

Design and Planning of Puzzle Games to Prevent and Intervene in the Elderly with Alzheimer's Disease

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Abstract:- This article conducts unique research on the design of puzzle games for the prevention and intervention of the elderly with Alzheimer's disease. This article combines the investigation and research on the elderly with Alzheimer's disease. It also summarizes the physiology, mental state, pathogenic factors and living habits of the elderly through the research method. In addition, it considers the design principles of ease of use, safety, and interest in combination with information technology. Finally, a game with a rehabilitation function that provides mental exercise training was designed. These games will be tested in the future. The extended physical products of related training games will be suitable for home or community activity centres.

Keywords:- The elderly, Alzheimer's disease, rehabilitation, Serious Games

I. INTRODUCTION

The ageing of the population is a significant social problem that needs to be faced together at home and abroad. China is joining the ranks of the ageing population at several times the speed[1]. Furthermore, Alzheimer's disease has also become a common disease that plagues the elderly. With vigorous media publicity, people's awareness of the disease has generally increased. However, there are few effective treatments for the disease, and targeted video game products for preventing and intervening in the disease are also scarce in the market[2]-[3].

Traditional jigsaw puzzles and crosswords have always been regarded as effective means to fight Alzheimer's disease. However, the problem is that simple and slightly dull traditional games increasingly make people in the Internet age lose interest, thereby significantly reducing game therapy[4]-[5]. Xiao Zhang, CEO of the interactive entertainment product developer Perfect World, and scholars at Columbia University firmly believe that external environmental stimuli positively impact the human brain and even reshape the entire brain function. After the individual enters old age, the plasticity of the brain still exists. In the figure1, the combination of games and the field of medical rehabilitation can give full play to the game technology and promote the positive development of the field of rehabilitation medicine. The game can promote players to interact in a virtual game environment with multiple sensory stimulations, and to a large extent, reduce the risk of players'

misoperations in the natural environment[6]. At the same time, game rehabilitation therapy has changed the patient's previous boring treatment status, is conducive to physical and mental pleasure, and will significantly promote their rehabilitation[7]-[8].

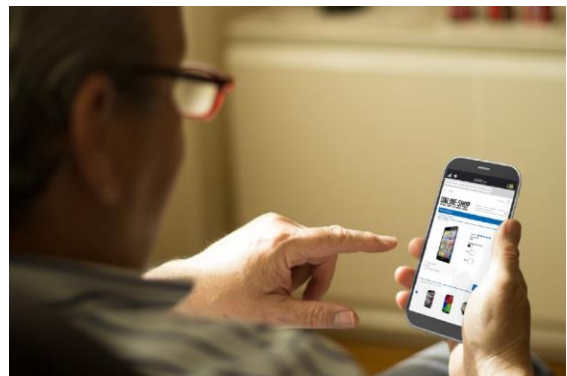


Fig 1:-Sample Demonstration of the elderly treats diseases through games

II. ALZHEIMER'S DISEASE

Alzheimer's disease is a degenerative central nervous system with an insidious onset and a chronic and progressive course[9]. It is manifested by memory impairment, cognitive impairment, personality change, and language impairment.

With the increase of age, the physical and psychological characteristics of the elderly have changed in many ways. Physiologically, the main body is ageing and dysfunction[10]-[11]. The gradual ageing and decline of tissues and organs in various human body systems lead to decreased body activity, reduced biological efficacy, weakened environmental adaptability, and reduced organ stress ability. Psychologically, due to the deterioration of physical functions, the troubles of diseases, the changes in the living environment and interpersonal relationships, the elderly have psychological states such as loneliness, depression, paranoia, and low self-esteem. With the advent of an ageing society and changes in family structure, empty-nested elderly families have developed rapidly. Studies have shown that anxiety and depression are the most common problems among the elderly in empty-nest families. Depression and anxiety make them more prone to Alzheimer's disease[12]-[13].

III. A PUZZLE GAME DESIGN FOR ALZHEIMER'S DISEASE

Investigate the basic situation of the elderly in the community, including personal psychological and physical characteristics, the elderly population's awareness of the prevention and treatment of the disease, and the current status of the elderly's daily life, and analyze the possible pathogenic factors, to find the characteristics and needs of users. The specific needs of the elderly are mainly realized as follows: everyday operations try not to change the inherent living habits of the elderly, reduce the new content that needs to be learned to play this game and integrate familiar things generally recognized by them in the design, which will help stimulate the empathy effect[14]. Aesthetic taste won the recognition of the elderly for the product.

A. Game design principles for the elderly

The principle of ease of use is convenient for the elderly, and the operation is convenient. The UI interface is straightforward, and can understand it at a glance, and can learn it at a glance, avoiding repeated operations and increasing the memory burden of the elderly.

The principle of safety, the game design has an estimate, which can cause protection in the event of an accident in the elderly.

Semantic principles of game products, citing positive psychological cues and avoiding negative psychological cues. Toys should not be labelled as older people, who also have psychological needs for self-esteem and equality.

The principle of fun. According to the nostalgic psychology of the elderly, the game copy should contain favourite elements, such as traditional culture, revolutionary stories, to increase product usability and participation.

B. Specific game product design

➤ The purpose of game design

- The new definition of Alzheimer's elderly population and the study of group differences.
- Analyze the pain points of the prospective elderly from the three dimensions of physiology, psychology and cognition, and analyze the needs of the prospective elderly for games based on the relationship between the pain points and needs, and use the game needs to solve the problems of negative psychology and cognitive ageing in the quasi-elderly[13].
- According to the existing game therapy theory, combine the case to find the game therapy suitable for the quasi-elderly group.
- The exploration of experience design thinking in-game therapy and its guiding role in the strategy of therapy game experience design.

➤ Game category: PUZ (Puzzle Game)

Through repeated game training for the elderly, the effect of improving cognitive ability is achieved.

➤ *Game level design:* Mainly divided into memory training level and attention training level.

According to the principles of ease of use and fun, the brain training game selects familiar elements generally recognized by the elderly, including rock-paper-scissors: through the gestures and requirements given by the game, select the corresponding options to exercise logical ability and reaction ability; Shopping payment: In combination with daily life, by memorizing shopping lists, simulating shopping and checking out, exercise computing power and memory; clue finding: within the specified time, find the corresponding pattern according to the card clues. Various brain training games improve memory, vision, calculation and logic skills, exercise observation, concentration and reaction skills.

➤ Game interface design

- *Colour:* In the figure2, the design follows the principles of product design for the elderly. The scene-oriented game interface adds a sense of intimacy, and the flat interface icons are concise and clear. The colour matching is three colours: green, white, grey; green represents vitality, environmental protection, eye protection; white pure; grey calm. The overall collocation gives people a sense of quiet, peaceful and comfortable.



Fig 2:- Game interface design

- *Patterns:* In the design and selection of patterns, combined with the principle of fun, eight pattern classifications are determined according to the nostalgic psychology of the elderly and their hobbies and aesthetic appeals. In the figure3, they are revolutionary symbolic objects, folk art, historical sites, heroes, daily necessities in the nostalgic era, toys in the nostalgic era, entertainment for the elderly, and types of dramas.

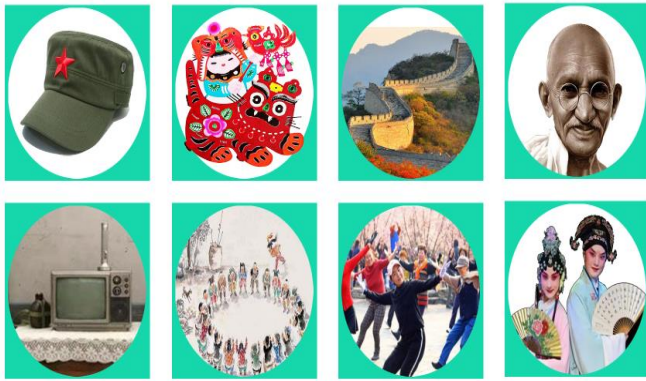


Fig 3:-The pattern classification

➤ *Game copywriting*

Include health information and related life knowledge about the prevention and treatment of Alzheimer's disease. Improve users' awareness of the disease and health information. For the elderly with severe vision loss, the game interface is also equipped with real people reading the game copy.

➤ *Data file*

The user's mental data file is established through the game data collection and analysis during training, and the early warning function is set. The medical condition and file data are reported to the doctor and family members promptly.

➤ *About Me*

Bind users through WeChat (or other social media: WHATSAPP/Twitter/FACEBOOK) to communicate with family members and doctors about the condition at any time.

➤ *Discussion on the game business model*

Mainly for the "free experience-personalized customization" business model.

The basic levels of emotional training games include free and open games for prospective elderly users to experience. This mode can attract many novice users to experience the game for the first time. It also allows more potential older people to exercise cognitive ability through game therapy and benefit from it. Considering the limited financial ability of the elderly and the cost of game development, if the elderly want a profound experience, the cost of the game can be reimbursed by medical insurance.

It is a puzzle game specially designed for the elderly to prevent and treat Alzheimer's disease. The game has made beneficial attempts in improving the social awareness of the disease, enriching and strengthening the mental exercise of the elderly, mental data recording and early warning, and the social integration of the elderly. The elderly need to maintain mental energy to delay the threat of the disease[15]-[17]. Training games scientifically train the brain's ability to delay the speed of cognitive ageing and keep the brain healthy[18]. At the same time, family members can bind to WeChat, check and grasp the mental health of the elderly at any time, and promptly intervene and encourage. The elderly can download and experience the game at home or in the

community with family and friends, exercise the observation and concentration of the elderly while increasing social interaction, and prevent other mental illnesses such as depression and loneliness in the elderly[19].

IV. CONCLUSION

The problem of an ageing society has become increasingly prominent. The pace of ageing accompanies Alzheimer's disease. We often miss the golden time for treatment and prevention of neglect. The government's proposal to strengthen work on the elderly to the current policies of innovative medical care and elderly care services have provided us with an excellent opportunity to study and help the elderly. Therefore, following the principles of product design for the elderly, the "Anzhi Home" tailored for the elderly to prevent and treat the disease has broad market application prospects and research value. It can help more prospective older people, enrich their spiritual and cultural lives, and eliminate negative psychology. Effectively prevent the prevalence of mild cognitive impairment and Alzheimer's disease for prospective older people, allowing them to guard the line of defence in their healthy old age at the starting point of being forgotten by time.

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