A Study of How List Format Influences the Visual Search Performance

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ABSTRACT

Previous research has shown that format design has an impact on the usability of listing pages. This study investigated the effects of specific list presentation format on visual search performance and subjective satisfaction in e-commerce listing pages. At first, we found seven important commodity features for consumers through pre-study. Then, an eye tracking study was conducted to record the visual search for target items and cognitive workload based on three different list formats (Vertical Format/T Format/Block format) in e-commerce websites. The results suggested that list format could significantly influence the visual search performance and satisfaction. The efficiency of Vertical format and T format is higher than block format. Designers could get some valid references from this result when they are designing listing pages.

Keywords

Listing pages, List format, Cognitive load, User satisfaction, Visual search

1. INTRODUCTION

The Listing page appeared in the early websites and has been widely adopted today. Almost every e-commerce website has listing pages. The design of listing page formats can influence both on consumers' satisfaction and visual searching performance [1]. There are two main formats, matrix and list format, which have been applied to e-commerce websites listing page broadly (see Figure 1). Most of previous research has concentrated on the question that how these two formats impact on user search performance, and some research found that list format helps users locating commodity information faster than matrix format[2] The specific design of the list presentation format, especially the organizational style of commodity information items in the row from each block have been seldom investigated. Li Chen did a study that similar recommendations of list format are presented in a category structure and the organization-based interface can significantly attract users' attentions.[3]

The list format consists of a table with one product per row. Columns may serve as separators for different kinds of features such as image, name, price, and etc. We supposed different presentation format in a row, which gathered information together into some blocks visually, would influence browsing path. In this paper, we investigated the effects of list presentation format of each row in e-commerce listing pages on visual search performance and satisfaction. The pre-study was a sorting task which provided some evidence that commodity features are more useful for users, and the main study materials are based on this

result. Then, an eye tracking study was conducted to record the visual search performance for target items and cognitive workload based on three different list formats (Vertical / T / Block format) and two different shopping tasks (hard / easy) in e-commerce websites. The aim of search task was to find out what kind of list presentation format could increase the task-performing efficiency.
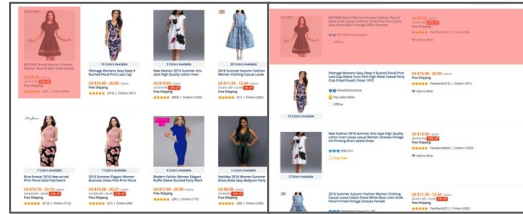

Figure 1. Left-matrix format, Right-list format

2. SORTING SESSION

The aim of pre-study was to provide some evidence about the most useful commodity features when shopping online. 25 people completed the test; and most of them were overseas students and employees of IT (12 males and 13 females, 18-30 years old). All of them were native English speakers with normal vision and rich Internet shopping experience. Participants were asked to pick out what they thought were necessary from 9 information feature cards (product name, price, information of seller, shipping fee, discount, rating and orders, inventory, add to wish list and share). And then, we ranked what they had already picked out in the order of importance. It showed that product name, price and discount were the most concerning features, rating and orders, shipping fee, information of seller, add to wish list were followed. This suggested that these seven features might be viewed for most of times by users, and should be designed into the features of materials for searching test.

3. SEARCHING SESSION

We tested twenty-eight participants (18 males and 10 females, 20-26 years old) in the User Experience Lab of Alibaba Company who were English native speakers with normal eyesight and rich Internet shopping experience. And they were not the same participants in sorting session. According to mainstream e-commerce websites and the results of sorting test, we designed three list presentation formats: (1) Vertical format, (2) T format, (3) Block format (see figure2). Each listing page had eight item floors and the descriptive information of each item had been shown in 775x200 pixel block. Each participant needed to complete three simple search tasks and three hard tasks in 6 pages, and we prepared two sets of webpages. 14 participants were assigned to use the first set of pages randomly, and the other used the second set. The commodity information was different in these 12 pages, and the target items were put in different floors in case of learning effect. In the simple task, participants needed to find the target items, which complied with two requirements (e.g., "Find a high-heeled shoes which cost no more than 30"). In the

hard task, participants needed to find the items, which complied with three requirements (e.g., "Find a sandal shoes which cost no more than 30 and the feedback is more than 4 stars."). They needed to complete one subjective questionnaire after finishing each task. The eye-tracker was used to record the search time and fixation counts from participants' （correlation cognitive load）.
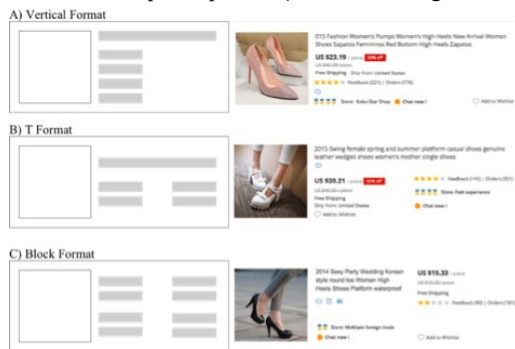

Figure 2. Three list formats: A. Vertical B. 'T' C. Block

4. RESULTS

We used a mixed ANOVA with significance level of .05 to analyze these data. Three participants did not select the targets correctly, so we excluded their data from the analysis. The search time was the primary measure to our test. A two-way within-subject analysis of variance (ANOVA) 3(format: Vertical format vs. T format vs. Block format) × 2(task: easy vs. difficult) was conducted to evaluate the effects of task complexity and list format design on search time. There was a significant main effect of the independent variable list information format, $(F\ (2,\ 50) = 8.185,\ p = 0.001,\ \eta^2_P = 0.247)$. And there was an unobvious interaction between these two factors, $(F\ (2,\ 50) = 3.337,\ p = 0.055,\ \eta^2_P = 0.118)$. It showed that the time that participants took was the slowest at selecting targets in the Block format (M=15.16, SD=0.848) than T format (M=11.99, SD=0.38) and Vertical format (M=11.94, SD=0.53). (See Figure 3)
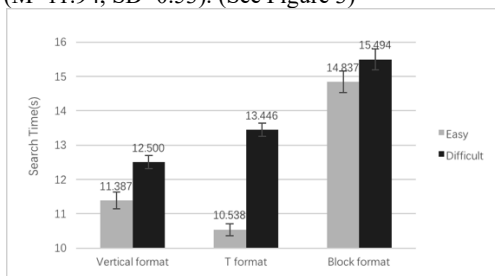

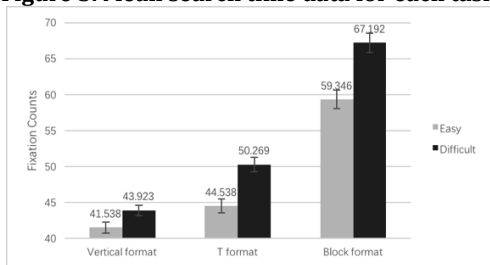**Figure 3. Mean search time data for each task**

Figure 4. Mean fixation counts data for each task

Eye movement data could help us understand the effects on cognitive load among three designs. The fixation counts also showed the similar results: There was a significant main effect of information format, $(F\ (2,\ 50) = 12.246,\ p < 0.001,\ \eta^2_P = 0.329)$,

the main effect of task complexity was also meaningful, $(F\ (1,\ 25) = 815.923,\ p = 0.001,\ \eta^2_P = 0.970)$. The fixation counts of Block format (M=63.27, SD=3.64) were more than T format (M=47.40, SD=2.84) and Vertical format (M=42.73, SD=2.12) significantly (See Figure 4). From plots of the eye movement, we can intuitively compare users' cognitive loads in different formats. The eye movement in Vertical format was the smoothest one, then comes T format, and finally Block format (See Figure 5).
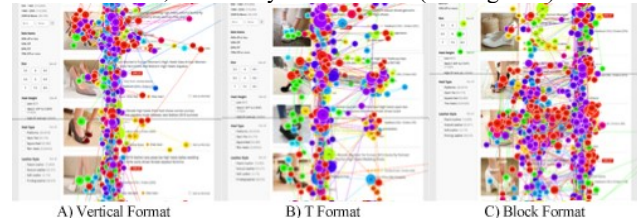

Figure 5. Eye movement in easy tasks

The results of 7-point scale satisfaction questionnaire also showed the similar trend. The result from the questionnaire of suitable for browsing ' showed that Vertical format (M=5.29, SD=0.4) was the most suitable for browsing rather than T format (M=4.87, SD=0.36) and Block format (M=4.68, SD=0.38). The result of the question 'logic of product information clearly' showed that participants thought Vertical format (M=5.26, SD=0.39) and T format (M=5.12, SD=0.35) were more logical than Block format (M=4.81, SD=0.67).

5. DISCUSSION

The search efficiency of Vertical format and T format was higher than Block format in either easy or difficult task mode. And there was a negative correlation between cognitive load and search efficiency. Participants' subjective satisfactions also showed that users might have preference for these two formats, especially the Vertical format. Based on the results, we found that the information list in Vertical format and T format could make users easier to browse and get the information efficiently. The result fit in previous research. In the Block format, information was separated in too many blocks, which brings workload for users' browsing and searching activities.

6. ACKNOWLEDGMENT

7. REFERENCES

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