement. These data indicate that the manual placement could significantly influence users' preference. And the influence of configuration is significant with navigation placed on the top or left.

Keywords

Navigation placement and configuration, visual search, cognitive load, subjective preference

1. INTRODUCTION

Regardless of web pages, software and apps, navigation is a necessary and functional component of the interface. Especially in e-commerce websites, the navigation can help users find target items quickly.

At present, the hierarchical navigation with semantic group is widely used in all websites, especially in the e-commerce websites. It's important to design a hierarchical navigation that helps users locate items faster and improve subjective satisfactions[1]. Based upon previous research, menu position is one of the influential elements. According to scan path theory and competition-for-attention theory, those positions that meet browse behaviors are more competitive than other positions, because position and distance have impact on browse path [2]. Some studies, which conducted to English speaking users have shown that users expect navigation menus to be located on the left-hand side, which is the convention in Western language websites [3]. By now, there is not too much research about all the positions of navigation in an e-commerce website surroundings. For another thing, the process of users' behavior is to find the navigation in the page then target the item in the navigation when using navigation, so it comes to the problem about configuration. The configuration means the quantity of commodity items at two levels hierarchical menu, the first level X elements and the second level Y elements. We

suppose that configuration is another important element that influences users visual search efficiency besides position, and in this paper we take both of them into considerations. Based on the semantic structure of hierarchical navigation, we carried out an experimental study, which was conducted to compare the influence of four navigation positions (top/bottom/left/right) and three configuration (12×4/6×8/8×6) on search efficiency and user satisfactions (cognitive workload and subjective preference) for shopping experience according to questionnaires.

2. METHODS

We tested twenty-five participants (15 males, 10 females) in the User Experience Lab of Alibaba Company who are English native speakers with normal eyesight, and all participants are eighteen to thirty years old with rich Internet shopping experience. These participants came from the Europe and the South America with the habit reading from left to right. The experimental materials were twelve high fidelity prototypes of e-commerce promotional activity pages with different navigations that all could be clicked and extended. These materials followed the style of Aliexpress.com (see Figure 1). Expect the change of position and configuration, other visual elements of navigation kept consistent. To avoid the influence of gender preference, we chose the category of household supply as tested commodities. The commodity pictures in each page were randomly selected from a photo gallery we prepared. There were four different navigation positions (top/left/right/bottom) and three configurations (6×8/8×6/12×4), all of which include two level menus, the main commodity classification and the specific classification (see Figure 2). The reason why using these three configurations is based on the common navigations in e-commerce website and the total number of items in different configurations are the same.

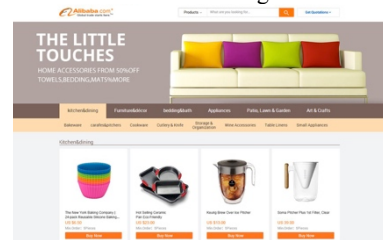


Figure 1. Experimental materials-Top position, 6×8

Participants were asked to search specific commodity items on the second level of navigation from these twelve pages showed on the screen as fast as possible. One example is that “suppose that you want to grow some flowers and green plants in the balcony, using the navigation to find garden tools”. Participants were requested to fill out the questionnaires about cognitive workload (three items with 7-point scale questionnaire from Perera and NASA-TLX) and subjective preference (four items questionnaire from Ajzen and Fishbein) after completing search task of each page.



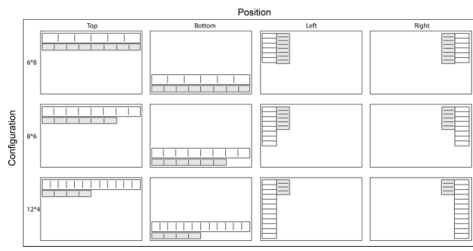


Figure 2. Illustration of each experimental condition

3. RESULTS

A two-way within-subject ANOVA were conducted with a significance level of 0.05 for judging the significance of effects. User performance was measured by the time of participants locate and select the target items. Figure 3a shows the search time data for each condition. There was a significant main effect of navigation position, $F(3, 69)=17.08, p<0.001, \eta_p^2=0.43$. And it can be seen in the figure that participants were faster at locating target items in top menus of navigation ($M=10.01s, SD=3.05$) than both left menus ($M=11.21s, SD=4.65$), right menus ($M=13.00s, SD=4.56$) and bottom menus ($M=14.76s, SD=4.09$); There was not a significant main effect of navigation configuration, $F(2, 46)=3.19, p=0.05, \eta_p^2=0.12$; There was also not a significant two-way interaction between position and configuration, $F(6, 138)=0.47, p=0.83, \eta_p^2=0.02$.

The primary measure of user subjective perceptions was subjective preference. There was a significant main effect of navigation position, $F(3, 63)=30.41, p<0.001, \eta_p^2=0.59$, where top menus ($M=22.49, SD=5.16$) and left menus ($M=20.67, SD=4.91$) resulted in more preferable than both right menus ($M=15.29, SD=6.58$) and bottom menus ($M=12.82, SD=5.52$) (see Figure 3b); There was a significant main effect of navigation configurations, $F(2, 42)=3.49, p=0.04, \eta_p^2=0.14$, that the score of user subjective preference was higher for 8x6($18.91, SD=5.13$) than for 6x8($17.36, SD=5.79$) and 12x4($M=17.17, SD=5.71$) locations; The two-way interaction effect between position and configuration was also meaningful, $F(6, 126)=2.25, p=0.04, \eta_p^2=0.09$. The score of 8x6 top navigation is the highest ($M=24.68, SD=4.24$), and the lowest is 12x4bottom navigation ($M=12.27, SD=5.04$), which were suggested through the simple effect analysis. Another measure of user subjective perceptions was cognitive workload. According to Pearson correlation, we found that there is negative correlation between cognitive workload and subjective preference ($r = -0.816, p<0.01$).

4. CONCLUSION&DISCUSSION

Based upon the results, we found that the position influences user performance and subjective perceptions obviously. In addition, we found that the configuration has no effect on searching time, but users acknowledged that configuration does play a distinct role on their subjective perceptions (subjective preference and cognitive workload).

The search efficiency of top position and left position was higher than right position and bottom position, which was same as the users' preference. The result fit in previous researches and scans path theory. Besides. Users obviously preferred the configuration of 8x6 than 12x4 because they considered that the configuration of 8x6 brought them low cognitive workload. And this conclusion was corresponding with 7±2 rule. While commodity items in the first level of 12x4 were too many that users could not bear the

burden of cognition when they were searching. Furthermore, there was an interaction between configuration and placement. Only in the case of top and left position, configuration has an obvious impact on satisfactions. When the navigation was on the top, users preferred 8x6 configuration than 12x4 significantly. For left, users preferred 8x6 configuration than 6x8. And when navigation was in the right or bottom, which were difficult to browse, the influence of configuration was weak. Finally, the time that participants complete the search tasks with 8x6 top navigation was the shortest, and next were 6x8 top, 8x6 left navigation while the using time of 12x4 bottom navigation was the longest and 6x8 bottom navigation followed. All of these results can be referred for the designers when designing navigations.

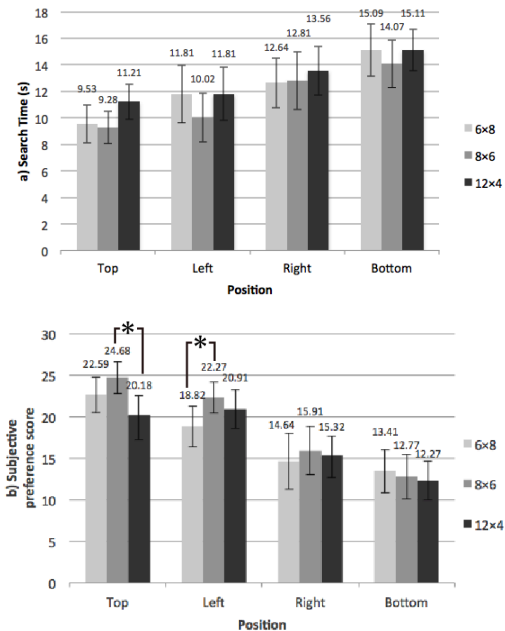


Figure 3. a) Mean search time data for each condition b) Mean subjective preference score for each condition * $p < .05$

5. ACKNOWLEDGMENT

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