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Research on Subway Guide Information Design Strategy Based on HIP Model

Lian Liu, Qihan Guo and Xing Fang

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Lian LIU [1] [0009-0001-7845-0912] ,Qihan GUO [1] [0000-0001-9723-883X] and Xing FANG [1] [0009-0002-3164-3394]

[1] Wuhan University of Technology, Wuhan, 430070, Hubei, China
lncs@springer.com

Abstract. The purpose of this research is to explore how to optimize the subway information design from the perspective of information processing, in order to improve the efficiency and accuracy of information transmission, and improve the passenger-oriented experience.First of all, the problems in subway information design at this stage are analyzed through literature analysis and current situation research.Discuss the feasibility of cutting into the information processing model.Then the subway guide information processing model is constructed.On this basis, taking Wuhan Metro as an example, the effectiveness of current information design is evaluated qualitatively and quantitatively and pain points are determined, and the pain points of subway information design are classified and analyzed from the three levels of perception processing, memory storage, and decision-making execution.Three strategies are proposed: the design of the performance layer based on perception, the design of the structural layer based on memory, and the design of the behavioral layer with decision-making as the main line.Examining the subway information design from the perspective of information processing can not only improve the wayfinding experience of passengers, but also effectively improve the overall operating efficiency of the subway system.

Keywords: Information Design, Subway Guide Information, Human Information Processing Model, Interaction Design.

1 Introduction

With the acceleration of urbanization, the subway, as an important part of public transportation, plays an increasingly important role in alleviating urban traffic pressure and improving urban operating efficiency.However, the current subway guide information design has problems such as redundant information, unclear transmission, and confusing guide signs. Then how to transmit information more efficiently, reduce the cognitive load of passengers, and improve the efficiency of passengers' processing of information has become an urgent problem to be solved.

The clear concept of guided tours was first proposed by American architect Kevin Lynch [1].The particularity of subway information design is mainly manifested in two aspects: first, the particularity of subway space and scene itself.The subway space is

relatively enclosed, lacks reference objects and lacks natural light. In order to meet the challenges posed by the underground environment, the design of underground spaces needs to go beyond functional and aesthetic considerations [2].It is also necessary to use innovative solutions to reduce people's psychological and physical stress in order to reap a good underground experience journey [3].Second, as an important part of urban transportation, the subway mainly serves those mobile people who travel through the city.Due to the huge flow of people in the subway, the movement speed of passengers is fast, and the routes of travel are diverse, which makes passengers in the relatively closed subway environment may feel nervous, uncomfortable or oppressive.

2 Construction of Information Processing Model Based on Subway Guidance

The Human Model of Information Processing is a classical theoretical framework proposed by Wikens et al. [4], which aims to describe the basic composition and operation of human cognitive processes.The information processing model in the subway includes the input of information (perception), the storage of memory (thinking), and the execution of decision-making (behavior).The specific model construction process is shown in Figure 1.

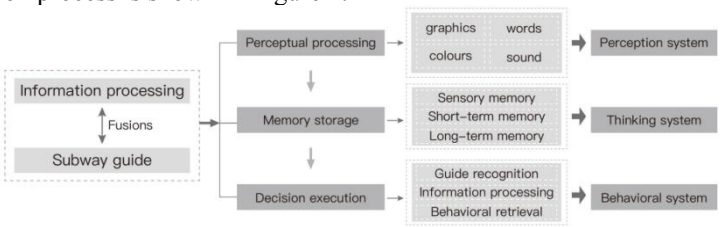

Fig. 1. Subway guide information processing model

Subway information design based on perception system focuses on human perception characteristics, including how sensory systems such as vision, hearing, and touch receive and process information, in order to improve the effectiveness of information design and user experience [5].The processing of subway guide information under the thinking system focuses on memory storage: the role of sensory memory in processing subway guide information in the thinking system is reflected in its short-term storage ability of initial sensory input.Sensory memory is the direct and short-lived memory of external stimuli by the human sensory system, usually of very short duration, only a few hundred milliseconds to a few seconds [6].In the subway environment, passengers need to rely on short-term memory to process and remember the information obtained from the information design in order to make navigation decisions.Due to the limited capacity of short-term memory, it is usually considered to be able to process 7 ± 2 pieces of information at the same time [7].Long-term memory not only helps passengers recall information when they need it, but also reduces the cognitive burden and improves navigation efficiency when habitually

using the subway system [8].In the decision-making execution stage, the emphasis is on how passengers can respond to specific behaviors based on the received guidance information [9].

3 Research on the Effectiveness of Subway Guide Information - Taking Wuhan Subway as an Example

In order to understand the needs of passengers as a whole, we first selected 18 heavy subway users aged 23 to 65 to conduct in-depth interviews and observations, and recorded the current situation of Wuhans information design with a user journey map, as shown in Figure 2. The content of the interviews included incidents, attitudes and feelings about riding the subway. Through interviews, it was found that the main groups who take the subway are students, commuters and retired groups. Passengers are currently generally satisfied with the information design of Wuhan Metro, but there is still room for improvement. The existing problems are mainly focused on:
1. Errors are easy to occur during the ride, especially at stations that require changing floors; 2. The legibility of the guide screens in subway carriages needs to be improved; 3. There is a lack of information design that considers vulnerable groups.

Fig. 2. Current status of Wuhan subway guide information distribution

4 Analysis of Survey Results

A total of 219 questionnaires were collected in this questionnaire survey, and the respondents included the elderly, children, and people with physical disabilities.13.58% of passengers are very satisfied with the overall evaluation of information design, 59.26% of passengers are relatively satisfied, and about 27% are generally dissatisfied.Therefore, there is still some room for improvement in the information design of Wuhan Metro.

4.1 The level of perceptual processing

At the perceptual processing level, problems in subway information design include: 1. Subway information is abundant and dense, and the priority of information is blurred.

In addition to the wayfinding information, there are also some for-profit advertisements, non-profit public service announcements, and public art displays, making it difficult for passengers to quickly obtain the wayfinding information. 2. The presentation method of guide information is not enough to quickly attract passengers attention, and the visibility of the information is poor. For example, when the information environment is complex, the color contrast is weak, the font is too small, or the graphic design is not eye-catching, etc. , making it difficult for passengers to quickly identify and understand information.

4.2 The level of memory storage

If the amount of information in the subway information design is too large or the design is too complicated, it will exceed the short-term memory capacity of passengers, making it difficult for passengers to remember the route guidance from one location to another.This happens mostly at transfer stations or when transferring to transportation. Passengers need intensive and clear guide information to guide them to complete the transfer behavior, otherwise they are likely to forget the route information in the middle.People have limited memory capacity, and complex or unintuitive guided information will increase the cognitive burden.

4.3 The level of decision execution

According to the questionnaire, 72.84% of passengers have experienced situations where the guide information is not clear in the past experience of taking the subway, resulting in taking the wrong direction or taking the opposite direction.The signs are complicated and incomprehensible, the direction information is confused, and the information is distributed in other locations when some information is needed may all lead to the above situation.If the information design does not provide clear instructions or there is inconsistency in the information, then passengers may be confused when making route choices and implementing decisions, resulting in extended decision-making time and even making wrong decisions.

5 Subway Guide Information Design Strategy Based on HIP

5.1 Perception-based presentation layer design

In terms of guide view graphic design, intuitive icons and a unified graphic language can effectively improve the perception efficiency of passengers.When designing icons, it is necessary to ensure that they are intuitive and easy to understand, and can be quickly recognized and understood.At the same time, it is necessary to ensure that the graphic language within the entire subway system is unified, to avoid differences in graphic style and design between different stations, and to reduce the cognitive burden on passengers.In terms of guide color design, first of all, use high-contrast color combinations to improve readability, especially for important information, such as emergency exits, safety tips, etc.Secondly, it is necessary to maintain the consistency of color coding, assign fixed color coding to different types of information (for example, transfer lines use different color identification), and

maintain consistency throughout the subway system.In terms of guided text design, the size of the text is graded according to the reading distance and importance to ensure that it can be clearly recognized at long distances and close distances.Choose simple and easy-to-read fonts to ensure that passengers of all ages can easily read.As shown in Figure 3, the Copenhagen metro system adopts a unified visual system, and the lines are distinguished by colors with a high degree of hue differentiation.

Fig.3. Design status of Subway guide system in Copenhagen, Denmark

5.2 Structural layer design supported by memory

On the one hand, it can be optimized through the user's memory characteristics and behavioral characteristics: the travel speed of passengers when riding rail transit is about 1.21m/s, and the time image of human sensory memory is within 1 second; the panning is 2-4 seconds, and the short—term memory can reach within 1 minute.On the other hand, the direction guidance information is reiterated at each intersection to help passengers strengthen their memory, while reducing the presentation of non-essential information at key nodes to avoid confusion and reduce the difficulty of wayfinding.As shown in Figure 4, the photo shows that the Vienna Central Railway Station repeats the information that guides the direction at the complex key nodes to deepen the sensory memory and short-term memory of passengers.

Fig. 4. Guided design of key nodes of Vienna Metro Station, Austria

5.3 Behavioral layer design with decision-making as the main line

Establish a clear and coherent pre-decision framework, and build a systematic standard system of guide signs: systematically classify different types of guide signs, and divide them in detail according to their position in space and the attributes of the identification itself, and then build a comprehensive and complete standard library.The establishment of this standard system aims to ensure the unity and clarity of the guide information, so that passengers can quickly and accurately interpret the guide information.An immediate response mechanism to potential boundary conditions, and an error-proof design is added: make a clear distinction between the wrong direction in the existing guidance information, such as one of the transfer stations of the Vienna Metro, the Central Railway station, in the guide design, consider the intuitive way of forking the wrong route to remind passengers to choose the correct route, as shown in Figure 5.

Fig. 5. Error-proof design of Vienna Metro guide in Austria

6 Conclusion

As the main transportation hub of the city, the subway guide and identification system gives full play to its important functions, enabling people to find accurate directions quickly and smoothly.In this research, by integrating the information processing model with the subway information design, the subway guide information processing model is proposed.The subway information design strategy is also discussed in depth from the three levels of perception, memory and feedback, aiming to improve the navigation experience of passengers by optimizing the display and interaction of information.It is hoped that this research will put forward new design ideas and valuable references for subway information design, and ultimately achieve a more efficient, convenient and comfortable subway ride experience.

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