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Interface Design Strategy of Elderly Smart Phones Based on User Experience

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Abstract: Population aging has become a major problem in China's social development. With the development of society and the renewal of ideas, the lifestyle of the elderly has undergone significant changes. Nowadays, the mentality of the elderly is getting younger and younger, and their ideas are getting more and more advanced. They are ready to understand the modern information life and enjoy the benefits of the information revolution. As an indispensable personal device in modern life, smart phones are widely used by the elderly. However, with the constant updating of the information age and the diversity of interface design, it is difficult for the elderly to bridge the gap between cognitive habits and smartphone use habits. Interface design is an important means of human interaction, and also an important means to bridge the knowledge gap between the elderly and smartphones.

1. Introduction

China is the most populous country in the world and the oldest country in the world. The elderly account for one-fifth of the world's elderly population, and the elderly in Asia account for half of the global elderly population. With the rapid development of mobile Internet, the popularity of smart phones in hardware design is getting higher and higher. However, due to the particularity of the elderly, the popularity of smart phones among the elderly is still very low. This paper mainly adopts the concept of user experience and discusses how to design mobile interfaces, so that the elderly can have a good interaction while considering their physiological and psychological characteristics.

2. Physiological and Psychological Characteristics of the Elderly

The main purpose of the interface is to optimize the user experience of the product. If the design of mobile interface is always user centered, the interest in user experience will grow. As a special group, the elderly should fully consider their different usage habits and methods with other groups when developing mobile electronic products. Therefore, we need to study the physiological and psychological characteristics of the elderly, summarize the mode and direction of elderly smartphone interface design, and provide a satisfactory user experience for the elderly.

2.1. Physical Characteristics of the Elderly

The organs and physiological functions of the elderly gradually degenerate, including functional and physical degradation. The physiological function of the elderly, especially the immune function and resistance, is gradually declining. The decline of vision and color recognition capability has a significant impact on the font and color selection of mobile interfaces. In addition, when using smart phones, the deterioration of joint stability and flexibility may lead to poor communication. This is also a feedback problem encountered by the elderly when using smart phones. The special physiological characteristics of the elderly determine the direction of smart phone interface design[1].

2.2. Psychological Characteristics of the Elderly

Not only the physiological characteristics of the elderly have changed, but also the psychological characteristics of the elderly have changed. When designing the interface of smart phones for the elderly, we should consider such factors as brain function decline, memory decline, good memory of remote events, weakened memory of recent events, and difficulties for young people to learn new things. Despite these setbacks, the psychological level of the elderly has declined significantly, their emotional behavior has been stimulated, and their physical and mental health has been further damaged. A common psychological feature of the elderly is that they are prone to loneliness, suspicion loss, fear, and inferiority. After retirement, their leadership and social roles changed, and children "gave up their nests". The past full of life space has disappeared forever, and they cannot adapt to the new rules of life. An expert investigated 13633 urban elderly people and found that 40% of them were lonely, depressed, and unable to speak. There are two main reasons: objectively, the separation of societies, the drawbacks of sports, the decline in the frequency of communication with the outside world, and the lack of information exchange; the subjective aspect is that the elderly have a closed mentality when they have their own interpersonal relationship model. They don't want to make new friends and are not good at accepting new things. These feelings of despair, self-respect, loneliness, and suspicion have a negative impact on the mental health of the elderly, bring great psychological pressure to the elderly, and bring fear and anxiety to their lives[2-4].

3. Discussion on Interface Design Strategy of Old style Smartphone from the Angle of User Experience

3.1. User Interface Design

The interface acts as a bridge between people and machine. The GUI consists of shapes, materials, and physical buttons. The main factors that affect the interface design of mobile phone software are graphics, fonts, menus, and interface layout. With the rapid development of network technology, good interface design can make the software simple, efficient, and interesting, and also provide users with better online experience. Good interaction is reflected in the software interface and plays an important role. The interface design of smart phones for the elderly should be considered from the aspects of graphics, text, interface, etc. In view of this, this paper will focus on the development of mobile phone interfaces[5].

3.2. Interface Design Strategy for Elderly Smart Phones

The development strategy of the elderly smart phone interface can be based on two principles: 1) Considering the memory loss of the elderly, the menu level of the mobile interface should not

exceed three levels, and all main functions should be displayed on the home page. The interaction degree of most smartphones on the market is too complex to reflect their power, but it is an obstacle for the elderly. Because there are too many interface layers, they often cannot find a suitable interface, which makes them refuse to operate anywhere. (2) Due to the decline of joint stability and mobility in the elderly, the functional symbols should be highlighted and the contact area should be increased accordingly to avoid accidental contact[6-9].

3.3. Visual Design Strategy of the Elderly Smart Phone Interface

The design of mobile phone visual user interface for the elderly mainly includes fonts, colors and layout. For fonts, it is recommended not to mainly use red, green, or blue, because the visual perception of the interface color of the elderly will be reduced. As shown in Figure 1, the microwave crystal turns yellow, especially in the elderly, which reduces the ability of the elderly to recognize shortwave colors. Designers can use yellow glasses to evaluate the color, to eliminate the misunderstanding of the real color among the elderly. They are turning yellow. As for the interface, the elderly have not found any functions, so it is necessary to reconfigure the interface according to the habits and needs of the elderly. In the process of using, you can add some command prompts to help the process. The traditional mobile interface for the elderly can no longer meet the needs of the elderly, and the traditional layout needs to be changed[10-11].

Figure 1: Simple interface design

3.4. Need to Develop a Smart Phone Interface for the Elderly

Since the beginning of the 21st century, China's aging development plan has emphasized supporting and expanding the participation of the elderly and encouraged them to actively explore new forms of participation. However, with the improvement of social participation and the significant changes in the social system caused by the industrial revolution, technological innovation has seriously weakened the authority and interests of the elderly in society, bringing many practical problems and obstacles to their social participation. The focus is also on solving these problems and obstacles, that is, developing products suitable for the actual needs of older user groups. In addition, scientific and technological progress and the improvement of living standards have diversified the nutritional needs of the elderly [12].

4. Characteristics of Cognitive Memory in the Elderly

4.1. Sensing Function of Mobile Phone Interface

With age, the functions of all human organs, including brain, bone, skin, and other physiological functions, as well as the functions of the sensory system, will decline significantly. Most of the elderly have poor vision, leading to deterioration of retinal images. With the increase of lens density

and hardness, the pupil diameter, lens transparency, retinal light sensitivity, and the number of photoreceptors decrease, leading to the decline of visual system perception and visual system function. The number of older students is the largest, accounting for two-thirds of the total number of young students. Pupil dilation is not ideal. Therefore, it is difficult for the elderly to see what young people see, and their recognition ability decreases with age.

4.2. Focus on Mobile Interface

When the mobile interface appears in front of people, people are often attracted and distracted by many stimuli. One or two of them are particularly attractive to our eyes. This stimulus area is called the focus area, where it is easy to feel the stimulus, while other stimuli outside the focus area are blurred, and some are even ignored. There are difficulties in allocating and diverting the attention of older people. When there is too much information, it is difficult for the elderly to concentrate. When searching for information, important information may be lost. Designers must design interfaces and interaction models suitable for the elderly to make up for their shortcomings. According to the characteristics of the elderly, two design principles are proposed: 1) reduce the amount of information on the interface and map the information to the upper left corner of the screen. Too much information distracts people from the need to reduce information redundancy to avoid information loss. 2) Increase the contrast between stimulus and background. Find the target, lock the focus, and shorten the search time. The general shape can display the target and the target color, and different contexts can also highlight the target, as shown in Figure 2.

Figure 2: Key design

4.3. Memory Function of Mobile Interface

Another major challenge that older people face in using mobile phones is that they do not remember how much information and complex access paths hinder them from achieving their goals. In order to improve the elderly's ability to store information on the smartphone interface, the following two aspects can be improved: (1) The image memory utilization rate is low, and the elderly's storage capacity is weak. Designers can display icons on menus so that older people can easily remember them. Emphasize the relationship between graphics and meaning, and users' understanding of the specific functions of the phone will support the memory capacity of the phone to a large extent.

5. Interface Interaction Design Principles of Mobile Phone Applications

Nowadays, the attitude of the elderly towards learning and lifestyle has undergone significant changes. Many old people are willing to try new things, learn, and keep up with the times. To guide the elderly to access the Internet correctly, learn to read microblogs, write comments, shop online, and treat online, not only feels the convenience of the information age, but also makes the elderly

more diversified in recent years. Smart phones have become the main segment of the mobile phone market because of their complete functions, good scalability, and rich user interfaces. The demand of the elderly for mobile phones is no longer limited to personal functions such as mobile phones, alarm clocks, radios, and emergency phones. In addition to large fonts, large capacity, and high criticality for the elderly, the design of smart phones must also meet the new needs of the elderly in the new era.

5.1. Principles of Elderly Interaction

With the development and popularization of various smart phone interfaces, the service life of smart phones continues to extend. Lights. For example, in 2019, a reporter's survey of residents in Tiedong, Taixi and Lijiang, Anshan City, Liaoning Province, found that on average, 60% of people under 90 use smartphones. Most elderly people say they use not only mobile phones, but also firmware. As shown in Table 1, some elderly people also use services such as micro chat and video chat, pickup and delivery fees, utility fees, and telephone charges. User feedback model is one of the important objects to be considered in the interaction design of traditional consumer mobile phones. The elderly have unique functions and psychological characteristics. The particularity of the elderly must be considered in the feedback model. First of all, there must be a certain degree of predictability before surgery, so that the elderly will not be afraid of mistakes or disappointment. Second, the elderly can communicate with each other through mobile phones to experience the fun of intimacy and communication. As the finger joints of the elderly will become stiff to a certain extent with the growth of age, the elderly must feel the expected impact of interface design on the telephone interaction process.As shown in Figure 3.

Table 1: Proportion of Intelligent Machine Application Demand of the Elderly

Demand Type Demand	Proportion
Interaction	11%
Contact	50%
Service	12%
Assistant	14%
Other	13%

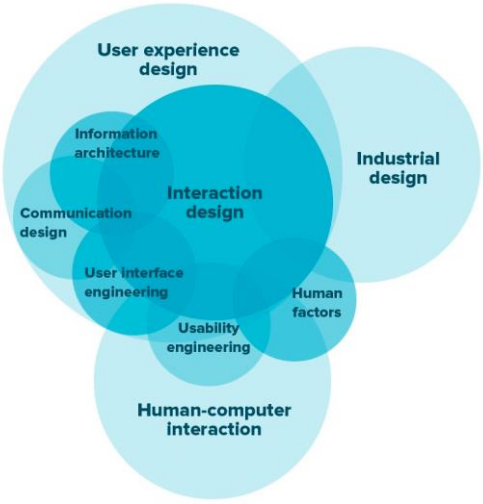

Figure 3: Schematic of human-computer interaction

5.2. Interactive Analysis and Application of Mobile Phones for the Elderly

Generally speaking, the elderly prefer simple interfaces and interactions to dazzling ones. Therefore, designers must minimize the number of interface parameters. First, they must only provide the elderly with the necessary functions and may exclude all other unnecessary or complex procedures. The secondary interface should be simple and generous, rather than using a complex model as the background. The whole interface design shall be clear to avoid errors. Users can avoid switching errors by centralizing their commonly used functions and placing them in a location that is easy to search. For example, if the contact information reaches the user interface, the user may have information. Combine these unique management activities to avoid unnecessary problems. After the user operates or operates incorrectly, the interface should be restored to the current user status, to control the mobile phone status in real time.

6. Emotional Design Analysis of Smart Phone Interface

6.1. Color Combination

There is scientific evidence to prove the importance of color: "The human visual organs are 80% 20 seconds ago and 50% 5 minutes later. The color preference of the elderly is very different from that of the young. With age, experience, personality, and strong cognitive ability, the preference of the elderly tends to be calm and firm, which conforms to the natural law of human development.

6.2. Symbol Transfer

In the process of information transmission, there are two types of information transmission. One is simple graphical symbols, derived text, and sometimes their expression combination. It can not only serve as a reference point for people's behavior, such as street signs, but also reflect some rules of behavior, such as brands, brands, etc. The advantage of combining these two expressions with visual accuracy lies in the transmission and reception of information. Intercultural communication, memory, and communication are almost independent of age, culture, and language. Nowadays, smart phones are maturing and improving, and there is a certain market for smart phone applications. In the theory of emotional design, instinct is the first level of emotional design. The interface provides elderly users with a portal for nursing research and analysis. It can be said that the three-stage theory of emotional design is the key for the elderly to design for such a special group, because the deterioration of physical function leads to low cognitive ability, memory, livelihood and other aspects. Faced with these challenges, it is also difficult for them to use smartphone applications that cannot meet actual and objective needs. At the interface level, the design should also consider more specific text forms. According to its biological and psychological characteristics, the design should improve the navigation efficiency, improve the accuracy, emphasize the imitation effect, and strengthen the symphonic connection between the image and the elderly. For example, text font size, font selection, association with graphics, color selection, etc., considering the elderly's stay time in smartphone operation, considering their personal interface preference design, analyzing users' behavior habits, designing and responding to their emotional signals, it can generate resonance and improve the recognition rate.

6.3. Bilateral Requirements

Under the influence of emotional design theory, the value, connotations and significance of the old smart phone design interface may exist, which is the ultimate requirement of the reflector.

Whether it is a real-time design model or a sustainable design model, whether it is to meet basic needs or self-realization needs, the most important connotations and value significance are related to human group identity. It makes the elderly user group realize that the product is a cultural product, containing information and data in the smartphone interface, which can stimulate their emotional memory, and describe and display their real needs in the script. Meeting the basic needs of this group enables them to feel the convenience of interface design when using smart phones. Everything is in the user's memory. In the process of interface design, through the interaction between users and products, users' demand for design has been further improved, and the original self-realization has taken a step forward. The bending is also reflected in the design, so we often need to update the design iteratively. This is also one of the main arguments of psychology. The needs of users depend not only on their physiological needs, but also on the basic process of tracking, differentiation, and self-realization of the same theme. The elderly users also have this process of demand change. The process of their interaction with smart phones enables designers to understand their requirements for designing content and meaning, and integrate cultural elements, information, data, emotional memory, and other interface elements, thus arousing their resonance. At the same time, the needs of the elderly continue to improve. The initial interface design is basic, which can have such culture, information and emotional memory. Different times, different cultures, different interests, and different memories. Although the differences in time and space limit their thinking ability, they provide many interface design elements according to the diversity and details of needs. Therefore, at the thinking level, the interface design of the elderly smartphone must meet the objective requirements of two-way flow, pay attention to the content and significance of the design, and provide more space for design update based on the interactive design capture process. Combine the final design requirements with aesthetic concepts to create works embodying emotional value.as shown in Figure 4.

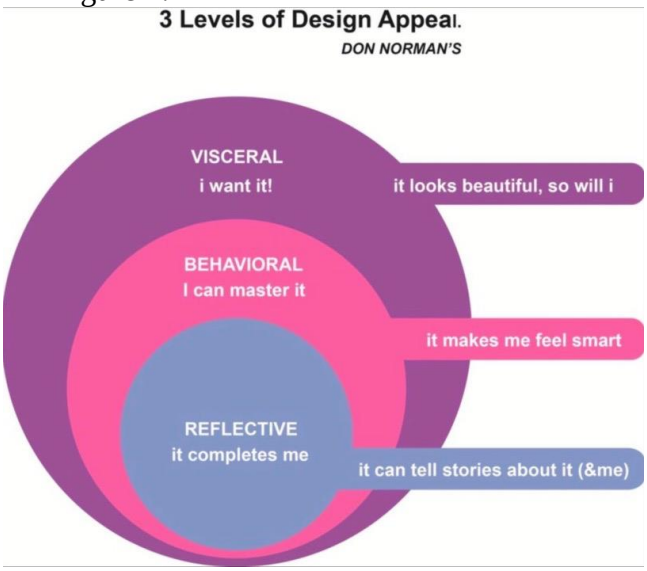

Figure 4: 3 levels of design appeal

7. Conclusions

Today, the level of scientific and technological research is improving. The design and development of smart phones are also research directions. With the growth of the number of the elderly, smart phone interface design has become an important independent research direction. From the perspective of user experience, combined with the physiological and psychological characteristics of the elderly, this paper discusses how to develop mobile phone interfaces to meet

the needs of the elderly, which can not only reduce this phenomenon. Due to the complexity of the operation, the elderly are excluded from high-tech development, but it can also reflect their love. Experience and suggestions on designing mobile phones for future vulnerable groups.

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