Healing by Architecture
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How can architecture contribute to healing? This question touches upon the essence of architecture. In this book, architecture is conceived of as a discipline that has far more fundamental issues to solve than the visual appearance of buildings. Nowadays, large buildings such as hospitals are required to fulfill a complex amalgam of physical, aesthetic, social and symbolic functions. Finding ways to optimize these functions is a major challenge for modern architecture. Before even thinking about what a project will eventually look like, the architect has to identify the intended functions of the project. Doing so is not only part of the discipline of architecture, but its essence. It implies an active role of the architect in the entire building process, including the development of the program of requirements.

  In the context of healthcare architecture, there is one particular aspect of buildings that has received increasing attention over the past decade. This function concerns the potential healing properties of hospital environments. These healing properties have inspired a whole new design approach that is generally referred to as Evidence Based Design. This approach has become very popular in healthcare architecture, and few projects are nowadays presented that do not incorporate the ambition to create a healing environment. Architects who follow the Evidence Based Design approach to hospital design use knowledge on the health impacts of specific physical characteristics of designed spaces on patients, staff and visitors as guiding principles in their design.

History and the philosophical roots of Evidence Based Design
Evidence Based Design takes up a theme that can be traced back to the late eighteenth-century: the conviction that the designed environment contributes to the healing of patients. One of the most outstanding philosophical ideas of the Enlightenment was the identification of nature as the ruler of the universe, and the notion that, in principle, there is no distinction between nature and society. Based on this ideal it was assumed that if urban societies would fail to adapt themselves to the laws of nature, they would become unsound places. The fire in the Paris Hôtel-Dieu in 1772 highlighted hospitals as the sickest parts of the city. It triggered an avalanche of revolutionary proposals, the common feature of which was the intention to create hospitals that were in full compliance with natural laws. Hospitals became avant-garde, and so became hospital design, and part of the reasons for this position was the conviction that the environment where people lived, more specifically the *designed environment,* was far more effective for improving people's health than medical treatment.

  Until the beginning of the twentieth century, the architecture of hospitals was partly determined by the ideals that sprang up in the wake of the Enlightenment. A natural setting and the provision of clean air were seen as essential. Then this tradition broke off. A revolution in medicine and technology combined with the emergence of the International Style to transform the hospital into a medical machine. The environmental qualities of hospitals were usually neglected. One of the achievements of Evidence Based Design is that it restored these qualities to their original preeminence.

  Remarkably, Evidence Based Design did not develop as a specialization of architecture. In fact, it stems from a totally different context, one in which history, culture, and therefore architecture seem to be completely lacking. Evidence Based Design originates in environmental psychology in the 1980s and its evolution is intimately linked to the work of Roger Ulrich. What sets Evidence Based Design apart from its precursors is the ambition to measure the effects of the environment on the people who are exposed to it. Empiricism replaces philosophy. Although in principle all types of buildings provide valuable research data, Evidence Based Design focuses on healthcare facilities, predominantly hospitals.

  How does Evidence Based Design collect its data? Design can mean many things, but whatever

its precise definition, the term always refers to environmental aspects. Most tests of impacts of environmental aspects are comparative. Groups of patients who are in multiple bedrooms are compared to patients with a similar medical record, but who spend their time in single bedrooms. In the same way, the effects of rooms with or without a view on nature are being compared. Even the effects of paintings on the bedroom walls have been evaluated: what are the effects of abstract painting relative to the impact of paintings depicting natural scenery? Remarkably, the impact of color is almost neglected, though precisely in this field a lot could have been gained by referring to existing, groundbreaking research.[1] Most of the results focus on stress outcomes: do specific environmental qualities increase stress, or do they help to calm patients?

As Evidence Based Design developed and gained ground, all effects that could be attributed to environmental causes were accepted as evidence, and psychology became less important. These effects can be manifold: apart from 'health outcomes', the prevention of injuries (by falling out of bed, for instance), reduction of pathogens in the air, lower levels of medical errors, and better acoustics are also considered as evidence. Remarkably, although Evidence Based Design focuses on people's reactions, it is hardly ever interested in their opinions. Instead of mapping people's ideas and views, it concentrates on their 'primary reactions'. These 'primary' reactions are considered hard, objective data, that are not influenced by response bias or other social or cultural values. The notion that primary data are the only valid source of evidence appears to be intrinsically linked to a view of patients in hospitals as mere biological entities who have returned to their pure, natural state, finally released of the burden of culture, education, and social class. A view that can easily be traced back to Enlightenment ideals that portrayed civilization as a negative influence that leads humans away from their essence.

Evidence Based Design opens prospects of a pristine, crystal clear universe, untainted by the stains of history, resulting in an environment that fulfils basic human needs without blurring them by the ephemeral symbols determined by rapidly changing political and economic trends. What a glorious perspective, what a revolutionary view – but is it really valid? How hard is the evidence? Isn't this ideal inspired by philosophical positions as much as by empirical data? What would it mean to strip society of history? Where would it leave us? Would we see what Hans Castorp, the hero of Thomas Mann's *Magic Mountain*, saw in the final scenes of this great novel? 'Hans Castorp looked around. He saw something scary, evil, and he knew what it was: Life without time, life without worries nor hopes, life as stagnant, busy debauchery, dead life.'[2] If Evidence Based Design wants to contribute to hospital as a vital part of society, it definitely needs to consider architecture in its full capacity, including its historical and cultural dimensions. Achieving this is precisely what the authors in this sections intend to contribute to.

The Hard Facts
Setting aside the philosophical roots and potential implications of Evidence Based Design, we may now take a look at the evidence base itself. How much evidence is available for the healing functions of architecture, and how good is the evidence base? Unfortunately, these questions are difficult to answer on the base of existing reviews that have been conducted by advocates of Evidence Based Design, such as the recent review by Ulrich et al.(2004) that was carried out under the auspices of the Center for Health Design. In line with recent developments in Evidence Based Design, this review has taken a broad scope, including evidence on impacts of

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[1] An epochal work in this respect is Antal Nemcsics, *Colour Dynamics. Environmental Colour Design*, Budapest 1993.

[2] 'Hans Castorp blickte ums sich... Er sah durchaus Unheimliches, Bösartiges, und er wußte, was er sah: Das Leben ohne Zeit, das sorg- und hoffnungslose Leben, das Leben als stagnierende betriebsame Liederlichkeit, das tote Leben.' Thomas Mann, *Der Zauberberg*, Frankfurt am Main 2001 (first published in 1924), 863.

environmental features that are not central to architecture, such as antiseptic soap dispensers, and evidence on environmental impacts that are only indirectly related to healing, such as impacts on acoustics and job turnover rates of hospital staff.

To obtain a more accurate estimate of the amount and quality of the evidence base, the project The Architecture of Hospitals has commissioned a new review of evidence for healing properties of hospital environments. The scope of this review was more closely aligned to conventional definitions of the concepts of 'architecture', 'healing environment', and 'health'.[3] This review focused on four key features of hospital buildings that have traditionally been considered components of healing environments: nature, daylight, fresh air and quiet. The review was restricted to medical and psychological health outcomes. A distinction was made between clinical evidence (e.g., evidence from studies conducted in healthcare settings or among clinical populations) and non-clinical evidence. Evidence was classified as 'strong' or 'weak' based on the quality of the research design and the relevance of the environmental manipulation to healthcare settings.

A total of 97 studies were identified that fulfilled the criteria of the review. The outcomes of these studies provide sufficient evidence that presence of nature in or around buildings can positively influence health. More specifically, it has been demonstrated that viewing nature on a screen or through a window can reduce stress and pain, while presence of indoor plants can lift people's mood and reduce self-reported symptoms of physical discomfort. Perhaps counter-intuitively, the health benefits of direct contact with 'real' nature, such as a visit to a garden, were found to be less well-established. The outcomes of the studies in the review also provide solid evidence that ventilation of fresh air can improve self-reported and medically diagnosed health. However, the evidence for health benefits of daylight in buildings was judged as weak and inconclusive, while the evidence for the health benefits of quiet was qualified as indirect. Although there is ample evidence for negative health impacts of noise, the role of the physical environment in producing or reducing negative health impacts of noise has only been demonstrated in a handful of studies.

The review that was carried out for the project The Architecture of Hospitals focused only on a selection of environmental features that are relevant to health and healing. As such, it does not provide a comprehensive overview of evidence for healing properties of architecture. In particular health benefits of frequently mentioned aspects such as color, personal space, personal control, and way-finding have not been addressed. Some of these aspects, such as personal space and interior design properties, are addressed in the articles in this section of the book. Both the review and the articles in this section confirm that there is sound evidence for the health impacts of healing environments which can no longer be ignored. How this evidence can be used to enrich the architecture of hospitals will be among the fundamental issues that will have to be addressed in the near future.

Does healing by architecture imply that architecture should adopt the scientific approaches of medicine? Many of the articles collected here radiate a somewhat clinical atmosphere, an effect highlighted by many references (that were included in their original template). Though the emphasis on isolated aspects and statistical methods differs dramatically from the allegedly somewhat anarchistic and intuitive approach inherent in the science of architecture, it is hard to find intrinsic reasons for seeing them as incompatible.

[Jane Malkin opens this part by demonstrating the immense importance of environmental considerations in the architecture of hospitals, making abundantly clear that architects and hospital managers alike should pay far more attention to these considerations, as they have a direct impact on the hospital's core functions.]

Having its origins in environmental psychology and emulating the scientific methods of

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[3] Agnes van den Berg, *Health impacts of healing environments: A review of the benefits of nature, daylight, fresh air and quiet in healthcare settings,* Groningen 2005.

Evidence Based Medicine, Evidence Based Design impacts the world of architecture from outside, covering only part of the complete scope of the architect's work. That, naturally, makes the relation between the two an issue. Mardelle Shepley and Kirk Hamilton address this issue, Shepley starting with a methodological comparison, Hamilton from a best practice approach (focusing on architecture). Complex though the interaction between Evidence Based Design and Architecture may be, both articles clearly demonstrate that they can and should be reconciled.

[Roger Ulrich, credited as the *auctor intellectualis* of Evidence Based Design, presents a general introduction of this still relatively new discipline, directing his message mainly at hospital managers and policy makers.]

How Evidence Based Medicine works in practice is demonstrated in another article by Shepley, followed by the contributions of Marie-Andrée Fournier and Robert White. They focus on the neonatal intensive care units, pointing out, among other things, the single patient room solution as by far the best. Richard van Enk extends this view to all patient rooms, ushering in the end of the multiple bed wards.

[How Evidence Based Design can help to reduce falls and enhance safety, two vital aspects in the architecture of hospital, is outlined in the second article Roger Ulrich contributes to this book.]

Clare Cooper Marcus and Sandra Sherman close the circle by returning to the issues of nature in hospitals - the starting point of the modern hospitals over 250 years ago. The two articles demonstrate how far Evidence Based Design has evolved from the purely philosophical level and to what extent scientifically oriented, empirical methods are the essence of this approach.