Back to the Future: The Next 50 Years

51st International Conference of the Architectural Science Association (ANZAScA)

Edited by
Marc Aurel Schnabel
Foreword

The Architectural Science Association (ASA), formerly known as the Australian and New Zealand Architectural Science Association (ANZAScA), is an international organisation, the objective of which is to promote architectural science, theory and practice primarily about teaching and research in institutions of higher education.

In 2017, ASA embarks into the future – again. 54 years ago, Prof Henry (Jack) Cowan, Mr Derrick Kendrick and other architectural science academics held the first meeting to start the formation of the association. Since then, nearly every year, the ASA is holding an annual international conference, drawing on not only architectural scientists but also researchers and practitioners outside tertiary educational institutions. Papers discuss cutting-edge research across Architectural Science as well as areas dealing with architectural (science) education, digital design, historic preservation of buildings, landscape architecture and urban design. The annual conferences draw top academics, researchers and practitioners from all continents around the world. Standing on the shoulders of our work of the past 50 years, the 51st instalment of the conference explores avenues that will have the significant impact on in the development of Architectural Science in the next 50 years. Hence, it is timely to ask, What are the future trajectories in our field?, What are the visionary researchers and practices that will influence our built environment over the next 50 years?, and more importantly, Do we now have a better-built environment, more responsible architecture, and more environmentally sustainable design, than we did 50 years ago? The theme of this 51st International Conference of the Architectural Science Association (ANZAScA) is, therefore: “Back to the Future: The Next 50 Years”. This publication presents 79 accepted papers presented at the Conference, hosted by the School of Architecture, Victoria University of Wellington, Wellington, New Zealand, 29 November – 2 December 2017. Details of the Conference are currently at https://www.asa2017.victoria.ac.nz, and each paper is archived at ASA’s website: www.anzasca.net.

Each paper in these proceedings has undergone a rigorous peer review process. Following the call for abstracts in March 2017, a total of 193 abstracts were submitted for review. Each abstract was blind peer reviewed by two members of our International Scientific Committee, made up of 82 experts from ten countries, across four continents. Of these, 159 abstracts were accepted for development into a full paper. Following this, 141 full papers were submitted, each of which was again blind peer reviewed by two to three members of our International Scientific Committee. Based on the reviewers’ recommendations, 85 papers were accepted for presentation at the conference, and 79 are included in this publication.

On behalf of the Organising Committee, I would like to sincerely thank all of the people who have contributed to realising this Conference. Thanks go to all the authors for working hard on the papers and presentations. I am very grateful to members of the International Scientific Committee for their rigorous reviews, without which we would not have been able to maintain and improve the quality of the papers. I am deeply grateful for those who have worked behind the scenes: from the School of Architecture, particularly Shuva Chowdhury, who went several extra lengths, Yingyi Zhang, and Selena Shaw; my colleagues at the Office of Faculty of Architecture and Design, various people around Victoria University of Wellington, and members of ASA Exco, in particular Guy Marriage, who came up with the conference theme. We hope that the papers presented in this publication reflect on the theme and the role that Architectural Science has played and will continue to play for the betterment of our built environment.

Marc Aurel Schnabel, Wellington, 2017
Conference Theme

In celebrating the 51st International Conference of Architectural Science Association (ANZAScA), we look forward into the future and seek the presentation of visionary research and practice that will influence our built environment over the next 50 years. Standing on the shoulders of our colleagues and our works of the past 50 years, the conference explores avenues that will have the significant impact on in the development of Architectural Science. The theme calls for relevant ideas from a variety of domains reflecting and speculating on future trajectories of architectural science to reveal possible phenomena, factors and forces that will influence these trajectories with an exploratory perspective.

The 51st International Conference of the Architectural Science Association (ANZAScA) is hosted by the School of Architecture, Victoria University of Wellington, New Zealand. We cordially have been inviting architectural science and design researchers, educators, design professionals, stakeholders, and students to present their critical thoughts, discuss new ideas, and engage in our debate:

“Back to the Future: The Next 50 Years”

The Conference Proceedings are grouped into nine chapters:

- Vision (trajectories, speculations & phenomena)
- Theory (philosophy, methodology, culture & society, history)
- Context (landscape, urban design, heritage)
- Design (buildings, details, (digital) design)
- Simulation (calibration & validation, virtual, augmented & mixed environments, climate change)
- Architectural Science (environmental quality, well-being, health)
- Modes of production (construction technology, productivity, BIM, CIM, robotics, innovative technology, automation)
- Practice, Education & Profession (building code, professionalism, development, safety, pedagogy)
- Culture (culture, indigenous, tradition)

Contributions to the above groupings of research-areas have been sought to cover relevant content relating to the architectural science of the disciplines of architecture, engineering, building science, design, urban- & landscape design, computer science, philosophy, psychology, mathematics, humanities, and other relevant disciplines, who can contribute to the discussion. Researchers and doctoral students have been invited to submit research papers and critical essays and to attend the conference to widen our discussion about the future trajectories of architectural science.
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A Pilot Study of Design Evaluation of Three Memory Support Residential Facilities in Victoria

Hing-wah Chau and Clare Newton

The University of Melbourne, Melbourne, Australia
{chauh, c.newton}@unimelb.edu.au

Abstract: There are over 400,000 persons with dementia in Australia. This figure is projected to increase by 90% to more than 760,000 in the next 20 years and exceed 1.1 million by 2056. Due to the significant increase in the number of people with dementia, the demand for memory support residential facilities is expected to increase. People with dementia are vulnerable to environmental impacts, so the design of such facilities has a significant impact on the quality of life and well-being of the residents. In this pilot study, three memory support facilities in Victoria are selected for evaluation: Rathdowne Place in Carlton, Peninsula Grange in Mornington and Campbell Place in Glen Waverley. Through design analysis and fieldwork observation, the aim of this study is to identify key factors of the built environment for residents with dementia, compare building layouts and provide design recommendations.

Keywords: Design for dementia; memory support facilities; residential care; design evaluation

1. Introduction

According to the latest statistics available from the World Health Organisation, around 47 million people have dementia with 9.9 million new cases being diagnosed every year. The total number of people with dementia is projected to near 75 million in 2030 and almost triple to 132 million by 2050 (WTO, 2017). Over 400,000 persons with dementia were living in Australia in 2016 and the figure will exceed 1.1 million by 2056. In 2016, over 23% of people with dementia were living in care accommodation (Brown et al., 2017, p.23). Due to the significant increase in the number of people with dementia in Australia, the demand for memory support residential facilities is expected to increase. How to provide a living environment for residents with dementia which can cater for their specific needs is crucial.

In this pilot study, three memory support facilities in Victoria are selected for evaluation: Rathdowne Place in Carlton, Peninsula Grange in Mornington and Campbell Place in Glen Waverley. Through design analysis and fieldwork observation, the aim of this study is to identify key factors of the built environment for residents with dementia, compare building layouts and provide design recommendations.
2. Characteristics of People with Dementia

For designing an appropriate memory support facility, it is important to understand the characteristics of people with dementia. Dementia is a broad term to describe a collection of symptoms that are caused by disorders affecting the brain. The most common type of dementia is Alzheimer’s disease, which affects up to 70% of all people with dementia (Alzheimer’s Australia, 2017).

According to the report, Dementia in Australia published by the Australian Institute of Health and Welfare (AIHW, 2012), residents with dementia showed problematic verbal behaviours (such as being verbally disruptive and having paranoid ideation that disturbs others), problematic physical behaviours (including physically threatening or harmful behaviour and constant physical agitation), severe cognitive skills impairment, wandering behaviour and depression (Table 1).

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<th>Behaviour characteristics</th>
<th>Percentage of residents with dementia showing the behaviours twice a day or more</th>
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<td>(1) Problematic verbal behaviours</td>
<td>55%</td>
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<tr>
<td>(2) Problematic physical behaviours</td>
<td>50%</td>
</tr>
<tr>
<td>(3) Severe cognitive skills</td>
<td>48%</td>
</tr>
<tr>
<td>(4) Wandering behaviour</td>
<td>27%</td>
</tr>
<tr>
<td>(5) Depression</td>
<td>10%</td>
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Besides behavioural issues, people with dementia may also encounter difficulties in handling the activities of daily living including mobility, personal hygiene, toileting and continence depending on different stages. Currently, there is no cure for dementia, however, medications are available to ameliorate symptoms such as agitation and paranoia.

Due to various impairments of people with dementia, they are vulnerable to environmental impacts. Therefore, the design of memory support facilities has a significant impact on the quality of life and well-being of the residents. As mentioned by Weisman et al. (1990), ‘even modest changes in the environments of people of reduced competence may have significant positive consequences.’ (pp. 14-15).

3. Evidence-based Strategies for Design for Dementia

Evidence of the impact of design for people with dementia continues to evolve with patterns becoming ‘visible and potentially reliable when we collate and sift through the results of multiple, small, non-randomised research projects undertaken over the past twenty years’ (van Hoof & O’Brien, 2014, p. 2). Encouraging residents, carers, health professionals and families to participate in design processes is helping to shift design away from a medical model with residents as passive care recipients to more homelike environments in which residents remain engaged in life in meaningful ways (Davis, Byers, Nay, & Koch, 2009).

In recent years, design for dementia has shifted from focusing on solving behavioural problems to a more positive approach on design for remaining capabilities. Six principles for quality aged-care environments have been summarised as: 1] facilitating orientation, 2] promoting independence, 3] providing for intellectual and sensory stimulation, 4] supporting safety and security, 5] developing a homelike and familiar atmosphere and 6] balancing private and social spaces (van Hoof & O’Brien, 2014,
p. 5). People with dementia have varying and changing capabilities and so architecture which is able to evolve and respond according to need is a useful approach.

4. Design Evaluation of Three Memory Support Facilities

4.1. General Layout

The three selected memory support facilities in Victoria were recently built: Rathdowne Place in 2014, Peninsula Grange in 2015 and Campbell Place in 2017. All of them provide single bedrooms with ensuite. The scenario of spaces for couples is not available. Shared rooms are more common in the UK, Asia and Europe and less so in Australia and the US. Among them, Peninsula Grange has the largest memory support facility which can accommodate 34 residents. The 34 bedrooms are grouped into four wings, with eight bedrooms in two wings, seven and nine bedrooms in the remaining two wings. Bedrooms are located on both sides of the corridors, with a maximum length of five bedrooms. Communal spaces at the central portion link the four corridors together. On the north-east side of the facility, there is an outdoor garden (Figure 1 left).

![Figure 18: Floor plans of memory support facility at Peninsula Grange (left) and Rathdowne Place (right)](image)

The memory support facility at Rathdowne Place is the smallest within these three facilities catering for 13 residents. Its size makes it less economical to staff (author conversation with Australian Unity architect on 02.08.17) with seven bedrooms on one side (House 1) and six bedrooms on the other side (House 2). Bedrooms are in L-shaped configuration in House 1 and in linear arrangement in House 2 with a corridor of three bedrooms in length. House 1 and House 2 are separated by an activity room, but are open to the same covered terrace outside. (Figure 1 right). The memory support facility at Campbell Place
is slightly larger than the one in Rathdowne Place and can cater for 17 residents. It has eight bedrooms on one side (House 1) and nine bedrooms on the other side (House 2). Corridors in each house are in T-shape configuration. House 1 and House 2 are connected by a service corridor for staff access. Each House opens to an outdoor terraced garden. (Figure 2 left).

Figure 2: Memory support facility at Campbell Place: final layout (left) and original layout (right)

The original layout of the memory support facility at Campbell Place (Figure 2 right) shows the bedroom arrangement in L-shaped configuration, which is similar to the layout of House 1 at Rathdowne Place. In contrast to the final design outcome (Figure 2 left), the original layout shortens the length of corridors and enables better visual access between bedrooms, communal spaces and terraced gardens outside. Having said that, the final layout supported by the operation offers a designated service corridor leading to the pantry, which can directly connect to the respective domestic kitchen of each House. This can facilitate the delivery of meals from the central kitchen via the service corridor and enables the staff at the domestic kitchen to have the ease of access to the pantry during meal preparation process (Figure 3). However, by providing such pantry, the original calm/ activity room has been deleted (Figure 4).
From the perspective of operational efficiency in terms of meal delivery and preparation, the final layout is favoured by staff, but the provision of calm/activity room is beneficial to residents with dementia. As mentioned previously, at least half of people with dementia exhibit problematic verbal and physical behaviours twice a day or more according to the statistics, it is highly preferable to provide a space for solitude for some residents (Weisman et al., 1990, p.60). If the folding partition has adequate sound proofing performance, the subdivision of the room can allow residents to have a quiet room on one side and an activity room for small group interaction on the other side. Folding partitions allow spatial flexibility and enable residents living in both House 1 and House 2 to share the same space for other social events.

The provision of the multi-purpose room between the two Houses at Rathdowne Place shares a similar idea with the original layout of the Campbell Place (Figure 5). However, due to its limited size, spatial subdivision by folding partitions is no longer feasible. The room can be used as an activity room or a calm room only at different times. Contrary to the Campbell Place, there is no designated service access at
Rathdowne Place. The staff working at the Campbell Place may have better communication and collaboration as they share the same pantry and the domestic kitchens are connected to each other, whereas the staff at Rathdowne Place may need to work more independently. At Rathdowne Place, the main entrance for visitors and staff access for daily operation share the corridor for the services rooms, which may bring inconvenience to visitors and may also cause disturbance to the residents as a source of over stimulation (Fleming and Bennett, 2017, p.20).

![Figure 5: Enlargement plan of the memory support facility at Rathdowne Place](image)

Although there is no designated service corridor for the memory support facility at Peninsula Grange, kitchen entrances and service entrances are provided for staff access which are separated from the main entrances to minimise the disturbance to dining areas. Similar to Campbell Place, a pantry is provided adjacent to one of the domestic kitchens to facilitate daily operation. However, the service entrances are close to bedrooms nearby which may cause distraction and disturbance to the residents unless the service doors are well camouflaged with silent locks (Zeisel et al., 2003, p.708).

4.2. Dining Area and Domestic Kitchen

The dining hall at Peninsula Grange can be divided into halves by sliding partitions, resulting in two smaller dining areas to cater for 17 residents on one side. This offers adaptive spatial usage to cope with the needs of the residents. Since the gathering of 34 people together at the same place may create too much noise resulting in overstimulation, agitation and confusion to some residents, the flexibility of spatial subdivision can reduce the possibility of disruptive behaviours during mealtimes (Schwarz et al., 2004, p.174). The dining hall offers visual and physical access to gardens on both sides which can be orientational cues and helpful stimulation to residents. Windows at both south-eastern side and north-western side can also allow natural light to enter to the interior (Figure 6).

At Peninsula Grange, the domestic kitchen is the focal point of the dining area. It does not replace the full-service kitchen, but breakfast preparation, beverage making and dessert baking can contribute to the domestic ambience of the space, reducing the image of the overall institutional setting (Figure 7 left). The distinctive smell of food during meal preparation provides olfactory sensitivity to residents. The kitchen
next to the dining area also facilitates the staff to cater for personal dietary requirements and allows residents to make choices, especially during breakfasts, so that they feel more in control of their lives, which has positive implications for the sense of competence and self-esteem of people with dementia. The kitchen is not merely a food preparation area, but also ‘a practical and non-institutional alternative to the traditional nurses’ station’ (Weisman et al., 1990, p.61). Staff at the kitchen enjoy an unobstructed view of the dining area, adjacent living areas and the outdoor garden beyond, which offers informal surveillance and ease of monitoring of the residents (Figure 6). Similar domestic kitchen arrangement is also provided at Campbell Place (Figure 7 right).

Figure 6: Enlargement plan of the memory support facility at Peninsula Grange

Figure 7: Domestic kitchen at Peninsula Grange (left) and Campbell Place (right)

Fleming and Kirsty (2007, pp.217-218) do not recommend open plan kitchen as residents with dementia may present a danger to themselves or to others in the kitchen. The unrestricted access to appliances (including a toaster, an oven, a microwave, a kettle and a fringe) can be dangerous, so the provision of a domestic kitchen relies on proper staff supervision and effective measures to keep residents out of the kitchen without causing frustration and agitation to them.
Compared to the open plan kitchens at Peninsula Grange and Campbell Place, the domestic kitchen at Rathdowne Place is more enclosed with glass doors to prevent any unauthorised entry in compliance with the recommendation of Fleming and Kirsty (Figure 8). The original idea of having a domestic kitchen at the centre of the communal area at Campbell Place (Figure 2 right) has been realised at Rathdowne Place (Figure 1 right), but the kitchen at Rathdowne Place has full-height partitions which affect the sight lines within the memory support facility.

![Figure 8: Domestic kitchen at Rathdowne Place](image)

### 4.3. Outdoor Gardens

Among the three memory support facilities, the outdoor garden at Peninsula Grange is the biggest. Doors opening to the garden are unlocked during the daytime enabling residents to go outside as one of their choices. This can lead to the decrease in negative aggressive behaviours of the residents (Namazi and Johnson, 1992, p.20). In fact, a well-designed garden is a therapeutic environment for people with dementia as it can provide visual, tactile, olfactory and auditory stimulation through the combination of natural landscape, fragrance, sunlight, wind and birds. The timber trellis at the entrance of the garden serves as an iconic structure for residents’ spatial orientation (Figure 9 left). If more interest points can be provided along the looped path and appropriate shelters can be erected to protect seating areas from excessive sun and strong wind, this may attract more residents to use the garden. Wheelchair-accessible raised planting beds can also be provided to allow residents with remaining abilities to participate in gardening. Although the open terraced garden at Campbell Place is relatively small and there was not much planting at the time of visit before the move-in of any resident, it can still be a source of sensory stimulation to residents if it is properly landscaped (Figure 9 right). Gardens at Peninsula Grange and Campbell Place face north-east and south-east respectively. Both of them can capture favourable morning sunlight, encouraging residents to go outside (Figures 1 & 2).

The outdoor activity area at Rathdowne Place is the smallest with a covered terrace and limited planting (Figure 10 left). It faces north, but due to its openings on one side and its close proximity to the adjacent building, solar exposure is unavoidably affected. Solar penetration to the communal space behind the covered terrace is further reduced due to the set-back from the façade (Figure 1 right).
4.4. Memory Boxes

The memory support facility at Rathdowne Place is the only one among these three facilities to have memory boxes outside residents’ rooms (Figure 10 right). The inclusion of personal objects in the memory boxes, such as photos and other artifacts, can provide opportunities for people with dementia to reinforce their long-term memory and reflect upon their past experiences within their remaining capabilities. This can personalise the institutional setting and enhance the sense of identity by creating a familiar environment and serve as an effective orientation cue for wayfinding than displaying distinctive but non-personal items (Namazi et al., 1991, p.14). Displaying personal objects along the corridor may also stimulate social interaction and conversation among residents and enable the staff to have better understanding of the residents about their stories and preferences (Kovach et al., 1997, p.108).

5. Conclusions and Recommendations

Through this pilot study, the general building layouts of the three selected memory support facilities at Rathdowne Place, Peninsula Grange and Campbell Place are compared. Key design factors are identified and appropriate provisions within the facilities are discussed, including:
1. visual access and clear sight line within the domestic ambience of the space
2. separate access for staff to minimize disturbance and avoid overstimulation to residents
3. orientation cues for wayfinding
4. choices to residents for their sense of self-esteem
5. outdoor activity space for connection to nature
6. sense of identity and familiarity by displaying personal objects

The impact of the built environment of memory support facilities on the quality of life and well-being of residents with dementia requires ongoing research. We propose further ethnographic research including observation, photo elicitation, a questionnaire survey and focus groups to collect and collate feedback from the staff and family members of the residents. Collected data can inform the future design approach of similar memory support facilities to suit the specific needs of people with dementia.

Acknowledgements

The authors wish to thank Australian Unity for providing access to the three Memory Support Facilities in Victoria, Australia for this pilot study and allowing relevant floor plans and images to be published.

References


BACK TO THE FUTURE: THE NEXT 50 YEARS

This volume contains the double-blind peer reviewed papers accepted for the 51st International Conference of the Architectural Science Association (ANZAScA) held at Victoria University of Wellington, New Zealand, during 29 November - 2 December 2017. They provide a current snapshot of leading research in the field by researchers from around the world.

Published by:
ARCHITECTURAL SCIENCE ASSOCIATION (ANZAScA)

ISBN: 978-0-9923835-4-1
Author/s:
Chau, H-W; Newton, C

Title:
A Pilot Study of Design Evaluation of Three Memory Support Residential Facilities in Victoria

Date:
2017

Citation:

Persistent Link:
http://hdl.handle.net/11343/212470

File Description:
Published version