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Related research on the interactive improvement plan of the payment APP for the elderly: Focusing on Alipay

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Abstract

The purpose of this Research is to improve the information architecture and interface of Alipay app for the elderly, and to help the elderly solve issues on payment and simple financial services by optimizing the interactive scheme. The current aging-friendly versions of payment apps are only improved at the visual level and do not really solve the dilemmas faced by elderly user. Therefore, this research is to improve the payment app solutions at the visual level, information level and architecture level by analyzing the needs of the elderly. This Research uses literature review, user interview and questionnaire research of the aging-friendly version of Alipay to obtain the usage needs of the elderly. Also this Research analyzes the advantages and disadvantages of the current existing solutions by comparing the advantages and disadvantages of the current Chinese aging-friendly transformation app solutions, so as to derive the information architecture and the prototype of the aging-friendly improvement programs of Alipay.

Keyword : The elderly, Aging-friendly solution transformation, Cognitive aging, Interaction design

1. Introduction

1.1 Research background and purpose

With the progress of science and technology as well as the advent of an aging society, the World Health Organization predicts that China will be the most severely aging country in the world by 2050. As a result,, the ‘elderly-oriented’ design has become more and more important. In 2020, with the outbreak of the global COVID-19 epidemic, ‘non-contact payment’ and ‘online payment’ became increasingly common. In 2021, China promulgated the list of the first batch of aging-friendly and accessibility-adapted websites and apps. However, as far as most of the current apps are concerned, most of them are designed with the preferences of young audiences, while the cognitive characteristics of the elderly differ greatly from those of young people [1]. Most of the apps cannot meet the needs of elderly users in terms of visual, interactive and emotional aspects, so that the elderly cannot complete

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the business of payment in many scenarios. In addition, the outbreak of the COVID-19 epidemic has caused a huge impact on the elderly in travel, socialization, and entertainment, and the payment methods and scenarios have been greatly changed [2]. While at present, most of the payment apps used in China are Alipay and WeChat. So how to properly analyze the needs of the elderly and understand the cognitive aging of the elderly, so as to help them cross the digital divide is the focus of this study to explore.

1.2 Research Scope and method

The research scope and research methods of this paper are consistent with those described below. Firstly, through literature review, this paper mainly focuses on understanding the characteristics of cognitive aging of the elderly and the human-computer interaction model of the elderly users. Secondly, it analyzes the advantages and disadvantages of the first batch of app aging-friendly transformation solutions in China, and the composition of the current version of Alipay for the elderly. Through user interviews, the pain points and core needs of elderly users in the payment scenario are summarized. Then, through the questionnaire survey and test of Alipay's aging-friendly version, the points that cannot be covered in the current product version are excavated. Finally, the specific improvement solutions are derived.

2. Theoretical knowledge of human-computer interaction for elderly users

2.1 Characteristics of cognitive aging

Because the physiological and psychological characteristics of elderly users are quite different from those of ordinary people, the cognitive aging characteristics of elderly users should also be taken into account in product design. The characteristics of cognitive aging of elderly users are mainly divided into three aspects, namely, perceptual perception characteristics, memory characteristics and emotional characteristics.

The sensory perception of the elderly population will show degenerative changes. This is most often seen in human-computer interaction when older users provide feedback to the user interface through visual, auditory, and tactile senses [3]. The visual decline of the elderly is mainly manifested as follows: reduced visual acuity, which makes them prone to presbyopia; poor color discrimination, which makes it difficult to distinguish short-wave colors such as blue-green; reduced adaptation to light and dark, which

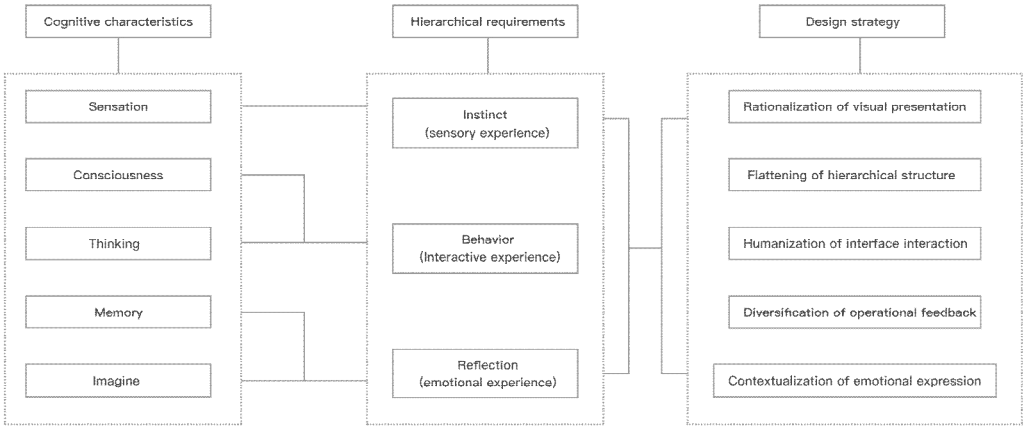
makes them prone to glare; and reduced field of view, which results in the elderly users being able to see less than normal [4]. The decline of auditory function in the elderly is mainly manifested in: hearing loss; sound discrimination is reduced, and it is difficult to distinguish complex tones; language comprehension declines and has difficulty in comprehension [5]. And the decline of tactile function in the elderly is mainly due to the decrease of sensory nerve fibers on the skin, which leads to the decrease of sensitivity.

While the decline of memory characteristics is mainly manifested in the difficulty of remembering things for elderly users. In human-computer interaction, it is most often manifested in the elderly users' memorizing of the interface operation steps and larger information load [6].

The elderly group is in a sensitive and fragile period emotionally, and their psychological tolerance has decreased, mainly due to the physiological and psychological degenerative changes and changes in social roles, which are prone to negative emotions such as depression, loneliness and aging. In the process of human-computer interaction, if the interface design does not meet the psychological needs of the elderly users and the operation is inconvenient, the elderly users will become depressed and reduce the sense of experience and pleasure of the product, thus leading to a decrease in the acceptance rate of the products [7].

2.2 Relationship between cognitive aging characteristics of elderly and app requirements

Donald A. Norman pointed out three levels of design in the Emotional Design, namely, instinct level, behavior level and reflection level.



[Fig. 1] Model of corresponding relationship between cognitive characteristics and requirements levels

The design of instinctive level focuses on the first impression of products, which emphasizes the sensory experience brought by products. The design of behavioral level is related to the function, performance and ease of use of products [8]. The design of reflection level pays attention to the meaning of information, culture and products or product utility, that is, the emotional experience of users [9]. Therefore, based to the analysis of the cognitive characteristics and demand level of elderly users, this paper proposes corresponding aging design strategies in five aspects [10]. The model of the corresponding relationship between cognitive characteristics of the elderly and APP requirements levels is shown in [Fig. 1].

3. Research process

3.1 Comparative analysis of app aging-friendly transformation solutions in China

In 2021, China promulgated the list of the first batch of aging-friendly and accessibility-adapted websites and apps, which are mainly aimed at apps that are frequently used by Chinese people in daily life. In this analysis, five app products, Alipay, WeChat, Baidu, Taobao and Didi Chuxing.

[Table 1] Comparison and Analysis of the Aging-Friendly Transformation Solutions of Chinese Apps

App	Type	Solution	Detailed	Advantages	Disadvantages
Alipay	Financial services	Launch a small program for elderly users / Freely adjust the font	1. Font, icon enlargement 2. Make the typography more sparse 3. Collect frequently used functions	More targeted for the use of elderly users and convenient for version iteration	Only the home page has been revamped, no change in the first level interface or second level interface
WeChat	Social communication	Launch the corresponding video tutorial manual	1. Font size can be adjusted freely 2. Launch a total of thirty-nine WeChat function instructional videos	Let users use it with a sense of scene, and make the problem more detailed and targeted	Unable to solve the problem in time, the entrance of teaching video is too hidden, requiring children to learn together, and the learning cost is too high
Baidu	Search	Launch a dedicated app for elderly users	1. Typesetting becomes more sparse 2. Simplified functions	Collect the functions commonly used by users	Only the interface and architecture have been optimized
Taobao	Life shopping	Set up the associated relative account system	1. Set up the family account system	Reduce the learning cost of elderly users	If in the case of family doesn't have time or doesn't see it, the elderly can't solve the problem alone
Didi Chuxing	Traffic trip	Launch a small program for elderly users	1. Set up one-click “calling for a car” service. 2. Set up the “Call for a car” service.	One-click service can be realized, and the operation is simplified.	The interface design is too simple, and the operation interaction is too simple

[Table 1] is about Comparison and Analysis of the Aging-Friendly Transformation Solutions of Chinese Apps. we can see that there are two kinds of aging-friendly solutions for Alipay at present, one is to adjust the font size directly, and the other is the aging-friendly version of Alipay launched by the government alone. But at present, both solutions are flawed. Solution 1 only optimizes the overall layout at the visual presentation level. The text and icons are enlarged, but only the homepage and some first-level pages are optimized. The architecture should also be redesigned. In the second solution, although the common functions for elderly users are concentrated on the homepage, the corresponding first-level interface and second-level interface have changed back to the original version, with no change in font and typesetting. Generally speaking, these two solutions still belong to a primary stage of the aging-friendly version, and now they only stay at the first level, that is, the level of information display. At present, compared with the standard version, the functions of the caring version still lack a lot [11]. [Table 2] is the interface display of the first version with large fonts and the second version of Alipay solutions.

[Table 2] Interface of the first version with large fonts and the second solution of Alipay solutions.

Alipay app large-fonts version interface display		**Alipay app caring version interface display**	
Home page	First-level interface (payment code display)	Home page	First-level interface (payment code display)
			

At present, most of the aging-friendly apps on the market have optimized the layout, enlarged the text and icons, and adjusted the color to reduce the difficulty of recognition for elderly users. While at the hierarchical level, it reduces the learning burden and memory burden of elderly users by simplifying operation steps and setting ‘one-click xx’ function and ‘one-click customer service’ function. In terms of

operation feedback, some app products have already opened the voice search function, but the revision of the aging-friendly solution is not only limited to the visual level. How to correctly understand the needs of elderly users, properly guide users to learn and enhance their learning initiative is the key to solve the problems of elderly users.

3.2 In-depth interviews with elderly users

This user interview was conducted from May 23, 2021 to May 25, 2021, mainly targeting Chinese senior citizens around 60 years old, and the number of interviewees was 10. The main contents of the interview included the basic information of users, the basic situation of using smart devices, and the needs and scenarios of users using the app to pay or handle financial services. The purpose of the interview is to understand the usage characteristics and pain points of users using app. The basic information of interview users is shown in [Table 3].

[Table 3] Basic information of user interviews

Number	Age	Payment scenario	Mobile phone usage characteristics
1	58	Grocery shopping	Very little spending, not good at using payment apps
2	62	Shopping in supermarkets, taking a car.	Payment apps are used less often but occasionally.
3	57	Apply for community subsidies, pay for living expenses.	Be able to use payment apps, have corresponding needs.
4	58	Transportation, grocery shopping.	Illiteracy, can't use payment app.
5	56	Charging phone bills, buying groceries.	Rarely spend money, not well at using payment apps, dependent on children.
6	58	Apply for community subsidies and go shopping in supermarkets.	Be able to use payment apps, have corresponding needs.
7	57	Financial management and living expenses.	Be able to use payment apps, have corresponding needs.
8	61	Transportation, living expenses.	Spend less and rarely use payment apps.
9	65	Receive a pension	Don't know how to use payment apps.
10	62	Go shopping in the supermarket, charge the phone bill, and transportation.	Can use payment apps, but rarely.

According to the basic information of users of [Table 3], it can be seen that most of the scenarios for elderly people around 60 years old living in first-tier cities to use app or pay in cash are: grocery shopping, transportation, living expenses (water, electricity, gas, cell phone bills), and subsidies. And

some elderly users who will use app to check out usually have the following characteristics: they will use apps to pay only when they have corresponding needs, and they are not skilled in operation. On the other hand, through user interviews, we summarize the problems older users encounter when using the Alipay app.

we divide all the problems encountered by the interviewed elderly users when using Alipay app for payment, which are mainly divided into three categories, namely, scene problems, interaction problems and functional problems. In terms of scenario problem, elderly users generally think that it is very inconvenient for them to use payment apps to pay while traveling. The root cause is that it is too complicated to find the corresponding interface quickly in the operation. In tems of interactive problems, elderly users find it difficult to input text and numbers. They prefer the form of voice input. It is also learned through interviews that due to the limitation of input keyboard size and the degradation of their sense of touch, the elderly often feel lacking in strength when inputting text, and the frequency of errors increases. In terms of functional problems, users generally think that the advertisements implanted after payment will induce the purchase of products, which will make the elderly users' sense of experience decline, resulting in users being ‘afraid to operate for fear of making’In addition, some practical functions such as ‘one-click contact with customer service’ and “account management” are too hidden, which makes it difficult for users to find them.

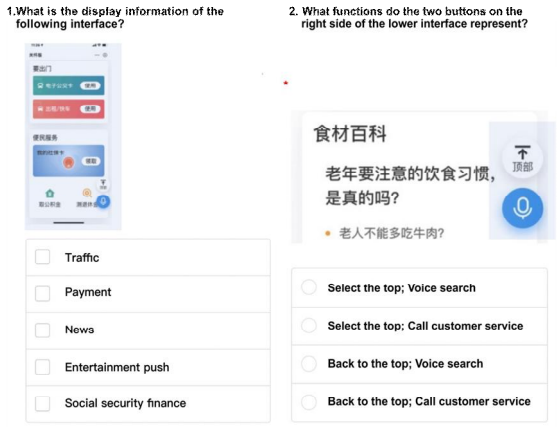
To sum up, we know that the payment needs of elderly users around sixty years old are mainly to ensure their basic material life and health. The usage habits and frequency of mobile payment are due to their own needs and the intervention of the external environment. In view of the problems encountered by the elderly users in the payment scenario, the main reason is that the design of its operation process, interaction mode and hierarchical structure does not conform to the usage habits of the elderly users. Therefore, how to design a mobile payment app according to the needs of the elderly is important.

3.3 Questionnaire survey on aging-friendly version of Alipay app

From October 5th to November 3rd, 2021, a questionnaire survey was released on the current aging-friendly version of Alipay app. The purpose of the survey was to sort out the demand points that can be alleviated in the function of the current version of Alipay app, and to explore the problems of elderly users' understanding and operation of the function of the current version. The contents of the investigation are as follows: firstly, elderly users' understanding about the information of current product interface. Secondly, the recognition degree of icons and keys by elderly users on the main interfaces

was investigated.

The survey results show that 65% of the elderly users can accurately recognize the information of the product interface, another 23% of users have vague concepts, and 12% of users do not know the information content displayed by the interface at all; As for the identification of icons and buttons on the interface, this questionnaire provides the meaning of two kinds of icons and buttons on the interface. Only 26% of users chose completely correct answers, and 56% of users chose one correct answer, while 18% of users chose both answers incorrectly. The Display of questionnaire survey topics is shown in [Fig. 2].



[Fig. 2] Display of questionnaire survey topics

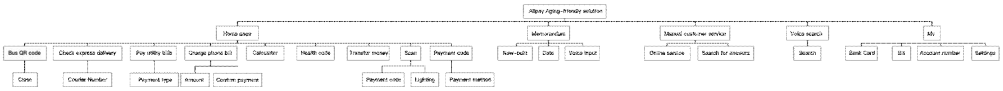
Through simple testing and questionnaire research, the following conclusions were drawn: 1) When elderly users use Alipay and other mobile payment methods to operate financial services, they are affected by their own information acceptance and proficiency; 2) While dealing with simple financial business, the elderly around 60 years old have certain learning ability; 3) The visual layout is not satisfactory; 4) The elderly users mostly take the attitude of not easily trying for the functions they don't understand or know; 5) They are still doubtful about the functions of buttons, and have misunderstandings about the visual performance of some buttons.

To sum up, through in-depth interviews with users, the use characteristics and pain points of users when using app for payment are derived. And through questionnaires and tests, the functional and operational problems of elderly users for the aging-friendly version of Alipay app are analyzed, so as to make sufficient preparations for the following proposal of a reasonable prototype framework for improvement.

4. Content information design and interaction prototype

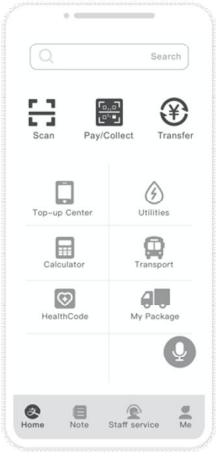
4.1 Information architecture design

According to the cognitive characteristics of the elderly, the hierarchical structure design of the improvement solution must follow the hierarchical needs of the elderly to cut down redundant or unnecessary functions and information, simplify the interface operation steps. Therefore, the functions of the previous aging-friendly version of Alipay app are integrated and reduced to ensure the basic needs of the elderly, namely, payment, QR code scanning, payment of living expenses, and travel and transportation functions. In addition, the buttons of 'Voice Search' function and 'Human Customer Service' function will be placed more conspicuously in the menu bar of the homepage for the convenience of elderly users. See [Fig. 3] for the information architecture of Alipay's aging-friendly solution revision.



[Fig.3] Information architecture diagram of Alipay aging-friendly solution revision

4.2 Home page and navigation bar interactive prototype design

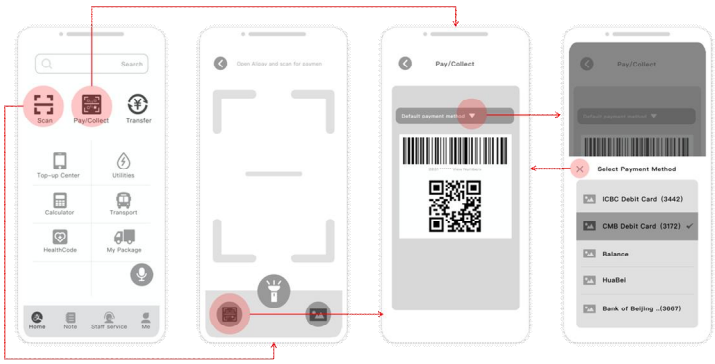


[Fig. 4] Home page and navigation bar information

[Fig. 4] is Home page and navigation bar information prototype. the three most commonly used functions for elderly users are placed at the top of the interface, namely 'Scan', 'Payment' and 'Transfer' functions, and the rest functions are arranged in the center of the page. The fonts in the interface will be selected with high recognition rate for the elderly users, and the font size is set to 14pt-18pt. In addition, the icons are designed with quasi-materialized icons to enhance their understanding of the functions.

4.3 Interactive prototype of scanning code and payment/receipt code

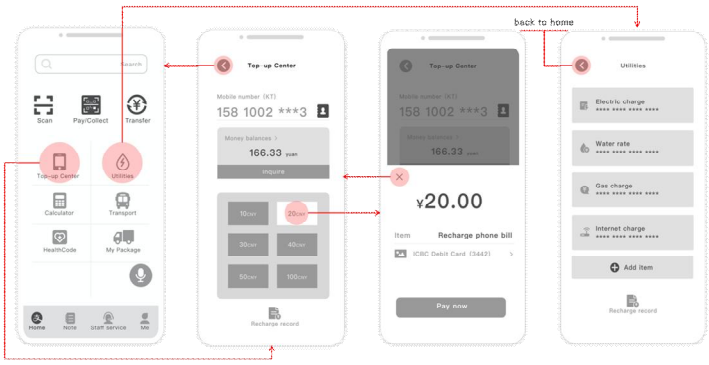
Users can jump to the scanning interface directly by clicking the scan button. And the button is set to convert the QR code directly in the scanning interface, which can adapt to the offline multi-scene payment situation and let the elderly users switch between scanning and being scanned easily. As the payment information pops up during the payment, it will be accompanied by a strong vibration of the phone and voice announcement, prompting the information of the payment amount for the elderly in this way. [Fig. 5] is Interactive prototype of scanning code and payment/receipt code.



[Fig. 5] Interactive prototype of scanning code and payment/receipt code

4.4 Interactive prototype of recharge and living expense payment function

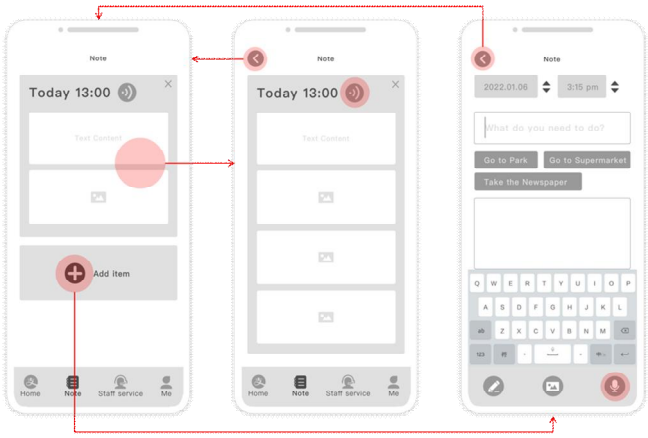
In the recharge function, the overall layout and hierarchy are optimized to make it easier and faster for elderly users to recharge their cell phone bills. The design eliminates the superfluous ads and makes the overall interface more concise so that elderly users can use the function without concerns. In addition, in the interface of paying living expenses, we integrate all the cost items into one module, which is displayed in the same hierarchical order, so as to improve the user's recognition and ease of use during operation. [Fig. 6] is Interactive prototype of recharge and living expense payment function.



[Fig. 6] Interactive prototype of recharge and living expense payment

4.5 Interactive prototype of memo function

Memo function can help elderly users remember daily life more effectively. In the design of the program, the memo can add pictures and text contents freely. At the same time, in order to take care of the inconvenience or illiteracy of typing for elderly users, it is necessary to consider various information input means. [Fig. 7] is Interactive prototype of memo function.

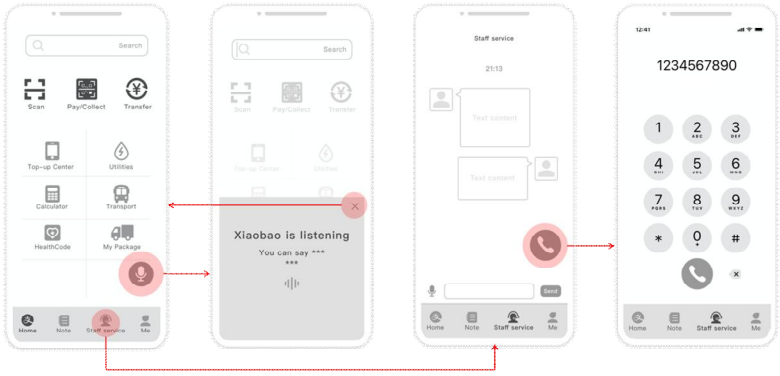


[Fig. 7] Interactive prototype of memo function

4.6 Interactive prototype of voice search and human customer service

In order to solve various difficulties encountered by elderly users in operation and payment scenarios, in the program it puts the human customer service function directly in the navigation bar of the home

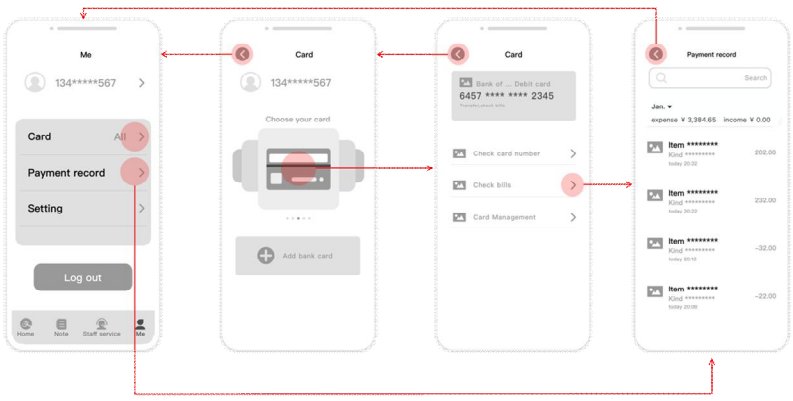
page. At the same time, the manual customer service interface is also equipped with a 'one-click call' function, which can directly call the special work staff. [Fig. 8] is Interactive prototype of voice search and human customer service.



[Fig. 8] Interactive prototype of voice search and human customer service

4.7 Interactive prototype of personal homepage and wealth management

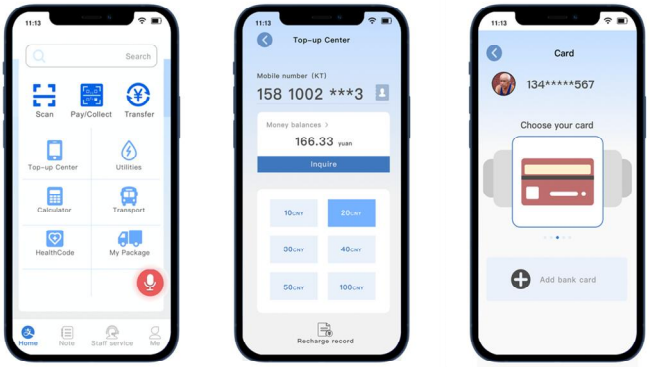
[Fig. 9] is Interactive prototype of personal homepage and wealth management. the main functions are 'Bank Card', 'Payment History' and personal settings. In the bank card interface, we have improved the selection of bank cards to a sliding interaction. In addition, we increased the number of icons for each expense in the payment history interface, so that users can immediately recall the specific information of the expense after seeing the icon.



[Fig. 9] Interactive prototype of personal homepage and wealth management

4.8 High-fidelity interface design for the aging-friendly version of Alipay app

[Fig. 10] is High-fidelity interface design for the aging-friendly version of Alipay app. In order to give the elderly users enough tips, the buttons representing important functions are strengthen of their color contrast. In the interface, the more complex interface is simplified, which makes users feel more situational, reduces the sense of distance and arouses the happy emotional experience of the elderly users.



[Fig. 10] High-fidelity interface design for the aging-friendly version of Alipay app

5. Conclusion

The purpose of this paper is to improve the information architecture and interface of Alipay app for the elderly, and to help the elderly solve issues encountered in daily payment and simple financial services by optimizing the overall scheme. Through literature review and user interviews, this paper analyzed that the needs of elderly users are mainly to ensure their basic material life and health, and the usage habits and frequency of mobile payment are interfered by their own needs and the external environment; In view of the problems encountered by elderly users in the payment scenario, the main reason is that the design of its operation process, interaction mode and hierarchical structure does not conform to the usage habits and cognitive characteristics of elderly users. By means of questionnaire survey and test, the problems of elderly users in the operation and function of the current version are excavated. Based on the above analysis, the solution improvement of payment app is carried out, and the corresponding interactive prototype and some high-fidelity interfaces are created.

In addition, the purpose of this study is only to put forward a theory of improved solution. For real situation it still needs to carry out certain tests of this solution. It is expected that the corresponding product prototype needs be made in the follow-up research, and data need to be carried by letting users conduct questionnaire and on-site evaluation. Further research will be carried out on this basis. Only by allowing more and more users to give feedback and through continuous iteration, the functions of products can be more and more perfect, so as to really help the elderly solve difficulties as well as catching up with the pace of the times.

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