How does interaction design affect user experience through online shopping interfaces?

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Abstract. Since the birth of eBay, the world’s first online shopping platform in 1995, there have been more and more shopping websites. The interfaces of online shopping websites have also changed dramatically. And user experience of online shopping is influenced by interaction design factors of the web interfaces. Thus, this article discusses how interactive design affects people’s shopping experience through online shopping interfaces. Rosenzweig (2015) points out being easy to use and effectiveness are two important principles in user experience design. Therefore, the purpose of this article is to illustrate how different interactive design factors affect users’ shopping experience by analyzing the usability and efficiency of the examples of eBay’s and Amazon’s interfaces. The analysis of the two online shopping interfaces indicates that user experience is influenced by the feedback and Fitts’ law factor in terms of usability. Besides, it is affected by the navigation and time factor based on efficiency. According to the research of this article, designers can optimize people’s shopping experience by improving the usability and efficiency of websites in interface design.

1. Introduction
With the widespread application of e-commerce websites, a growing number of people choose online shopping. Ranganathan and Ganapathy (2002) suggest that good interface design is the key factor to meet the needs of consumers and enterprises to survive in competitive online sales. In addition, Kurniawan (2003) contends that interaction design should focus on the interaction between people and products, taking into account users’ backgrounds, experiences, and feelings during the operation. Therefore, user experience is critical in interaction design. Moreover, Flavían and Gurrea (2008) propose that an attractive design can evoke feelings of pleasure in the use of a website. This means a well-designed shopping website will not only provide users with a quick and convenient way of shopping but also make people enjoy this convenient purchase. Upon all these points, there is the main research question. ------How does interaction design affect user experience through online shopping interfaces? Meanwhile, Kolko and Connors (2010) add that usability and effectiveness are of great importance in interactive design. As a result, user experience in the online shopping interface is closely related to interaction design. For this reason, there are three sub-questions in this report

------How does interactive design affect people’s shopping experience in terms of the efficiency of shopping interfaces?

------How does interactive design affect people’s shopping experience in terms of the usability of shopping interfaces?

------What shortcomings in the interface can be improved to make people’s user experience friendlier?
Based on the three questions, this article analyzes the effectiveness and usability of different elements in the interface design of shopping websites to explain how different interactive design factors affect shopping experience and makes recommendations for interface improvement through the analysis and comparison of different forms of similar functional interfaces of different websites.

2. Material and Methods

2.1. Venn Diagram

2.1.1. Online Shopping Interface. The online shopping interface is a display platform that allows consumers to use a shopping search engine to find products of interest and buy goods directly from sellers over the Internet. Customers can use a variety of electronic devices to access the platform, such as desktop computers, laptops, tablets, and smartphones.

2.1.2. Interaction Design. Interactive design is a field of design in which people interact with products and services to achieve a common purpose. Its core is to focus on user needs and then meet them.

2.1.3. User Experience. User experience is a kind of subjective feeling that the user builds up in the process of using the product. User experience occurs in every step of the operation when users use an online shopping app. Therefore, a good user experience is crucial to selling goods online.

2.1.4. Relationships among Interface, Interaction Design and User Experience. When a user opens an online shopping website, there is interaction in every step of the operation. As a result, the interface of an e-commerce website is more interactive than other web pages. For this reason, interactivity is an important factor to be considered in the interface design of online shopping websites. Whether consumers are attracted to the interface for the first time, and whether consumers can first find the product they need, these user experiences are all about interactive design. The intersection of the interface, interaction design and user experience in the Venn diagram is usability and efficiency, which means that these two principles can affect the three parts simultaneously. Thus, usability and efficiency are the central focus area of this report.
2.2. Literature review

2.2.1. Influence of Navigation on Efficiency. Simple navigation is essential in the online shopping interface. According to Cooper et al (2000), the definition of navigation is a feature that can help users understand a new interface or help them to locate objects in the system. Moreover, they propose that the poorly designed navigation presents the most common problems in interactive design and difficult navigation is a major frustration to the user experience. Meanwhile, Kurniawan and Panayiotis (2007) give a new explanation of the concept of navigation: Web interface navigation is similar to spatial navigation. The navigation bar across the top of a website which points to the top-level categories of the ontology is called global navigation, which is equivalent to a map used in space navigation. Sub categories under global navigation are called local navigation, which is equivalent to the landmarks of every place on the map. Good web navigation can help users reach their destinations effectively. Furthermore, the authors point out a good design principle to improve the efficiency of users is that each page should have the global navigation bar at the same location so that users can easily jump back to the home page and maintain a certain operational memory.

2.2.2. Influence of Time Factors on Efficiency. In terms of interface efficiency, another factor that affects people’s shopping experience is the time. Middlebrooks, Murayama, and Castel (2016) propose that people’s memory and attention are limited, and short-term memory information loss will bring psychological frustration to users. Therefore, complex interface elements and too many operations will not only affect the speed of page loading but also affect people’s shopping experience. Furthermore, Schneider and Anderson’s study (citing Hick’s Law from 1952) suggests that the response time of users making decisions is positively correlated with the number of options. This means the more options the user faces, the longer response time is required. Consequently, the application of Hick’s Law helps designers improve users’ efficiency and users will spend less time on their choices. When the user is given fewer choices in the design, the user’s decision time cost will be lower. Shortening the user’s selection time is a solution to improving the efficiency of the interface; however, it does not mean that the shorter time for the system is better. Kolko and Connors (2011) argue that an interface that changes information too quickly can cause information loss, which means the user may forget the information that has just appeared. For this reason, the designer must evaluate the time read of the interface and keep the user’s operating time within a reasonable range.

2.2.3. Influence of Fitts’ Law on Usability. The usability of an interactive design interface also affects people’s user experience, and Fitts’ law is widely used in design. Fitt (1954) proposes that the time required to rapidly move to a target area is a function of the ratio between the distance to the target and the width of the target. This law has developed into a human movement prediction model that is mainly used in human-computer interaction and ergonomics. Mackenzie (1992) adds that Fitts’ law is also applicable to the interaction interface. In Fitts’ law, the location time of the mouse cursor is determined by the distance from the cursor’s position to the object and the size or width of the object’s area. That is, positioning time is a function of cursor moving distance and object area. The closer the cursor is to the object or the larger the object area is, the shorter the positioning time is. Therefore, the result of the user’s operation time is often different in the interaction interface. The larger the clickable button area within a reasonable range is, the easier it is to click, while the smaller the clickable area is, the less easy it is to operate. Furthermore, the findings from a study conducted by Meguffin and Balakrishnan (2005) indicate that target expansion contributes to selection, even if the user has moved 90% distance to the target. It can be argued that this is the reason why the size of the option button increases when the mouse moves to a certain area on many shopping sites. Consequently, making full use of Fitts law in web design can reduce the user’s operation burden and improve the user’s shopping experience.
2.2.4. Influence of Feedback on Usability. Another aspect of usability is reflected in the feedback of interaction design. Eick (1995) argues that interactive visualization tools (such as animation) can create better matches between tasks and decision environments, improving the quality of information and reducing the amount of work required. Moreover, Rogers, Preece and Sharp (2011) claim that feedback on progress is one of the key elements of flow and does not prevent users from the normal flow of activities and interaction. Feedback must be easy to see and understand without obscuring or interfering with the user’s actions. Nevertheless, there is little evidence that all feedback on the interactive design page is desirable. Cooper et al (2000) suggest that when an error occurs, the sound generated by the interface is called negative acoustic feedback, and negative auditory feedback should be avoided in the design of the interface, because the sound is a public statement of users’ operation failures.

2.3. Mind Map

![Mind map](image)

Figure 2. Mind map

3. Results

3.1. Design precedents
As the world’s first online shopping platform, ebay’s interface has changed dramatically in more than 20 years. In fact, the original interface has been able to meet people's shopping needs, but its interface is still continuously improved to optimize people's user experience.
3.2. Case studies

3.2.1. Comparative Analysis of Registration Interfaces between eBay and Amazon. When customers first log in to the two sites as new users, they need to create an account first. By comparison, it is found that the user only needs to select “create an account” from the login and create account options in the Amazon interface, while the user needs to distinguish the button of “create an account” from four similar buttons and then proceed with creating an account in the eBay interface. According to Hick’s Law, the more choices the system provides, the longer time it takes for the user to make a choice. Such interface settings not only prolong the user’s operating time but also affect user experience in terms of the efficiency of the web interface.
3.2.2. Comparative Analysis of Navigation between eBay and Amazon. Navigation performance is also different on the two websites. In the eBay interface, the user can find the categories option in the main interface effortlessly, while in the Amazon interface, users need to click on the left folded navigation bar and select items according to different categories. This means that if the user wants to find the kind of product he needs, he needs an additional step. Besides, the navigation bar under eBay’s every interface allows customers to return to any page interface rapidly. By contrast, the user needs additional option to jump to another page in the Amazon interface. Consequently, the simple operation of eBay can greatly improve the efficiency of user operations, make the operation process smoother, and optimize users’ shopping experience. Whereas, Amazon’s customers must spend more time locating and looking for goods. Thus, the navigation bar is a critical part of the interactive interface.
Figure 5. Navigation for eBay and Amazon
3.2.3. Comparative Analysis of Sign-in Interfaces between eBay and Amazon. The login buttons for the two interfaces are significantly diverse. In the Amazon interface, the login button is most prominent in the main interface, and the orange button background gives users a larger area to click on. However, in the eBay interface, the login button is at the top of the interface, and the clickable area is just a small arrow. According to Fitt’s law, the larger the button is, the easier it is for the user to click and the less time it takes. Therefore, the login button in the Amazon interface is of higher usability, and the user spends less time to complete an operation and has a superior user experience compared with eBay.

![Sign-in interfaces for eBay and Amazon](image)

3.2.4. Comparative Analysis of Feedback between eBay and Amazon. Both sites give positive feedback when customers add items to the shopping cart. In the Amazon interface, in addition to a text hint, there is addition vibration that reminds users of adding commodities successfully, and the top right shopping cart also appears in the number of new items added to the shopping cart. In terms of eBay, a new interface for adding commodities to shopping carts appears, and a hint for adding quantities appears on the shopping cart at the upper right side. Rich visual feedback in the two interfaces gives users the most objective and direct experience suggestions through the guidance of the text and clearly presents the status and effect of these manipulations to users.
4. Design methods

4.1. Web analytics
Hanington and Martin (2012) argue that web analytics is a gateway for your organization to become deeply invested in what your customers are doing online. In website analysis, a large number of data must be collected, such as the number of visits to the site, the click rate of different items, the time customers stay at different interfaces, and the probability of the customer’s second repurchase. The data of the analysis can help verify the research results clearly. Moreover, website usability tests can be carried out and the website can be optimized according to the data.

4.2. Usability testing
Hanington and Martin (2012) point out usability testing is an evaluative method that allows teams to observe an individual’s experience with a digital application as he or she walks through the steps of a given task. Through the previous data analysis, the prototype for usability testing can be improved. This process can further improve user experience by testing whether the improved interface is easy to operation for average users.
5. Conclusions
This article analyzes the influence of different interaction factors on the usability and efficiency of online shopping interfaces and points out that the design of navigation and the time factor are two main factors influencing the efficiency of an interface. In terms of effectiveness, the rational use of Fitts’ law and appropriate feedback can help users to simplify operations and improve the user experience. This article takes user experience as the leading direction for design and compare the interaction factors in eBay and Amazon interface. Interaction design connects consumers and Internet products closely, effectively increases the usability and efficiency of online shopping interfaces, and forms the most natural interaction between users and interface.

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