The Old People Using Intelligent Mobile Equipment Influence Extent

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Abstract. Aging is inevitable; faced with the global aging population, how to make good use of cross-disciplinary technological integration for enhancing the care of the elderly in the physical, psychological and social environments becomes a very important issue. This is called the Gerontechnology. For the general public, "aging" often refers to the physiologically aging body parts. However, aging actually has psychological and social dimensions. From the analysis of the age groups, the proportion of the young population (0–14 years old) is decreasing year by year due to the declining birth rate. Currently, the young population only accounts for 13.45% of the total population. In Taiwan, the population over 65 years old accounts for 12.83% of the total population, making Taiwan approach the Aged Society, in which the elderly account for 14% of the total population. What is the Gerontechnology? Gerontechnology is actually a compound word that has been created to meet the needs of social development and is formed by combining Gerontology with Technology. Herman Bouma, a pioneer scholar in the Gerontechnology field, proposed to "understand technology and aging, and ensure the best technological environment so that we can support the elderly". By definition, this is an application of technology that integrates different disciplines. It requires not only the participation of biomedical scholars and engineering scholars but also the involvement of scholars in social sciences, humanities, planning and design in order to create gerontechnological products characterized by both practical and industrial benefits. Currently, there are a number of operating service modes and a variety of home care application products on the market, such as the concept design of intelligent medicine cans, fall detectors, psychological comfort mechanical seals, indoor and outdoor universal lightweight electric vehicles. We should integrate this concept of technology into our daily lives, not allow technology to cause distress or fear, and enable technology to create comfort and security, thus generating the feeling of mutual trust. In addition, it can reduce the social cost of care for the elderly and shorten the time and distance between the elderly and their children, relatives and friends to enhance their interaction and emotional exchanges.

Keywords: Hand gesture mode · Smartphone design · Focus grouping
Usability evaluation · The elderly people

J. Zhou and G. Salvendy (Eds.): ITAP 2018, LNCS 10927, pp. 142–156, 2018.
https://doi.org/10.1007/978-3-319-92037-5_12

1 Introduction

1.1 Aging Trend and Technological Development

The elderly often encounter inconvenience in their daily life. For example, their sensitivity to the sound, touch, pressure and fingers starts declining, which will often make the elderly feel psychologically frustrated and reject the related actions. Perceptual ability, muscle strength, flexibility, mobility, memory and learning ability will gradually reduce with aging [1], while the reason why the elderly are not as good as young people in these respects is that the elderly take a little more time in the cognitive phase of their perceptual response. The service design for the elderly is indeed a complicated system because whether the added value of the product is relatively improved as more design factors are considered is an issue worth discussing. Of course, the design of product use patterns for the elderly also places higher requirements on the service designers on both technological and thinking levels. It is undoubtedly a new challenge to the design of service-oriented systems. The perceptual ability of people remains unchanged before the age of 60. After people reach 60 years old, it is normal that their intelligence, reasoning ability, memory and comprehension ability degenerate [2], and their analytical, judgment, and computational abilities also degenerate to 75% to 85% of their original abilities [3]. Pointed out that aging might lead to perceptual changes, which might then affect the ability to learn new things [4]. Believed that the emphasis on perceptual decline of the elderly was of greater practical value than the emphasis on the perceptual stability or growth of the elderly [5]. Some researches put forward that the most important obstacles for the elderly to learn computers were: vision degeneration, memory degeneration, and perception. The perception is the psychological factor that makes the elderly reject learning computers. They think that they are old, and thus unfit for high-tech products or fear of damaging the computers during the learning process [6]. Due to the degenerating physical functions of the elderly, they are not suitable for sitting for long and easily become impatient. The fonts in front of them on the computer screen become unclear, and they easily feel self-abased and frustrated due to their slow learning. However, it is found in many studies that the elderly can get help from using computers and the Internet. For example, computer technology can improve their living quality, help them establish a positive attitude and increase their life satisfaction. Communication through various 3C products, and contact with family and friends using e-mail or social groups can expand learning opportunities and channels. Learning resources in a technology-rich environment, including text, graphics, sound, video and animation, can enhance the brain operation ability of the elderly [7].

1.2 Current Touch-Based Device Operation Mode

With the rapid development of graphical user interfaces, mice and other non-keyboard pointing devices, such as track balls, ThinkPad track points, game consoles, touch pads, recent touchscreen and fingerprinting methods, have gradually replaced keyboards. In the future, technologies related to motion capture and speech recognition may also be utilized [8]. In the vision part, the elderly should be avoided from the flickering and rapid change of light brightness. In addition, the elderly should not be

required to quickly switch their focal distance on the screen, and they should not be expected to detect minor changes. Therefore, the obvious marking instructions become very important. Besides, too small operational goals should also be avoided [9]. Touch interface is transformed from the single-touch in the past into the multi-touch at present, which leads to great changes in the operations. Single-touch operation is similar to the mouse control, and mainly distributes the command after a single click on the target; multi-touch is applied to the visual direct operations, such as the zooming and rotation of the images, etc., which requires different ideas in operations [10]. Multi-touch operation has been completely different from the physical touch provided by the hardware interface in the past, and replaced by the gesture which directly uses the fingers to operate the interface. Unlike traditionally sole pressing actions, all the interface operations are completed by the light tapping, long pressing, dragging and other actions. Because of this, the user must face a new form of operating interface mode completely different from the traditional habit. Coupled with the limits of the size and screen range of the portable hardware, the usability issue of the new human-computer interface is derived [11]. In the perception part, the elderly should be allowed for mistakes and given multiple opportunities for practice, which contributes to a positive improvement in performance. In fact, the elderly can complete the operational tasks on their own, but only with more steps than the young. In the mobile phone interface, the efforts in the working memory should be reduced, and the elderly should be avoided from memory opportunities because the time delay will lead to short-term memory loss. The interface designed for the elderly should be better in the task process delay, and stress simple operations which avoid distractions and excess. As people become older, their vision, flexibility and memory tend to degenerate year by year. Therefore, the interface designers should give special consideration to these factors to improve the readability and usability of the interface design, and provide a friendly and comfortable use environment. “Touch technology” makes the device simple with fewer buttons, but the device still retains its original features. Like a bridge, touch technology provides the public with new communication means to technology products, and give them easier access to information and technology. When the finger touches the screen, the sensor outputs a signal. Then, the controller transmits it to the computer for interpretation. Later, the driver component compiles it and finally outputs it to the screen, on which the required information by the finger touch position is displayed. Touch technology can be divided into digital type and analog type according to different signal generation principles. The analog touch principle differs from the digital touch principle in that it has a dotspacer between the upper layer and the lower layer. After the touch, the upper and lower electrodes are connected to produce a potential difference signal, which the circuit passes to the controller. Then, the coordinates of the touch point are calculated.

- **General Resistive Touch**

In the sensing method, the voltage change is generated when the finger touches the panel, and the coordinate information is obtained after the calculation. The main structure includes the transparent conductive film on the upper layer, and the transparent conductive glass on the lower layer. Between the two layers, spacing balls are used to provide insulation effect, thus avoiding the generation of error signal in the case

of no touch. The transparent conductive film and the transparent conductive glass are coated with conductive lines and the output voltage is fixed to form an electric field. When the hand (or other medium) touches the panel, the transparent conductive film is recessed and brought into contact with the glass to form a short circuit. The advantages include applicability to any touch media, such as fingers, gloves and passive pen, and accuracy, reliability and durability, which can meet the market demand. However, the operation of resistive touch screen requires light tapping. Over time, it easily fails, which makes it less durable, and its sensitivity is not very good, which makes drawing and writing not smooth.

- **Matrix Resistive Touch**

Analog Matrix Resistive Touch (AMR) technology improves on general resistive touch technology. Unlike digital resistive touch, when the panel is pressed, complete linear data can be acquired, so it can support multi-touch (Multi Touch) function. AMR is also known as modified resistance, and its sensitivity of touch sensing is also improved significantly. It only requires fingers to write fluent lines on the touch panel while the general resistive touch requires touch pen for clear writing. The function has been improved, and the convenience and precision of direct finger operation are enhanced significantly.

- **Surface Capacitive Touch**

The touch point is used to cause capacitive changes, resulting in a relative induced current to detect touch point coordinates. Usually when electrodes are placed in the four corners of the panel, a uniform electric field can be formed on the panel surface. When the finger touches the panel, the electric field induces a current, and the position of the touch point is calculated according to the current intensity ratio and the distance difference of the four corners.

- **Projecting Capacitive Touch**

Structurally similar to the surface capacitance, it is also known as matrix capacitor or digital capacitor. The greatest advantage of the projecting capacitive touch is that the touch does not require direct contact, and thus the panel can be placed under the transparent substrate, which can protect the panel well. The touch can be completed by finger or a special pen. Even with gloves, the projecting capacitive panel can be operated.

- **Electromagnetic Touch Panel**

When the screen is pressed by an electromagnetic pen, electromagnetic changes occur, and the touch point coordinates can be obtained by calculating the intensity of the micro-current generated after the change.

Its principle is to use the coil on the electromagnetic pen to touch the screen panel and produce changes in the magnetic field in order to calculate the touch point coordinates. Electromagnetic touch panel has a high light transmittance, high resolution and sensitive response with Z-axis sensing capability, which make it suitable for drawing and handwriting recognition. In addition, it is not required to touch the screen directly, which is the advantage of touchability. In the active electromagnetic sensing, the

electromagnetic pen will firstly launch an electromagnetic signal with a specific frequency to the X/Y axis antenna array on the digital panel, below which there is a metal layer.

- **Infrared Touch**

The transmitter emits infrared rays to the receiver. When the panel is touched, the path of the infrared signal will be blocked, and the receiver cannot receive the light signal. After calculation, the touch position can be acquired. The sensing principle applies the reception interruption theory of light source. When the finger or the touch object interrupts the light, it can be known which receiver does not receive the light signal, and thus the position of touch point can be obtained after calculation by the computer.

- **Surface Sound Wave Touch**

Surface sound wave runs on the screen. When the screen is touched, the surface sound wave energy is weakened, and the touch position can be obtained after the receiver calculates the decay energy. The sensing principle is that the controller sends out the electronic signal to the transmission converter first, and then the converter converts it into the surface sound wave, and directly sends it to the reflection panel. When a touch occurs, the surface sound wave energy changes. It is expected to break through the panel size limit, and increase the public willingness to use electronic products.

1.3 Current Related Patent Application

- **Method for Recognizing and Tracing Gesture (Patent No.: US 8,270,670 B2)**

A method for recognizing and tracing a gesture fetches a gesture image by an image sensor. The gesture image is processed for recognizing and tracing, and a corresponding action is performed according to the processed result. The gesture image is pre-processed and then a moved image is detected. The moved image is analyzed to obtain a gesture feature. When the gesture feature is corresponding to a moved gesture, a center coordinate of the moved gesture is detected and outputted to control a cursor. When the gesture feature is corresponding to a command gesture, a relevant action command is outputted. Therefore, the method provides cursor movement and command input by user gesture (see Fig. 1).

- Mobile Gesture Reporting and Replay With Unresponsive Gestures Identification and Analysis

In gesture reporting and replay, touch events are captured from an operating system of a client device for touch actions on a touchscreen. The touch events are interpreted as gestures. Any application events are captured from an application in response to the gestures. A given gesture and any given application event in response to the given gesture are compared against an expected application event (see Fig. 2).

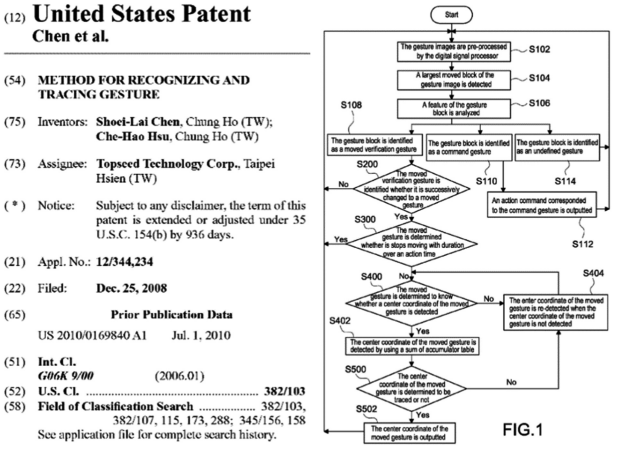


Fig. 1. Method for recognizing and tracing gesture

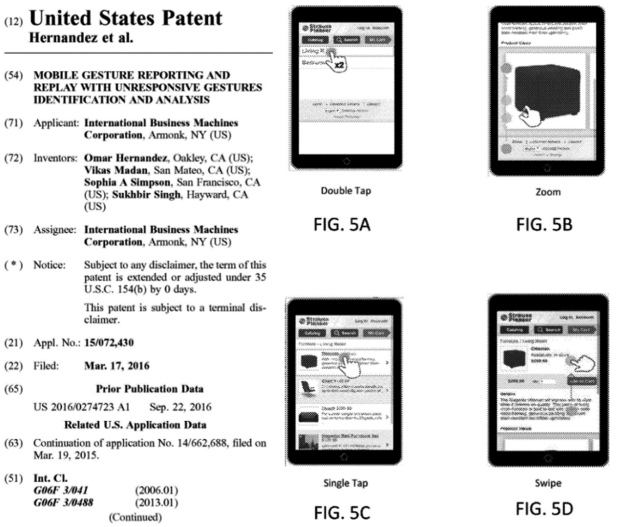


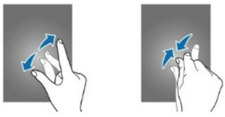
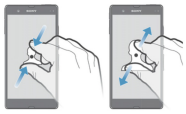
Fig. 2. Mobile gesture reporting and replay with unresponsive gestures identification and analysis

1.4 Operation and Problems of Current Intelligent Products

The development of modern high-tech products progresses with each passing day, and manufacturers launch diverse intelligent action interface products. Concerning the product value, the manufacturers place more emphasis on product introduction, such as environmental protection, safety, equipment efficiency, and various innovative entertainment features. However, concerning the use experiment, after replacing the product of a manufacturer, the users are forced to learn a different operation mode designed by another manufacturer, such as the text color, product feedback mechanism,

screen display mode and brightness, floating window size and gestures on the interface. Because of different gestures, the users need to try many times, which might cause learning fatigue, or directly lead the users to abandon the operations and turn to relatives and friends for help. Some studies proposed that multi-touch devices are closer to the users' use compared with the traditional device operation after careful analysis and comparison. Gesture is a natural and powerful tool for inter-personal communication. In some cases, gesture means more than the information communication through sound [12]. The interest of the elderly in multi-functional interface design needs to be inspired by a more user-friendly interface to a large extent, and the gestures must adopt a more natural and intuitive way. This study preliminarily collected the common types of smart phones on the market and observed that the gestures that are currently used by the general public include the three types, namely moving, rotating and zooming, which are the most common. The key points in the gestures compiled by the author are stated (as shown in Table 1).

Table 1. Types of smart phones and gestures of operations

Phone category	Move gestures	Rotate gesture	Zoom gesture
Samsung NOTE 4	Drag (Move fingertip over surface without losing contact)	Enter the image editing function menu, and click the rotating function button	
iPhone 4s	Drag (Move fingertip over surface without losing contact)	 (Fix with one finger and rotate with another finger)	
HTC ONE M8	Drag (Move fingertip over surface without losing contact)	Enter the image editing function menu, and click the rotating function button	
SONY XPERIA Z3	Drag (Move fingertip over surface without losing contact)	Enter the image editing function menu, and click the rotating function button	
ASUS Zenfone	Drag (Move fingertip over surface without losing contact)	Enter the image editing function menu, and click the rotating function button	The same with each cell phone zoom operation gestures

1.5 Research Purposes

The purpose of this study is to apply the questionnaire interviews and the actual operations, and make exploration from the human-computer response and feedback time of intuitive gestures. This study explores human factors as well as thinking and perception behaviors, and proposes to develop the effective response and feedback time

data for the elderly during operation. The final result can promote perception, memory, decision-making, attention execution, response execution, and feedback mechanisms to meet the critical needs of the elderly for lifelong mobility without being influenced by the intelligent products that have become inaccessible due to aging. In the past relevant research, it is initially found that for the operation of intelligent products, their needs and perception will change to different degrees with aging; on the contrary, the younger people have a better mastery of the technological products in terms of both familiarity and response speed of product operation than the elderly. Under the social structure with an aging tendency in the future, we should pay more attention to intuitive operation and work efficiency in the product operations for the elderly and handicapped people. The author believes that the findings of this study will make considerable contribution to the future elderly group or those who have relevant needs, and the issue requires special attention. The current high-tech mobile devices, such as mobile phones and tablets, are mentioned in the related reports on the elderly and the technology. In recent years, the continuous promotion of cloud services has also created a rapid development of intelligent mobile devices that enable various mobile operators to promote new products in order to meet the needs of different users. As a result, the mobile operators have reduced their learning costs and reaped the time-saving benefits. As more operators are gradually investing in this area, the market for mobile devices is booming. If the elements that affect the use of touch gestures for the elderly can be grasped, and accordingly an operation gesture model that meets the needs of the elderly can be designed, the author believes that this will be one big blessing for the elderly, and various touch mobile devices will also have a new future development direction. It is expected that the touch gestures which meet the needs of the elderly can retain the original use accuracy, and improve the difficulty of re-learning and re-memorizing the existing touch gestures of the elderly, thus helping the elderly become more efficient, and enjoy more pleasure in reading the information provided by the mobile devices. The specific objectives are stated as follows:

(1) Investigate the elderly who use common touch mobile devices, find out the problems that the elderly encounter during gestures, and collect the identifiable elements, cautions and preferred cases of the elderly in using touch gestures.
(2) Conduct human factor engineering recognition experiment on the factors with higher impact based on the identifiable factors collected in the human factor survey, grasp the gesture efficiency of the elderly in operating the touch mobile devices through field observation, and set the appropriate parameters for control time.
(3) Collect and analyze the data by Taguchi method as the impacts caused by the reduced variation causes instead of removing the variation causes to improve the quality. The development process of the decision-making evaluation system and design that accord with the touch gesture operations of the elderly is constructed, which can be used for the future universal design principle to inspect the gesture development and design decision-making of the elderly.

2 Method

In the preparation stage, the literature discussion and conclusion are conducted, the principle of gestures and intuitive operations of intelligent devices, visual focus and related experiments are analyzed in an in-depth manner mainly to determine the possible impact factors of operational quality so that the intelligent mobile device evaluation experiment can be more effectively implemented and planned subsequently, and the key parameters of intelligent mobile device gesture design can be accurately obtained. Concerning the planning of the gesture system design of intelligent mobile devices for the elderly, considering that the degeneration of physiological functions affects the hand operations, and the changes of visual focus result in that the operation intelligent mobile devices cannot achieve more intuitive and comfortable operations, gesture system design must be based on the physiological status of the elderly. In addition, some studies also suggested that social environmental factors have an impact on the technological acceptance. Therefore, social acceptance must be included as part of the evaluation guidance of gesture design in the implementation of design and development [13–15]. The intelligent mobile devices which are the closest to people in daily life are adopted as the basis for the development of gesture system to carry out related design. The designed combinations are evaluated through experiments, and the innovative design of gesture system which can effectively help the elderly to improve the living quality is proposed.

2.1 Research Object

Expert Interviews
The suggestions provided by the expert in the interviews are used to gain an insight into the basic operation mechanism of intelligent mobile device interface gestures as well as the influence and limitation of the research on gesture operation issues. In addition, the literature discussion is used to clearly define the direction of the study, and expert interviews can provide the study with a preliminary understanding of the elderly in using the gestures of intelligent mobile devices, modify the subjects of this study, serve as the experimental detail design of the study, establish the basis and reference for innovative gesture system design, and explore the possible advantages and disadvantages of the gesture design. It serves as the physiological circulation mechanism for the intelligent mobile device interface designers and the human factor engineering experts to clarify the gestures, and the influence scope of the operation of the middle-aged and elderly people.

Survey on Gestures and Use Habits of the Middle-Aged and Elderly People
Interviews and observations with the middle-aged and elderly people are carried out, and the possible impact of physiological mechanism degeneration on the middle-aged and elderly people is discussed to provide reference for the design and development of gesture-based operating systems in intelligent mobile devices in the future. The actual gestures of the middle-aged and elderly people, understanding of intuitive physiological phenomenon, interactions with intelligent mobile devices, are considered to gain an

insight into the elderly's use, habits and personal preferences in the most direct ways. Therefore, in this study, the living quality of the elderly is adopted as the main axis, and the impacts of aging gesture types, hand gestures and visual focus on the elderly are explored in order to develop aided gesture products in an external and real-time auxiliary manner. Understanding the behaviors of users can not only provide assistance in the interface of intelligent mobile devices, but also reduce the fear and helpless feeling generated by the use of high-tech products so as to enhance the living quality in the future.

Field Survey and Experimental Collection

The main purpose of this project is to investigate the responses and suggestions of the elderly and the age group of 20–30 years old on touch mobile devices through questionnaire survey of 60 subjects (the age group of 20–30 years old as the control group, 30 subjects in each group). In order to truly grasp the situation of the elderly in using touch mobile devices, the face-to-face questionnaire interview is conducted. This project is implemented in hospitals and communities because the proportion of the elderly activities is quite high in these areas and they are very likely to depend on the chatting with relatives and friends; the reason for choosing the hospitals is that the elderly often act in the hospital. The hospitals often provide health education information, or the poor body immunization requires regular medical consultation. Face-to-face interviews in the above locations can improve the recovery rate and effectiveness rate of the questionnaires. In order to increase the number of sample sources available for survey, the leaders of the communities where the survey is conducted are informed in advance to negotiate on inviting the subjects which meet the experiment conditions to participate in the test on a fixed date. There is no limit to the hospital where the survey can be conducted on both weekends and weekdays.

Contents of Questionnaire Survey

Questionnaire design is divided into closed questionnaire and open questionnaire. The closed questionnaire is easy for the subjects to fill in while the open questionnaire is filled in freely by the subjects. The questionnaire contents include the work-related items of the subjects, such as gender, educational level and subjective questionnaire as well as the interpretation and response to the messages received from the operation. Contents include gender, educational level and use of touch mobile devices. The variables in this part are to explore the difference in the preference and response to the messages from touch gestures of the elderly with different social and experience statuses.

Touch Gesture Response Data of the Elderly

The touch gesture experiment of the elderly includes four items: (1) the understanding and preference of the elderly on mobile device gestures from different manufacturers (background color and message type); (2) the attention and message reception of the elderly on the dynamic display of touch gestures; (3) the preference of the elderly on the setting type of the dynamic display of touch gestures, for example, illustration demonstration, single-finger or multi-finger input; (4) the preference of the elderly on

dynamic display of message contents by touch gestures: dynamic display of color, and graphic presentation method (bar, circle, flash). Used horizontal and vertical methods to study changes in physiology at the age of 30 and 80 [16]. It can be seen from Table 2 that changes in age bring different impacts on various body systems.

Table 2. Change of parameters as the indicators of aging

Physiological functions	Decline percentage at the age of 80 compared with that at the age of 30
Nerve conduction (sensory) speed	15%
Cardiac output (at rest)	30%
Vital capacity	50%
Maximum respiratory efficiency	50%
Renal blood flow	60%
Maximum working rate	70%
Maximum oxygen intake	70%

Experiment Method

Dr. Taguchi Genichi developed and promoted the Taguchi Quality Engineering in the 1950s [17]. Using simple orthogonal table experimental design and compact analysis of variation to conduct analysis with a small amount of experimental data can effectively improve product quality. The understanding and preferences of different information sources are analyzed and discussed, and whether there are differences between the different demographic variables and the understanding and preference of the messages displayed by the touch gestures of mobile devices is obtained. This study hopes to use Taguchi experimental methods, and apply factor analysis to identify the factors with higher impacts from all the possible factors through brainstorm and review by professional knowledge and experience. The implementation of Taguchi method can be divided into the 10 steps: (1) select quality characteristics; (2) determine the ideal performance of the quality characteristics; (3) list all the factors that affect the quality characteristics; (4) determine the level of signal factor; (5) determine the level of control factor; (6) determine the level of interference factor, and if necessary, conduct interference experiment; (7) select the appropriate orthogonal table and arrange a complete experimental plan; (8) execute the experiment and record the experiment data; (9) conduct the data analysis; (10) confirm the experiment. Taguchi defines quality as the total cost that the entire society pays for a product over its life cycle, which is called quality loss. Lower quality loss means higher quality. The quality loss function in the quadratic curve form is used to measure quality characteristics.

2.2 Research Sample

2.2.1 Screen Image Zooming-in Function (Status When the Finger Is Placed Perpendicularly to the Mobile Phone)

See (Fig. 3).

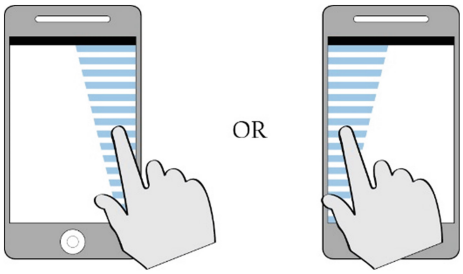


Fig. 3. Display of zooming-in status when the finger is placed perpendicularly to the mobile phone

2.2.2. Screen Image Zooming-in Function (Status When the Finger Is placed Horizontally to the Mobile Phone)

See (Fig. 4).

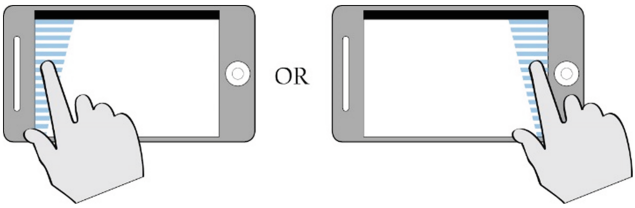


Fig. 4. Display of zooming-in status when the finger is placed horizontally to the mobile phone

2.2.3. Screen Capture Function (Status When the Finger Is Placed Perpendicularly to the Mobile Phone)

See (Fig. 5).

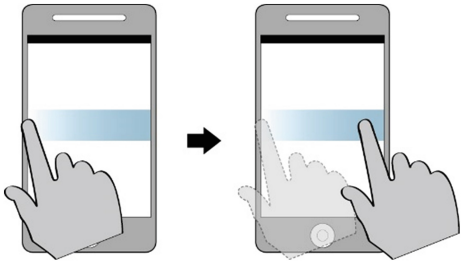


Fig. 5. Side display of capture status when the finger is placed perpendicularly to the mobile phone

2.2.4. Screen Capture Function (Status When the Finger Is Placed Horizontally to the Mobile Phone)
See (Fig. 6).

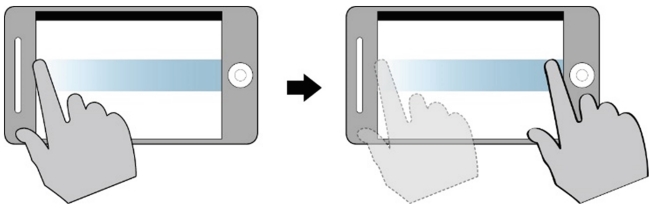


Fig. 6. Display of capture status when the finger is placed horizontally to the mobile phone

3 Anticipated Achievement of the Study Experiment

This study aims to apply the questionnaire interview and actual gesture methods, starts from the hand gesture operation modes and the personal information processing model, and analyzes how the overall degeneration produces the variability and the modified degeneration conditions. Considering human factors, thinking and perceptual behaviors, this study proposes to develop a mechanism by which the elderly can effectively improve gesture operation and promote perception, memory, decision making, attention, response execution, and feedback in order to achieve lifelong mobility of the elderly without suffering from the inconvenience of using the intelligent technology due to aging. In the past relevant research, it is initially found that for the operation of intelligent products, their needs and perception will change to different degrees with aging. In fact, the elderly can complete the operation tasks on their own, but only with more steps than the young. In the mobile phone interface, the efforts in the working memory should be reduced, and the elderly should be avoided from memory opportunities because the time delay will lead to short-term memory loss. The interface designed for the elderly should be better in the task process delay, and stress simple operations which avoid distractions and excess. As people become older, their vision, flexibility and memory tend to degenerate year by year. Therefore, the interface designers should give special consideration to these factors to improve the readability and usability of the interface design, and provide a friendly and comfortable use environment. The development of modern high-tech products progresses with each passing day, and manufacturers launch diverse intelligent action interface products. Concerning the product value, the manufacturers place more emphasis on product introduction, such as environmental protection, safety, equipment efficiency, and various innovative entertainment features. However, concerning the use experiment, after replacing the product of a manufacturer, the users are forced to learn a different operation mode designed by another manufacturer, such as the text color, product feedback mechanism, screen display mode and brightness, floating window size and gestures on the interface. Because of different gestures, the users need to try many times, which might cause learning fatigue, or directly lead the users to abandon the

operations and turn to relatives and friends for help. It can be known from the research on gestures of the elderly in using intelligent mobile devices which is discussed previously that the single-finger gesture is the most intuitive and most convenient. Based on the final research results, the gesture operation mode is designed: (1) side zooming-out gesture operation mode; and (2) stopping on the screen for a few seconds and then moving to the right as the operation mode for screen image capture. It is expected to prove that these two gestures are the currently most suitable and appropriate operation modes for the elderly. In recent years, the continuous promotion of cloud services has also created a rapid development of intelligent mobile devices that enable various mobile operators to promote new products in order to meet the needs of different users. As a result, the mobile operators have reduced their learning costs and reaped the time-saving benefits. As more operators are gradually investing in this area, the market for mobile devices is booming. If the elements that affect the use of touch gestures for the elderly can be grasped, and accordingly an operation gesture model that meets the needs of the elderly can be designed, the author believes that this will be one big blessing for the elderly, and various touch mobile devices will also have a new future development direction. The touch gestures which meet the needs of the elderly can retain the original use accuracy, and improve the difficulty of re-learning and re-memorizing the existing touch gestures of the elderly, thus helping the elderly become more efficient, and enjoy more pleasure in reading the information provided by the mobile devices. The reason why the gesture which the author studies and designs and the current commonly-used gestures easily cause misjudgment is that after the gesture which the author designs touches the screen for a period, function selection menu or prompt will appear. The purpose is to remind the users of the next step and to give the elderly a longer operation response time. The author thinks that the future research can move towards the following direction: if the response time set by the future intelligent mobile devices is based on the response and feedback time required by the elderly during the operation, it will be better than the response time of the existing intelligent mobile devices, which remains to be verified and evaluated by further experiments.

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