Conceptualising the "Fourth Space" in Aged Care Environments: A Design Framework Informed by Melbourne and Chinese architecture

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Abstract: Amid the acceleration of global aging, the lack of emotional companionship and social connection has become increasingly prominent among the aged population. However, traditional aged care spaces continue to follow the functionalist logic of medical architecture, making it difficult to respond to residents' emotional needs for "companionship" and "being seen."

Based on the author's nearly 20 years of experience in medical and aged care services, as well as three months of field observations in Melbourne in early 2026, this paper proposes the concept of a "Fourth Space" and develops a corresponding theoretical framework for aging societies.

The study first reviews global aging trends and the dilemma of emotional companionship among the aged population, arguing that "social interaction" emphasised by traditional Third Place theory may, in elderly care contexts, transform into a source of social pressure. Through continuous observation of Federation Square and the National Gallery of Victoria in Melbourne, this study finds that high-quality public spaces are shifting from "promoting interaction" to "allowing coexistence." Their characteristics, such as weak boundaries, non-mandatory interaction, and what the paper terms "environmentalised companionship", offer new insights for the design of aged care space.

On this basis, the paper defines the "Fourth Space" as a transitional environment between private and public spaces, emphasising a mode of presence characterised by coexistence rather than active communication. It further proposes three key design directions: (1) minimal boundary construction, which reduces psychological defense by blurring spatial boundaries; (2) non-mandatory interaction mechanisms, which allow individuals to coexist in diverse ways without forced communication; and (3) an AI-enabled environmental companionship system, which integrates artificial intelligence into spatial environments to form low-intervention, long-term companionship relationships.

The study further validates the feasibility of this framework through practical cases in Chinese aged care institutions, demonstrating that the "Fourth Space" can be gradually implemented through incremental spatial optimisation. The findings suggest that the "Fourth Space" is not only an extension of the Third Place theory in aging contexts, but also a crucial spatial paradigm for addressing emotional needs in aging societies, offering both theoretical and practical implications for future aged care models.

Keywords: Fourth Space; Aging Society; Elderly Care Environments; Artificial Intelligence; Emotional Companionship; Social Interaction; Spatial Design; Third Place Theory

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1.0 Background of Aging and the Dilemma of Companionship

1.1 Global Aging Trends

At the global level, population aging has become an irreversible structural trend. According to the World Population Prospects 2024 [1], published by Department of Economic and Social Affairs (UN DESA) of United Nations published its report, by 2023, the proportion of the global population aged 65 and above had reached 9.62%, and this figure continues to rise. The study was based on data from over 1,000 national population censuses, 3,200 sample surveys, and civil registration systems from 129 countries. It is also projected that by 2050, this proportion will exceed 16%, meaning that one in every six people worldwide will be aged 65 or older.

According to the United Nations' standard classification of population aging, a country or region is considered an aging society when the proportion of people aged 65 and above exceeds 7%, a deeply aging society when it reaches between 14% and 20%, and a super-aged society when it exceeds 20%. Currently, global aging is characterised by rapid growth, large scale, and significant regional disparities, and is exerting profound impacts on healthcare systems, social security structures, and broader societal organization. Population aging is not merely a matter of demographic change in numbers; rather, it represents a systemic transformation of social organisation and ways of living.

Since entering the fields of healthcare and aged care services nearly two decades ago, the author has had the opportunity to engage with scholars in demography and sociology, gradually developing an analytical perspective that interprets social and economic phenomena through the lens of population structure. From this perspective, aging is no longer confined to the domains of healthcare or aged care, but has emerged as a core variable that fundamentally shapes the logic of social operation.

1.2 Emotional Companionship and Social Connectivity among the Elderly

In the process of population aging, the core challenges faced by the aged population extend beyond physical health, and are increasingly reflected in the lack of emotional companionship and social connectivity. According to the Report on the Current Situation of Companion-Oriented Consumption among the Elderly

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Research Interests: Her research focuses on the design and application of elderly care spaces and AI-assisted companionship systems (such as intelligent care robots) in the context of an aging society. Adopting a global perspective, she explores interdisciplinary approaches to integrating AI companionship systems with emotional support, health management, and disease prevention for older adults.

in Guangzhou (2024) [2], released by the Guangzhou Consumer Council, a survey targeting individuals aged 55 and above found that approximately 51% of elderly people in Guangzhou experience a lack of companionship in their daily lives. Among them, empty-nest elderly account for 21%, those living alone for 18%, and those living with their children but without grandchildren for 14%.

These groups, often with relatively abundant free time, tend to compensate for emotional deficiencies through participation in community activities, tourism, pet ownership, and even the consumption of health products. With changes in family structure and the acceleration of urban life rhythms, the traditional family-centered model of companionship has gradually weakened, leading to increasingly prominent issues of loneliness and social isolation among the elderly. National data further indicate that the proportion of elderly individuals living alone has reached 14.2%, while 23.76% of aged population in China report experiencing varying degrees of loneliness. Surveys focusing on community-dwelling of elderly populations reveal a social isolation detection rate of 26.9%, among which 4.7% experience a high level of loneliness.

Based on nearly two decades of professional practice, the author has observed that although many elderly care institutions have continuously improved their functional configurations and medical service systems, their spatial design still largely prioritses "management efficiency." As a result, limited attention has been given to creating appropriate spatial conditions that support emotional interaction and social engagement among elderly residents. This function-centered spatial model, to some extent, exacerbates psychological alienation among the elderly. In parallel, the author has, over the past three years, conducted multiple investments and long-term observational studies in Japan, with a particular focus on understanding how highly aged societies respond to aging-related challenges. The Japanese experience suggests that relying solely on institutional systems and service provisions is insufficient to fully address the issue of loneliness among older adults. Instead, the spatial environment plays a crucial yet often overlooked role.

Japan has made notable advancements in the design of elderly living environments. For example, there are many human-centered spatial strategies addressing physical, psychological, and social needs, such as accessible ramps and elevators, safety-oriented features including anti-slip flooring and rounded-edge furniture, as well as shared spaces that balance social interaction with privacy. These practices have demonstrated the capacity to alleviate loneliness at the environmental level, further underscoring the critical value of

spatial design in shaping the well-being of the elderly.

1.3 Practical Limitations of Existing Elderly Care Spaces

At present, the spatial design of most elderly care institutions continues to follow the core logic of medical architecture, emphasising clearly defined functional zoning, explicit circulation routes, and fully controllable management processes. While such design approaches contribute to operational efficiency, they also, often implicitly, reinforce a sense of being "managed" within the space. This perception may lead elderly individuals to experience psychological distance and defensiveness.

Against this backdrop, how spatial design can respond to older adults' needs for "companionship" and "being seen" has become an important societal issue. As a mother of three children, the author has, through personal experiences of childbirth decisions and family responsibilities, developed a deeper understanding of how demographic changes shape long-term societal development. Although increasing fertility rates is considered an important pathway to addressing population aging, in the current context of a continuously expanding elderly population, improving the lived experience of the elderly generation through spatial and environmental optimisation presents a more immediate and practical approach. Therefore, beyond traditional elderly care spatial models, it becomes necessary to explore new types of spatial configurations that can reduce social pressure, enhance individuals' willingness to stay, and support the presence of emotional experience. This need constitutes the practical starting point for the conceptual development of the "Fourth Space" proposed in this study.

2.0 Theoretical Foundations and the Emergence of the "Fourth Space"

2.1 Overview of Third Place Theory

The concept of the "Third Place" was proposed by the American sociologist Ray Oldenburg in 1989 in his seminal work The Great Good Place [3]. It refers to informal public spaces that exist beyond the domains of home and workplace. Such spaces are typically characterised by openness, accessibility, and low thresholds of entry, serving as important settings for everyday social interaction and playing a vital role in fostering community vitality and social connectivity.

This theory emerged in the late twentieth century, a period during which global demographic structures were relatively young. For example, statistical data from 1973 indicate that the global working-age population (15–64 years) reached approximately 2.24 billion. At that time, most countries were still experiencing

relatively youthful population structures and vibrant urban public life. Within this context, the emphasis of Third Place theory on "spontaneous interaction" and "public participation" was supported by a broad and stable social foundation.

During the author's early engagement with demographic and sociological studies, Third Place theory was adopted as an important analytical framework for understanding the relationship between social interaction and spatial environments. However, with the continued focus on population aging and long-term practice in the field of elderly care services, the author has gradually recognised that the social conditions underpinning Third Place theory are undergoing fundamental transformation.

2.2 Limitations of Third Place Theory in Aging Contexts

Within the context of elderly care institutions, the interaction-oriented logic emphasised by Third Place theory faces significant practical challenges. The theory presupposes that individuals possess both the capacity and willingness to participate in public life. However, the aged population are often affected by declining physical abilities, increased psychological defensiveness, and reduced motivation for social engagement, which limit their ability to actively integrate into conventional public spaces.

According to the Report on the Development of National Mental Health in China (2023–2024), levels of anxiety among individuals aged 70 and above have shown a notable increase, while self-reported life satisfaction and psychological resilience among middle-aged and older populations have declined. Regional health surveys indicate that approximately 55% of older adults suffer from at least one chronic illness, and around 20% experience mental health conditions such as depression or anxiety. Data from the Fourth National Sample Survey on the Living Conditions of Urban and Rural Elderly in China further show that older adults with poorer physical health are less willing to participate in social activities. These findings collectively highlight the structural barriers faced by elderly populations when engaging with public space.

Drawing on nearly two decades of professional experience in healthcare and elderly care, the author observed as early as more than ten years ago that even when communal activity spaces were provided within aged care institutions, older residents did not necessarily choose to participate. Instead, some tended to remain at the periphery of such spaces, assuming the role of observers rather than active participants. This phenomenon suggests that the "interactivity" advocated by Third Place theory may, in aging contexts, be transformed into a form of latent social pressure.

Therefore, under conditions of deepening

population aging, it becomes necessary to undertake a contextual reassessment of Third Place theory and to explore alternative spatial paradigms that are better aligned with the needs and characteristics of elderly populations.

2.3 The Conceptualization of the "Fourth Space"

Building on the above observations, this study proposes the concept of the "Fourth Space" as an extension of Third Place theory. The Fourth Space is defined as a transitional environment situated between private and public spaces. Unlike traditional public spaces, it does not presuppose interaction as a prerequisite, but instead emphasises a mode of presence characterised by coexistence rather than communication.

In early 2026, the author conducted a three-month period of field observation in Melbourne. The findings indicate that certain public spaces, by softening spatial boundaries and lowering participation thresholds, create environments in which individuals can coexist without the necessity of active engagement. This spatial condition offers a more comfortable mode of presence for the aged population and provides new insights for the design of aged care environments.

Based on this study, the core characteristics of the Fourth Space can be summarised as follows: (1) minimal boundary construction, which reduces psychological barriers through the blurring of spatial divisions; (2) non-mandatory interaction, which allows individuals to share space without the pressure of active social engagement; and (3) environmentalised companionship, which refers to a form of sustained presence generated by the spatial environment itself rather than by direct interpersonal interaction.

Importantly, the Fourth Space is not intended to replace Third Place theory. Rather, it represents a contextual extension and functional reconfiguration of the theory in response to the conditions of aging societies. In this sense, the introduction of the Fourth Space is not merely a theoretical supplement, but also carries forward-looking significance for aging societies, potentially emerging as an important spatial paradigm for everyday life in the future.

3.0 Field Observation and Case Analysis of Melbourne Landmark Spaces

3.1 Research Background and Methodology

The case study presented in this paper is based on a continuous three-month period of on-site living and observation conducted by the author in Melbourne from January to March 2026. During this period, while accompanying her three children in their daily study and life, the author engaged in high-frequency visits to major Melbourne landmark spaces, systematically examining

patterns of spatial use and behavioral characteristics across different types of environments.

The author's three children represent different developmental stages. The eldest daughter is enrolled in a foundation program at the University of Melbourne and represents the young adult stage, while the older son and the younger son correspond to adolescent and child stages respectively. The behavioral differences among these three individuals within the same spatial settings provide a natural comparative framework for observing how public spaces are experienced and engaged with by different age groups.

At the same time, the author transformed everyday lived experiences into a form of continuous observation, focusing on three key questions: how individuals enter a space, whether they are willing to remain within it, and how a sense of "companionship" can be generated by the space without relying on active interpersonal interaction.

In terms of case selection, this study focuses on Federation Square and the National Gallery of Victoria (NGV) as primary research sites. These two locations respectively represent high-frequency public activity spaces and slower-paced cultural environments, and together constitute two of the most representative types of landmark spatial environments in Melbourne.

3.2 Federation Square: The "Container Logic" Behind High-Frequency Activity

Federation Square, as one of the most central public plazas in Melbourne, hosts approximately 500 public events annually, demonstrating a high level of usage frequency and social participation. This study argues that its intensive use is not solely the result of programming or event management, but is closely related to the spatial design logic of the square as an "open container."

The square adopts an open platform structure, where multi-level surfaces, variations in elevation, and a boundary-less paving system guide pedestrian flows to naturally converge from multiple directions. Within the space, there are no rigid functional zones; instead, continuous spatial interfaces and visual permeability create a flexible environment that can be "filled" by a wide range of activities. This de-functionalised spatial strategy allows the space to accommodate diverse modes of use, from large-scale events to individual occupation and informal gathering.

During field observations, the author's three children exhibited distinctly different behavioral patterns within the same environment. The eldest daughter tended to actively engage in organised public activities, the older son gravitated toward the spatial periphery, combining movement with light social interaction, while the younger son was more attracted to the exploratory and visually stimulating aspects

of the space. These differences suggest that the space does not impose a singular mode of use, but instead enables multiple forms of behavior to coexist.

Therefore, Federation Square should not be understood merely as a conventional "interactive public space," but rather as an open spatial container that allows individuals to inhabit the space in diverse ways. Its characteristics, particularly minimised spatial boundaries and non-mandatory modes of participation, directly resonate with the concept of the "Fourth Space" proposed in this study.

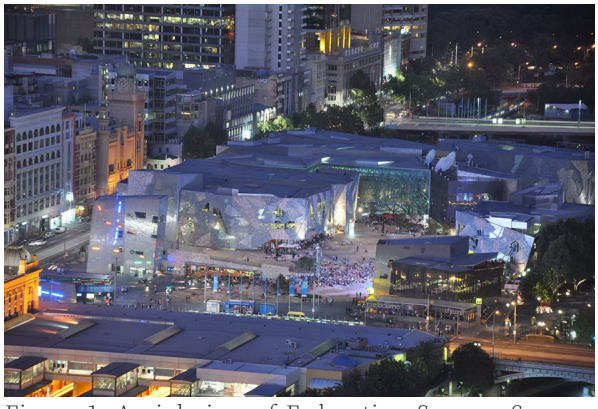

Figure 1. Aerial view of Federation Square. Source: Wikipedia.

3.3 NGV: Non-mandatory Interaction and the Spatial Condition of "Quiet Coexistence"

In contrast to the outward openness and high-frequency interaction observed in Federation Square, the National Gallery of Victoria (NGV) presents a distinctly different spatial rhythm. Its entrance water feature, interior spatial sequence, and controlled use of natural light collectively create a perceptible slowing of pace, shaping a more contemplative and immersive spatial experience.

Rather than encouraging direct interpersonal interaction, the space guides individuals into a state of environmental immersion. Within this condition, people maintain a certain degree of distance from one another, yet remain present within the same spatial environment, forming a stable mode of "coexistence."

Through multiple visits to the NGV with her three children, the author observed that each individual was able to establish their own mode of presence without interruption. Different behavioral states naturally coexisted within the same space, without the need for organisation or external guidance.

The following images illustrate three representative scenarios observed in this study. All images are sourced from Wikipedia, and the accompanying descriptions are based on the individual responses of the author's three children to each spatial setting.

Figure 2, The older son's spatial behavior in the transitional zone of NGV

The older son shows a clear preference for remaining in the external space and entrance transition area of the National Gallery of Victoria (NGV). Through the continuous transition between water features, platforms, and the building façade, this zone forms a buffering interface that smoothly extends from urban public space into the interior cultural environment.

His movement is not oriented toward a specific functional objective, but instead reflects a relatively free state between entry and temporary occupation. This spatial condition lowers the threshold of participation, allowing individuals to engage with the space without a predefined purpose.

From the perspective of the "Fourth Space," such transitional zones should not be understood merely as entrances or circulation paths, but as dwellable spaces characterised by weak boundaries. They provide a low-pressure mode of presence for different individuals and establish an emotional buffer for subsequent spatial experience.

The eldest daughter shows a strong preference for the central hall of the National Gallery of Victoria (NGV), particularly the stained-glass ceiling. Through complex geometric compositions and colored translucent structures, natural light is continuously transformed throughout the day, creating a dynamic visual environment.

Her presence in this space is not driven by social interaction or functional objectives, but rather reflects a form of passive engagement based on visual perception and sensory experience. This continuous attraction, generated by environmental variation, enables individuals to remain engaged with the space without the need for active interpersonal interaction.

From the perspective of the "Fourth Space," this spatial condition constructs a sense of companionship through the environment itself, rather than through human interaction. It represents a typical form of what may be understood as an environmentally mediated mode of presence.

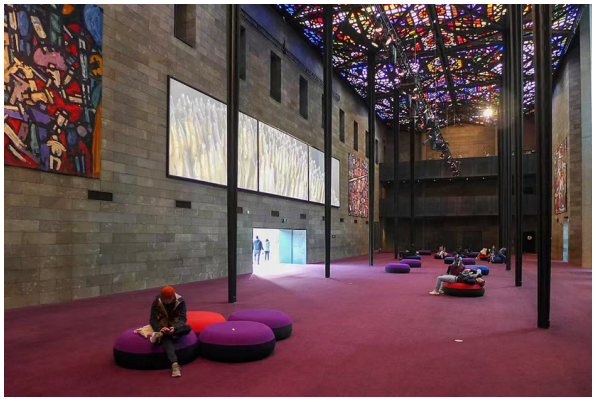

Figure3.The eldest daughter's engagement with the central hall of NGV

Figure4.The younger son's autonomous use of the exhibition space in NGV

The younger son shows a preference for remaining within the internal exhibition spaces. Through the arrangement of exhibits distributed along the perimeter and a central area for temporary occupation, the space forms a "dual-centered" spatial structure in both visual and behavioral terms.

Within this configuration, individuals may either circulate around the exhibits or pause within the central area, creating multiple pathways of spatial use. The younger son's behavior in this setting demonstrates a high degree of autonomy, rather than passive participation or externally guided activity.

This spatial form avoids the social pressure associated with forced interaction, while still maintaining a sense of the presence of others within the space. It thus exemplifies a mode of coexistence rather than interaction, closely aligning with the low-intervention logic of companionship emphasized in the concept of the "Fourth Space."

The spatial condition presented by the NGV suggests that a sense of companionship does not necessarily rely on interpersonal interaction, but can instead be generated through the continuous presence of the environment itself. This environment-centered mode of presence provides important insights into addressing the needs of the aged population to feel "seen" without being disturbed in aged care settings.

In summary, continuous field observations of Federation Square and the National Gallery of Victoria (NGV) reveal that, despite differences in function and form, diverse types of public spaces share several common characteristics at the level of spatial use.

First, these spaces tend to soften boundaries and lower thresholds of entry, enabling individuals to enter and remain without a predefined purpose, thereby establishing the foundation for sustained spatial engagement. Second, interaction is not positioned as the primary objective; instead, individuals are allowed to coexist with others without disturbance, which effectively reduces social pressure. Third, through environmental elements such as light, circulation paths, and points of temporary occupation, these spaces generate a perceptible sense of companionship that does not depend on verbal communication.

These characteristics become particularly evident during the author's visits with her three children of different age groups. While each individual developed distinct patterns of spatial occupation, all were able to maintain a stable experience of presence without being required to actively participate. This form of low-pressure coexistence, generated by the spatial environment itself, represents a key distinction from conventional public

spaces.

Based on these observations, this study argues that the evolution of Third Place theory is gradually shifting from an interaction-oriented model toward one that allows for coexistence. This shift is particularly significant in the context of aging societies and offers new directions for the design of aged care environments. Therefore, it becomes necessary to further extend and reconfigure the functional and conceptual dimensions of Third Place theory. By systematically synthesising these spatial characteristics from a design perspective, this study proposes a "Fourth Space" framework tailored to elderly care contexts.

4.0 A Design Framework of the "Fourth Space" for Elderly Care Environments

Based on the preceding field observations and behavioral analyses of representative landmark spaces in Melbourne, this study argues that the "Fourth Space" should not be understood as a single spatial typology, but rather as a design logic oriented toward human emotional needs. In the context of aging societies, the value of space is no longer limited to functional organisation or the facilitation of social interaction, but lies in its capacity to provide individuals with a low-pressure and sustainable mode of presence.

Existing research indicates that physiological needs, psychological well-being, and social connection constitute the core considerations in elderly individuals' selection of care environments. However, in practice, some aged care institutions, such as those observed in parts of Wuhan, China, fail to meet these needs due to rudimentary spatial design, insufficient communal areas, and a lack of age-friendly outdoor environments. These conditions further underscore the necessity of a spatial design logic that prioritises emotional needs in aging contexts.

Accordingly, the design of the Fourth Space calls for a shift from a traditional function-centered approach toward one guided by perception and relational experience. Drawing on the findings of this study, the Fourth Space framework can be summarised into three core design directions: (1) minimal boundary construction; (2) non-mandatory interaction mechanisms; and (3) an environmental companionship system.

4.1 Minimal Boundary Construction: From Spatial Separation to Spatial Transition

Traditional aged care institutions often rely on clearly defined functional zoning and rigid spatial boundaries, where corridors, rooms, and communal areas are distinctly separated. While such configurations improve management efficiency, they also tend to reinforce a sense of institutionalisation and the perception of being "managed."

The Fourth Space framework emphasises

the softening of spatial boundaries as a means of reducing psychological defensiveness, enabling spaces to shift from being merely "entered" to becoming "dwellable." The key lies in creating transitional zones between public and private realms, such as semi-open corridors, intermediary courtyard spaces, and visually permeable connecting areas. These spaces are neither fully open nor fully enclosed, thereby allowing individuals to experience a state of being "seen without being disturbed."

As demonstrated in the preceding case studies, both the multi-directional access system of Federation Square and the gentle ramps and transitional areas within the NGV exemplify the blurring of spatial boundaries. Such designs enable individuals to enter spaces naturally and to choose whether to stay or leave according to their own preferences, without confronting predefined behavioral expectations.

In the context of aged care institutions, the introduction of blurred boundary design can help reduce psychological resistance to public spaces, encouraging older adults to gradually move from private rooms into semi-public environments. In doing so, it supports a progressive process of spatial engagement.

4.2 Non-mandatory Interaction: From Socially Driven Engagement to Coexistence

Conventional public spaces are typically designed to promote interaction, using programmed activities and functional arrangements to encourage participation. However, within the context of aged care institutions, such forms of "induced participation" may evolve into a source of social pressure, leading some older adults to withdraw from shared environments.

The Fourth Space framework emphasises a principle of non-mandatory interaction, whereby space does not presuppose communication as a prerequisite, but instead allows individuals to inhabit the same environment in diverse ways. The objective of the space is no longer to facilitate dialogue, but to sustain a stable condition of coexistence. For instance, within the exhibition halls and resting areas of the NGV, individuals may choose to pause, observe, or simply sit, without engaging in any form of interaction. While maintaining their own rhythms, different individuals remain present within the same environment, collectively forming a condition of "co-presence."

This mechanism is particularly significant for elderly populations. By lowering the threshold of interaction, individuals are able to perceive the presence of others without bearing the burden of social expectations, thereby alleviating feelings of loneliness at a psychological level. This mode of "coexistence rather than interaction" constitutes a key distinction between the Fourth Space and traditional Third Place paradigms.

4.3 AI-Integrated Environmental Companionship: From Technological Intervention to Spatial Integration

In traditional aged care models, "companionship" is primarily dependent on interpersonal relationships, such as the continuous involvement of caregivers or family members. However, with the deepening of population aging, such models are becoming increasingly difficult to sustain. By the end of 2023, the population aged 60 and above in China had reached approximately 296.97 million, accounting for 21.1% of the total population, while the old-age dependency ratio (65+) had risen to 22.5%. At the same time, labor constraints and contemporary work patterns mean that grown-up chilren are often able to spend only limited time with their aging parents. These conditions indicate that reliance solely on interpersonal companionship is unlikely to provide a sustainable long-term solution. Consequently, the integration of artificial intelligence has emerged as a key direction in the future development of elderly care, receiving increasing attention in smart care research [4].

Despite this, many existing AI-assisted care solutions remain device-centered, emphasising functional capabilities and interactive features such as proactive dialogue, reminders, and emotional recognition. While these functions may offer practical support, they can also generate a sense of intrusion or technological pressure, leading to psychological distance and resistance among elderly users.

From the perspective of the Fourth Space framework, the introduction of AI should not position technology as a dominant interactive agent, but rather as an integrated component of the spatial environment, forming part of what may be understood as environmental companionship. The core principle is that AI should not actively interrupt human states, but instead remain unobtrusive, becoming perceptible and responsive only when individual needs arise. In this way, it supports a form of low-intervention and sustained companionship.

Within this framework, AI care robots and intelligent systems are no longer conceived as central actors, but are embedded as environmental nodes within the spatial system. For example, robots may exist as stationary presences, move gently along circulation paths, or respond adaptively to environmental conditions, while maintaining alignment with spatial flows, lighting conditions, and acoustic environments. Similarly, intelligent systems may rely on passive environmental sensing, such as changes in light, duration of stay, and behavioral rhythms, rather than continuous active output.

This design logic is closely aligned with the principle of non-mandatory interaction discussed earlier. AI is not introduced to initiate communication, but to establish

a sense of presence through subtle feedback and ambient responsiveness, thereby creating a condition of being "perceived without being disturbed." This condition is particularly important for elderly populations, as it not only reduces social pressure but also minimises the psychological burden associated with technology.

More importantly, the value of AI-integrated environmental companionship lies not only in functional supplementation, but in its capacity to operate in synergy with spatial design to form a continuous system of emotional support. When spaces already embody characteristics such as weak boundaries and coexistence, the integration of AI becomes non-intrusive and seamlessly embedded within the environment. This enables a transition from "human-to-human companionship" toward a hybrid model in which space and technology jointly support human presence.

Accordingly, future applications of AI in elderly care should shift from a device-oriented paradigm to an environment-oriented approach. Rather than disrupting the intrinsic logic of space, technology should enhance its emotional and experiential capacities. This integrated model is grounded in spatial design and supported by technology, which constitutes a key component of the Fourth Space framework.

In summary, the Fourth Space proposed in this study is not a singular spatial form, but a design system oriented toward human emotional needs. Its essence lies in lowering entry thresholds through weak boundary construction, reducing social pressure through non-mandatory interaction, and providing sustained support through AI-integrated environmental companionship. Together, these elements form a stable, low-intervention spatial relationship.

This framework represents a departure from conventional design paradigms dominated by function and efficiency, shifting the focus from how people use space to how space supports human presence. In the context of aging societies, such a shift holds not only design significance but also broader implications for the innovation of elderly care models. Through the integration of spatial, behavioral, and technological dimensions, the Fourth Space establishes an adaptive environmental system that can be experienced differently by diverse individuals, thereby providing both a theoretical foundation and a practical framework for future implementation in elderly care institutions.

5.0 Practical Validation in Chinese Elderly Care Institutions

Building upon the "Fourth Space" design framework developed in the preceding sections, this study further examines representative cases from aged care

institutions in China to validate and analyse the presence of corresponding spatial characteristics. Through observations of spatial configurations and patterns of use, it can be identified that many such institutions already exhibit features aligned with the Fourth Space concept, including curved spatial interfaces and intermediary spaces.

5.1 Emotional Buffering through Curvilinear Interfaces

Antoni Gaudí, a key practitioner of organic architecture, emphasised the structural logic of natural curves in his architectural works, arguing that curvilinear forms are more closely aligned with natural order and organic life structures [5]. Such soft spatial boundaries reduce the sense of visual and psychological pressure, offering important insights for the de-medicalisation of contemporary elderly care environments.

Taking the Shanghai Dachang aged Care Center, operated by Shanghai Chang' le aged Care Services, as an example, its architectural façade is composed of continuous curvilinear forms. The external corridors and balconies are designed with horizontally extended soft curves, which visually soften the overall massing of the building and reduce its "institutional" appearance. Compared with the rigid and rectilinear façades commonly found in traditional elderly care facilities, this approach emphasises the elimination of sharp edges and the introduction of continuous surfaces, which creates a more gentle and emotionally responsive spatial expression.

Figure 5

The application of curvilinear interfaces not only creates formal variation at the visual level, but also establishes an emotional buffering mechanism at the level of spatial perception, helping to reduce the psychological defensiveness of elderly individuals when entering a space.

At the same time, such soft boundaries embody the design characteristic of "minimal boundary construction" to a certain extent, transforming space from something that is merely "entered" into one that invites "staying".

5.2 Miminised Boundaries and Coexistence Patterns in Transitional ("Gray") Spaces

At the level of site organization, a semi-open canopy structure is introduced in the forecourt to create a transitional "gray space" between interior and exterior environments.

This space is neither fully public nor entirely private; rather, it functions as an intermediate environment that allows for

temporary stay, where individuals can be present and observable without being compelled to participate.

Figure 6.

In practice, this space exhibits clear characteristics of minimal boundaries: elderly individuals can pause briefly, observe others' activities, or engage in light interaction without bearing the pressure of sustained social engagement.

Compared with the behavioural constraints imposed by clearly defined functional zoning in traditional aged care environments, such "gray spaces" reduce participation thresholds through blurred boundaries, offering individuals a mode of presence in which they are "visible yet undisturbed."

At the same time, this spatial condition embodies a typical mechanism of non-mandatory interaction, where communication is not the primary objective. Instead, it allows individuals to form a relationship of coexistence within the same environment, thereby alleviating feelings of loneliness at the psychological level.

5.3 Local Adaptation Pathways of the Fourth Space

At present, the spatial design of aged care institutions in China still prioritises functional efficiency and medical safety, while the needs for emotional companionship and social connection remain insufficiently addressed at the spatial level.

For example, in the design of public activity areas, there is often a lack of open and inclusive spatial layouts, as well as shared facilities such as communal kitchens or tea rooms that can facilitate social interaction. In addition, relatively little attention is given to the creation of a warm atmosphere or to personalised details, which are essential for meeting the emotional needs of elderly individuals. As a result, such environments struggle to effectively support the formation of social connections and provide emotional comfort.

However, the realisation of the Fourth Space does not rely on the construction of entirely new systems; rather, it can be gradually achieved through the optimisation of existing spatial forms. For instance, by introducing soft boundaries, adding transitional spaces, and reducing behavioral constraints, it is possible to enhance the emotional capacity of a space and encourage longer stays without altering its overall functional structure.

Therefore, the implementation of the Fourth Space in Chinese elderly care institutions should follow a strategy of incremental adaptation. That is, based on existing architectural frameworks, a

gradual transformation from "functional space" to "emotional space" can be achieved through the refinement of spatial details and interface design. This process reflects an initial pathway for adapting the design logic of the Fourth Space within the local context.

6.0 Conclusion and Future Outlook

According to relevant data, the global population aged 65 and above reached 761 million in 2021, accounting for 9.62% of the total population, and is projected to rise to 1.6 billion, or 16%, by 2050. Population aging is thus expected to deepen significantly worldwide. In this context, traditional elderly care space design, primarily oriented toward functionality and operational efficiency, can no longer adequately address the needs of the aged pupulation for emotional companionship and social connection.

Drawing on nearly two decades of professional experience in healthcare and elderly care services, as well as three months of field observation in Melbourne in early 2026, this study systematically analyses the spatial use patterns of representative urban landmark spaces based on real-life scenarios.

The findings indicate that high-quality public spaces are increasingly shifting from "promoting interaction" to "enabling coexistence." Exemplified by Federation Square and the National Gallery of Victoria (NGV), such spaces employ minimal boundary design, non-mandatory interaction mechanisms, and carefully constructed environmental atmospheres to support stable spatial presence and emotional connection without imposing social pressure. These characteristics offer valuable insights for the design of elderly care environments in an aging society.

On this basis, the paper proposes the concept of the "Fourth Space" and establishes a design framework centred on minimal boundary construction, non-mandatory interaction, and AI environmentalised companionship. This framework moves beyond the traditional emphasis on function and behavior, instead focusing on how space can support human modes of presence, thereby providing a more human-centered design approach for elderly care institutions.

Through the analysis of practical cases in China, it is demonstrated that the Fourth Space does not entirely depend on new systems, but can be gradually realised within existing spatial structures through interface refinement, transitional space design, and behavioral guidance. This incremental approach enhances the framework's feasibility and scalability in real-world applications.

From a longer-term perspective, with the advancement of artificial intelligence, future aged care environments will no longer be defined solely by physical architecture, but will evolve into integrated

systems shaped by the interaction of space, technology, and human behaviour. In such systems, AI will not function as an isolated device, but will be embedded into the environment, forming a continuous and low-intervention companionship relationship with the physical space.

Based on long-term observation of demographic change and professional practice, the author argues that population aging should be understood not only as a challenge, but also as a driving force for the evolution of spatial forms. In this process, responding to human emotional needs through design will become a central issue in the future development of elderly care systems. In this sense, the Fourth Space represents not only a spatial design concept, but also a meaningful exploration of living patterns in an aging society. Its value extends beyond elderly care institutions and may gradually influence broader public spaces and urban environments.

Although this study originates from the author’ s personal practice and cross-cultural observations, the proposed framework demonstrates forward-looking and potentially universal applicability. With the continued accumulation of empirical cases and the advancement of technological tools, the Fourth Space is expected to evolve from a conceptual model into a systematic application, opening new pathways toward more inclusive, low-pressure, and human-centred environments.

References:

[1] United Nations, Department of Economic and Social Affairs, Population Division. *World Population Prospects 2024* [R]. New York: United Nations, 2024.

[2] Guangzhou Consumer Council. *Report on the Current Situation of Companion Consumption among the Elderly in Guangzhou* [R]. Guangzhou: Guangzhou Consumer Council, 2024. (in Chinese)

[3] Oldenburg, R. *The Great Good Place: Cafes, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community* [M]. New York: Marlowe & Company, 1989.

[4] Sixsmith, A., & Sixsmith, J. Smart technologies and the ageing population: Enabling the future [J]. *Journal of Aging Studies*, 2020.

[5] Zerbst, R. *Gaudí: The Complete Buildings* [M]. Köln: Taschen, 2005.