

The Application of Design Psychology in Aging Housing Design

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Abstract. In this paper, based on the design psychology, the physical and mental characteristics and demand of the elderly as the main design exploration point, focused on the design psychology in the application of aging residential design, through the analysis of aging housing problems summarizes the shortcomings, on the basis of following the market user demand, put forward better optimal aging residential design. Based on the analysis of the psychological and physiological football of the elderly, the paper uses the design characteristics of design psychology to design the bedroom, toilet and balcony of the aging residence and optimize the residential details, so that the aging residential space can play its own advantages and functionality to a greater extent.

Keywords: design psychology suitable for aging, the elderly residential space, space design

1 Introduction

Design psychology is a subject composed of psychology and design, and they are interlinked. The main theory of design psychology comes from the related fields of psychology. The design psychology in the design domain research goal and the design main body is consumer crowd and user's psychological phenomenon as well as affects psychological phenomenon each correlation factor science. Its theory derives only from four major branches of psychology: art and aesthetic psychology, industrial psychology, consumer psychology (also known as "consumer behavior") and advertising psychology, and sociocultural psychology^[1]. The aim is to study the user's psychology and behavior so as to make the design result better meet the needs of users and consumers, and finally achieve the goal of rationalization and humanization.

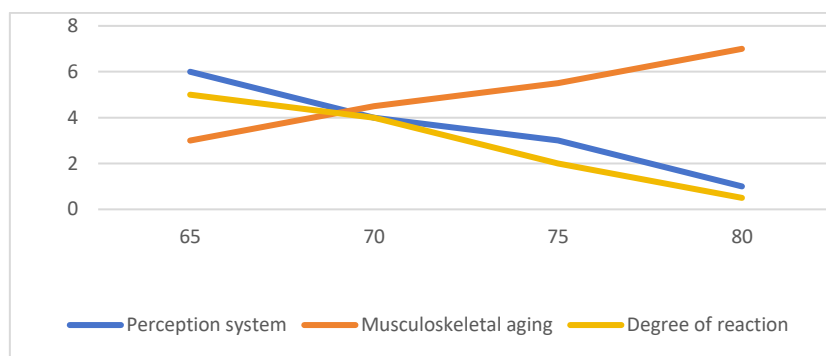
2 The physical and mental characteristics and residential needs of the elderly

2.1 Physiological characteristics

One is the aging of the body functions. With the increase of age, the physical and physiological functions of the elderly begin to change constantly, and the difficulty in accepting life thoughts will lead to large emotional fluctuations. Studies have shown that

women have more mood swings than men after menopause; second, sensory function declines. Old eyes, hearing loss, slow taste and other cause the elderly to mishear, misunderstand the meaning of conversation, sensitive, suspicion, or even paranoid ideas ^[2]; third, the neuromotor function is slow. Slow mobility, uncoordinated, even clumsy, contusion of the enthusiasm of the elderly social activities; fourth, memory loss. Recent experience is easy to forget, while the distant experience of memory is still good, it is difficult to accept new knowledge, with the increase of age and cause disease, psychological pressure is easy to produce a sense of loneliness.(as in table 1)

Table 1 Chart of Physical Functions of the Elderly



Second, the decline in sensory function. Old eyes faint, hearing loss, slow taste and so on lead to the elderly easy to mishearing, misunderstanding the meaning of others' talk, sensitive, suspicious, or even intentional paranoid concept ^[2].

Third, the nerve motor function is slow. Slow mobility, uncoordinated, even clumsy, contusion of the enthusiasm of the elderly social activities;

fourth, memory loss. Recent experience is easy to forget, while the distant memory is good, it is difficult to accept new knowledge, with the increase of age, psychological pressure is easy to produce a sense of loneliness.

2.2 Psychological characteristics:

2.2.1 Adaptive psychology

The decline in physical functioning has led to a gradual loss of control over the external environment in the elderly, who need more comfort in their lives and emotions ^[3]. They are more likely to want the care and care of their children, friends and family, older people who cannot take care of themselves, and older people with mental retardation. They are more likely to want to communicate emotionally with others to ease their daily fears. Therefore, the space for the elderly need more security, sense of belonging, sense of privacy, as well as the need for a sense of communication and comfort growing.

2.2.2 Psychology of self-value realization

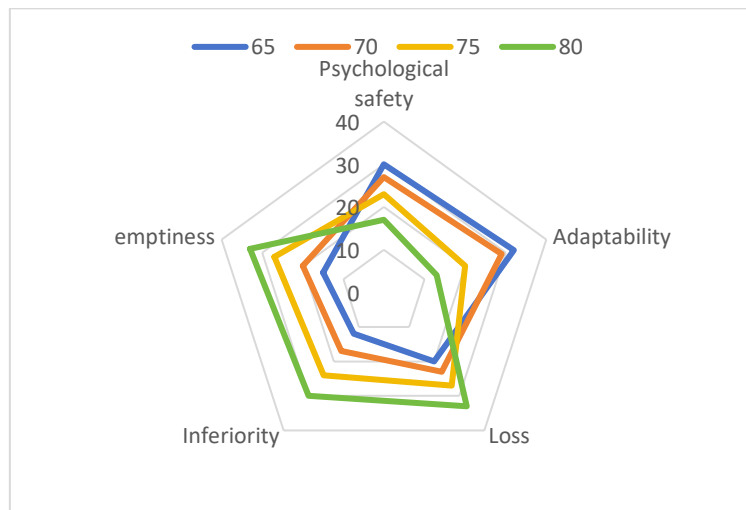
Old people will have the psychological characteristics of decreasing self-worth after they get old. Many seniors need to use control relationships, especially with controlled objects, to

enhance their sense of worth. They want to improve their quality of life with the help of some of society's developing technologies. However, because of their learning ability, their ability to accept new things is not as good as before. In the design of space, modern people pursue more scientific and intelligent design. However, with the deterioration of various functions of the body of the elderly unable to adapt quickly, there is a fear that their ignorance will cause damage, so they are very careful in the use process, and even seek help from time to time. In this psychology, the current needs of the elderly groups are expected to achieve self-fulfillment, catch up with the pace of society, fear and social disconnect.

2.2.3 Frugal and practical psychology

Thrift has been the traditional virtue of the Chinese nation, for the elderly, they are frugal to the extreme. Most pensioners in China do not have large pensions. Some depend on the state and government for financial support, and quite a few on their children. In this form of old-age support, for the elderly, they do not want to increase the burden of their children, adhere to the principle of saving, for the material to meet the conditions is practical, rejected the majority of young people to pursue flashy goods. In this psychology, the design of aging space needs to meet the daily life of the elderly, as well as some special design for special groups of the elderly, taking full account of the emotional needs of the elderly, refused to exaggeration and luxury. (as in table 2).

Table 2 Chart of Changes in Psychological Gap of the Elderly



3 Problems existing in the design of a house suitable for aging and residence

"Design for Aging" is a design concept designed to create products and environments for the elderly, and aims to create products and environments for the elderly. Based on the life characteristics and emotional needs of the elderly, the optimal design scheme is analyzed to achieve the purpose of improving the living environment and quality of life of the elderly [4].

This design concept appears in response to the global aging trend, and with the aging degree of the population, the needs of the elderly have become more special and complex. Therefore, the emergence of the aging design concept provides a more convenient, comfortable and safe living environment for the elderly. Compared with the barrier-free design that also focuses on the design of the elderly, the aging target is more targeted and pays more attention to the physical and mental needs of the elderly. The design space from the perspective of the human scale, physical condition and health of the elderly is hoping to bring improvement and adjustment to the elderly. Understand the psychological characteristics of the elderly from the psychological perspective, and put forward a targeted program design to deal with the negative and negative emotions of the elderly. Therefore, the aging-appropriate design must ensure that from the perspective of the elderly, the maximum help to help the elderly improve the quality of life.

3.1 The design is too complex and focuses too much on the form

The design of the elderly housing is increasingly intelligent, which meets the demand of the current market. Through the indoor installation of intelligent equipment and the corresponding space environment monitoring system, it provides intelligent elderly care services for the elderly who often stay at home ^[5]. Intelligent residential design although input accurately algorithm and program, through artificial intelligence, the Internet and other industries big data joint development design, meet the needs, but at the same time due to the complexity of the algorithm, the elderly degree of knowledge gap and the lack of the ability to accept new things lead to suitable aging design is not really from the perspective of the elderly themselves, standing in the characteristics of the elderly physical and mental development to think design.

3.2 Design pays too much attention to form

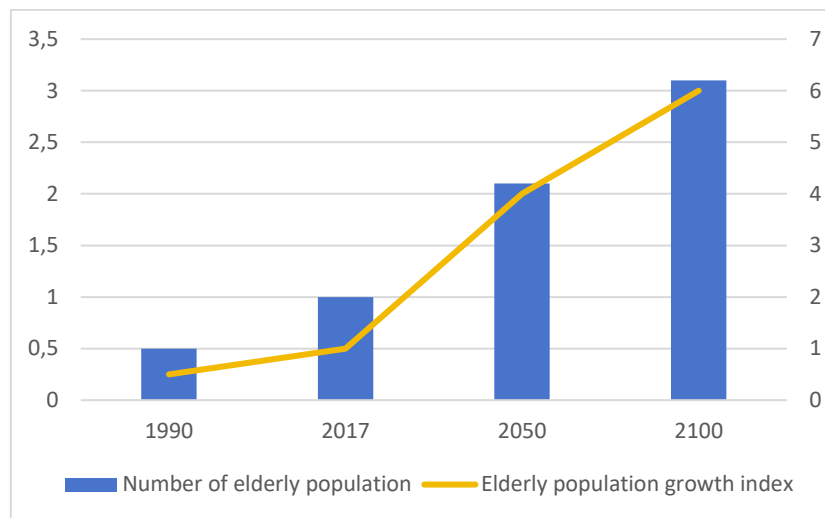
Design With the values of modernism become diversified, "freedom". Designers are more of the "beauty of" under the surface of the grandiose culture. In the background of profit transformation and luxury consumption demand, it is difficult to find the standard of value judgment. However, in the residential space of the elderly, the basic facilities of the old community are still backward, Unable to meet the needs of older people, Or living in a "tech" home carefully prepared by their children, Although the chairman is also designed to follow the mainstream style of society, Tall and high in shape, but also, But because most elderly people are unable to identify and use the "advanced" equipment in the living space, And the inability to adapt to what young people call beauty becomes more sensitive, Lower sense of self-worth, Feeling completely out of touch with society, Less enthusiasm in life, And afraid to live up to their children's filial piety, Over time, there is a resistance, In the end, the design purpose of the real aging house is not achieved.

4 The Application principles of design psychology in aging residential design

In view of the social phenomenon of population aging, design psychology can help to analyze the consumption behavior and social behavior of the elderly population, and put forward the design idea (as in table 3) suitable for aging housing according to the analysis results, so as to

give the elderly group more humanistic care and improve the home life of the elderly. The application of design psychology in the design of aging house design needs to follow the following principles:

Table 3. Global aged population growth chart



4.1 Humanized design principle

For the consideration of the particularity of the elderly group, the overall development trend of aging residential design should be more humanized. The core requirement of humanization is that the design must reflect humanistic care, designers should be based on the expectations of the elderly for the residential construction and the understanding of the elderly aging living space design, so that the elderly can really feel the warmth of the design, this is the development direction of the aging residential design ^[6].

4.2 Safety design principles

Whether it is suitable for aging residential design or the urban residential design for ordinary residents, All have to put safety first, From the perspective of design psychology, we should take more care of the mental health and physical conditions of the elderly, Strengthen the security of spatial layout planning and design, Design the corresponding safety measures, If the ground material of toilet should be the first standard, If necessary, safety handrails consistent with the height of the resident; For the elderly home can install a distress system to connect the children's mobile phone in case of quick contact children at any time in danger; Indoor should also consider the corresponding facilities (such as indoor doors and Windows, furniture shape material, home appliances, etc.) safety, For the choice of space decoration materials, Should also choose the noise emission or pollutant emission standards of the healthy decoration materials, Ensure the physical health of the elderly is not harmed from harm from the living space environment ^[7].

4.3 Design principles of age-appropriate sex

The design of aging housing should start from the behavioral characteristics of the elderly, and analyze the physical conditions and spiritual needs of the elderly from the perspective of design psychology so as to reflect the care of aging design for the elderly, and the elderly. At the same time, humanization and aging should be fully run through the whole residential design. In view of the current real estate developers take aging as the highlight of publicity but not authoritative characteristics, the elderly should be comprehensively considered from the perspective of design psychology, establish a general design standard system, and improve the freedom of design ^[8].

4.4 Universal design principles

The universality principle is that the design methods and design results can be targeted to more users as much as possible, which is also called the inclusiveness principle. The design of houses for the special group of the elderly can give more care and inclusiveness to the elderly of different ages and different physical conditions. From the perspective of design psychology, we consider the characteristics of the physical and mental development of the elderly, and find that the elderly cannot participate in social activities equally, and reduce their sense of social existence. In view of this phenomenon, the designer put forward the concept of barrier-free design, fully considering the physical condition of the elderly to ensure the convenience and realization of the space design, and improve the sense of security and utilization rate of home care for the elderly.^[9] For the elderly with the same action, the space streamline should be reasonably divided in the residential design, with high and low platforms on the spot, and gentle slope for the elderly with the visual disorder, the color should keep the light bright, and the traffic safety guide sign system at the corner. For the elderly with pain disorder, create a quiet and comfortable living environment for noise reduction. The universality principle is that the design methods and design results can be targeted to more users as much as possible, which is also called the inclusiveness principle. The design of houses for the special group of the elderly can give more care and inclusiveness to the elderly of different ages and different physical conditions. From the perspective of design psychology, we consider the characteristics of the physical and mental development of the elderly, and find that the elderly cannot participate in social activities equally, and reduce their sense of social existence. In view of this phenomenon, the designer put forward the concept of barrier-free design, fully considering the physical condition of the elderly to ensure the convenience and realization of the space design, and improve the sense of security and utilization rate of home care for the elderly. For the elderly with the same action, the space streamline should be reasonably divided in the residential design, with high and low platforms on the spot, and gentle slope for the elderly with the visual disorder, the color should keep the light bright, and the traffic safety guide sign system at the corner. For the elderly with pain disorder, create a quiet and comfortable living environment for noise reduction.

5 The Application Analysis of Design Psychology in Aging Housing Design

5.1 Bedroom

As the continuous growth of the elderly age, its activity space and scope are getting smaller and smaller, for the residence of the largest activity, the highest frequency of use is the bedroom. Consider from the Angle of design psychology, old people fear cold xi Yang, the orientation of the bedroom is more suitable for layout in the south, can be the light as much as possible into the room to the bed, the old people can enjoy sunshine when lunch break or sick in bed, also benefit at the same time to sanitation disinfection. But be careful when the bedroom has east and west Windows, Certain shading measures shall be taken, Such as window blinds and bamboo curtains, So that the elderly can adjust the amount of indoor light according to their own needs; Bedrooms for the elderly need good ventilation and light lighting, Especially when the elderly need long bed, Daily activities will be concentrated indoors, Good ventilation is conducive to regulating the indoor temperature and humidity, therefore, To open the relative position of the fan by adjusting the bedroom doors and Windows, Reasonably organize the ventilation streamline in the bedroom to avoid the formation of ventilation dead corners; The elderly bedroom also needs to be isolated from the noise, Try not to set up the bedroom near the elevator shaft, To avoid the noise of the elevator operation to the elderly's rest caused by interference. The location of the air conditioning outdoor unit should be prevented from being too close to the old man's bed.

5.2 Toilet

According to the survey statistics, the fall rate of the elderly in the toilet is as high as 26.6%, the characteristics of the physical and mental development of the elderly make no matter day or night, the toilet is one of the space with the highest frequency of the elderly. In the designer to fully consider the elderly's own physical conditions, anti-fall has become the top priority of the design. Do the toilet that dry and wet separates on space layout, and reduce wet area area as far as possible, toilet had better install one word armrest, L type armrest is used to maintain body balance. Shower area can be installed sitting bath device, for the elderly, the author will take a more safe and more comfortable bath, and install high and low shower. An emergency call device is installed next to the toilet paper holder. Because the elderly are forgetful, the toilet can choose an intelligent toilet to automatically flush water. Toilet floor chooses anti-skid matte floor or cork floor. Analysis from the perspective of design psychology, the old man with the sensitivity of the growth of the age, the color to distinguish will be more and more weak, so the overall color of the ground and metope to distinguish, let the old man perception boundaries, toilet metope is given priority to with light color, and the color of the toilet contrast is not strong, so on the toilet lid or the toilet background as far as possible with strong contrast color to help the old man better identification.

5.3 Balcony

The balcony is the indispensable part in the family life, it can provide ventilation and daylighting not only, still can become the bridge that the family and the outside world communicate. The balcony serves as the continuation of indoor space, should solve the

problem of good indoor and outdoor height difference when designing, consider the height of the elderly, appropriate height can reduce the occurrence of accident, also can be more convenient for the access of wheelchair. In addition, the ground material of the balcony also needs to consider the safety of the elderly, the floor of gazebo is unfavorable whole laid hard material to prevent slip and fall the circumstance that falls injury happens. The orientation of the balcony should avoid the dominant wind direction of autumn and winter two seasons as far as possible, the line of sight should be transparent as far as possible, provide the opportunity to nature. Consider the living habit of old people, need to often air dry clothings and plant flowers and plants, can set a few comfortable furniture lounge chair on the balcony, set aside planting space, the rest of convenient old people and entertainment.

5.4 Fine design

The fine design of the aging housing should be considered from the perspective of the elderly themselves, so as to truly let the elderly feel the humanistic care and help them to realize self-care in life.

Door: first of all, the opening direction of residential doors and Windows should pay close attention to the use habits of the elderly, and design on the premise of safety and convenience. If the flat door is used, due to the strength of the elderly one hand, the door should not be too heavy, keep the opening process smooth, can be installed to prevent opening and closing too hard; for the handheld part of the door handle in the space, choose the rod or stick too spherical handle; in addition, the surface of the safety handrail should be easy to grasp and no edges and corners; the whole room entrance and room entrance space should be appropriately enlarged to meet the needs of the elderly using the wheelchair to switch the door.

Space color and pattern: In the aging buildings, space color and materials play an important role. From the point of view of design psychology, the elderly can not accurately identify the dark tone of blue, green and purple series because of the change of trial characteristics. Therefore, in the aging space, bright and bright colors such as red, blue, orange, coral should be appropriately adopted to decorate the space. Increasing the recognition of the space can stimulate the elderly brain and remain active. In addition, because the elderly may suffer from visual impairment, so the ground in the pavement choice to avoid choosing some stereograms, spiral grams that affect the judgment to prevent the illusion ^[10].

Space ground: the space ground materials of aging housing should be slippery as the premise, warm, and choose some elastic small plastic or wood materials; the wall as smooth as possible, the corner design multi-round corners, to avoid the elderly should collision or fall to receive secondary injury; from the perspective of design psychology, the design should give more to the elderly gentle feeling, so in the selection of materials should consider the material texture and texture of the brought to the psychological feelings of the elderly, as much as possible through the material to foil clean, elegant, stable, safe residential space really become the inner feelings of the elderly ^[11].

6 Conclusion

With the growing phenomenon of aging in China, the design does not pay too much attention to the elderly. From the perspective of design psychology, this paper deeply analyzes the psychological and physiological needs of the elderly, summarizes the principles of design suitable for aging and how to really start from the elderly and design for the elderly in the residential design. In the face of the elderly under the dual influence of physical and mental development designers should change design thinking, design can assist the old man living residential space, believe that with the improvement of design development, aging design in the society will be more and more popular, perfect, optimization, truly reflect the human care for the elderly, mentioned the people's livelihood in our country, to create a more stable and harmonious society, better show the development level of our economy and civilization development.

References

- [1] Liu Sha, Tan Yu. Design Psychology Research Methods and Study Design [J]. Decoration, 2020, (04): 10-15.
- [2] Geng Mengyao, Yang Ning. The application of design psychology in the design of intelligent aging products [J]. Industrial Design, 2022, (10): 55-57.
- [3] Wang Liejuan. Elderly product design study in the context of interaction design [J]. Packaging Engineering, 2021,42 (04): 323-326.
- [4] Yu Zhihong. Space design of pension buildings based on the concept of suitable for aging [J]. Industrial buildings, 2016,46 (08): 56-60.
- [5] Wang Ying. Development status and prospects of technologies suitable to aging [J]. Residential and Real Estate, 2023, (19): 66-68.
- [6] Powell R B , Ramshaw G P , Ogletree S S ,et al.Can heritage resources highlight changes to the natural environment caused by climate change? Evidence from the Antarctic tourism experience[J].Journal of heritage tourism, 2016, 11(1):71-87.DOI:10.1080/1743873X.2015.1082571.
- [7] Li Qiang. Research on the emotional design trends of elderly products [J]. Industrial design, 2020 (11): 64-65.
- [8] Yu Ran. Characteristics of small nursing homes in the United States and implications for nursing home buildings in China [J]. Urban Architecture, 2015 (5): 48.
- [9] Liu Dongwei, Jia Li, Wang Shanshan. Research on the general design of residential buildings suitable for aging under the home care model [J]. Journal of Architecture, 2015, (06): 1-8.
- [10] Dixon J , Tredoux C , Durrheim K ,et al.‘The Inner Citadels of the Color Line’: Mapping the Micro-Ecology of Racial Segregation in Everyday Life Spaces[J].Social and Personality Psychology Compass, 2008.DOI:10.1111/j.1751-9004.2008.00123.x.
- [11] Li Tieli. Research on the characteristics of communication space of institutional nursing homes: take Dalian and Shenyang as an example [D]. Dalian: Dalian University of Technology, 2011.