

Treatment Effects of Healing Gardens for Alzheimer's: A Difficult Thing to Prove

John Zeisel

University of Salford & Hearthstone Alzheimer Care

1. Background

Alzheimer's is a degenerative disease whose etiology is quite specific. A protein called 'plaque' covers parts of the brain while dendrites of individual cells disintegrate into what are called 'tangles'. These plaques and tangles are not random but rather affect similar parts of the brain of people living with this disease, although at different times in its progress. By the end of the disease up to 40 per cent of the brain's weight, and as much of its cellular structure, can be affected. But at the same time, during the disease itself, as much as 80 or 90 per cent is still functioning. These working parts of the brain provide us with the key to the 'treatment effects' of the built environment, including contact with the outdoors through gardens and their designs.

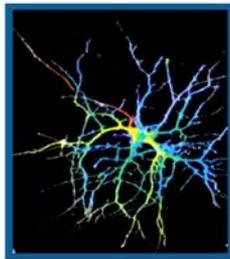


Figure 1. Plaques and tangles

Among the parts of the brain that are affected in different ways and that hold the keys to healing garden treatment are the hippocampus, the amygdala, executive function in the frontal lobe, and the chiasmatic nuclei (CN). The following simplified description illustrates the logic and process that successful healing garden design follows.

The hippocampus is a small sea horse-shaped organ located next to the amygdala in the 'limbic' area of the brain. Sometimes called the key to the brain's glove compartment or file cabinet, one of its functions is to distribute experiences into the brain's memory bank and to retrieve memories from the same places when a person needs them. In people living with Alzheimer's (PLWA), this organ is damaged early in the disease, making it difficult to get at old memories and place new ones. Of particular significance to garden design is the fact that memories of place and location, called 'cognitive maps', are included in the memories that are hard to place and retrieve. A garden designed to help a person find their way without using the cognitive mapping capacities that they have lost is a successful healing garden.

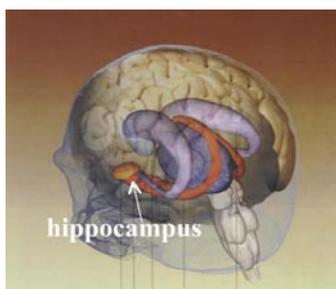


Figure 2. The hippocampus

The amygdala sits right next to the hippocampus and has a different function. The amygdala primarily handles emotion, feelings and moods and is damaged quite late into the disease. People living with Alzheimer's remain exquisitely sensitive to emotional subtleties and expressions for a long time. A garden that elicits positive moods that PLWA can fully experience and by which they can orient themselves, is a successful healing garden.

Frontal lobe damage leads to the PLWA having difficulty organizing complex – or even not so complex – sequences of events, called 'executive function'. Indoors, such events might be cooking a meal, brushing teeth, or cleaning up. In relation to the outdoors, executive function is needed to find the way out, plan a walk or organize a garden activity. An outdoor environment that is self-organizing, that enables the PLWA to use the garden without having to organize themselves, is a successful healing garden.

Finally there are the chiasmatic nuclei – the cells in our brain that keep time for us. The CN cells help the body maintain an inner clock. It's not exactly a 24-hour clock, but it does help us sleep at night, wake in the morning and know the difference even if we have little contact with the sun and the weather. In PLWA, CN cells are damaged, leading to problems if no outside cues as to time of day, day of week, or season are available. These include what are called 'sleep/wake disturbances' in which a person will wake suddenly at night and not understand it is night time, and 'sundowning' in which a PLWA may become agitated at the end of the day and say they "want to go home" even if they are already at home. Contact with the elements through ongoing access to a healing garden can reduce such symptoms.

The following photographs and drawings represent healing gardens that are successful in their design, in that they respond to the needs described above. After describing the gardens, we shall explore the design principles that underlie them.

Figure 3 is of a large triangular-shaped ground floor garden in Marlborough, Massachusetts. It is directly adjacent to an Alzheimer's assisted living residence, with a dining room, living room and kitchen on the same floor. Residents have essentially 24-hour access to the healing garden through a residential 'front door' with glass windowpanes and sidelights to 'see those outside'. Once outside, residents see a front porch to the right, a back patio to the left and a clearly marked pathway that starts at the right near the porch and circles the garden until it reaches the back patio. The path circles a front yard and a back yard and passes various planting beds, a park bench area off the path, and an area with two raised planting beds. The front door is set into a peaked enclosure that clearly indicates 'way in' to residents in the garden. The garden is surrounded on two sides by three-storey high buildings, and on the third side by an eight-foot fence, the top two feet of which are decorative.



Figure 3. Healing garden in Marlborough, Massachusetts

The second garden looks quite different and is located on a large balcony area adjacent to an Alzheimer’s assisted living residence on the fifth floor of a five-storey building in White Plains, New York. The garden is long and thin, with one entrance from the kitchen/dining room and another through an activity room that has been turned into the executive director’s office. The garden is surrounded by a light blue metal fence with half-inch by two-inch wide slats, with an inch in between each. The fence undulates like a wave from six feet up to eight feet and back down in a regular motion. There are three distinct areas to the garden: a covered front porch outside the kitchen; a park with circular benches between the two other areas and with no direct doorway inside; and a back yard with seating and a barbecue outside the second doorway. Connecting all three areas is an organic shaped pathway painted onto the slightly malleable pavement. All three areas are painted a different colour, the park is separated from the other two on each side by rose arbours, and on all sides of the garden is an organic shaped area painted green to indicate that is where large potted plants are to be put.



Figure 4: Healing garden in White Plains, New York

2. Design Principles

There are three major overlapping design principles or schema for the design of healing gardens for PLWA. These are: natural mapping (Norman); latent image elements (Lynch); and housing zones (Zeisel).

Naturally-mapped environments and objects are those in which all the information needed for their use is designed into the object or environment itself. No instruction book, map or memory is needed to negotiate the environment or figure out how to make the object work. A naturally-mapped environment is one with a few clearly recognisable pathways that can be seen from anywhere in the setting, with an entrance and exit that everyone can see and understand as such, and with destinations that users of the environment can see easily. One that is not naturally mapped would have several forks in the pathways leading to destinations that are hidden around curves and bushes, would leave users in places with no clear way out and might even have paths that lead back on themselves without an indication of a way out.

Latent image elements, defined by Kevin Lynch in his landmark study and book *Image of the City* of how taxi cab drivers organize information about cities in which they work, include:

- Paths: The channels along which people move; the predominant element in their image of their environment as they move through it.

- Edges: Boundaries between two areas; either penetrable barriers or seams that join parts of a garden together. Edges like the fence around a garden define and hold together general areas.
- Districts: Sections of a garden that someone can enter into; recognizable as having a unique identifying character.
- Nodes: Spots in a garden that are foci to and from which people travel. Nodes can be junctions, the crossing of paths or places of intense activity.
- Landmarks: Reference points singled out from a host of possibilities in a setting: towers, domes, signs, trees, doorways; “increasingly relied upon as a journey becomes more and more familiar” (Lynch: 48).

These five elements appear to be central to the way the brain processes environmental place information. Research has shown that landmarks play a central role in how people organize mental information for wayfinding – to develop their cognitive maps. Outdoor environments can be fully described using these descriptive elements.

Zeisel, in *Housing for Families*, defined the following housing ‘zones’ as natural organizing principles for residential settings. Residential housing in most traditional societies can be diagrammed into the following zones:

- ‘Outsider public’ is like a park where everyone is welcome.
- ‘Insider public’ is like a residential street where everyone is free to walk, but those who live there keep a close eye on strangers.
- ‘Front personal areas’ are front gardens and lawns that belong to someone but are physically accessible, if, for example, a ball should bounce into them.
- ‘Building edges’ (front) include porches and front stoops that clearly are off-bounds for strangers with no business there, but are accessible.
- ‘Building walls’ include the windows and doors that separate inside from outside.
- ‘Front stage areas’ are the formal welcoming areas of a home.
- ‘Back stage areas’ include kitchens and bedrooms that residents use more informally.
- ‘Building edges (back)’ include patios and back porches that are clearly off bounds for outsiders, even those trying to make contact.
- ‘Back personal areas’ are represented by back yards where children play and people gather.
- ‘Insider public’ (back) areas include back alleys and other areas shared only by those who live there.

The significant characteristic of this spatial typology is that successful residential plans include all these zones, either by space or by some other defining element such as a change of grade or a fence. Where zones are omitted, failures often occur.

These three organizing principles – overlapping and merged into a single healing garden plan – represent the major design principles for successful Alzheimer’s treatment gardens. The reasoning behind this is a combination of theory and practice from environmental psychology, planning, industrial design, psychology and Alzheimer’s care practice. They can be seen in the gardens described above.

3. Intended Effects and the Difficulty of Measuring Them

Treatment of a disability, illness or disease is any approach that reduces symptoms. Research has shown that other environmental design characteristics such as camouflaged exit doors,

uniquely designed common areas and residential décor are associated with reductions in social withdrawal, agitation, aggression and delusions among people living with Alzheimer's (Zeisel et al, 2004). The intention of healing or treatment gardens is to reduce sleep/wake disturbances and sundowning, and generally to regulate the damaged mental/body clock of people living with the disease. These results would be expected, given what we know about the brain and how it is affected.

It is not as easy as it seems to measure these effects, however. The reason for this is that a healing garden is not merely a space. It is a place managed by others so that it may be available all day long or only at certain times; it may have organized activities, frequently or seldom; it may have a see-through or an opaque enclosure; it may have a completely secure enclosure, or one that can be climbed. Its visibility from inside can lie anywhere on a complex continuum. The list of variables is quite long. Efforts to measure a person's exposure to daylight and thus evaluate garden exposure yield little clear data. These complexities make it difficult to assess the actual effects of healing gardens on people living with Alzheimer's. Overcoming these methodological difficulties is a major challenge (and opportunity) for the environmental psychology and landscape design communities.

4. Unintended Interesting Effects

An interesting observational study that was carried out in the Marlborough Alzheimer's healing garden described above sheds light on another benefit of such places – they increase residents' independence. Grant observed residents, family members and staff who used the garden over a period of six days in the summer of 2001. She uncovered two enlightening uses of the garden, both representing contributions to residents' feeling of independence. First, she found that the most used single element (13 per cent) was the 'park bench' in the 'outsider public' part of the garden. Residents would sit on a bench alone, or with family members. This solitary element was used more than, for example, a chair on the 'patio'.

Second, of all the trips out into the garden, 36 per cent were by residents on their own, ie not accompanied by anyone else or as part of a group. And even more interesting, fully 59 per cent of the trips back inside were alone. The naturally mapped garden, designed to include Lynch's image elements and Zeisel's housing zones, gave residents living with Alzheimer's the opportunity to come and go as they pleased. This unintended effect is a major accomplishment for such an environmental element and one which future research will surely evaluate.

In sum, the theory and practice of healing garden design is quite advanced. Post-occupancy evaluations of such places and other assessments of their effects must overcome significant methodological challenges in order to demonstrate the treatment effects of healing gardens.

Keywords: Healing gardens; Alzheimer's; design; disability

References

Grant, C. (2003) Chapter III: Hearthstone at New Horizons, in *Factors Influencing the Use of Outdoor Space by Residents with Dementia in Long term Care Facilities*. PhD Thesis, Georgia Institute of Technology, UMI Dissertation Publishing, disspub@umi.com: www.umi.com

Lynch, K. (1960) *The Image of the City*. Cambridge, MA: MIT Press.

Norman D.A. (1988) *The Design of Everyday Things*. New York: Doubleday/Currency.

Zeisel, J., Hyde, J. and Levkoff, S. (1994) 'Best practices: An environmental-behavior (E-B) model for Alzheimer special care units', in *Am. J. Alzheimer's Care and Related Disorders & Research*, **9**(2), 4-21.

Zeisel, J. and Tyson, M. (1999) Alzheimer's treatment gardens, (with) in Cooper Marcus, C and Barnes, M. (eds.), *Healing Gardens: Therapeutic Benefits and Design Recommendations*. John Wiley & Sons.

Zeisel, J. and Raia, P. (2000) 'Non-pharmacological treatment for Alzheimer's disease: A mind-brain approach', in *American Journal of Alzheimer's Disease and Other Dementias*, **15**(6); Abstract published in *The Journal of Neuropsychiatry and Clinical Neurosciences*, **12**(1).

Zeisel, J., Silverstein, N., Hyde, J., Levkoff, S., Lawton, M.P. and Holmes, W. (2003) 'Environmental correlates to behavioral outcomes in Alzheimer's special care units', in *The Gerontologist*, **43**(5), 697-711.

Zeisel, J. and Welch, P. (1981) *Housing Designed for Families: A Summary of Research*. Joint Center for Urban Studies for MIT and Harvard.