

What Makes a Garden a Healing Garden?



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The interest in healing gardens has increased around the world. Several research disciplines and professions deal today in different ways with healing gardens. However, do we define the healing garden and its effects on the visitor's well-being in the same way, or are we talking about different things? This article consists of two parts. The first part discusses healing influences of healing gardens based on theories and findings from the different research disciplines of environmental psychology, landscape architecture, medicine, and horticultural therapy. The second part of the article focuses on the people the healing garden is intended for. When dealing with healing gardens, it is fundamental to try to find answers to how and why the human being benefits from being in a healing garden.

Gardens and Healing Gardens

All over the world there is an increasing interest in research results showing the impact of the physical environment on people's health and well-being. The realization that good design, both indoors and outdoors, not only generates functional efficiency but also strengthens and improves health processes has given rise to a new branch of architecture, called Design and Health (Dilani, 2001). Knowledge and awareness of how good design as well as bad design may influence people's well-being is increasing among architects as well as among interior decorators and landscape architects. An expression of design and health in landscape architecture is to be found in the movement around *healing gardens*, i.e. gardens that in different ways may influence the visitor in a positive way (Cooper Marcus & Barnes, 1999).

In Sweden today, the concept of healing has several connotations, some quite concrete, others more spiritual and mental. Generally speaking, however, healing may be said to be a process that promotes overall well-being (Cooper Marcus & Barnes, 1999). In medical anthropology the individual's personal, subjective experience of recovery is also emphasized (Janzen, 2002). It is in other words equally important that the illness is cured in a purely medical respect and that the individual experiences a personal feeling of recovery. Is it, then, possible for a garden to be anything else than healing? Is not the aspect of healing woven into the very concept of *garden*? Myths all over

the world depict the garden as an enclosed and safe place where one takes refuge to find shelter, comfort, and relief from sorrow and pain (Prest, 1988;



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The monastery at Evora in Portugal.



Gunnarsson, 1992; Gerlach-Spriggs, Kaufman & Warner, 1998; Lundquist, 2000). This, however, does not apply to all types of gardens. There are instances of modern gardens that have had a negative influence on the visitor's well-being (Cooper Marcus & Barnes, 1999). How is it possible for a garden to influence the visitor negatively? To begin with, we should try to define the concept of gardens.

The Garden as a Room

An important feature of the garden is that it should be possible to experience it as a whole, marked off from the surroundings. Through the ages the garden has been defined as a piece of enclosed ground (Gerlach-Spriggs et al., 1998; Lundquist, 2000). It is therefore important how the border is shaped, since the border may be regarded as the outer wall of the garden. The wall, which may be a hedge, a wall, or a fence, helps to delimit the garden from the surroundings and may, if it is well designed, give the visitor a feeling of being outside public life and of being safe. Inside the walls are the rooms of the garden, several or just one. These rooms have walls, floor, and ceiling; the floor, for instance, may consist of grass or gravel, the ceiling of heads of trees.

The Garden as a Manifestation of Life

Another important feature in a Western garden is that it is built largely of living material. The living, organic, growing, and constantly changing quality is the foundation stone of the garden, designed to give the visitor fundamental feelings of security, hope, and life. Unfortunately, many created outdoor places have been called gardens in spite of the fact that they have hardly contained any living plant material at all. Trees, grass, and flowers may be there but without dominating, without being part of a composition, without being the very core, or without being in focus. Instead, perhaps, one finds a sculpture or that the rooms for the most part consist of hard, angular elements in walls, floor, or ceiling.

The Garden as Applied Art

A garden, particularly an institutional garden, may be regarded as a very special form of applied art, able to offer the visitor a rich variety of experiences since in a garden all the senses of man are activated. To have a complete idea of a garden one has to be in it – to feel the irregularities of the ground under one's feet, see and rejoice at the tender blossoms of the witch hazel in the middle of winter, smell the sweet odor of the rose, hear the singing of the wind in the poplars, and feel the

wind in one's hair. A garden that does not bring the visitor a message of life, lust, and cyclic change, that does not convey feelings of calm, safety, strength, beauty or sensual stimulation – is it really a garden, or does it fall outside the definition? We maintain that it is in any case not a healing garden.

This article aims to summarize different research disciplines' theories on the healing influences of healing gardens. Secondly, it discusses design hypothesis based on the visitor's needs and relation with the garden.

PART I: Theories of the Healing Influence of the Garden

Research about the impact of the physical environment – indoors and outdoors – on people's health and well-being was formerly carried on in isolation by different research disciplines, such as medicine, environmental psychology, and in recent years landscape architecture. Today a change can be noticed. Collaboration transcending professions and research boundaries takes place not just in Sweden but also in several other parts of the world. An example of this is the foundation of The International Academy for Health and Design. This academy is multidisciplinary and research-based. Its goal is to stimulate and develop research on the interaction between culture, design, and health (Dilani, 2001). As a result of the academy's 2nd International Conference on Design and Health in Stockholm in the summer of 2000 the book *Design & Health – The Therapeutic Benefits of Design* was published (Dilani, 2001). Several professional categories are represented together in this book, active in research as well as in practice, e.g. artists, designers, architects, clinicians, psychologists, biologists, landscape architects, administrators, doctors, and nurses.

From a theoretical design and landscape architectural point of view it is important to show that one benefits from being in a garden environment while also trying to find an answer to the questions of *how* and *why* one benefits. Are there better and worse garden environments, and in that case, what is it that constitutes the differences? For thousands of years there have been ideas to the effect that man's health and well-being will be influenced in a positive way by his spending time in natural surroundings, wild nature as well as enclosed gardens (Knopf, 1987; Gerlach-Spriggs et al., 1998; Cooper Marcus &

Barnes, 1999). Beneficial properties are attributed to daylight, fresh air, and greenery. But it was not until 1984 that the first report about the measurable effects of nature's influence on health was published (Ulrich, 1984). This study was soon followed by others, now forming the basis of the theories of landscape architects (Verderber & Reuman, 1987; Kaplan & Kaplan, 1989; Cimprich 1990, 1992; Ulrich et al., 1991; Grahn, 1993; Küller & Küller, 1994). In this article we have summarized and sorted the theories on healing effects in gardens from different research areas into three different schools: *The Healing Garden School*, *The Horticultural Therapy School*, and *The Cognitive School*.

The Healing Garden School

According to this school the visitor's health effects are, above all, derived from the experiences of the garden room as such, its design, and its contents. The following three theories have been developed in the disciplines of environmental psychology and landscape architecture:

First theory. The first theory claims that the health effects are due to a restorative influence on emotional centers in the limbic system of the brain, caused by the environment – above all by nature-like surroundings and wild nature. The theory regards man as a biological individual, suited for a life close to nature. In natural surroundings it is possible for man to react and to trust his unconscious reflexes. Examples of stimuli that generate reflexes that warn us or make us extra cautious are darkness, precipices, snakes, and blood. Other stimuli prompt reflexes that make us relax, like a view over a lake framed by light or open meadows. These quick reactions are based on innate, memory-like functions that have had decisive importance for man's continued existence on earth. (Coss, 1991). The city, on the other hand, is an unnatural environment for man. In the city, man cannot trust his reflexes but must make use of logical thinking. Open, light, savannah-like natural areas have been found to give the quickest restorative reactions after stress, since they resemble man's original home. When you come to such surroundings, the body unconsciously relaxes. If you are severely stressed, this is more noticeable than when you otherwise feel well. This theory has been tested successfully in laboratories (Ulrich et al., 1991; Ulrich & Parsons, 1992; Ulrich, Lundén & Eltinge, 1993; Parsons, Daniel & Tassinary, 1994).

Second theory. According to the second theory, the health effects are due to the restorative influence of verdure on cognitive functions. The higher cognitive functions require much energy and the brain may easily be overstrained. This theory is based on the fact that man has two different types of attention, spontaneous attention and directed concentration. Knowledge of these two different types of attention goes back to the end of the 19th century (James, 1983). One of these types is usually spoken of as *directed attention*. It is governed by and at the same time part of the mind – the higher cognitive parts – and its capacity is limited. Directed attention is tired out in a relatively short time and is very precious. We make use of it in our daily work, when doing paperwork, when driving through an unknown town, etc. With directed attention we can focus on what has to be done at the same time as we sort out all that is irrelevant.

The other type of attention is quite spontaneous and unconscious; it is located in the older parts of the brain and is called soft fascination (It was earlier called *involuntary attention*, see Kaplan & Kaplan, 1989, but is now known as *soft fascination*, see Kaplan, Kaplan & Ryan, 1998). With this kind of attention we register a sudden rustle in a bush or the glimmer of a stone. The capacity of this kind of attention is practically unlimited, as long as we do not have to sort out or sift out our impressions. Nature contains fascinating things that attract this spontaneous attention, where new discoveries fascinate without tiring out, since impressions in nature are contained in a larger whole and therefore not in need of being sorted out and sifted out by the directed attention of higher consciousness centers. This theory has been tested several times with positive results (Canin, 1991; Hartig, Mang & Evans, 1991; Cimprich, 1992; Gilker, 1992; Hartig, 1993; Tennessen & Cimprich, 1995; Herzog & Gale, 1996;).

Third theory. Finally, the third theory asserts the health effects are due to the fact that the garden and nature make demands that can softly balance the person's own ability and control. Perceptual and cognitive functional obstacles cause accessibility problems and handicap experiences in combination with obstacles in the physical environmental (Iwarsson, 1997). However, there is reason to talk about the accessibility of the surroundings in relation to mental functional obstacles or psychological states of ill-health as well. A person stricken with a trauma like grief or personal illness needs an environment as well as relations that make less heavy demands.

Family and relatives demand more than unknown people. Animals demand less than human beings and are also more straightforward – they cannot lie or burden anyone with guilt. Plants demand less than animals; they can't run away either or show ingratitude. Rocks and water demand even less – they are there all the time (Searles, 1960; Ottosson, 2001). Generally speaking, nature makes fewer demands than gardens, where you can build in more or less demands in the design.

The Horticultural Therapy School

According to the theory belonging to this school the health effects are primarily derived from the activities in the garden room. A theory often put forth among medical and horticultural therapeutic scientists is that the health effects are due to the fact that work in a garden is particularly obvious, meaningful, and enjoyable (Relf, 1992; Simson & Straus, 1998). Man is at heart an active creature, and activity is healthful in itself. If he has a chance to use his body and his mind in the pursuit of pleasurable and meaningful occupations, he feels rewarded (Kielhofner, 1997). This experience of being rewarded is particularly apparent in connection with activities and environments that generate so-called “flow experiences.” In flow situations a harmonization between the individual's capacity and the challenge is felt, and the demands and possibilities in the environment give a feeling of well-being, total commitment, and forgetfulness of time and self (Csikszentmihalyi, 1990). Gardening can, in a simple way, stimulate a great number of cognitive processes and physical exercises, and, hypothetically, self-rewarding flow-experiences as well.

The Cognitive School

The health effects are derived from the experiences of the garden room as such as well as from the activities in the garden room and the visitor's background and character. Researchers in environmental psychology and landscape architecture as well as in medicine and horticultural therapy often mutually put forth the following theory: The health effects are due to the fact that the garden or the wild nature with its shapes, colors, odors, etc., plus the activities that can be carried out there, can restore a person to a more positive view of himself and his capacities. Experiences and memories of meaningful occupations or places during a person's active years, above all from his childhood and youth, give him a conception of his identity. Such environments as



(Photo: Ulrika Stigsdotter)

Intense form of horticultural therapy.

belong with his self are the ones he gives the preference to. An environment that correspond with his preferences and himself tells him that he is what he feels he is – part of the world of meaning (Tornstam, 1986; Grahn, 1991; Perris, 1992; Havnesköld & Risholm Motander, 1995). In this room it is also possible for him to grow; it is a so-called *instorative* environment.

PART II: Designing for the Visitor

When designing a healing garden it is fundamental to focus on the people the garden is intended for, but one ought not to forget the basic theories. Some hypotheses that might help, as a guide to the construction of the healing garden's design, will be briefly presented below.

A Balance Between Just Being in the Garden Experiencing It and Working with Gardening

The two schools of healing gardens and horticultural therapy may be regarded as two poles on a scale, where healing gardens deals with the passive experience of the architecture of the garden room and horticultural therapy with cultivation as an activity. During the last five to ten years a closer association has occurred between the schools, at least on an academic level, but there is still a lot that separates them. Most therapeutic gardens, of course, are about slight differences on these themes, but too many gardens are extreme variations. Many so-called gardens focusing on horticultural therapy have rational cultivation beds



adjacent to care institutions. These cultivation beds, often raised, are not planned or designed to be part of the construction and composition of a garden room. On the other hand, the cultivation beds may be planned so that the cultivation functions well, the accessibility for the patients is excellent, water is within easy reach, convenient storehouses are nearby, etc. But there is hardly a garden room as such.

On the other hand, landscape architects working with healing gardens have sometimes also made things far too simple and focused too much on the visual aspects. A garden is not just to look at. One may enter a garden and turn from being an observer into a visitor, experiencing the four dimensions of the garden (three-dimensional space and time) with all one's senses. The garden is unique in that it can activate all the senses: sight, hearing, smell, and taste, but also the temperature sense, the muscular sense, and the sense of touch are activated when, for instance, one puts one's hand on a stone warmed by the sun or the sense of

balance is exercised when one walks along an uneven path. Many healing gardens suffer from functioning as a point of observation without functioning as a place to experience with one's senses. The design may have a vitality that can be experienced as interesting and challenging, in particular to healthy observers, but these challenges may be felt as heavy demands for a person who is ill. Furthermore, experiences for other senses than sight are lacking. Odors, sounds, and other non-visual impressions are easily forgotten. The gardens may also function badly for activities other than passive observation.

The Visitor's Mental Power

Earlier studies of how people function in parks and gardens at the Department of Landscape Planning at Alnarp (Grahn, 1989, 1991; Ottosson & Grahn, 1998) have found that experiences of nature affect people differently, largely depending on their life situation. A person's experience of nature will depend on how much he is able to absorb from the environment and how strong his mental power is. This may be illustrated with the aid of a pyramid, where the need for environments with few demands is big at the bottom and smaller at the top as seen in Figure 1 (Grahn, 1991; Ottosson & Grahn, 1998).

At the bottom of the pyramid is the *directed inwards involvement* level where mental power is very weak. What physical activity can be undertaken tends to be private, like walking, picking berries, or collecting wood a short distance into the forest, and disturbances are disliked (Ottosson, 2001). An

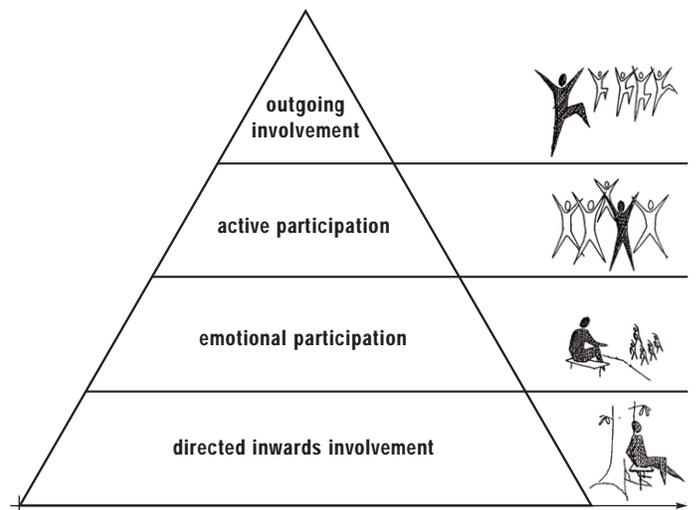


Figure 1: Type of involvement depending on the individual's mental power. Modification of Grahn's model (1991).

individual at this level is mentally active, sorting impressions he carries with him, and not very willing to be fed with new impressions that he has to sort out. This individual wishes to think things over without being disturbed. He is not alone but instead together with himself.

On the next level in the pyramid are those who have somewhat greater mental power. They begin to take an interest in their social surroundings and like to observe people around them, but they do not have the strength to take active part in what they are doing. They are content with *emotional participation*. They manage to be a little friendlier and can talk a little with neighbors; they are not as sullen and antisocial as the individuals at the bottom of the pyramid.

Yet another step up in the pyramid *active participation* is found. An example of this level is an individual who is part of a group doing something together. This individual possesses the mental power of giving and sharing. Together with other people an individual at this level can create things, such as organizing a dinner or helping to plan and lay out a flowerbed.

At the top of the pyramid is the *outgoing involvement* level, where the mental power is very strong and one is able to lead a group of people. Men and women at this level can take initiative in starting things and carrying them out. They are in charge of the creative processes and make sure things get done. Only individuals on this level are mentally strong enough to

completely follow through on their ideas and plans without strong support from the surrounding group.

Visitors in a healing garden possess a varying amount of mental power representing all the levels of the pyramid. Therefore, a healing garden must be designed to suit visitors of all levels of mental power. The healing garden must be designed to create different degrees of demand on the visitor. Specific demands might include being together with other people on one level and cultivation of a bed that requires much care to survive on another level. There should be areas or rooms where one can retire privately but also rooms where one can be together with many people at the same time.

Communication: Garden Rooms with Different Characters

We communicate all the time with the world around us, and not only with words. The environment confronting us tells us how to behave, by instinct and by conditioning. A healing garden must be able to communicate with the visitor on many levels, through sight, smell, hearing, etc. Professionals in the field of architecture speak of the semiotics of buildings, maintaining that people quickly learn to read what the constructed environment has to say, for example, about power, sanctity, and value (Morris, 1971; Rasmussen, 1986). Here, it is primarily a question of conditioned behavior. C. G. Jung (1964), on the other hand, maintains that we react by reflex to inherited symbols – archetypes – that we can find when in a more or less unconscious state, as in dreams. These archetypes

The Eight Garden Room Characters	Character of the Garden Room
1. Serene	Peace, silence and care. Sounds of wind, water, birds and insects. No rubbish, no weed, no disturbing people.
2. Wild	Fascination with wild nature. Plants seem self-sown. Lichen- and moss-grown rocks, old paths.
3. Rich in Species	A room offering a variety of species of animals and plants.
4. Space	A room offering a restful feeling of "entering another world" a coherent whole, like a beech forest.
5. The Common	A green, open place admitting of vistas and stay.
6. The Pleasure Garden	An enclosed, safe and secluded place, where you can relax and be yourself and also experiment and play.
7. Festive	A meeting place for festivity and pleasure.
8. Culture	A historical place offering fascination with the course of time.

Table 1: Characteristics of the eight garden rooms.

show us how to relate to the world around us. Recent research by Ulrich (1984), Coss (1991), Öhman (2001), and others shows that there are inborn reflexes warning us of things like spiders, snakes, and great heights. There may also be inborn attitudes towards odors and sounds.

In a healing garden we should be able to build in a lot of communication and attitudes. One type of communication is about how we relate to demanding surroundings; Harold Searles (1960) and Johan Ottosson (2001) have earlier been referred to in this context. At the bottom of the ladder of demands we find stones and water, as on a shore. Higher up on the ladder is wild nature, then a garden to cultivate. Still higher on the ladder are domestic animals and at the top are human beings. This theory suggests that some visitors in a healing garden may find it difficult to start by cultivating, particularly in a group. Table 1 gives a brief presentation of the room characters (Berggren-Bärring & Grahn, 1995a).

Earlier research at the Department of Landscape Planning at Alnarp studied why certain parks are frequently visited, whereas other parks hardly attract anyone. The researchers came to the conclusion that there are different park or garden rooms with different characters (Grahn, 1991; Berggren-Bärring & Grahn, 1995a, 1995b; Grahn & Berggren-Bärring, 1995; Hedfors & Grahn, 1998). Certain room characters are more popular than others. A park where many of the room characters are represented attracts more visitors than a park with just one of these room characters. The studies showed that there are eight main characters that make up parks and gardens. These characters consist of symbols manifesting themselves through many different sensations via sight, hearing, locomotion, etc.

The characters communicate directly with the visitor. The room characters *Serene*, *Space*, *Rich in Species* and to some extent *Culture* appeal to many people. It is of particular interest that they also appeal to the most ill and vulnerable persons; those who strive to find balance with themselves. The room characters *The Common* and *The Pleasure Garden* usually appeal to those who are somewhat less stressed and vulnerable, either those who wish to observe other people carrying out activities or those who wish to carry out the activities themselves. *The Festive* finally appeals to some stressed persons but frightens others (Grahn, 1991; Berggren-Bärring & Grahn, 1995a; Grahn & Berggren-Bärring, 1995). Most of the room

characters require more natural areas with large masses of growth such as tall trees and many kinds of plants.

The Accessibility to the Visitor

A healing garden, like all public parks and gardens, should strive to be accessible to everybody, to be a *design for all* (Welch, 1995; Månsson, 1999). Design for all is design of products, environments, and services in such a way that they can be used by as many people as possible, no matter what qualifications or needs they may have. The idea is to make the garden so flexible that it can be used exactly as it is without any ugly post-construction additions or accessories. A healing garden ought to be accessible irrespective of people's age or functional disorder. This is a high objective and one that may be difficult to achieve directly. A garden, however, is not finished when it is laid out; it is a constantly ongoing and changeable process. All the time one can change and improve the design of the garden so that it better satisfies the needs and wishes of the visitors.

Discussion

There are many gardens called healing gardens both in Sweden and in other parts of the world. Alarmingly many of them do not answer to the traditional definition of a Western garden. A lot of these gardens are entirely focused either on the activity, which in most cases is horticultural therapy, or on a more isolated design concept that has very little to do with the visitor and his or her needs. The impact of the garden room on the visitor and how he or she experiences the room with its seclusion, security, sunlight, odors, beauty, and history, has not been considered. This may be the beginning of a dangerous trend. A garden is a piece of nature, marked off from its surroundings, with floor, walls, and ceiling. Unlike architecture, a garden room can offer not only three-dimensional experiences of space but also the fourth dimension of time. A garden is about perception as well as activity and they are both needed. Our own earlier research results and those of other researchers have convinced us that people are unconsciously influenced by the environment they spend time in, since the physical surroundings are their reality (Grahn, 1989, 1991; Kaplan & Kaplan, 1989; Coss, 1991; Ottosson & Grahn, 1998; Ulrich, 1999; Ottosson, 2001). Our relationship to our physical surroundings depends on how we perceive it with our senses and how we emotionally and intellectually consider those perceptions. If we only focus on the

activity or on a trendy design concept, we will miss the impact of nature and architecture on people's well-being.

To work with the creation of gardens, it may be necessary to think about a garden as a phenomenon. There is a relation, today unspoken, between the visitor and the garden; they are interdependent. The visitor and the garden become a fusion of nature and culture. The needs of the individual visitor vary, which leads to notions of different phenomena and values in the garden, depending on what one is looking for. If the visitor enters a garden with many room characters, he or she will have a better chance to find what he or she is looking for. Thus, it gives the individual the opportunity to lose himself in thoughts and activities that he finds both amusing, interesting, and healing. The garden is a phenomenon that is several thousands years old, and it may have been regarded as a healthful place to be in from the very beginning (Prest, 1988; Gunnarsson, 1992; Gerlach-Spriggs et al., 1998). This has led to the use of gardens in medical care and treatment for a very long period of time. Ideas of connections between health and garden can be traced back to the Middle Ages, the Roman Empire, and as far back as the Persian Empire (Prest, 1988; Gerlach-Spriggs et al., 1998; Stigsdotter, 1999). We know for certain that the medieval monks thought that their hospitals ought to be built in areas of great natural beauty in order that the rehabilitation should function well (Gerlach-Spriggs et al., 1998). Modern scientists can explain this with semiotics, inborn reflexes, and restorative experiences.

But why not listen to the old myths that tell us that man and garden originally belong together? Here we find the Garden of Eden, the Paradisia of the Persians, and the Arcadia of ancient Greece. In the myths, man and garden belong together in the future as well, in the heavenly paradise and in Elysium. What is it in this perspective that takes man to the garden? Why do we find through the millennia similar descriptions of beautiful enclosed gardens in myths all over the world? What is it in the myths that draw people to the gardens? Perhaps it can be described as a yearning for devotion and beauty, or for a place without sin. If you are at the bottom of the pyramid of mental power, the unconscious urge that takes you to the garden perhaps can be described precisely as a yearning. This yearning for a place where you can forget yourself and melt into the surroundings so that you become a rather



(Photo: Ulrika Stigsdotter)

The Santissimi Quattro Coronati monastery in Rome, Italy.

insignificant part of something bigger perhaps can be described as devout. This urge appears to be stronger the more difficult your own situation.

Conclusion

Today many different professions and research disciplines have several theories concerning the healing garden's healing effects on the visitors. We have divided the theories into three different schools:

1. The Healing Garden School, where the health effects are, above all, derived from the experiences of the garden room as such, and its design and contents
2. The Horticultural Therapy School, where the health effects are primarily derived from the activities in the garden room
3. The Cognitive School, where the health effects are derived from the experiences of the garden

room as such, as well as from the activities in the garden room

We believe that the healing garden is about perception as well as activity. However, it is crucial to find the balance between just being in the garden experiencing it and working with gardening. To do that the designer needs to have knowledge about the group of people the garden is intended for, and be aware of their levels of mental power. A healing garden must be able to communicate with the visitor in a supportive and positive way. Depending on the visitor's stress level, the garden should consist of different rooms with different characters; *Serene, Wild, Rich in Species, Space, The Common, The Pleasure Garden, Festive, and Culture*. Finally, a healing garden, like all public parks and gardens, should strive to be accessible to everybody.

References

- Berggren-Bärring, A-M. & Grahn, P. (1995a). Grönstrukturens betydelse för användningen: En jämförande studie av hur människor i barnstugor, skolor, föreningar, vårdinstitutioner m fl organisationer utnyttjar tre städers parkutbud. *Landskapsplanering Rapport 95:3*, Alnarp.
- Berggren-Bärring A-M. & Grahn, P. (1995b). Importance of the single park area on experienced characteristics. *Ecological Aspects of Green Areas in Urban Environments*. IFPRA World Congress Proceedings, 110. Antwerp, Flanders, Belgium: September.
- Canin, L.H. (1991). Psychological restoration among AIDS caregivers: Maintaining self-care. Unpublished doctoral dissertation, The University of Michigan, Ann Arbor.
- Cimprich, B. (1990). Attentional fatigue and restoration in individuals with cancer. Unpublished doctoral dissertation, The University of Michigan, Ann Arbor.
- Cimprich, B. (1992). Attentional fatigue following breast cancer surgery. *Research in Nursing and Health*, 15, 199-207.
- Csikszentmihalyi, M. (1990). *Flow - the psychology of optimal experience*. New York: Harper & Row.
- Cooper Marcus, C. & Barnes, M. (Eds.). (1999). *Healing gardens: Therapeutic benefits and design recommendations*. New York: John Wiley & Sons.
- Coss, R.G. (1991). Evolutionary persistence of memory-like processes. *Concepts in Neuroscience* 2, 129-168.
- Dilani, A. (Ed.). (2001). *Design & health – The therapeutic benefits of design*. Stockholm: AB Svensk Byggtjänst.
- Gerlach-Spriggs, N., Kaufman, R.E., & Warner, S.B. (1998). *Restorative gardens: The healing landscape*. New Haven, CT: Yale University Press.
- Gilker, C.M. (1992). *Views to nature: Effects on attentional capacity*. Madison, WI: University of Wisconsin.
- Grahn, P. (1989). Att uppleva parken. Äldre, sjuka och handikappades behov och användning av parker. *Stencil*, 89:6. Sveriges lantbruksuniversitet, Institutionen för landskapsplanering, Alnarp.
- Grahn, P. (1991). Om parkers betydelse. *Stad & Land* 93. Movium/institutionen för landskapsplanering, Sveriges Lantbruksuniversitet, Alnarp.
- Grahn, P. (1993). Planera för bättre hälsa! In (no Editor) *Planera för en bärkraftig utveckling* (pp.109-121). Byggforskningsrådet, Stockholm.
- Grahn, P. & Berggren-Bärring, A-M. (1995). Experiencing parks. Man's basic underlying concepts of qualities and activities and their impact on park design. *Ecological Aspects of Green Areas in Urban Environments*. IFPRA World Congress Proceedings, 97-101. Antwerp, Flanders, Belgium: September.
- Gunnarsson, A. (1992). Frukträden och paradiset. *Stad & Land* 105. Movium/institutionen för landskapsplanering, Sveriges Lantbruksuniversitet, Alnarp.
- Hartig, T., Mang, M. & Evans, G. (1991). Restorative effects of natural environmental experiences. *Environment and Behavior* 23, 3-26.
- Hartig, T.A. (1993). Testing restorative environments theory. Unpublished doctoral dissertation, University of California-Irvine.
- Havnesköld, L. & Risholm Mothander, P. (1995). *Utvecklingspsykologi. Psykodynamisk teori i nya perspektiv*. Stockholm: Liber AB.
- Hedfors, P. & Grahn, P. (1998). Soundscapes in urban and rural planning and design. *Yearbook of Soundscape Studies* 1, 67-82.
- Herzog, T.R. & Gale, T.A. (1996). Preference for urban buildings as a function of age and nature context. *Environment and Behavior* 28, 44-72.
- Iwarsson, S. (1997). Functional capacity and physical environmental demand. Exploration of factors influencing everyday activity and health in the elderly population. *Institutionen för Samhällsmedicinska vetenskaper Dalby/Lund*, Lunds Universitet, Lund, Sverige.

- James, W. (1983). *The principles of psychology*. (Original published in 1890). Cambridge, MA: Harvard University Press.
- Janzen, J.M. (2002). *The social fabric of health: An introduction to medical anthropology*. Boston: McGraw Hill.
- Jung, C.G. (1964). *Människan och hennes symboler*. I samarbete med von Franz, Henderson, Jacobi & Jaffé. Stockholm: Forum.
- Kaplan, R. & Kaplan, S. (1989). *The experience of nature*. Cambridge, MA: Cambridge University Press.
- Kaplan, R., Kaplan, S. & Ryan, R.L. (1998). *With people in mind: Design and management of everyday nature*. Washington D.C.: Island Press.
- Kielhofner, G. (1997). *Conceptual foundations of occupational therapy* (2nd ed.). Philadelphia: F. A. Davis.
- Knopf, R.C. (1987). Human behavior, cognition, and affect in the natural environment. In D. Stoklas & I. Altman, (Eds.), *Handbook of environmental psychology* (pp.783-825). New York: John Wiley.
- Küller, R. & Küller, M. (1994). *Stadens grönska, äldres utevistelse och hälsa*. Stockholm: Byggeforskningsrådet, R24:1994.
- Lundquist, K. (2000). Bidrag till kännedom om begreppet trädgård och om trädgårdsväxternas historia i Sverige. *Rapport, 2000*(1). Institutionen för landskapsplanering, Alnarp.
- Morris, C. (1971). Writings on the general theory of signs. *Approaches to Semiotics 16*, 1-486. The Hague, Mouton.
- Månsson, K. (1999). *Bygg för alla*. Stockholm: AB Svensk Byggtjänst.
- Öhman, A. (2001). Förnuft och rädsla : Neutrala mekanismer för omedveten aktivering av emotioner. In H. Lagercrantz (Ed.), *Hjärnan och medvetandet* (pp. 124-143). Nora: Nya Doxa.
- Ottosson, J. & Grahn, P. (1998). Utemiljöns betydelse för äldre med stort vårdbehov. *Stad & Land 155*. Movium/institutionen för landskapsplanering, Sveriges Lantbruksuniversitet, Alnarp.
- Ottosson, J. (2001). The importance of nature in coping with a crisis: A photographic essay. *Landscape Research 26*(2) 165-172.
- Parsons, R., Daniel, T.C. & Tassinary, L.G. (Eds.). (1994). Landscape aesthetics, ecology, and human health. In W. Covington & L. DeBanco, (eds.), *Sustainable ecological systems* (pp.266-280). Fort Collins, CO: USDA Forest Service General Technical Report RM-247.
- Perris, C. (1992). *Kognitiv terapi i teori och praktik*. Stockholm: Natur och Kultur.
- Prest, J. (1988). *The Garden of Eden: The botanic garden and the recreation of paradise*. New Haven, CT: Yale University Press.
- Rasmussen, S.E. (1986/1959). *Experiencing architecture*. Cambridge, MA: The M.I.T. Press.
- Relf, D. (1992). Human issues in horticulture. *Hort Technology 2*, 159-171.
- Searles, H.F. (1960). *The nonhuman environment in normal development in schizophrenia*. New York: International University Press.
- Simson, S. & Straus, M.C. (1998) *Horticulture as therapy: Principles and practice*. New York: Food Products Press.
- Stigsdotter, A.U. (1999). Klosterträdgården - ett paradiset på jorden. *Svensk Rehabilitering*, (3), 1999.
- Tennessen, C.M. & Cimprich, B. (1995). Views to nature: Effects on attention. *Journal of Environmental Psychology 15*, 77-85.
- Tornstam, L. (1986). *Åldrandets socialpsykologi*. Stockholm: Rabén Prisma.
- Ulrich, R.S. (1984). View through a window may influence recovery from surgery. *Science 224*, 420-421.
- Ulrich, S.R., Simons, R.F., Losito, B.D., Fiorito, E., Miles, M.A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology 11*, 201-230.
- Ulrich, R.S. & Parsons, R. (1992). Influences of passive experiences with plants on individual well-being and health. In D. Relf, D. (Ed.), *The role of horticulture in human well-being and social development* (pp.93-105). Portland: Timber Press.
- Ulrich, R.S., Lundén, O. & Eltinge, J.L. (1993). Effects of exposure to nature and abstract pictures on patients recovering from open heart surgery. *Psychophysiology 30*, 7.
- Verderber, S. & Reuman, D. (1987). Windows, views, and health status in hospital therapeutic environments. *The Journal of Architectural and Planning Research 4*, 120-133.
- Welch, P. (Ed.). (1995). *Strategies for teaching universal design*. Berkeley, CA: Adaptive Environments and Boston, MA: MIG Communications.

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