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User Behavior Analysis of Online Flight Booking Interfaces Based on Eye-Tracking Experiments: Evidence from Qunar App

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Abstract: *With the rapid development of online travel platforms, improving the usability of mobile flight booking interfaces has become increasingly important. This study investigates user behavior during the flight booking process based on an eye-tracking experiment. Taking the Qunar mobile application as the research object, a simulated flight booking task was conducted on 20 participants. Eye-tracking data and operation paths were collected to analyze users' behavioral characteristics during different stages. The results show that users mainly perform information searching and comparison behaviors during the browsing stage, frequently switching between flight lists, filtering functions, and flight details. During the booking stage, users mainly focus on information verification, including passenger information, discount information, additional services, and payment amounts. The comparison between operation paths and eye-tracking paths indicates that users often conduct visual confirmation before performing operations. Based on these findings, this study suggests optimizing flight information presentation and functional layout, as well as improving cost information transparency. The results provide practical implications for enhancing the usability and user experience of online travel platform interfaces.*

Keywords: *eye-tracking experiment; user behavior; online travel platform; flight booking interface; interface optimization*

1. Introduction

With the rapid development of mobile internet technology, online travel platforms have become an important channel for users to search travel information and complete booking services. Compared with traditional travel booking methods, mobile applications provide users with more convenient access to flight information, price comparison, and order processing. However, the increasing amount of information displayed on mobile interfaces also increases the difficulty of information search and decision-making.

Usability is an important factor in evaluating interactive systems. Nielsen [1] suggested that usability evaluation should focus on users' efficiency, satisfaction, and interaction experience. Norman [2] further emphasized that interface design should reduce users' cognitive burden and support effective interaction. The flight booking process is a typical information-intensive decision-making process. Users need to consider multiple factors, including flight schedules, ticket prices, airlines, baggage allowance, and additional services. During this process, users not only perform operational behaviors but also continuously search and evaluate visual information. Traditional usability evaluation methods mainly rely on questionnaires and subjective evaluations, which may not fully reflect users' real-time interaction behaviors. Eye-tracking technology provides an effective means for analyzing user behavior by recording users' visual attention and eye movement patterns [3][4]. Therefore, eye-tracking has been widely applied in interface usability evaluation and user experience research [5].

Based on this background, this study conducts an eye-tracking experiment on the Qunar mobile application to analyze users' behavioral characteristics during the flight booking process. By combining operation path analysis and eye-tracking path analysis, this study explores users' information searching, comparison, and confirmation behaviors, and provides suggestions for optimizing online travel platform interfaces.

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2. Literature Review

2.1. Eye-tracking Technology and User Behavior Research

Eye-tracking technology has been widely used in human-computer interaction and usability research because it can objectively capture users' visual attention and information processing behaviors during interaction [4].Previous studies have shown that eye movement indicators, such as fixation frequency, fixation duration, and visual paths, can reflect users' attention distribution and information search strategies [3]. Compared with traditional evaluation methods, eye-tracking experiments provide more direct evidence of users' interaction processes and have become an important approach for usability evaluation [5]. In addition, eye-tracking research has been applied to understand visual attention allocation and information processing during user interaction [6].By analyzing users' visual attention patterns, researchers can better understand how users obtain information and make decisions during interface interaction.

2.2. User Experience Research on Online Travel Platforms

Online travel platforms usually involve complex information structures because users need to compare multiple factors before making booking decisions. In flight booking scenarios, users often need to evaluate flight time, price, service information, and other travel-related factors. Pan et al. [7]analyzed user behavior on online travel agency websites and found that interface information organization plays an important role in users' information search and decision-making processes. In addition, eye-tracking studies in tourism have shown that visual behavior analysis can provide valuable insights into users' attention patterns and interaction characteristics on tourism-related platforms [8].

2.3 Research Gap

Although previous studies have explored usability evaluation and user behavior on online platforms, several limitations remain. Existing research mainly focuses on overall usability evaluation, while less attention has been paid to users' detailed interaction processes during mobile flight booking. Furthermore, users' visual attention and actual operation behaviors are sometimes inconsistent. Therefore, analyzing only one type of behavior may not fully explain users' decision-making processes. To address this gap, this study combines operation path analysis and eye-tracking analysis to investigate users' behavioral characteristics during different stages of the flight booking process. The study aims to provide a more comprehensive understanding of user interaction behaviors and offer practical suggestions for interface optimization.

3. User Behavior Analysis

3.1 Task Unit Division

To analyze users' interaction behaviors during the flight booking process, this study divides the interface into task units based on functional areas in the Qunar application. The booking process is divided into two stages: the browsing stage and the booking stage. The browsing stage includes flight search, filtering, sorting, and comparison, while the booking stage includes passenger information confirmation, additional services selection, and payment confirmation. According to interface functions, the browsing stage is further divided into the following task units, as shown in Table 1.

Table 1: Division of units at the two ticketing stages

Operating units	task unit name	Operating units	task unit name
B11	Flight list page	B17	"Book" button
B12	Top filtering condition area	B20	Passenger information display area
B13	"Filter" button	B21	Coupon selection area
B14	"Time Sorting" button	B22	Travel protection selection area
B15	"Price Sorting" button	B23	Payment amount confirmation page
B16	Flight detail page	B24	"Proceed to Payment" button

The transition frequency between different task units reflects users' operation behaviors, while the eye-tracking path reflects users' visual information acquisition process. By comparing operation paths and eye-tracking paths, users' information searching and decision-making behaviors can be further

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analyzed.

3.2 User Operation and Visual Behavior Analysis in the Browsing Stage

The browsing stage is a critical process in which users search, filter, and compare flight information. During this stage, users need to obtain relevant information from multiple interface areas and make decisions according to their travel requirements.

Table 2: Operation Paths and Eye-Tracking Paths During the Browsing Stage

Operation path	Frequency	Eye-tracking path	Frequency
B11→B16→B17	6	B11→B16→B17	18
B11→B13→B16→B17	5	B11→B18→B16→B17	9
B11→B12→B15→B16→B17	4	B11→B15→B11→B16	6
B11→B15→B16→B17	3	B16→B18→B16	6
B11→B12→B13→B16→B17	2	B17→B18→B17	5

As shown in Table 2, users' operation paths during the browsing stage are mainly concentrated between the flight list page (B11), filtering function area (B13), sorting function area (B15), and flight detail page (B16).

Among them, the path B11→B16→B17 appeared frequently, indicating that most users entered the flight list page first, then checked detailed flight information before proceeding to the booking stage. This behavior suggests that users do not make decisions directly based on the initial flight list but need to obtain more detailed information before confirming their choices. Meanwhile, the path B11→B13→B16→B17 also appeared frequently, indicating that some users actively used filtering functions to narrow down flight options. Since mobile flight booking interfaces usually contain a large amount of information, users need to apply filtering conditions such as departure time, price, and baggage allowance to reduce unnecessary information and improve decision-making efficiency.

In addition, some users used sorting functions during the browsing process. This indicated that users not only searched for available flights but also compared different options based on their preferences. Therefore, the browsing stage is not simply an information browsing process but involves information evaluation and decision-making. To further compare users' operation behaviors with their visual attention, Table 3 summarizes the differences between operation paths and eye-tracking paths during the browsing stage.

Table 3: Analysis of Operation Paths and Eye-Tracking Path Features during the Browsing Stage

Operation unit path	Operation frequency	Eye movement frequency	Frequency difference	Interface distance	Analysis category
B11→B16	21	18	3	5	High frequency and high distance
B16→B17	20	18	2	1	High-frequency paths
B11→B13	19	15	4	5	High frequency and high distance
B11→B15	8	6	2	4	Information comparison

The comparison between operation paths and eye-tracking paths shows that users' visual attention is generally consistent with their actual operations. For example, the B11→B16 path shows relatively high operation frequency and eye-tracking frequency, indicating that the flight list page and flight detail page are the key areas for users to obtain decision-related information. However, some areas attracted users' visual attention without generating immediate operations. This indicates that users usually conduct information observation and comparison before making actual selections. Users may repeatedly check important information such as flight prices, departure times, airline information, and baggage allowance to reduce uncertainty during decision-making.

Therefore, users' behaviors in the browsing stage mainly involve information searching, comparison, and selection. Although the current interface provides basic functions for flight searching, users still need to switch between different information areas to integrate relevant information. Therefore, optimizing key information presentation and improving the layout of filtering functions can reduce users' information search costs and improve interface usability.

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3.3 User Operation and Visual Behavior Analysis in the Booking Stage

After selecting a flight, users proceed to the booking stage. Compared with the browsing stage, users' behaviors in this stage shift from information searching and comparison to information confirmation and order verification. The main operations include passenger information confirmation, coupon selection, additional service selection, and payment confirmation. The overall operation paths and eye-tracking paths during the booking stage are summarized in Table 4.

Table 4: Operation Paths and Eye-Tracking Paths during the Booking Stage

Operation path	Frequency	Eye-tracking path	Frequency
B20→B22→B24	7	B20→B21→B22→B23→B24	16
B20→B21→B22→B24	5	B20→B22→B23→B24	10
B20→B22→B21→B24	4	B22→B23→B24	10
B20→B21→B24	2	B23→B24→B23	6
B20→B22→B23→B24	2	B24→B19→B20	5

As shown in Table 4, users' operation paths during the booking stage are mainly concentrated in the passenger information area (B20), coupon selection area (B21), travel protection selection area (B22), and payment confirmation area (B24).Among these paths, B20→B22→B24 appeared frequently, indicating that after entering the order confirmation page, users usually confirm passenger-related information and additional service information before proceeding to payment. Compared with the browsing stage, users' operation paths in the booking stage are more concentrated, which indicates that users have already completed flight selection and mainly focus on ensuring the accuracy of order information.

In addition, the frequent occurrence of the B20→B21 path indicates that the coupon section is an important information area during the booking process. Users not only pay attention to completing the booking task but also check whether discount information can effectively reduce the final payment amount. The path B22→B24 also shows that users usually evaluate additional services before payment. This suggests that users need to understand the relationship between optional services and the final cost before making the final decision.

To further analyze users' behavioral characteristics during the booking stage, Table 5 compares the operation frequency, eye-tracking frequency, and interface distance of key task-unit transitions.

Table 5: Analysis of Operation Paths and Eye-Tracking Path Features during the Booking Stage

Operation unit path	Operation frequency	Eye movement frequency	Frequency difference	Interface distance	Analysis category
B22→B24	20	10	10	4	High-frequency paths
B20→B22	15	5	10	4	High frequency and high distance
B20→B21	5	7	2	3	Visual focus on differences
B21→B22	6	6	0	3	Information confirmation
B24→B21	8	8	0	6	Return to confirm

The comparison between operation paths and eye-tracking paths further reveals users' information confirmation behaviors during the booking stage.

The results show that users' visual attention is mainly concentrated on passenger information, discount information, travel protection, and payment-related areas. Some paths show higher eye-tracking frequency than operation frequency, indicating that users pay attention to certain information areas even when they do not immediately perform clicking operations. For example, users may repeatedly view the coupon area and payment amount area before submitting the order. This indicates that discount information is not only a functional element but also an important factor influencing users' evaluation of the final purchase cost. Furthermore, some users return from the payment-related area to the discount or service area before completing payment. This returning behavior suggests that users perform additional verification before the final decision. Users are not only concerned with whether the booking process can be completed but also whether the price information is clear and reasonable.

Therefore, users' behaviors during the booking stage mainly represent information verification and cost evaluation processes. The current interface can support the basic booking process, but the connection between discounts, additional services, and final payment information can be further improved. By presenting cost-related information more clearly, users' repeated confirmation behaviors can be reduced

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and the overall booking experience can be improved.

4. Optimization Suggestions

Based on the analysis of users' operation paths and eye-tracking paths, this study identifies several behavioral characteristics during the flight booking process. The results indicate that users need to repeatedly search, compare, and confirm information during interaction with the Qunar application. Therefore, this study proposes optimization suggestions from the perspectives of interface information presentation and cost information display.

4.1 Optimizing Flight Information Presentation and Functional Layout

The results show that users frequently switch between flight lists, filtering functions, and flight detail pages during the browsing stage. This indicates that users need to obtain information from different interface areas before making flight decisions, which increases the complexity of information search. Therefore, the interface design of online flight booking platforms can be improved by optimizing the presentation of key flight information. Important decision-making factors, including flight time, ticket price, airline information, and baggage allowance, should be displayed more clearly on the flight list page to help users quickly compare different options. In addition, the layout of filtering and sorting functions can be further optimized. Frequently used functions should be placed in more visible positions, and commonly selected conditions can be integrated to reduce users' searching effort. By improving the accessibility of filtering functions and reducing unnecessary page switching, users can complete flight selection more efficiently.

4.2 Enhancing Cost Information Transparency

The analysis of the booking stage shows that users pay close attention to discount information, additional services, and final payment amounts before completing the order. The frequent switching between these areas indicates that users need to repeatedly verify whether the final cost matches their expectations. Therefore, online travel platforms should strengthen the presentation of cost-related information. The relationship between discounts, additional services, and the final payment amount should be displayed more clearly, allowing users to understand the composition of the total cost more easily. By improving the transparency of price information and integrating related cost information, users' repeated confirmation behaviors can be reduced. This can enhance users' confidence during the final booking decision and improve the overall user experience.

5. Conclusion

This study investigates user behavior during the mobile flight booking process based on an eye-tracking experiment. By combining operation path analysis and eye-tracking analysis, this study explores users' information searching and decision-making behaviors in different booking stages. The results indicate that users mainly conduct information search, filtering, and comparison during the browsing stage, while they focus on information confirmation during the booking stage. Users pay particular attention to flight information, discount information, additional services, and final payment amounts. The comparison between operation paths and eye-tracking paths further shows that users' visual attention and actual operations are not always consistent, as users often confirm information before making decisions. Based on the findings, this study proposes two optimization suggestions: improving flight information presentation and functional layout, and enhancing cost information transparency. These suggestions provide practical references for optimizing online travel platform interfaces and improving user experience. This study is limited by the relatively small sample size and the homogeneity of participant characteristics. Future research can include users with different backgrounds and combine additional behavioral data to further explore user interaction behaviors.

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