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LIVING WITH ALZHEIMER’S DISEASE:
ENVIRONMENTAL DESIGN PATTERNS FOR AGING COMMUNITIES

BY

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THESIS
Submitted in partial fulfillment of the requirements
for the degree of Master of Landscape Architecture in Landscape Architecture
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2011

Urbana, Illinois

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ABSTRACT

Landscape can promote people’s health by supporting physical activity, offering restorative experiences, and providing opportunities for social interaction. Such benefits may be particularly important for the elderly people with Alzheimer’s disease, who, in general, have reduced mobility and cognitive abilities. As the Baby Boom generation grows older, we face an urgent need to provide landscapes that create healthy settings for elderly people who have or will have some day develop this disease. This thesis examines the psychological and physical needs of elderly people with Alzheimer’s disease by exploring the literature and reviewing precedents, then synthesizes this information by identifying a number of design priorities, patterns for a small-scale site. These priorities and patterns are then adapted to a larger scale setting, where temporary interventions for the landscape are explored. This thesis is an example of how a designer can gain in-depth practice at creating design guidelines that respond to scientific knowledge and specific human needs, create design patterns that increase elderly people’s health in different scales, and identify criteria for future design and research efforts.
ACKNOWLEDGEMENTS

I wish to express my gratitude to all the people who helped me in finishing this thesis. My sincerest thanks to my advisor, Professor William Sullivan, who always gave me inspiration to continue and suggested better solutions for me when I felt confused. I also want to thank my committees Professor Jinki Kim and Rebecca Ginsburg, who also gave me lots of helpful advise and comments on my work. Thanks to Professor Ellen Deming, David Hays, and Carol Emmerling, who came to my reviews and their critiques and comments were also important to improve my work. I am also grateful to Jim Hornek, the Volunteer Coordinator of Champaign County Nursing Home, who received me warmly when I visited there and did his best in answering my questions and providing the materials I need for my work. Thanks to my numerous friends who supported me along the way. I also convey utmost thanks to my parents, their endless support and love. Finally, my greatest gratitude to my grandma, who suffered from Alzheimer’s disease for 7 years and passed away 3 years ago, you are my motivation for study this topic and make me thinking about it is meaningful to me, to you, and more other people, wish you peaceful in your world, I will be missing you for ever.
TABLE OF CONTENTS

1. INTRODUCTION...........................................................................................................1
1.1 Research Overview....................................................................................................1
1.2 Background...............................................................................................................3

2. THEORETICAL FRAMEWORK......................................................................................5
2.1 Literature Review....................................................................................................5
2.1.1 Mechanism of Alzheimer’s Disease......................................................................5
2.1.2 Elderly Peoples’ Physiological, Psychological Change and Social Deficit..............6
2.1.3 The Restorative Environment.............................................................................6
2.1.4 Healing Gardens.................................................................................................7
2.1.5 Recreational Activity of Elderly People..............................................................8
2.1.6 Social Interaction and Dementia..........................................................................9
2.2 Landscape Treatments...........................................................................................9
2.3 Precedent Study.....................................................................................................10

3. GENERATING PATTERN FOR DESIGN.......................................................................15
3.1 Priorities for Alzheimer’s Patients..........................................................................15
3.1.1 Enclosure and Safety.......................................................................................15
3.1.2 Wayfinding.......................................................................................................16
3.1.3 Sensory Perception...........................................................................................16
3.1.4 Social Interaction..............................................................................................17
3.1.5 Physical Exercise..............................................................................................17
3.2 Design Patterns in Small-scale Settings...................................................................18
3.2.1 Identify the Settings ........................................................................................................... 18
3.2.2 Application of Patterns ...................................................................................................... 18
3.2.2.1 Enclosure and Safety .................................................................................................... 19
3.2.2.2 Wayfinding .................................................................................................................. 20
3.2.2.3 Sensory Perception ....................................................................................................... 21
3.2.2.4 Social Interaction ......................................................................................................... 23
3.2.2.5 Physical Exercise ......................................................................................................... 24
3.3 Neighborhood Settings .......................................................................................................... 25
3.3.1 Identify the Settings ......................................................................................................... 25
3.3.2 Design Patterns from Small-scale to Large-scale ................................................................. 25
3.3.3 Adaptation ....................................................................................................................... 25
3.3.3.1 Enclosure and Safety .................................................................................................. 25
3.3.3.2 Wayfinding ................................................................................................................ 28
3.3.3.3 Sensory Perception ..................................................................................................... 31
3.3.3.4 Social Interaction ....................................................................................................... 31
3.3.3.5 Physical Exercise ....................................................................................................... 32
3.4 Evaluation ............................................................................................................................ 33

4. CONCLUSIONS ...................................................................................................................... 35

REFERENCES .......................................................................................................................... 37

IMAGE SOURCES ...................................................................................................................... 39
Chapter 1

INTRODUCTION

1.1 Research Overview

One in eight of elderly Americans have Alzheimer’s disease. Over time, most of these people will move from their home into some sort of health care facility. In this thesis, I explore the kinds of landscapes that can be used to support people with Alzheimer’s disease in their home for as long as possible.

Although there have been some excellent theses in our department examining landscape characteristics for people with dementia, those theses have focused on small-scale settings such as healthcare facilities. My concern is also of a larger scale setting, such as a neighborhood, that might be altered in an effort to allow individual who have Alzheimer’s disease to stay in their home.
homes for as long as possible before being moved to a nursing home. Thus, in this thesis I also develop a number of design patterns that support people with Alzheimer’s disease in the site scale and neighborhood scale.

My contribution will be to synthesize a number of priorities and design patterns that are frequently used in small-scale settings for Alzheimer’s patients from a review of the literature and an exploration of precedents, and then examine how these patterns can be adapted to larger scale settings. Because we do not know today where people with Alzheimer’s disease will live in the future, and we do not know how long they will be able to live in their neighborhood before going to a health care facility, some of the adaptations I will explore will likely be temporary changes in the environment. Thus, my thesis will be different from previous works in two ways: it will focus on larger scale settings than much of the previous work, and it will examine temporary intervention in the landscape as a way of creating healthy places for individual who have this debilitating disease.

Figure 1.3-1.4 – Alzheimer’s patients live happily in their neighborhood

From left: Pidjass 2006, Gilmore 2011
1.2 Background

For a variety of reasons, people are living longer than ever these days than ever before (Strong, 2006). As a result, the increase of elderly population will place special burdens on society. In the United States, as the ‘Baby Boomers’ (born in 1945-1964) grow older, there will be dramatic increase in the elderly population – an increase to about 76 million individual in the coming years (Whitbourne, 2006). According to the United States Census Bureau, there will be 80 million people over 65 years of age in 2050, in other words, 1 in 5 Americans will be elderly by that time.

![Growth of the Elderly Population](image)

**Figure 1.5 – Growth of the elderly population**

U.S. Bureau of the Census

As people grow older, they typically experience a gradual physical and cognitive decline, and more easily get dementia (Altman et al, 1994). Alzheimer’s Disease is the most common
cause of dementia among elderly people. It is an irreversible, progressive brain disease that slowly destroys memory and thinking skills, and eventually the ability to carry out the simplest tasks. According to 2010 Alzheimer’s Disease Facts and Figures, 96% of Alzheimer’s patients are elderly people. An estimated 5.1 million Americans aged 65 and older – one in eight people aged 65 and older (13 percent) – have Alzheimer’s disease. By 2050, someone in United States will develop Alzheimer’s disease once every 33 seconds.

Today, people with Alzheimer’s disease are often moved to health care facilities prior to the point when their physical decline merits such a move. It can be very difficult families and caregivers to take care of a person with Alzheimer’s disease in a typical home and in most neighborhoods.

To what extent can we design places that provide greater support for people with Alzheimer’s disease so that they might stay as long as possible in their homes and neighborhoods? This thesis explores this question by examining the literature regarding the specific types of cognitive declines that are typical for Alzheimer’s patients, and by reviewing several precedents for design patterns that have frequently been used in Alzheimer’s garden design. I will then synthesize this information into a set of design priorities for Alzheimer’s patients that can be used in both site scale and neighborhood scale. Based on these priorities, I will present a number of design patterns that are applicable to the site scale and neighborhood scale.
Chapter 2

THEORETICAL FRAMEWORK

2.1 Literature review

2.1.1 Mechanism of Alzheimer’s Disease

Alzheimer’s disease will primarily cause damage in three parts of the brain: the hippocampus, amygdala, and frontal lobe. The hippocampus is a small sea-horse-shaped organ in the brain. One of the functions of hippocampus is to distribute experiences to the brain’s memory centers and to retrieve memories from the same places when a person needs them. For people with Alzheimer’s disease, this organ is damaged and thus they have difficulty making and retrieving memories. The amygdala is next to the hippocampus. It helps process emotions, feelings and moods. Because of damage to the amygdala, people with Alzheimer’s disease are often exquisitely sensitive to emotional situations. The frontal lobe helps people process information, plan, and solve problems. People with Alzheimer’s disease often have difficulty in organizing sequences of events and in processing information (Zeisel, 2005).

Figure 2.1, 2.2, 2.3 – Alzheimer’s disease causes damage in three parts of brain: (from left) hippocampus, amygdala, and frontal lobe
Through understanding the mechanism of Alzheimer’s disease, I explore the relevant landscape treatments and design patterns that might be appropriate for people who have the cognitive impairment that so often is associated with this disease.

2.1.2 Elderly Peoples’ Physiological, Psychological Change and Social Deficit

Schooler (1976) has indicated that as we age, people increasingly encounter physiological change: a decline in hearing and vision, slower reaction and response, and loss of balance. There are psychological changes as well: lack of feeling secure, a need for more tranquility, and social withdrawal that leads to a feeling of being socially insignificant. Because of these physiological, psychological and social changes, elderly people are more vulnerable to a multitude of threatening and potential injurious circumstances in their surrounding settings.

By understanding these changes of elderly people, I can examine their specific needs for landscape design.

2.1.3 The Restorative Environment

Kaplan and Kaplan (1989) have shown that the natural environment is restorative because it provides relief from mental fatigue. This relief invokes the use of an effortless involuntary attention and recharges one’s directed attention. There are four co-acting components that are important to a restorative experience: being away, extent, fascination, and compatibility.
For elderly people with Alzheimer’s disease, a restorative environment, that promotes a scene for being away, from the hustle-bustle of modern world, a sense of fascination by exposing people to bird songs and flowers, and opportunities to choose from a variety of activities, is likely to be beneficial. Therefore, the design patterns that can be related to this idea are Viewing Nature and Horticulture. By viewing all kinds of softly fascinating as well as touching nature through horticulture, Alzheimer’s patients may find that their moods are enhanced and agitated or passive feelings are reduced.

2.1.4 Healing Gardens

According to Cooper-Marcus (1999), healing gardens can represent a meeting point of medicine and design, as well as provide opportunities for movement and exercise, for decision-making, and privacy. Most importantly, these gardens can allow patients to experience a sense of control. They also encourage people to gather, support social interaction with others, and provide engagement with nature.

Annalisa Gartman Vapaa (2002) also identified a number of common characteristics of healing gardens in her master thesis. She found that healing gardens should stimulate the user’s senses, should be easy for navigation and mobility, and should offer contrast to stressful environment. Healing gardens should also encourage wildlife to be present and should reinforce the cycle of life through plants that provide seasonal change.

For elderly people with Alzheimer’s disease, healing gardens provide an outdoor place that can benefit their physical health through recreational activity, psychological health through restorative experience, and social interaction through gathering and communication.
2.1.5 *Recreational Activity of Elderly People*

There is a bunch of literature studying relationship of recreational activity and health. Schwarzenegger et al (2005) studied the health benefits of recreational activity and determined that there are physical health benefits associated with recreation specifically involving physical activity. Recreation can have a positive impact on reducing obesity, diminishing risks of chronic diseases (heart disease, diabetes, cancer, osteoporosis), boosting the immune system, and increasing life expectancy. There are also mental health benefits that can be derived from both active and inactive recreation opportunities. These activities include exercise, physical activity and even mentally recalling outdoor recreation activities can have positive effects on reducing depression, relieving stress and improving quality of life (self-esteem, personal and spiritual growth, life satisfaction).

According to Elizabeth Wright, certain recreational activities - such as watering the garden, raking leaves, feeding the birds, etc.- can help people with Alzheimer’s disease compensate for lost abilities, promote self-esteem, maintain skills that do not require new learning, provide an opportunity for enjoyment, pleasure and social contact, and be culturally sensitive.

Health, both physical and mental, is the top concern for elderly people with Alzheimer’s disease. Because of the obvious link between health and recreational activity, studying their preferences for recreational settings we can improve health for elderly people with Alzheimer’s disease.
2.1.6 Social Interaction and Dementia

Scientists in Sweden found that elderly people who live alone, without friends and strong family ties, are more likely to develop dementia because of a lack of social interaction.

Social interaction can protect people from dementia because it stimulates connections between brain cells and keeps its cognitive function active. When we talk and spend time with others, we use parts of the brain that otherwise remain idle. Being social often involves physical exercise or mental activity, which is ideal for preventing dementia because physical and mental activities are also good for the brain. Thus, in terms of landscape design, we can create some space that can attract people stay and spend some time, also have more chance to meet and talk with others.

2.2 Landscape Treatments

Given the insights gained from the studies and theoretical concepts described above, It is clear that Alzheimer’s patients will have physical, as well as cognitive, losses as their disease processes. Because most people with Alzheimer’s disease are elderly, they will are also likely to have declines in visual functioning. Thus, the landscape treatment can be to use bright colors and high contrast things such as flowers. Aging can also bring about a loss of balance and flexibility, so wheelchair accessibility and other mobility aids should be considered in design.

The treatments for cognitive loss, interventions such as continuous pathways, landmarks and anchors can help those people with Alzheimer’s disease to find the orientation. Since they are emotionally sensitive, we should provide privacy, and a sense of safety in the design.
Additionally, the landscape should provide multiple opportunities for people to experience soft fascinations. Soft fascination (Stephen Kaplan, 1995) can include such thinks as scents, water, green, vegetation, flowers, birds and other animals. Such elements are likely to produce a sense of calmness and also support reflection. Lastly, Alzheimer’s patients often have difficulty in organizing activity, so we should provide them with symbolic instruction and encourage them to engage in some simple physical exercise.

<table>
<thead>
<tr>
<th>IMPAIRMENT</th>
<th>SYMPTON</th>
<th>Rx</th>
</tr>
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<tbody>
<tr>
<td>Physical loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ophthalmopece</td>
<td>Decline in visual function</td>
<td>Bright colors</td>
</tr>
<tr>
<td></td>
<td>≥</td>
<td>High contrast</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>Loss of bone material mass</td>
<td>Wheelchair accessibility</td>
</tr>
<tr>
<td></td>
<td>≥</td>
<td>Mobility aid</td>
</tr>
<tr>
<td>Cognitive loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hippocampus (Memory bank)</td>
<td>Lose old memory and hard to place new memory</td>
<td>Continuous pathway</td>
</tr>
<tr>
<td></td>
<td>≥</td>
<td>Landmarks and anchors</td>
</tr>
<tr>
<td>Amygdala (Control time)</td>
<td>Sensitive to emotional subtleties and expressions</td>
<td>Privacy and safety</td>
</tr>
<tr>
<td></td>
<td>≥</td>
<td>Soft fascination for calming: scent, water, green, birds</td>
</tr>
<tr>
<td>Frontal lobe (Organize)</td>
<td>Difficulty in organizing and sequence of events</td>
<td>Symbolic instruction</td>
</tr>
<tr>
<td></td>
<td>≥</td>
<td>Simple physical exercise</td>
</tr>
</tbody>
</table>

Figure 2.4 – The impairments, symptoms and landscape treatment of Alzheimer’s disease

2.3 Precedent Study

Healing gardens and other therapeutic environment are being used effectively to meet the special needs of patients suffering from Alzheimer’s disease. What are the special characteristics of healing gardens that support people with Alzheimer’s disease? In order to address this question, I examined five healing gardens in the United States for this precedent study.
With the knowledge of the various landscape treatment I examined before and a close examination of the five healing gardens, I synthesize nine main characteristics that should be present in landscape that are designed to be supportive of Alzheimer’s patients. ‘Raised bed’ and ‘mobility aid’ are for wheelchair accessibility. ‘Landmark’ and ‘circular pathway’ are for orientation. ‘Enclosed’ and ‘one entrance’ and ‘nontoxic’ are for safety. ‘Four season garden’ and ‘old-fashioned plants’ are for fascination.

These five Alzheimer’s gardens are scattered in different states of the U.S. The first one is at the Portland Memory Garden in Portland, Oregon. It has four seasons of plants and flowers in raised beds that have been chosen to stimulate the senses and to spark past memories, as well as a circular pathway and visual landmarks. It is fenced so it offers security and comfort for patients.
The Alzheimer’s Memory Garden in Macon, Georgia, is the first memory garden in the U.S
opened in July 1999. It has only one entrance, one circular path. It is packed with benches, non-
toxic plants and raised beds of plants with bright flowers, fuzzy leaves to lean on and to touch
and a pond with good view.

![One entry gate](image1)
![Pond with good view](image2)

**Figure 2.7 – One entry gate**
Viandyra 2008

**Figure 2.8 – Pond with good view**
Viandyra 2008

The Camellia Wing Garden in Dallas, Texas, is designed for the residents in a nursing home. It has a paved wandering loop with handrail, accessible covered gazebo as landmarks. Safety and security are addressed by every detail such as gate closure. Plant material was chosen for seasonal interest, color, texture, taste, etc. in the raised planter.

![Walking with handrails](image3)
![Covered gazebo as landmarks](image4)

**Figure 2.9 – Walking with handrails**
Landscape archive

**Figure 2.10 – Covered gazebo as landmarks**
Landscape archive
The Alois Alzheimer’s Center Garden in Greenhills, Ohio, is also designed for a nursing home. It has raised beds for planting nontoxic flowers and some “old-fashioned” plants that can arouse patients’ childhood memory. It is fenced for enclosure and has a circular pathway connected to the patio.

Sophia Louise Durbridge-Wege Living Garden in Grand Rapids, Michigan, is another example in a nursing home garden. It is enclosed and has a simple looped pathway encouraging walking. There are a wide variety of perennial flowers in raised bed for four-season garden and memory-recall.
The table below shows that not all the places have all the characteristics. The characteristics of ‘raised bed’ and ‘mobility aid’ are essential for Alzheimer’s garden design because it provides the accessibility for patients with wheelchairs. Landmarks are not used popularly though they are important for orientation, while ‘circular pathway’ is frequently used for guiding the wanderers. ‘Enclosed’ is necessary for security reason, even though ‘one entrance’ is not mandatory in the garden. “Four seasons” and “old-fashioned plants” can stimulate senses and recall memories so they are necessary, and all the plants should be ‘nontoxic’ because patients would put them into their mouths.

The patterns and designs I generated in this thesis will respond to the nine characteristics that I have identified through the precedent studies and through my review of the literature.

Figure 2.15 – Study of five precedents for nine characteristics
Chapter 3

GENERATING PATTERN FOR DESIGN

In this chapter, I will generate several priorities that are essential in outdoor design for Alzheimer’s patients. Then, I will further apply each priority into design patterns that are frequently used in small-scale settings. At last, I will also examine how these patterns can be adapted to larger scale neighborhood settings.

3.1 Priorities for Alzheimer’s Patients

Based on the theoretical framework described in Chapter Two, I now pose and examine several design priorities for Alzheimer’s patients. These priorities are synthesized from the previous literature review and the precedent study. The priorities aim at supporting Alzheimer’s patients with different kinds of therapeutic goals.

3.1.1 Enclosure and Safety

Among the most frequent activities that take place in gardens designed for people with dementia are walking and wandering (Cooper, 1999). Because of a decline in cognitive functioning that is the hallmark of Alzheimer’s disease, environment designed for Alzheimer’s patients should have a level of enclosure that prevent them from going out. This can be achieved through design with fences, gates, walls, or hedges.
Most people with Alzheimer’s disease are elderly and they often develop kinesthetic (balance) problems. Thus, the environment must include the standard safety precautions, for examples, to provide handrails along the pathway and to use ramps instead of stairs (Calkins, 1988). So the therapeutic goal for this priority is to keep people inside as well as keep people safe.

3.1.2 Wayfinding

Kevin Lynch, in his book *Image of the City* (1960), identified paths and landmarks that are used by people for orientation and way-finding. In Alzheimer’s gardens, a straight pathway with a dead end should be avoided because patients will wander over and not move away then become agitated. The environment should have a circular and continuous pathway that allows the patients to see the caregivers and also allows them to wander a bit. It should also have major landmarks that can be seen everywhere in the garden and minor landmarks as a series of interest along the pathway (Copper, 1999). The therapeutic goal of this priority is orientation.

3.1.3 Sensory Perception

The more we are engaged with the environment through all our senses, the lower are our rates of anxiety and the less we are aware of pain (Cooper, 2005). People with Alzheimer disease are emotionally sensitive, so the environment needs to stimulate a good mood by providing a multi-sensory experience with colorful flowers, varying shades and textures of green, the sights and sounds of water, elements that attract birds and butterflies, fragrances, and ornamental grasses which move with the slightest breeze. The therapeutic goal of this priority is provide a supportive, softly fascinating setting that invites interaction.
3.1.4 Social Interaction

Social interaction can protect people from dementia because it stimulates connections between brain cells and keeps its cognitive function active. Social interaction can also stimulate the brain to release “feel good” chemicals such as norepinephrine, which leads to contentment. It has been found that happiness increases with age among seniors who remain socially involved (Erickson et al, 2009). Thus, a supportive environment for Alzheimer’s patients will include spaces that can encourage communication among people. In garden design, nodes are hubs of activity or natural gathering and stopping places along normal circulation routes (Cooper, 1999). We can design this kind of places by using crossings paths providing places for activities that people can do together (e.g., pot plants or weed together), or by simply being sure there are comfortable places to sit in the sun and shade – places that are protected from the wind. The therapeutic goal of this priority is to support cognitive and social functioning.

3.1.5 Physical Exercise

Regular exercise boosts brain growth factors and encourages the development of new brain cells and the connections among brain cells. Exercise also reduces the risk for disorders that lead to memory loss, such as diabetes and cardiovascular disease. Exercise also makes a huge difference in managing stress and alleviating anxiety and depression—all of which leads to a healthier brain. The environment should provide space for people with Alzheimer’s to go outside and exercise on a daily basis. The therapeutic goal of this priority is to support cognitive functioning and physical health.
3.2  Design Patterns in Small-scale Settings

3.2.1 Identify the Settings

The most common and traditional environmental design for Alzheimer’s disease is a garden in a healthcare facility, which has been specifically designed for Alzheimer’s patients. These gardens are typically small in size. The image below shows the existing Alzheimer’s garden in Champaign County Nursing Home – an area that is about 435 sq.ft. Though these gardens are compact they still have multiple functions to meet all the needs of patients.

![Figure 3.1 – Champaign County Nursing Home](Google Map)  
![Figure 3.2 – Healing garden in CCNH](Google Map)

3.2.2 Application of Patterns

Based on five priorities for Alzheimer’s patients, I have generated nine design patterns that are applicable to small-scale settings. All these patterns can be used widely in traditional garden design.
3.2.2.1 Enclosure and Safety

*Raised Bed*

A raised bed can allow people who use wheelchairs to touch the plants and engage in gardening activities. It can also serve as a physical partition or fence to create enclosing environment, as well as continuous handrails along the bed. It reflects a need for mobility aid as well as enclosure.

![Raised bed as physical partition](image)

*Figure 3.3 – Raised bed as physical partition*

*Camouflaged Exit*

The purpose of a camouflaged exit is to prevent Alzheimer’s patients from walking away from the garden. Strategies for camouflaging the exit include painting the door with the same color of surroundings, or covering the exit with high shrubs and blocking the view outside. It can reduce ‘exit seeking’ or ‘elopement’ behavior by people with Alzheimer’s disease.
3.2.2.2 Wayfinding

*Continuous Pathway*

Because a continuous pathway does not have a dead end, it can always guide the patients to walk out from their building and finally get back to it. This kind of pathway should be the main route in a garden and use different paving material to be distinguished from other minor paths. A continuous pathway with constant material can orient the direction for people with Alzheimer’s disease.

*Figure 3.4 – Camouflaged exit to block the view outside*

*Figure 3.5 – Continuous pathway can orient direction*
**Landmarks**

Landmarks should be seen everywhere in a garden. They can be relatively big in size or tall in height so as to be noticeable. Sometimes they will also use dramatic colors in order to be seen at a far distance. Therefore, Landmarks are visible reference points that provide cues for people with Alzheimer’s disease to find their way around the garden.

![Figure 3.6 – Landmarks as visible reference](image)

3.2.2.3 Sensory Perception

**Viewing Nature**

Enjoying a good view in nature can have a calming effect because it stimulates good senses for people. People with Alzheimer’s disease can use all the senses of vision, smell, hearing and touch to perceive the beauty of natural environment.
Horticulture

Horticulture can be therapy for people with Alzheimer’s disease. Engaging in horticultural activities allows people to get close to nature for mood enhancement and to organize a sequence of different garden activities. People can also gain a sense of satisfaction after their hard work on horticulture.

Figure 3.7 – Viewing nature to stimulate good senses

Figure 3.8 – Horticulture can gain a sense of satisfaction
3.2.2.4 Social Interaction

**Pocket Garden**

The pocket garden is small space distributed along the main path of outdoor environment. It can be the place for people to take a rest as well as providing a place to sit and talk with other people. Though it is small it still has some attractions such as seating area and green space, in order to let people stay for a longer time there and talk with the people next to you.

![Pocket garden](image)

*Figure 3.9 – Pocket garden can provide a place to sit and talk with others*

**Middle Meeting Point**

The middle meeting point is the intersection of two paths, which is a place for people to take a rest when passing by. Sometime it is also a gazebo or arbor, so people can sit in the shade talking with other people as well as enjoying the garden view.
3.2.2.5 Physical Exercise

*Exercise Field*

Exercise field is the place for people taking outdoor exercise. It includes some outdoor exercise equipments on site for specific purposes, also some opening space that supports walking or playing with a ball.
3.3 Neighborhood Settings

3.3.1 Identify the Settings

For the people with Alzheimer’s disease who would prefer not to stay in a healthcare facility, it would be ideal if they could stay in their neighborhood for as long as possible. But 99% of neighborhood settings are not specifically designed to be supportive Alzheimer’s patients. In order to make the neighborhood settings more accommodating, the neighborhood will most likely need to undergo a temporary, low-cost intervention, that could be relatively removable, and also take into consideration the common use by other residents.

Three different scenarios of neighborhood settings were chosen for exploring adaptation of design patterns in large-scale settings: suburban, town and urban.

3.3.2 Design Patterns from Small-scale to Large-scale

Design patterns in large-scale settings are based on the five priorities for Alzheimer’s patients that I described above. Some of patterns were developed from similar patterns in small-scale settings by changing the dimensions. And some evolved from those in small-scale settings by changing the forms but still following the fundamental ideas of each priority.

3.3.3 Adaptation

3.3.3.1 Enclosure and Safety

The three scales – suburban, town and urban neighborhood – have different levels of openness. The suburban neighborhood setting is relatively enclosed and somewhat isolated from outside environment as a separated community. The town setting is mostly within street blocks,
which includes an entry on every block. The urban setting is open to streets, and sometimes in busy downtown areas.

![Figure 3.12, 3.13, 3.14 – Three scales of setting with different levels of openness](image)

(from left) suburban, town, urban

**Enclosed Community**

Enclosed community is for suburban neighborhood setting. It is enclosed with only a few exits to outside. In the new context, plants can also be used as fences when grown in line compactly. Therefore, people with Alzheimer’s disease are restricted in the ‘gated community’ but can still have a view to outside.

![Figure 3.15 – Plants as fence for enclosed community](image)
**Continuous Path**

Continuous path is for the town setting. There is an U-shape turning in each entry of neighborhood as exit-control. It uses high contrast color paving material, in order to let people follow the unique path and turn around before walking out of neighborhood from the entry.

![Continuous Path](image)

**Figure 3.16 – Continuous Path prevents people from walking out of neighborhood**

**Raised Bed Boundary**

Raised bed boundary is for the urban setting. Raised planters can be used around buildings, so to some extent it can block the building areas from the streets. Planters use high contrast color paving material, in order to be a unique symbol or warning to keep people inside the ‘boundary’.
3.3.3.2 Wayfinding

In three scales – suburban, town and urban settings – have different sizes of front yard space that can be used for distinguishing. Suburban neighborhood setting mostly has a large front yard and lots of space. Town neighborhood setting has medium-size front yard and smaller space compared to suburban neighborhood. Urban neighborhood setting has no front yard space.

Figure 3.18, 3.19, 3.20 – Three scales of setting with different sizes of front yard space
(from left) suburban, town, urban
Distinctive Design

The pattern of distinctive design is for suburban setting because it has larger front yard for distinguishing. It uses distinctive vegetation such as low and ornamental shrubs or perennials that are planted massively in the front yard. These can be very noticeable and can be seen from a far distance, thus guide people with Alzheimer’s disease back to their houses.

![Massive ornamental vegetation in the front yard as distinctive design](image)

Figure 3.21 – Massive ornamental vegetation in the front yard as distinctive design

Landmarks

This pattern is for town setting. They are relatively large sculptures or installments such as shaped shrubs that are placed in the front yard. They also use some recognized symbols so they can be very noticeable from a distance as landmarks. For people with Alzheimer’s disease, the symbols of animals or other features from childhood memory can easily attract their attention.
Contrast Facades

This pattern is for urban setting. The facades of a building or doors and windows are painted with contrast color or grew with climbing plants, in order to distinguish the doorway from the others and allow people to find their home.

Figure 3.22 – Recognized symbols in the front yard is noticeable as landmarks

Figure 3.23 – Contrast Facades can distinguish the doorway from the others
3.3.3.3 Sensory Perception

The design patterns for this priority do not have much difference in different scales, because the environment will have same therapeutic effects for people no matter the size of the place and the amount of the plants (Kaplan & Kaplan, 1989). Therefore the patterns in large-scale settings are still *Viewing Nature & Horticulture* same as explained previously.

![Image of Sensory Perception](image1)

**Figure 3.24-3.25** – Viewing Nature & Horticulture are also applicable in large-scale settings

3.3.3.4 Social Interaction

The design patterns for this priority in large-scale settings can still use patterns of *Pocket garden & Middle Meeting Point* from small-scale settings. In neighborhood, this small space can be located in some people’s front yard or corners of streets.

![Image of Social Interaction](image2)

**Figure 3.26-3.27** – Pocket Garden & Middle Meeting Point are applicable in large-scale settings
**Shared Open Space**

In large-scale settings such as neighborhoods, there is open space shared by all the residents. Shared open space in neighborhood is the place where people will frequently visit and gather, so it is still an optimal place for social interaction.

![Image of shared open space](image1.png)

**Figure 3.28** – Shared Open Space for people’s gathering and social interaction

3.3.3.5 Physical Exercise

The pattern of *Exercise Field* from small-scale settings can be applied in large-scale settings. Exercise field in neighborhood is not only for people with Alzheimer’s disease, but also used by other residents in neighborhood.

![Image of exercise field](image2.png)

**Figure 3.29** – Physical Exercise is also applicable in large-scale settings
**Continuous Trail**

Continuous trail in neighborhood is an expansion of continuous pathway but with much longer length. It also uses different color paving material to distinguish from other paths to keep its consistent. People with Alzheimer’s disease can walk and keep following this unique trail as daily exercise.

![Continuous Trail Diagram](image)

**Figure 3.30** – People follow Continuous Trail as daily exercise

### 3.4 Evaluation

The design solutions described in this thesis are based on the needs and actual behavior of people with Alzheimer’s disease. The solutions grow from the literature and my own creative problem solving process.
With the priorities, I began to apply them to small-scale settings and developed several correspond design patterns for each priority. Then I would like to go further to large-scale designs by changing the dimensions or forms of small-scale designs using innovative design ideas. Though some of those innovative ideas for large-scale designs cannot be related to any theory yet but just come from my assumptions, they are still oriented by human needs and behaviors.

The advantage of this research design is that I have used a very clear, logical and reasonable deductive process. The disadvantage is that there is no way to test whether the design solutions I have offered here are feasible or not. However, the application of design patterns to large-scale settings is a new idea, which will raise more attention to the issue of neighborhood design and development for aging individuals.
Chapter 4

CONCLUSIONS

People are becoming more conscious of the increasing rate of Alzheimer’s disease. This thesis examines the extent to which that outdoor environment can play a therapeutic role in the care of people with Alzheimer’s disease. Five main priorities with therapeutic goals for Alzheimer’s patients were developed and translated into spatial terms that can be applied to designs at various scales.

The most important contribution of my thesis is the design patterns I have generated for Alzheimer’s patients at the neighborhood scale. Focusing on the neighborhood scale in addition to the site-specific scale is different from previous work in this area. Though this is only a small effort to help daily life for people with Alzheimer’s disease, it is my hope that this work will arouse the attention of designers, public officials, and scholars for further investigation. I hope that this study can act as a catalyst for future research in the exploration of the therapeutic potential of living environments in neighborhoods that allow people with Alzheimer’s disease live as long as possible. For example, some future research can be an elderly-oriented community design, a study of different usage of outdoor space by people with Alzheimer’s disease in different stages, or more detailed design criteria regarding material selection, dimensions, and colors for people with Alzheimer’s disease.

In developing and implementing this research project, I came little by little to understand the complexity of Alzheimer’s disease and the potential impact on the lives of millions of elderly people and their families. I will continue with this topic in my future career, with a sense of
justice and responsibility in an effort to create a better environment that can support elderly people with Alzheimer’s disease. Clearly, there is still a long way to go.
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IMAGE SOURCES


