Exploring Offline Browsing Patterns to Enhance the Online Environment

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Abstract. In the early stage of e-commerce website design, the products for sale were displayed in lists or tables. As the number of products has increased, multiple tools have been introduced to help buyers find their targets, including sorting, searching, tags, and colour collections. However, this type of design does not provide much help for users without clear targets. In this study, we obtained insights from traditional shopping experiences by tracking real customers' in-store behaviour. Based on these observational results, we tested whether in-store behaviour can be adapted to the online-shopping experience.

Keywords: In-store Behaviour, Shelf Display, Web Design, E-Commerce.

1 Introduction

Early e-commerce websites were implemented with web designs similar to list-like catalogs, which were intended to help buyers (usually skilled internet users) to conveniently locate their targets. However, as online retailing has developed dramatically during the past decade, this approach may no longer be satisfactory for website users. For example, the users of Taobao.com have complained with increasing frequency about the difficulty of discovering favourable products. On the one hand, the number of products for sale has increased substantially, increasing the users' difficulty in finding and choosing products. On the other hand, more consumers who lack specific shopping targets now shop online. Those users are looking not for specific products but rather to browse for entertainment. Thus, list-like page layouts face a new challenge. The most important challenge for online retailers is no longer to present abundant, well-sorted products but to entice consumers to browse and make purchases.

Today, online retailers interact with their buyers in many ways. Basic tools such as sorting, searching, and filters are widely used on e-commerce sites. In addition to these traditional "database-thinking" tools, more helpful practices have recently emerged, providing such tools as size, price, colour, and style selectors to help consumers locate their targets (e.g., IKEA.com, Amazon.com).

However, researchers have so far ignored consumers' in-store experience. When they lack clear targets, consumers do not "list shop" in real stores. Compared to in-store shopping displays, online shopping displays are much plainer in terms of their diversity and interactivity. This experience gap makes online shopping less enjoyable

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for browsing users on e-commerce websites. As the shopping experience becomes crucial for online businesses, it is meaningful to study how to improve the online-shopping experience.

The goal of the current study is to explore the differences and similarities between online and in-store displays. By analysing consumers' shopping behaviour in real stores, we attempt to determine how different displays influence consumers' behaviour. We then test the resulting display strategy online to see whether it yields similar results in terms of users' behaviour.

2 Literature Review

Early e-commerce websites were implemented with web designs similar to list-like catalogs, which were intended to help buyers (usually skilled internet users) conveniently locate their targets. However, researchers have found that consumers' in-store information processing is more bottom-up than top-down in nature. In most cases, consumers make purchasing decisions after seeing products on shelves. [1]

Marketing professionals have performed considerable research on store design. These researchers have established multiple models to manage the limited space in stores. Some studies have focused on the relationship between space management and sales, including McKinsey [3]. Other studies have focused on the influence of displays on consumer behaviour. Yin and Tang have noted that stores' displays influence consumers' pricing strategies. [5] In retail practice, display guidelines are usually provided for branding or sales purposes.

However, limited research has been performed on online displays. Kotler has noted that the online experience is an essential factor influencing online consumer behaviour [2]. In an empirical study of online bookstores, Liang and Lai have examined the influence of store design on consumer purchases [4]. Here, we attempt to explore possible online display formats by comparing the offline- and online-shopping experiences.

3 In-store Behaviour

A large proportion of Taobao.com users were born before the 1990s and were previously traditional offline consumers before their first online order. Therefore, we began our research by observing consumers' offline shopping behaviour.

3.1 Observational Methodology

Location Selection. To minimise the influence of the product category, we focused only on women's shoes. We selected two popular brands, ST&SAT and Exull, which are frequently purchased by young female consumers in the Chinese market. For each brand, we selected a typical retail store near the city centre for observation.

Eye-Tracking Technology. We employed eye-tracking technology to record customers' in-store browsing behaviour. Because we planned to observe consumers' behaviour in real stores, we used mobile eye-tracking glasses for these observations. When the participants wore the glasses, their eye movements were fully recorded. The equipment caused little interference with the consumers' normal browsing process in the store.

3.2 Observations

In each store, five customers were invited to browse the shelves as they usually would while wear a pair of eye-tracking glasses that we had prepared. Before we began the observation, the eye-tracking glasses were calibrated. After this calibration, the participants were treated as ordinary customers, and they were free to choose and try on shoes if they desired to do so. To encourage serious decision making, we asked the participants to choose one or two pairs of shoes from the store.

3.3 Findings

From the sales staff in the stores, we learned that there were two different types of displays. One type was for clearance items, while the other type was for new arrivals and hot sales. In the clearance zone, products were usually sorted by price or colour and were displayed on the shelves in high density. For the new arrivals and hot sales, products were sorted by categories or themes and were arranged into small groups in a comparatively open manner. Posters, models, and sometimes other accessories, such as bags, were included to enhance the themes. The shelf displays were usually deliberately designed by marketing professionals or experienced salespersons at the headquarters of the brands. To help the sales staff in the stores display the products in exactly the desired manner, the headquarters provided specifications or guides. It is reasonable to believe that these shelf-display designs had been researched and tested for optimal profit and branding purposes.

Fig. 1. Clearance Displays

Fig. 2. Promotional Displays

In total, ten participants' eye-tracking data were collected during the observational study. The participants were all female and ranged from 20 to 50 years old. By analysing the participants' eye-tracking records, we found that the participants' eye-movement patterns differed when browsing clearance zones and promotional zones.

When browsing clearance zones, the participants' eye movements showed a simple, linear pattern. Similar to the eye-movement pattern used when reading a book, the participants started at one end of the shelf and moved their fixation points toward the other end. Depending on the length of the shelf, they might switch between levels several times. In general, however, their fixation points moved consistently forward, with little repetition. We also observed frequent skipping between fixation points. As when reading paragraphs on a page, the participants did not focus on every unit on a shelf. Rather, they moved their fixation points forward by three or four units. Thus, many units between fixation points were not fully noticed.

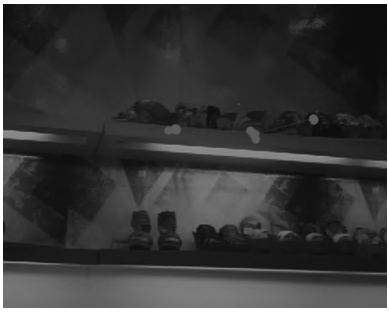

Fig. 3. Typical Clearance-Zone Eye Movements

The eye-movement patterns were quite different and more complex in promotional zones. Unlike in clearance zones, the participants seemed to unconsciously group several units into sections. Their eye-movements frequently included small saccades and dense fixations within certain areas, and these sections were connected by long-distance saccades. The sections usually corresponded to the deliberately designed product arrangements on the shelves. Within each section, many short, repeated saccades appeared. These movements did not show obvious patterns. The participants' fixation points moved rapidly and without a clear direction between different areas within each section.

After finishing a certain section, the participants moved to another adjacent section. However, the direction of these long-distance saccades between sections was apparently random, in contrast to the forward movement observed in clearance zones.

Fig. 4. Typical Promotional-Zone Eye Movements

Comparing the participants' eye-movement patterns in the two different display types, we concluded that consumers' in-store browsing behaviours are influenced by shelf displays. On shelves where products are displayed in high density, consumers scan the products with frequent skips. For carefully organised displays of product mixes, consumers tend to treat the product mixes as independent units and browse through adjacent units.

4 Online Experiment

Our observations provided insight about consumers' browsing behaviours in offline stores. Because shelf displays have been extensively studied in traditional retail, we sought to learn whether these offline behaviours could be adapted in the online environment. If so, we could learn more from the highly developed offline retail industry to provide a better online-shopping experience.

4.1 Experimental Design

To determine whether similar consumer behaviour occurs online, we designed a simulated experiment in the online environment. For comparison with our offline observations, we again focused on women's shoes.

Based on the conclusions obtained from the retail stores, we designed two web pages for the experiment. Page A contained 42 shoes. As on the standard search-result pages of Taobao.com, these 42 shoes were not clustered but were arbitrarily listed in neat rows. Detailed product information was also provided. Page B presented the same 42 shoes. However, the 42 shoes were grouped into 7 sections. Each section had a unique theme, which was shown at the top of the section. Models and other elements were added to some of the sections to enhance these themes.

Fig. 5. Page A & Page B Designed for the Experiment

To study the users' online behaviours on these pages, we again used eye-tracking technology to follow their eye movements on the screen.

4.2 Experiment

We invited seven female users to participate in the experiment. Four of the participants bought their shoes mainly in retail stores, while the other three mainly purchased shoes online. Each participant was first asked to browse Page A, which was similar to the search-result pages found on most current e-commerce sites. After a short break, the participants were asked to browse Page B. Each participant's eye movements were recorded while browsing.

4.3 Results

The eye movements on Page A showed a typical pattern for search-result pages. The participants began at the top-left corner of the page and moved their fixation points down row by row. The route of eye movement was invariably from top to bottom. Hardly any participants looked back to a previously scanned row until reaching the bottom of the page.

Fig. 6. Typical Page A Eye Movements

Fig. 7. Typical Skipping on Page A

The fixation points were not equally shared by every pair of shoes. As the participants moved to the lower rows, some shoes did not receive any fixation points. As in the

offline stores, the participants skipped some shoes near those they had just viewed. As long as they stopped at some point within each row, the participants continued to browse the next row from either the leftmost item or the item below the last one they had viewed in the previous row. The skipped products rarely had another chance to be seen.

The participants' eye movements on Page B were quite different and conformed to the designated sections. The participants viewed the sections in a top-down sequence. Each section contained numerous fixation points connected by relatively short saccades, while long-distance saccades appeared only between sections. Not all of the participants noticed the title we had created for each section, but all of the participants browsed the sections as independent units.

Fig. 8. Typical Page B Eye Movements

Within each section, the fixation points were located mainly on the pictures, including the models. However, the sequence of the fixation points showed few predictable trends. Within each section, the participants were usually attracted first to the product placed in the middle. Short saccades frequently appeared between the details of these shoes. Subsequently, the participants did not follow any particular pattern as they shifted their fixation points across the shoes. They often returned to look at shoes they had just viewed; we observed many repeated saccades among shoes within the same section.

Fig. 9. Typical Within-Section Eye Movements on Page B

The users' online browsing behaviours showed many similarities to our observations of consumers' in-store browsing behaviours. When browsing densely and arbitrarily displayed products, the consumers showed simple, linear eye-movement patterns both in the stores and on the web pages. As a result, some products were unconsciously skipped and not seen again by the consumers. When the products were grouped into themes, the consumers browsed by sections rather than scanning across every few units. Thus, the consumers seemed to concentrate within certain areas to examine the details of the products that interested them. Additionally, the consumers had more opportunities to return to products that they had previously viewed, for comparison or for other purposes. Particularly in the online environment, the boundaries between sections could be made even stronger.

5 Discussion

Traditional retailers design different display strategies for clearance products and for products that they want to promote. Furthermore, consumers' browsing behaviours are influenced by shelf displays. On most current e-commerce websites, however, the web designers have not provided alternative ways for their users to browse as they do in real stores. Most of their products are listed in the traditional way, with differently sized pictures and other information. In reality, users are not strongly engaged while browsing this type of design but tend to skip over every several items. This pattern is more like scanning than browsing.

Admittedly, traditional online displays have certain advantages for sorting and comparing and for presenting more information. However, the emerging trend is for online shopping to be a leisure activity rather than a task. An increasing number of users visit e-commerce websites for entertainment, without specific shopping targets.

These users' browsing behaviours are more passive, and traditional ideas such as sorting and categorising are less helpful for them. Designing browsing-friendly web pages could improve the shopping experience for these users. Because the proportion of these users is growing, this approach is also meaningful in business terms.

6 Limitations and Further Study

In this study, we explored consumers' in-store shopping behaviours and the feasibility of designing new display types for the online-shopping experience. This research was based on qualitative observations. Therefore, further quantitative studies are necessary. Moreover, the retail sector is highly complex. This study focused only on women's shoes, and adapting the approach used here beyond this product category may be risky. Whether our results can be successfully adapted to other categories remains unknown.

The traditional retail industry has accumulated considerable knowledge about consumers, providing an excellent resource for online businesses to better understand their users' behaviour.

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