

Article

Habitual Activities for People with Dementia: The Role of Interiors in Supporting Their Development after Relocating to a Care Environment

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Abstract: People with dementia have pre-reactive instincts, known as bodily habits, that allow them to continue with habitual activities. According to recent research, continuing and developing habitual activities in care facilities can help individuals with dementia establish a deep-rooted sense of home. Three aspects of developing habitual activity are critical in this process: continuing habitual activities fluidly, incorporating positive interaction into these habitual activities, and carrying out these habitual activities regularly. Based on this foundation, this article discusses how the interior environment of care facilities can support these three aspects of habitual activity for people living with dementia. Three cases in a long-term care facility were in-depth examined by using the microethnography approach. The study produced four themes. These themes emphasize the importance of organizing and managing the interior environment to support dementia residents' habitual activities. In addition, it emphasizes that caregivers and institutional regulations influence the organizational role of the interior environment.

Keywords: people with dementia; care facility; habitual activity; interior environment



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1. Introduction

Humans possess a pre-reflective instinct that enables them to execute movements without conscious intervention [1]. This instinct is known as a habit, which is a type of implicit memory [2]. In some studies, this is referred to as “body memory” [3]. This pre-reflective instinct in the body develops through repeated behaviors in the same context [4–6] and is related to automaticity [6,7]. As a result, it can happen without conscious control, effort, or thought [5,8]. A variety of cues, such as physical environments, other people, or preceding actions in a sequence, can activate the body's pre-reflective instinct [7,9,10]. Existing research has proven that while the explicit memory of people with dementia declines, their implicit memory can remain intact [11–13]. This means that even in the severe stages of dementia, people can retain their body's pre-reflective instinct. In order to better understand this concept, we refer to this pre-reactive bodily instinct as “bodily habits” throughout this paper. Bodily habits are triggered when people perform previously repeated activities, including procedural activities, habits, skills, and routines. These activities that elicit bodily habits are referred to as “habitual activities” in this paper.

An increasing amount of research is beginning to understand dementia through their bodily habits [14,15]. This has expanded the discourse on dementia beyond the biomedical perspective and has suggested new ideas for dementia care and treatment [16–19]. Maintaining bodily habits can provide continuity for people with dementia, as bodily habits can assist people with dementia in participating in as many daily activities as possible, allowing them to have a normal life and maintain their preferred lifestyle [20–22]. Meanwhile, it can help people living with dementia keep long-held beliefs and values [23,24].

Bodily habits are also regarded as a manifestation of self in people who have dementia [17,18,25]. When these skilled and fluid bodily habits are interrupted, they become physically still and inactive, described as “being a blank” [26]. These findings highlight the importance of encouraging people with dementia to maintain bodily habits and engage in habitual activity.

Previous research has demonstrated the critical role of the physical environment in promoting habitual activity in people with dementia [27–29]. With the rise of person-centered care [30], dementia care facilities are shifting towards small-scale and homelike facilities [31]. Because of the characteristics of deinstitutionalization, homelike care facilities allow people with dementia to continue their habitual activities [32]. Green care farms, for example, use farm and field characteristics to encourage people with dementia to do farm work, such as feeding animals, cleaning cages, and picking eggs [33–35]. People with dementia can continue to engage in these habitual activities because their surroundings are familiar [36]. As one study proved, when residents with dementia return to where they grew up, the familiarity of the environment encourages them to continue walking, shopping, and using public transport [20]. In addition to familiar surroundings, the physical environment can aid people with dementia in other ways in performing habitual activities. For example, Chard et al. discovered that clearing clutter, simplifying the environment, and using labels helped people with dementia perform daily tasks (e.g., setting the table and folding laundry) [37]. So far, numerous studies have explored the role of the physical environment in supporting individuals with dementia to perform their habitual activities. These studies have primarily focused on the support for the overall performance of habitual activities or support for specific habitual activities, such as housework [29].

According to recent research, the habitual activities of people with dementia can not only be continued but also developed. The continuation and development of habitual activities of people with dementia after admission to a long-term care facility help them to integrate into their new environment and establish a deep-rooted sense of home in the care facility [38]. The continuation and development of this habitual activity, which brings with it a deep-rooted sense of home, involves three aspects: continuing habitual activities fluidly; incorporating positive interaction into habitual activities; and carrying out habitual activities regularly. This paper discusses how the interior environment (Interior environment: According to Harris et al., the physical environment of healthcare can be divided into three categories: environmental features, interior features, and architectural features. Environmental features refer to temporary sensory elements such as lighting, noise levels, air quality, odours, and temperature. Interior design features are those that are less fixed, such as furniture, colours, finishes, artwork, and room layout. Architectural features, on the other hand, are more permanent, such as unit size, facility planning or layout, and door and window placement. Here, the interior environment encompasses both environmental and interior features [39]) can support people with dementia in developing their habitual activities in a long-term care setting. Specifically, it examines how the interior environment supports people with dementia to develop the three aspects mentioned above of habitual activities in a care setting.

2. Methods

This study used the microethnography approach. It is an approach to qualitative research that is also called focused ethnography [40] or constitutive ethnography [41]. Microethnography focuses on “aspects of bodily communication, such as gaze, gesture, postural configurations, and interactions with artifacts and the built environment” [42]. Thus, it is suitable for understanding the relationship between the interior environment and the habitual activities of people with dementia. The ethical committee of Politecnico di Milano approved this project.

2.1. Setting

In China, dementia care is based on three tiers of the care system: home care, community services, and institutional care [43]. However, with the increasing aging of the population and changes in the demographic structure of Chinese families, among other factors, more and more Chinese people have accepted institutional care [44]. In China, care facilities are now emphasizing the creation of a family-like institution and mutual support within this extended family [45].

The study was conducted in a homelike dementia care facility. Approximately 20 residents with dementia reside in this facility. This site was chosen due to its typical homelike care facility for people living with dementia. It is a three-story building with residential, activity, and common areas. The residential area has 16 rooms, each with a bathroom. There are three types of rooms: single, double, and en-suite. Each floor has a living room with an open kitchen and a laundry room (see Figure 1). Residents with dementia can engage in various activities, such as housework, walking, exercising, singing, and chatting.



Figure 1. Plan of care facility.

2.2. Participants

Recruitment of study participants began with agency directors recommending residents who had adapted well to living in a care setting to the researcher. Following this, a purposive sampling strategy was employed to recruit participants for this study, which can be used to find informative participants [46]. Purposive sampling was drawn according to the following inclusion criteria:

1. The participant is willing and able to give informed consent to participate in the study.
2. Dementia has been diagnosed.
3. The participant possesses the verbal ability to conduct an interview and the acting ability to observe.
4. The participant has been living there for more than six months (because six months is a critical period for older people to become acquainted with the care environment).

We finally recruited three residents living with dementia in the facility. According to the facility's information, the severity of dementia for the three residents was determined to be CDR1 to CDR2 on the Clinical Dementia Rating (CDR) scale [47]. For ethnographic studies, the sample size may be limited, but data saturation needs to be ensured by conducting longer or multiple in-depth interviews and observations with participants [48]. For reaching data saturation, this study adopts the triangulation approach to collect the data. Triangulation refers to using multiple methods or data sources in qualitative research to

develop a comprehensive understanding of phenomena [49]. Triangulation has also been viewed as a qualitative research strategy to test the validity by converging information from different sources [50]. So, we collected data from as many different participants as possible. Residents with dementia, their relatives, and professional caregivers were all included in this study. We finally chose three residents with dementia, their close relatives, and their primary caregivers for data collection (for the characteristics of participants, see Table 1).

Table 1. Characteristics of participants.

Type of Participant	Participant Profile
Dementia residents	Li, Man, 85 years old, Alzheimer’s disease, CDR 2, 2 years of residence Wang, Woman, 83 years old, Mixed dementia, CDR 1, 1.5 years of residence Zhang, Man, 79 years old, Mixed dementia, CDR 1, 1.5 years of residence
Dementia residents’ relatives	Li’s wife Wang’s daughter Zhang’s nephew
Dementia care staffs	Professional caregiver 1 Professional caregiver 2 Professional caregiver 3 Head of Institution

2.3. Data Collection

Data collection consisted of two main components: semi-structured interviews and observations.

Interviews with residents and their families were conducted in their rooms, and interviews with professional caregivers were conducted in the common areas and the head’s office. Each interview lasted between 0.5 and 1 h and was recorded. To ensure that everything went smoothly, an outline of questions was developed before the semi-structured interviews were conducted. The interview outline contains the following: (1.) What kind of interior environment supports continuing habitual activities fluidly? (2.) What kind of interior environment supports incorporating positive interaction into habitual activities? (3.) What kind of interior environment supports carrying out habitual activities regularly? However, the content and the order of questions in the actual interview would change depending on the situation.

Observations were made mainly by residents, and the observations were carried out by the project’s researchers. Here, the researcher is a complete observer with the etic perspective. This means that the researcher does not take part in the setting at all, and their role is only to listen and observe [51]. The observation utilized focused observation [52], which involves focusing on key elements derived from the interviews. The specifics of the observations were developed from the content of the post-visit analysis. Each case is observed for six weeks, four days a week, for a total of 24 days. A few days were skipped to process the data that were collected during the fieldwork. Observations started at 7 am (just as the first residents were being helped out of bed) and continued until around 8 pm (when all residents were in bed). Field notes (including drawings) and photographs are examples of the data collected through observation.

2.4. Transcript and Analysis

All audio recordings of interviews in this study were fully transcribed, and the observation field notes were partially digitized. As Nowell et al. explain, the lack of rigorous analysis has implications in terms of the credibility of the research process [53]. Therefore, data analysis process follows Braun and Clarke’s 6-step thematic analysis framework—namely,

familiarization, coding, generating themes, reviewing themes, defining and naming themes, and writing [54]. Furthermore, all analyses were finished using MAXQDA 2020.

2.5. Researcher Characteristics and Reflexivity

The research team consisted of experts in different fields of architecture and interior design, including a Ph.D. student specializing in Interior Design, another PhD student specializing in Architecture, and two esteemed Professors who also specialized in Interior Design. Notably, two members of the team boasted extensive experience dedicated to researching and designing environments tailored for dementia patients, demonstrating their acute understanding of the profound influence interior spaces wield over dementia-related behaviors.

To bolster the credibility of our data collection procedures, a stringent protocol was implemented. All facets of program delivery and content data were meticulously documented and subjected to comprehensive deliberation involving a minimum of two authors. The first author meticulously maintained a comprehensive audit trail throughout the data collection and analysis phases, meticulously chronicling the process in a reflective journal. This approach ensures the utmost transparency and verifiability of our findings. To ensure the reliability and consistency of our research, we adhered to the established benchmarks for reporting qualitative research [55], meticulously outlining our data collection and analysis methodologies.

3. Results

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, and the experimental conclusions that can be drawn.

3.1. Safety, Comfortable and Less Physical Effort as Basic Requirements

The analysis of the collected data has shown that the interior environment plays a significant role in the development of habitual activities in long-term care facilities for people with dementia. The interior environment, in particular, must be safe and comfortable, reducing the physical effort required by residents with dementia to perform activities. These three points are basic requirements.

3.1.1. Safety

The safety of the care facility environment is critical to ensuring that residents with dementia can carry out their habitual activities, and the head of the institution emphasized this:

“Safety is the most important thing, and it’s important to make sure that they [people with dementia] don’t run into any danger or get injured while doing their activities” (Interview of the head of the institution)

Relatives of people with dementia also told the researcher that the safe environment gave the residents more freedom of movement. The case of Li exemplifies this. Li’s wife told the researcher that Li constantly tried to open doors or windows to get out when they lived at home. To keep Li safe, his wife would restrict his movement, allowing him to only lie in bed or sit in a chair. Their current residence has several security features that prevent Li from escaping. For example, the institution’s windows are automatically locked, and the door to the outside is hidden. A safer environment alleviates Li’s wife’s concerns about his safety, and she no longer needs him to spend all his time lying in bed or sitting in a chair. He now has more space to move around, allowing him to resume some of his habitual activities.

“Now I’m not too worried about him the doors here are not very obvious, and the windows are all locked, he can’t open them easily. So, it’s still very safe here He can do more” (Interview of Li’s wife)

This is also evident in Wang's case. Wang's daughter told us that her mother had been bedridden for three months after falling while cleaning the house. Wang then reduced her activities for her safety. Wang gradually resumed some of her habitual activities after moving to the care facility because the environment reduces the risk of falls. Wang's daughter stated clearly that the facility's environment, particularly the bathroom, was safer than Wang's previous home (see Figure 2).

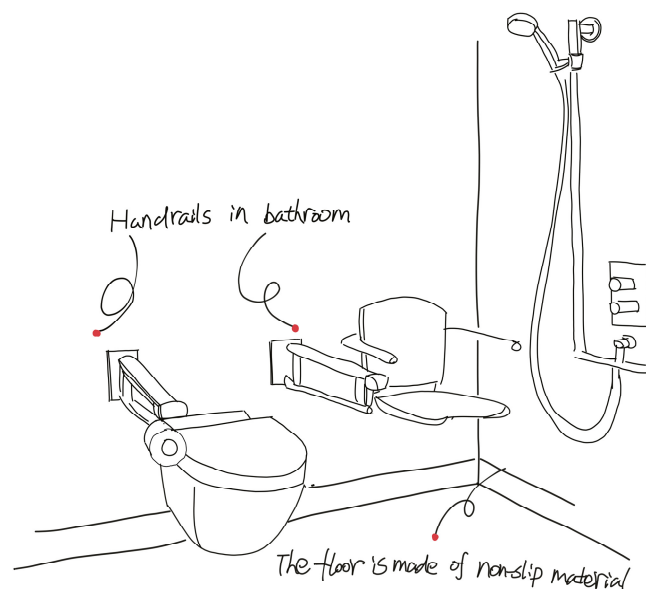


Figure 2. Wang's bathroom.

"We are very happy with the bathroom, and it has a lot more grab bars than the original home and non-slip mats. She can shower by herself again without worrying about slipping..... There is no threshold in the ground here. There is less risk of tripping. She doesn't have to worry when doing her work (chores)." (Interview of Wang's daughter)

"It is safer than the previous (Wang's home)....." (Interview of Wang's daughter)

3.1.2. Comfortable

The term "comfortable" refers to the physical and mental pleasure provided by the care environment, which encourages residents to engage in more habitual activities. Li, for example, now lives in a private room that is clean, warm, and comfortable. He is at ease in this place. This feeling encourages him to continue engaging in his favorite habitual activities. In the interview, his wife described it in this way:

"We are glad that this place has a better environment compared to other care facilities... It's not messy, it's clean. The colors of the rooms are also warm, and the sofas and all this are very comfortable... He likes to do what he likes to do here." (Interview of Li's wife)

Residents Zhang and Wang also shared similar experiences with the researcher: the non-institutionalized care environment encourages them to conduct their activities as if they were at home.

"I was scared that this was a hospital. But not here It makes me feel comfortable and at ease. It makes me want to live like at home, the ones I've been doing" (Interview of Wang)

"It's bright, clean, tidy and very harmonious You can do so much more" (Interview of Zhang)

3.1.3. Less Physical Effort

Another basic requirement is that the interior environment assists residents in performing activities with less physical effort. People with dementia can only perform activities in a more relaxed and less strenuous manner due to the deterioration of their physical functions. This is evident in all three of the cases we investigated, particularly in the case of resident Zhang. Zhang and his nephew told the researcher that a more spacious and accessible environment allowed Zhang to use his wheelchair and walker for more habitual activities.

“I can’t walk too far because my legs are no longer good, but here allows me to use the wheelchair all the time and allows me to walk from my room to the living room, which makes it easier for me to do what I want to do” (Interview of Zhang)

In addition to a spacious and accessible environment, the variety of assistive devices available in care facilities allows residents to carry out their activities with less physical effort.

“Our facilities have many aids, such as beds to support getting up, accessible toilets and various handrails. These are all designed to help them with some of their daily activities.” (Interview of the head of the institution)

3.2. Familiar Information and Orderly Guidance (*Continuing Habitual Activities Fluidly*)

The researcher found that people with dementia could continue some of their habitual activities with skilled and fluid body movements. The interior environment was beneficial in this process in two ways: (1) a familiar environment (associated with previous homes or previous experiences) activated autonomous habitual activities, and (2) orderly guidance (clear, logical, and cued) facilitated fluid body movements during the activities.

Li had his own seat in his private room. Although Li remained mostly silent, the seat appeared to activate various habitual activities, including watching TV, eating, and napping. His body movements were also fluid while engaging in these activities. The fact that Li’s seat conveys familiar environmental information to him causes the activation of his habitual activity. In an interview with Li’s wife, she explained this reason to the researcher:

“I was the one who brought it (the old bamboo chair) here, it’s an old piece. Now, I brought it here....., He continued as before (watching TV, eating and napping in his seat) I didn’t need to tell him, it happened naturally” (Interview of Li’s wife)

Furthermore, because the objects around the armchair provided Li with orderly guidance, his body movements were fluid when he performed activities in this seat. This orderly guidance is most visible in the way the objects are arranged around Li—his seat is always surrounded by the objects he requires to complete his habitual activities (watching television, eating, and resting). For example, a small table with a TV remote control is on the right side of the armchair. The objects Li uses while watching TV on the left side of the armchair, including a small storage box hanging from the armchair containing a handkerchief, a small bin, water, and some small biscuits. A footstool sits directly in front of the armchair, and a small blanket covers the backrest (as shown in Figure 3). Everything was arranged around Li’s seat so that everything was in his line of sight when he sat down, making it easier for Li to locate his items when performing activities, and thereby reducing hesitation in his body movements:

“I put all he needs in front of him, and he can easily see them So he doesn’t have to hesitate when he does.” (Interview of Li’s wife)

Li is also guided by the logical placement of objects around his seat. The TV remote control, for example, is placed next to Li’s usual hand (on the right), and a small box on the opposite side of the armchair contains items Li frequently uses while watching TV. This object categorisation allowed Li to organise his physical movements better: “sorting

as much as possible helps him”, as Li’s wife said. Additionally, the item’s eye-catching markings served as a good reminder. The on/off button of the TV remote control is red, reminding him how to turn the TV on and off (because the channels are pre-set, no additional adjustment is needed, as he just has to press the button to watch the program he wants).

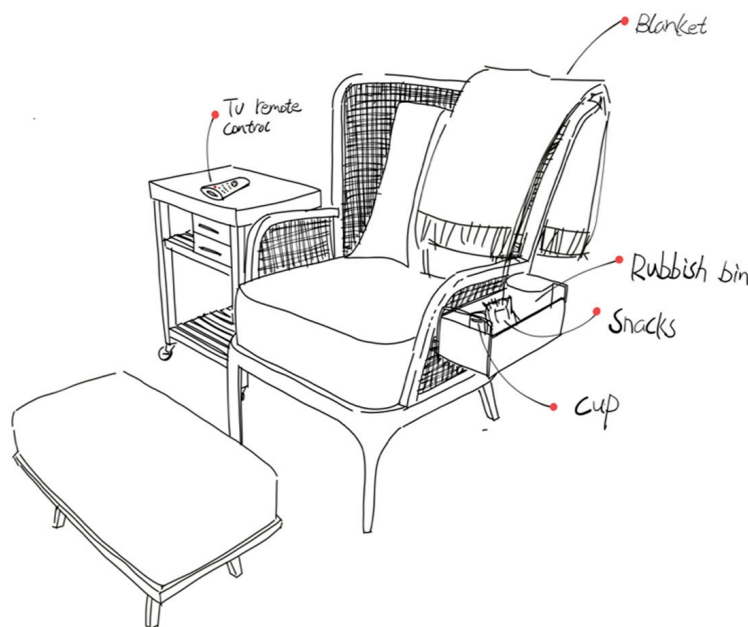


Figure 3. Li’s seat in his room.

On the balcony of Li’s room, there is another habitual activity with fluid movements: watering plants. After Li’s wife restored their original home balcony arrangement (a few plants, a watering tool, a small spade, and a small chair) to the care facility, this habitual activity was reactivated. The familiar surroundings prompted Li to resume his previous habit of watering plants:

“It’s the same set up as before, and he thinks it’s the original one (the balcony). He naturally continued what he was doing (watering the plants), just as he used to do at home” (Interview of Li’s wife)

Moreover, the items needed for watering activities were clearly and orderly placed on the balcony, effectively organizing Li’s fluid movements:

“On the side of the balcony near the window, there are a few potted plants, which are in the most prominent position on the balcony, so Li can easily see them. Next to the potted plants are some watering tools, like a watering can and a small spade. These items are hung neatly on the right side of the plant so that [he] (Li) can easily reach them. A chair is placed directly opposite the plant for Li to sit on after watering.” (Observation notes)

Resident Wang also has several habitual activities performed in fluid movements. Wang’s morning dressing activity was described as autonomous and coherent. This is because the professional caregiver always puts the next day’s clothes on a chair next to her bed the night before. These clothes conveyed familiar information to Wang, prompting her to dress herself when she awoke in the morning. According to resident Wang, the act of dressing occurred automatically upon seeing these clothes:

“These (clothes) are placed by the bed every morning, which reminds me to put them on It’s one of the most important things to do when you get up in the morning” (Interview of Wang)

These clothes are also always arranged in the order of dressing. This makes dressing activities easy for Wang, and the whole process is fluid:

“I would try to place her clothes in the order she wears them For example, the top clothes are placed on the chair in order from inside out, while the bottom clothes, such as trousers and socks, are usually hitched to the back of the chair like this This makes the process of dressing her easier. She only has to put them all on one by one. ” (Interview of professional caregiver 2)

In addition to dressing, another of Wang’s habitual activities occurred in the corner of her room—recalling and organizing past objects. Wang’s body movements during this activity were fluid. This corner inspires Wang’s recall and organizational activity because it evokes a sense of familiarity. In the corner, there is an old wooden sideboard containing an old radio, photographs of Wang’s family, and some boxes used to store old items (as shown in Figure 4). The daughter of Wang told us that all of these items were brought from her original residence. It was a habit for Wang to organize and recall these items. When her daughter brought these items to her new home, they triggered her previous habits.

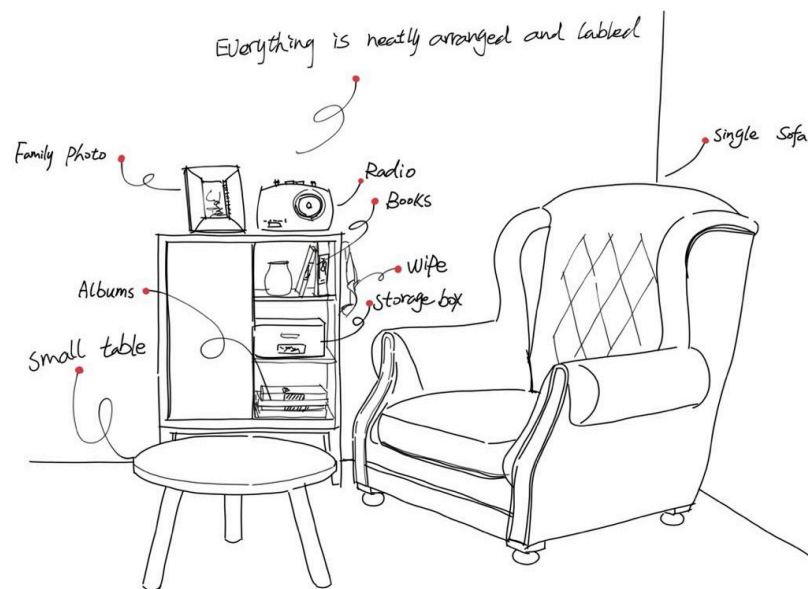


Figure 4. The corner inspires Wang’s recall and organizational activity.

Wang’s body movements were precise and fluid when she was recalling and performing her organizational activities. For example, she would take a rag from one side of the cabinet and wipe the photos and other items on the cabinet one by one. Following that, she would remove the boxes containing old items and photo albums from the cabinet, and would then sit on the sofa to the side to continue sorting and wiping these items. The entire process is smooth because all of the items inside the cabinet are neatly arranged. They were labelled to help Wang identify them and coherently organize her body when recalling and organizing activities.

Similar situations occur not only in residents’ private rooms but also in common areas. In the care facility’s dining room, a bar table is provided where clean cups, water dispensers, snacks, tissues, and other items are neatly arranged and labelled (see Figure 5). Many residents used these products autonomously during meals, just as they would at home. Caregivers have emphasized that the purpose of placing the bar table in the dining room is to encourage residents to be more self-sufficient, and this strategy has proven helpful.

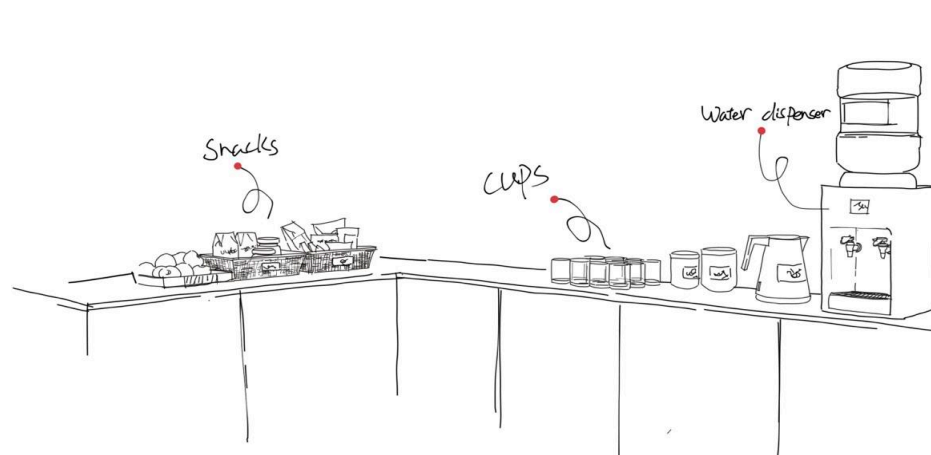


Figure 5. The bar table in the dining room.

Wang and Zhang, who eat in the care home’s dining room daily, thought that the bar table reminds them of their previous home, where food was always available. This familiarity encourages the act of reaching for food in the care facility, which is facilitated by the clear and organized display of items on the bar.

The living room of the care facility is furnished with some comfortable single sofas. A small table next to each sofa is usually stocked with newspapers, playing cards, and other items for the residents’ pleasure. This arrangement of furniture and objects encourages residents to engage in recreational activities. “We put these things out here, and it is natural for them to pick up a newspaper or cards and play with them... probably because they had them in former homes as well,” Wang’s caregiver says. Caregivers also work hard to keep these items neat, so that they are easy to find, which makes the process of moving around fluid for the residents.

“.....we try to put these things as neatly as possible, so they won’t be impossible to find.” (Interview of professional caregiver 3)

3.3. Visual Connection & Meaningful Resonance (Incorporating Positive Interaction into Habitual Activities)

The researcher discovered that as the length of stay increases, residents with dementia gradually incorporate positive bodily interactions with others into their previous habitual activities. The interior environment aids this process in two ways. First, the interior layout makes visual connections between the different habitual activities. This visual connection helps to connect different people’s habitual activities and increases opportunities for contact. The second is to create resonance with others through meaningful objects or things as residents engage in habitual activities. These two points contribute to incorporating positive interactions into residents’ personal habitual activities, transforming them into shared habitual activities.

One of Li’s habitual activities was sitting and watching television, during which he had some positive bodily interaction with his wife. For example, when Li’s wife was about to leave the room, Li would suddenly straighten his back and stare at her until she waved, at which point Li would lean back in his seat again. It could even be said that Li’s positive interactions with his wife are a part of the habitual activity he performs from his seat. This is due to the positioning of Li’s seat, which creates a visual link between the activities of Li and his wife. Li’s seat was strategically placed in the far corner of the room, facing the TV and the door (as shown in Figure 6). When Li sat in this position, he could see the television and the majority of the room. Because of the open view, he can clearly see his wife and his wife can always attend to his needs. This visual contact connects their daily activities and allows them to interact positively.

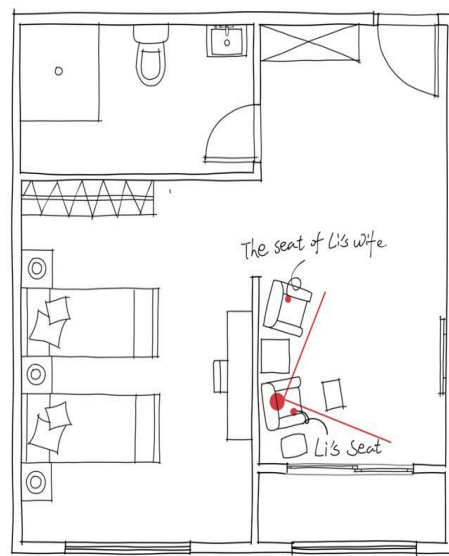


Figure 6. The position of Li's seat.

In addition to this visual connection, Li's case supports another theme—meaningful resonance. The seat next to Li's belongs to his wife. This chair is significant. It triggers a series of meaningful bodily interactions between Li and his wife.

“His wife would sit in this chair and watch TV with him (Li) after doing her chores. As this chair was close to Li's seat, this allowed Li to hold his wife's hand and Li's wife to help him sort out his clothes, and when others sat on it, he would show obvious displeasure and always pushed them away.” (Observation notes)

Wang's case also demonstrates how the interior environment incorporates positive interactions into habitual activities. Wang's room has a corner with a single sofa, a small table, and a sideboard (as shown in Figure 7). Wang spends some time daily in this area, listening to the radio, organizing items, and reminiscing about the past. These activities are not isolated, and there is frequently positive interaction between Wang and her caregiver when they come to inspect her, such as waves to say hello. This positive interaction has become an important part of Wang's day and is incorporated into her habitual activities in this corner. “They (the caregivers) are all very nice and come and see each day....., sit here and wait for them..... That was our appointment,” she says (Interview of Wang).

The visual connection created by the door to the room, which Wang frequently opens, facilitates this positive interaction. The open room door connects Wang's habitual activities (organizing and recalling items from the past) with the caregivers' work routines (inspecting residents). When caregivers pass by Wang's room during their inspections, they usually knock on the door and say hello inside, to which Wang responds in some way.

Furthermore, the items on the sideboard next to Wang's seat (photo albums and old items) resonate with Wang and the caregiver, causing them to interact. Wang's caregiver informed us:

“She would always show me these things of hers and share stories from them. It made her want to open up with me I could always find something to talk to her about too.” (Interview of professional caregiver 2)

In addition to private rooms, the public spaces of the care facility reflect this support for incorporating positive interaction into residents' habitual activities. Walking along the corridor every day was one of Li's habitual activities in the care facility. During his walks, he has positive nonverbal interactions with other residents and nursing staff, such as waving and nodding. Over time, greeting neighbors and caregivers has become a vital part of his walking activity.

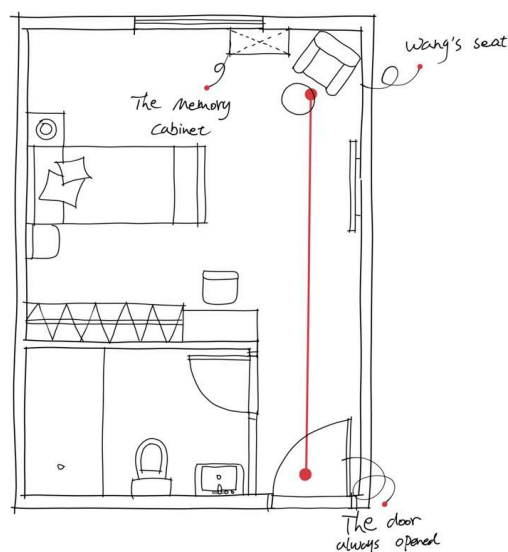


Figure 7. The position of Wang's corner.

Positive interaction with others becomes an important part of Li's walks because Li's walks pass through some of the busiest areas on the floor, including the nurses' station, the dining room, and the living room (see Figure 8). He also takes his daily walks after lunch, when many residents' doors are open, and the dining room and activity room are full of people. On his walks, Li was able to make visual connections with more people, increasing their chances of contact. Over time, Li developed some positive interactions with the residents and caregivers who were on the route at this time. Furthermore, Li always takes a seat opposite the nurses' station after his walks. Because this seat faces the nurses' station, Li has more visual contact with the nurses' station while sitting in this position, allowing Li to interact with the nursing staff:

"He's here every day, and even though he just sits there..... we always interact with him when we're not busy." (The interview of professional caregiver 1)

Another resident, Zhang, spends the majority of his time in the living room. He usually sits in a chair in front of a square table. He sits there to fiddle with the chess on the table. This is an important activity for him in the care facility, and it always includes some positive interactions with other residents, such as a greeting nod and an invitation to sit down and play chess. The position of Zhang's seat and the objects around it are critical for this. Zhang's seat is near the door in the living room, so nearly all residents entering the living room can see him. This allows him to communicate with more people who enter the living room. Moreover, the chess piece in front of Zhang became an object of significance that resonated with Zhang and another resident who enjoys playing chess. According to the description of the caregivers:

"They both enjoyed playing chess and whenever he (Zhang) started fiddling with the board, it seemed to attract his (another resident's desire to join in)"

(Interview of professional caregiver 3)

Every afternoon, many of the residents, including Zhang, engage in activities, such as singing in the living room, which often includes some positive bodily interaction (smiling, clapping, and humming folk songs together). This is also due to the placement of the seats during the activities. Before the singing activity, the care staff arranged the seats in a semi-curved shape and positioned them towards a central point (the TV or projection). This layout allows the residents to see each other during the activity, which strengthens their bond. Furthermore, the central point they are facing is frequently a thing that resonates with them, such as a TV showing songs from the 1960s.

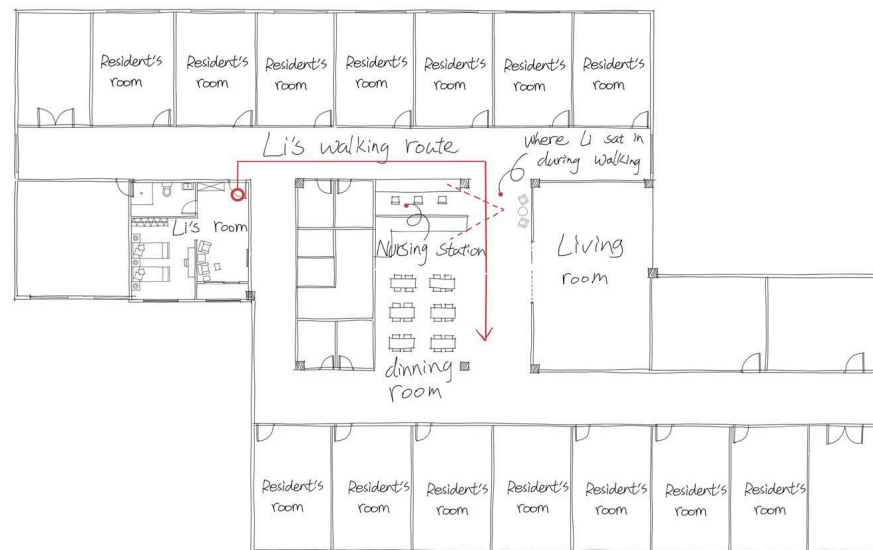


Figure 8. Li's walking route.

3.4. Spatial Orientation & Temporal Orientation (Carrying out Habitual Activities Regularly)

As the length of stay of the three dementia residents increased, their habitual activities in care facilities (including habitual activities that incorporate positive interaction) became more regular. This regularity means that these activities always take place in a fixed time and space. The interior environment aided this in two ways: (1) spatial orientation and (2) temporal orientation. The spatial orientation allows individuals with dementia to organize their various daily habitual activities into different specific spaces. Specifically, the different spaces guide the residents' various habitual activities, and the clear and orderly links between these spaces aid the residents in organizing their series of habitual activities. The temporal orientation allows individuals with dementia to organize their various daily habitual activities into specific times. The various time cues of each activity space hint at the habitual activities that residents can carry out at fixed times.

Li's habitual activities in the care facility were regular. All of his habitual activities were organized through multiple fixed areas in the care facility. For example, the armchair in the room for watching television, eating, and napping, the small balcony in the room for watering, and the corridor for walking activities. Different areas of Li's activity have distinct environmental characteristics, which inform what he should do. As Li's wife described: "When I brought it (old armchair) here, he knew what to do". The connection between these activity areas is simple and clear. The main areas of Li's activity in the room (the armchair, the balcony, and the door leading to the corridor) are in a straight line, allowing Li's habitual activities to be better organized by these areas without getting disoriented:

"Probably because these places (Li's activity areas) are all close together, he can easily find these places to do what he usually does." (Interview of Li's wife)

The regularity of Li's habitual activities was also demonstrated by the fact that they usually occurred at specific times. When he gets up in the morning, Li usually sits in his armchair and watches TV until after the lunch break. In the afternoon, he takes a walk along the corridor outside. Temporal orientation plays an important role in this procedure. Li's wife described how time cues prompted him to perform his habitual activities at a fixed time. If it was time for Li to watch television after he awoke in the morning, his wife would turn on the television news after he had finished washing up. The sound on the TV will draw Li to take his seat on his own. After the lunch break, some soft music is played in the common areas of the institution at a certain time of the afternoon, and the music serves as a good reminder: Li's wife told us that when the music starts, Li knows that it is time for a walk.

In Wang's private rooms, her habitual activities also showed a certain regularity. More specifically, her habitual activities in the room were organized by various combinations of furniture, such as the bed for sleeping, the dresser and chair for dressing and grooming, the single sofa and cabinet for resting and reminiscing, and the bathroom for cleaning activities. These various furniture combinations organize the various habitual activities she undertakes in her private room. This is how Wang described the process:

"I know very well, I need to be there can do what, even if sometimes I forget, these things (furniture and objects) can remind me." (Interview of Wang)

In Wang's room, the bed (for sleeping), closet and dresser (for dressing) and bathroom (for washing) are all located in a straight line and are closely connected. Wang's morning activities were better organized as a result of this simple and orderly connection:

"It's not difficult (for morning activities); they (areas) are right next to each other." (Interview of Wang)

In addition, the researcher also discovered that the regularity of Wang's habitual activity in the room is also guided by temporal cues. For example, she always has a bedspread on her bed, which she puts on when she gets up until it is time to go back to bed at night. This cover serves as a reminder to her of the change of time in the morning and evening:

"I become less sensitive to time, but it (bedspread) tell me I shouldn't be sleeping right now." (Interview of Wang)

The temporal cues that indicate sleep and waking activities were also reflected by objects. Wang had an antique alarm clock on her bedside table, which she checked every time she went to bed. It was difficult to tell whether she could accurately judge the time on the alarm clock, but it did serve as a reminder. Every night, the caregiver would turn on her bedside lamp about an hour before she goes to sleep. The lamp's warm light illuminated her bed and served as a helpful reminder that it was time for her to sleep. Each morning, the caregiver would place the clothes they had prepared the day before on a chair next to Wang's bed near the closet. Wang's morning dressing activities were prompted by these arranged garments.

In the common area, resident Zhang's habitual activities are also regular. The private room is for sleeping, the dining room is for meals, and the activity room is for playing chess and watching television. The spatial orientation of the facility's common areas has a significant impact on how regular his habitual activities are. Zhang's activity areas are connected by corridors with handrails leading him to the different activity areas, and the entrances to each area are clearly marked. Zhang's room, for example, has his name on the door, while the entrance to the dining room has some food signs, and the activity room has some entertainment signs. This clear functional and regional organization enables Zhang's habitual activities to be organized in a regular way within the institution's common areas:

"I know where I'm going to do something, just hold on to the railing here (in the corridor) and keep going It's where you eat and where you watch TV. . . The doorways are marked. It's not that hard." (Interview of Zhang)

Furthermore, temporal orientation supports the regularity with which many of Zhang's habitual activities take place in public. For example, before each meal, the caregiver spreads tablecloths and places the food on the dining room tables. The caregiver informed us that these alerted the residents that mealtime had arrived.

"When we start setting up, they know it's time to eat." (Interview of professional caregiver 3)

4. Discussion

Four themes emerged from the data analysis to explain the supportive role of the interior environment in the development of habitual activities for dementia residents in

a care facility. These four themes are (1) safety, comfort, and less physical effort as basic requirements; (2) familiar information and orderly guidance; (3) visual connection and meaningful resonance; and (4) spatial orientation and temporal orientation. The first of these four themes serve as basic requirements, while the other three correspond to the three aspects of habitual activity development in people with dementia: continuing previous habitual activity fluidly, incorporating positive interaction into habitual activities, and carrying out habitual activities regularly.

Specifically, the interior environment of the care facility must be safe so that people with dementia are not in danger while performing their habitual activities; the interior environment of the care facility must be comfortable so that people with dementia are more willing to engage in their habitual activities; and the interior environment of the care facility must be able to assist people with dementia in performing their activities with less physical effort. These three factors are basic requirements for allowing dementia residents to continue and develop their habitual activities in a long-term care facility. In addition, individuals with dementia benefit from familiar information and orderly guidance created by the interior environment, allowing them to continue their habitual activities fluidly. The familiar environmental information prompts them to engage in habitual activities autonomously, and the orderly guidance of the interiors aids them in performing these activities with skilled and fluid body movement without hesitation. Individuals with dementia benefit from visual connection and meaning created by the interior environment, allowing them to incorporate the positive interaction into these original habitual activities. By establishing visual connections through interior layout, the habitual activities of residents with dementia can be linked with one another, resulting in more enriched social contacts. Aside from visual connection, strategically placing certain objects within the interior environment can assist people with dementia in establishing meaningful resonance with others while performing their habitual activities. Both of these contribute to integrating positive social interactions into residents' personal habitual activities, transforming them into shared habitual activities. Individuals with dementia benefit from spatial and temporal orientation created by the interior environment, allowing them to engage in habitual activities with increasing regularity as their length of stay increased. Spatial orientation refers to them residents having different areas within a facility that guide their different habitual activities. These areas are well defined and organized, and they create a clear and orderly flow, effectively guiding the residents through their habitual activities. Temporal orientation is when the interior environment gives residents clues about what activities they should undertake at certain times. By following these clues, people with dementia can develop regular habitual activities that make their daily life more predictable and structured.

The findings of this study largely support previous research findings on the supportive role of the physical environment in daily activities in people with dementia. Previous research suggests that a familiar environment can stimulate habits in people with dementia [36,56]. There is a relationship between spatial layout and the abilities of people with dementia in activities of daily life [57]. The quality of the environment (e.g., safety, homeliness) can support the daily activities of people with dementia [58]. Spatial orientation and temporal orientation can support the daily activities of people with dementia [59–61]. The themes derived from this study are consistent with these findings. This study places greater emphasis than previous research on the importance of organizing and managing the interior environment in supporting the development of the habitual activities of individuals with dementia in comparison. Unlike the built environment, the interior environment is more dynamic and fluid, requiring effective organization and management strategies to ensure optimal support for individuals with dementia in their habitual activities. Whether it is the continuation of individual habitual activities, the transformation of individual habitual activities into shared habitual activities, or more regular habitual activity formation, the process needs to be supported by an effective organization of the interior environment. This also suggests that, when considering the physical environment to support a particular

habitual activity in dementia, it is important to consider not only the role of the interior elements individually but also their synergistic effect.

This study also revealed that the interior environment in supporting habitual activities in dementia is influenced by caregivers and institutional regulations. Indeed, the organization of the interior environment in the previous case descriptions actually relied on the caregiver. For example, Li's exclusive seat (the old familiar seat with its orderly arrangement of objects around it) was set up by Li's wife. It was also the institution's system of encouraging a personalized, private environment that allowed Li to create his own exclusive seat. This finding supports the consensus in dementia research that the environment of dementia care is a holistic environment that includes physical, social, and organizational settings, and that its three components are interrelated [62,63].

After transitioning to a care facility, the dementia residents in the study were able to resume certain habitual activities that they had lost while living in their previous homes. This positive change was attributed to the supportive and favourable environment provided by the new facility. For instance, Li's spouse relocated his chair from their former residence to his present room, enabling him to maintain certain routines in unfamiliar surroundings. Similarly, due to the enhanced safety of the care facility compared to Wang's previous dwelling, she could revive some of the activities she had forsaken in her "hazardous home". These instances underscore how the habits of individuals with dementia can transcend different settings, underscoring the significance of interior environments in supporting this process. Simultaneously, this provides another perspective for thinking about the potential role of the interior environment in the home environment. If the supportive role of the interior environment described in this paper can be introduced into the home, then it has the potential to facilitate the realization of the vision of ageing in place for people with dementia. This aspect is worth exploring in future research efforts.

5. Implications for Practice

This study builds on the previous themes and proposes a set of interior design strategies for the development of habitual activities for people with dementia. Due to the habitual activities that take place in different home-living scenarios, the proposed design strategies are related to scenarios. The design strategies are as follows:

1. Creating home-living scenarios that are safe, comfortable, and have less physical effort for dementia residents.
2. Ensuring the interior of the home-living scenario is familiar and orderly for residents with dementia.
3. Creating visual contact and meaningful resonance with others in home-living scenarios for residents with dementia.
4. Establishing spatial and temporal orientation between home-living scenarios for residents with dementia.

These design strategies break away from the interior design focus on space, physical form, and aesthetics, instead emphasizing the continuation and development of the habitual activities of people with dementia by the organizational role of interiors. This highlights that the interior design of a dementia care environment is not just about creating homes with aesthetic appeal, and it prevents the institution from becoming a "decorated" living room [64]. Additionally, this scenario-based design strategy is also more customizable. The design of the scenarios depends on the different cultural contexts, as there are differences in the home-living scenarios between cultures.

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