**Thesis for the degree of Licentiate of Architecture**

# Healing Architecture:

## Evidence, Intuition, Dialogue.

**Stefan Lundin**

**Department of Architecture**
**Chalmers University of Technology**

Gothenburg, Sweden 2015

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Department of Architecture
Chalmers University of Technology
SE-412 96 Göteborg
Sweden
Telephone + 46 (0)31-772 1000

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Translation: John Krause, John Krause Language Consulting
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# Abstract

In today's healthcare architecture there is a striving to make better use of evidence to achieve environments that can contribute to patients' healing, recovery, and well-being. These ideas are in part a legacy of the theory and practice of evidence-based medicine and the success it has enjoyed in its field. However, the volume of evidence in the field of construction is limited, and there is no reason to expect rapid growth anytime soon. This provides some explanation for why evidence alone cannot be expected to lead to healing architecture. But the design qualities for which research has found evidence of improved patient outcomes have long since been assumed and applied by experienced architects.

To achieve a healing architecture, architects must embrace—and be allowed to embrace—the tacit knowledge of intuition they have accumulated over time. This intuitive knowledge is the fruit of the direct exchange they have with the surrounding physical environment through their experiences—in everyday life, in education, in professional practice, and so forth. Intuition is personal and subjective, but it is an essential tool in the architect's work. By establishing a constructive dialogue with healthcare providers, the architect's sketches, models, and ideas can be exposed to critical evaluation, questioning, and discussion. This minimizes the risk for arbitrarily designed buildings.

The dialogue between architect and client organization, facilitated by the architect's sketches, follows a cyclical pattern of proposal, evaluation, and modification that recurs in one iteration after another. At the same time, the architect and client work together in dialogue about each proposal to articulate and refine the organization's demands and desires. Each of the participants has practical knowledge that may be hidden even to themselves, and dialogue brings that hidden knowledge to light so it can contribute to new thinking and innovative solutions. A positive side effect is that this process often leads to the development of the client's own operations and organization.

The point of departure for this licentiate thesis is an experienced architect's critical reflections on his own design practice and extensive reading of research literature in the field. The work can therefore be placed in the tradition of practice-based research in architecture, present in Sweden for many years and currently in strong development internationally. The author's objective has been to contribute to defining a healing architecture that joins the collaborative culture found in Sweden today with a strong American influence that argues for an architecture based on evidence.

**Key-words:**
Design research in architecture, healing architecture, EBD, evidence-based design**,** critical approach, best practice, intuition, tacit knowledge, design dialogue.

**Läkande arkitektur**

**- Evidens, intuition, dialog**

**Stefan Lundin**
Arkitektur
Chalmers Tekniska Högskola

# Sammanfattning

Vid utformning av vårdens arkitektur finns idag en strävan efter att i högre grad nyttja evidens för att åstadkomma miljöer som kan bidra till patienters läkning, återhämtning och välmående. Dessa tankegångar är delvis ett arv från den evidensbaserade medicinens teori och praktik, och den framgång den inneburit inom sitt fält. Mängden evidens inom byggandets område är emellertid begränsad och någon snabb tillväxt av denna kan inte förutses. Evidens kan därför inte ensamt göra anspråk på att leda till en läkande arkitektur. De kvaliteter, för vilka forskningen kunnat finna evidens, har sedan länge anats och tillämpats av initierade arkitekter.

För att åstadkomma en läkande arkitektur måste arkitekter ta del av, och tillåtas ta del av, den dolda kunskap som intuitionen utgör och som hon eller han tillgodogjort sig. Den intuitiva kunskapen är frukten av ett direkt utbyte med den fysiska verkligheten genom de erfarenheter livet gett oss; i vår vardag, utbildning, yrkesutövning osv. Intuitionen är personlig och subjektiv, men ett nödvändigt verktyg i arkitektarbetet. Genom en dialog med vårdens verksamheter utsätts arkitektens skisser, modeller mm för kritisk granskning, ifrågasättande och diskussion. På så sätt minimeras risken för godtyckligt utformade byggnader.

Dialogen mellan arkitekt och verksamhet, med skissen som verktyg, sker i ett cykliskt förlopp av förslag, granskning och ändring. I dialogen preciseras och nyanseras vårdverksamheternas krav och önskemål genom förslag till lösning av dessa. Utövarnas praktiska kunskap, som delvis ligger dold för dess utövare, ges genom dialogen möjlighet att bidra till ett innovativt tänkande och förslagsställande. Som en positiv bieffekt följer ofta en utveckling av den egna verksamhetens arbetssätt och organisering.

Denna uppsats tar sin utgångspunkt i en erfaren arkitekts kritiska reflektion över sin egen praktik och omfattande litteraturstudier. Arbetet kan därför placeras i den praktik-baserade forskningstradition som funnits i Sverige i många år och som nu är under stark utveckling internationellt. Viljan att bidra till en läkande arkitektur beskrivs i ett svenskt sammanhang av samverkanskultur som korsas av en stark amerikansk strömning som pläderar för en arkitektur byggd på evidens.

**Nyckelord:**
Designforskning inom arkitektur, helande arkitektur, EBD, evidensbaserad utformning, kritisk metod, evidens, beprövad erfarenhet, intuition, tyst kunskap, designdialog.

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# Table of Contents

# 1.

# The Context of Discovery

# 1.1 Architecture Promotes Healing: The 2007 Healthcare Building Award

> **The design of the spaces supports the organizational goal of achieving a healing environment for inpatient care. The building offers outstanding support for the assertion that architecture can do a great deal to promote patient healing.** (Forum Vårdbyggnad, 2007, p. 2)

### The 2007 Healthcare Building Award

The quotation above is from the jury statement for the 2007 Healthcare Building Award (*Vårdbyggnadspris*) given out by the Healthcare Building Forum.[1] The jury praises the newly opened building for general psychiatric inpatient care at Sahlgrenska Östra Sjukhuset, a university hospital in Gothenburg. I was responsible for its design. We began working on the project in 2001, and it has stayed with me and influenced my work throughout the past fourteen years.

The jury was expressing support for the belief that architecture can *promote patient healing*. In fact, they even asserted that it can do *a great deal* to promote healing and support the goal of *achieving a healing environment.* But on what basis did they form this opinion? It is an opinion that we architects generally share. Did they have *evidence*? Did they know it works from their own experience, from established *best practices*, or were they just expressing a general *intuitive feeling* about it? And what is it about architecture that contributes to sick people healing and recovering? These are the questions around which this licentiate thesis revolves.

### Architecture as Medicine, 2009

Inspired by winning the Healthcare Building Award and by positive feedback from patients, their loved ones, and staff, I asked the ARQ Architecture Research Foundation[2] if they would consider supporting an anthology focused on the importance of architecture in creating a good healthcare

[1] The Healthcare Building Forum (*Forum Vårdbyggnad*) is a Swedish interest group for administrators, planners, practitioners, and researchers who want to expand their knowledge about the importance of the physical environment for patient treatment and care. http://www.vardbyggnad.se/

environment. Funded by White Architects to promote research and development, the ARQ Foundation responded positively to the initiative and ultimately provided support for the project in several phases, from my initial writings to the photography and layout that went into the final book, and even the translation and printing costs. I shared the editorial duties with Lena From, an art historian and journalist whose experience includes editorship at *Arkitektur* (*The Swedish Review of Architecture*). The anthology was given what I think was a clever title: *Architecture as Medicine*, with the subtitle *The Importance of Architecture for Treatment Outcomes in Psychiatry.* Eight people—four who worked on the project and four independent authors and critics—were invited to describe Sahlgrenska Östra's new psychiatric unit in terms of the physical environment. The text was translated in preparation for a lecture I was to give at the Healthcare Design Conference in Las Vegas in November of 2010. That anthology opened the door to several new contexts for me.

As part of our work with *Architecture as Medicine* we asked Lennart Bogren, an associate professor and at the time head of the Psychiatry Department at Sahlgrenska Östra, to look for statistics that could tell us something about the quality of care delivered in the new facility compared to the old one. In his chapter "Straight to the Point," Bogren describes the old facility as institutional, with long corridors and continual overcrowding of patients into rooms that were not always suitable. The new spaces, on the other hand, have a certain domestic character and greater calm, and the overcrowding disappeared as a result of clinical choices and the consciously limited size of rooms meant for a single patient. Could a decrease in the use of compulsory treatment measures serve as an indicator of healthcare quality? More specifically, could the decrease in compulsory treatment be accredited to changes in the architecture—in the physical environment? And if so, could those changes be said to promote healing and support a healing healthcare environment? Bogren asserted that there was reason to believe such a claim.

In a comparison between the measures used in the old Lillhagen facility in 2005 and the measures used in the new Sahlgrenska Östra in 2007, he noted substantial reductions in the use of compulsory treatment of patients. He did not use data from 2006, since it could not be considered representative due to preparations for vacating the old hospital and the time needed to establish new routines after the move. The data showed that the number of people who received injections against their will each quarter declined by 26% (from 23 to 17) and the total number of injections dropped by 28% (from 47 to 34). In other words, the number of injections given to each patient under compulsory medication stayed the

same: about 2.0. The number of people forcibly subjected to physical restraints increased from 14 to 16 per quarter, while the total number of restraining incidents declined dramatically from 63 to 35 (a 44% drop). The average number of restraining incidents per patient thus decreased from 4.5 to 2.2. In addition to this data, Bogren also noted a reduction in the number of people readmitted after being released for more than a week, as well as a reduction in the amount of sick leave taken by staff (Bogren, 2009, pp. 137-145). Here the reader may perhaps hypothesize other explanations for these reductions, and in fact the staff did suggest several.[3] Of course there were other causes. But it's hard to avoid attaching great significance to the physical environment, according to Bogren, given that the practice and culture of care did not change substantially.

In the first part of this thesis, we will become acquainted with two different attempts to describe architecture for the Department of Psychiatry at Sahlgrenska Östra. Each tries to capture the architectural qualities that promote healing and lend support to the assertion that architecture can have the power to help us recover from illness. The first description is my own—the insights of the practicing architect. The second is by Roger Ulrich—the wisdom of the academic researcher.

## 1.2 The Practitioner's Insights: Architecture as Medicine, 2009

Right from the start of the project, early in our work developing the building program, it was apparent that the design for the Psychiatry Department at Sahlgrenska Östra Hospital was going to be a different kind of healthcare project. The department's internal project leaders were clearly convinced of the importance of architecture in establishing a good healthcare environment and achieving good treatment outcomes. The driving force and inspiration was provided primarily by psychiatrist Erik Brenner, the chairman of the department's construction project team, who had the experience of having worked in several different leadership positions in the field of psychiatry. At our first public presentation of the project, Brenner gave my presentation the rhetorical title "Is It Possible to Create a Healing Healthcare Environment for Psychiatry?"[4] The department's conviction was also reflected in their program statement, entitled

[3] The psychiatry staff comments on the outcomes in Bogren, 2009, p. 145.
[4] Lecture for Psychiatry Day, Gothenburg Concert Hall, November 12, 2003.

*Realizing a Vision*: “Advanced medical technology equipment is as important for the somatic specialties as appropriate facilities are for psychiatry” (Sahlgrenska, 2000, p. 3).

That maxim was important for our design work, but it was also a barb directed at political decision-makers. The building’s spaces were equated with somatic medicine’s equipment, as though to hint, “Who knows anything about medical technology equipment? We have no choice but to make the necessary investment!” Or: “Everyone knows how important technological equipment is in medicine,” with the same affirmative response. Throughout the entire project, which ended up taking five years to complete, we maintained a lively *dialogue* about the role of architecture in healthcare—from detail to whole—for the benefit of the final design results.

In the anthology *Architecture as Medicine*, written just over two years after the hospital’s completion, I tried to describe what I thought contributed to the project’s good results. In the chapter “The Architect Speaks,” I make an argument in ten parts with a total of forty recommendations for how architecture for psychiatric inpatient care should be designed. I could have chosen to briefly summarize those points here, but instead—with the benefit of the five intervening years—I will restate them in a slightly different way. I am now able to formulate them in a more focused and fundamental way than before. The most important aspects can be summarized in the following seven recommendations:

- *Promote dignity!*
- *Encourage normalcy!*
- *Create a free and open atmosphere!*[5]
- *Promote social interaction!*
- *Promote patients’ independence!*
- *Offer views to the outside and free access to the outdoor environment!*
- *Balance the demands for a safe and healing healthcare environment!*

*Promote dignity!* It is important that the building be able to convey an expression of dignity. Psychiatric care has often been relegated to older facilities—sometimes the facility left behind when a somatic ward gets a new one. Psychiatry has often had to make the best of a hospital’s worst spaces, and accept its role as “a minor medical specialty”—in spite of the fact that about 40% of today’s medical leave costs are related to mental

[5] A concept used by the Danish architecture firm PLOT in conjunction with the architectural competition for the design of the psychiatric wing for the Helsingør Hospital.

health issues, and those costs continue to grow.[6] Dismal and inconspicuous entrances, deferred maintenance, and inadequate cleaning have often undermined the status of psychiatric medicine. What signals do such conditions send? Patients and staff should instead be provided with facilities with a dignified environment custom-designed for psychiatric care. A building that is welcoming to patients heightens their expectations and hopes for the care they are to receive—essential to the mentally ill, for whom a lack of self-confidence and feelings of shame are often part of the illness. Mental illness has always been associated with irrational and abnormal behavior that can be frightening for others. But many mentally ill patients exhibit no such behavior, especially since the introduction of antipsychotic medication more than a half-century ago. The stigma against mental illness has been exacerbated throughout history by locating treatment facilities outside of town, like remote islands, and by referring to them with notorious nicknames.

*Encourage normalcy!* One of the ambitions for the new psychiatric building was to be able to offer an environment with a higher degree of normalcy—for example by locating the psychiatry clinic together with other somatic clinics, but in a building of its own and with its own main entrance. Striving to better integrate and unite body and soul is an approach that has been cultivated in the field of psychiatry since the 1970s. But the project was also about making the details of the interior design as ordinary as possible. While environmental psychologists recommend positive distractions to lead the patient's thoughts away from their disease, I recommend the opposite: the building's detailing and execution should strive to convey normalcy and avoid reminders of illness, which are sometimes referred to as *negative distractions* or *negative reminders.*[7] These can be anything from closed doors, locks, alarms, and bars on windows to "strange arrangements" that try to prevent injuries or keep patients from harming themselves. In psychiatry, patients do not usually need to stay in bed while in the hospital, which allows some opportunities not available in somatic care for the design of both individual patient rooms and the unit as a whole.

*Create a free and open atmosphere!* Psychiatric care is to some extent administered under the force of law. Today about 30% of psychiatric patients are in care as the result of a court order.[8] Unlike most other countries, in Sweden we allow the doors to the psychiatric care unit to remain

[6] https://www.forsakringskassan.se/wps/portal/press/pressmeddelanden/stress_ vanligaste_orsaken_till_sjukskrivning

[7] See for example Ulrich, R. et al (1991), "Effects on Design on Wellness: Theory and Recent Scientific Research" in the *Journal of Healthcare Interior Design*, no. 3, p. 105.

[8] SKL (2010) *Kartläggningen av den psykiatriska heldygnsvården*, Table 12.

locked—even for those who are in treatment voluntarily. This keeps those who are there against their will from leaving. One negative consequence of that policy, however, is that the voluntary patients must ask permission to leave the unit. It is also important to provide a suitable way to maintain direct interaction between patients and caregivers, so that patients can be seen by their caregivers and caregivers can keep an eye on the patients without resorting to a "guard tower" arrangement. In today's healthcare philosophy, "observation" is increasingly being replaced by direct and active contact between patients and staff. The ambition is to try to establish a free and open atmosphere that avoids allusions to power and violence in the design of the building.

*Promote social interaction!* Another important issue deals with how social interaction—that is, the communication among patients and between patients and caregivers—can be promoted by the physical environment. A common effect of mental illness is for patients to withdraw into themselves, wanting to be alone in response to various situations that can make them feel threatened. The patients need to be able to regulate the distance between themselves and others so they don't feel their personal space is being invaded. Corridors must not be too narrow, and adequate clearance is required to prevent crowding. It can be advantageous to provide alternative routes that allow a patient to avoid an interaction. To support socializing, on the other hand, we have planned in a variety of ways for patients to successively expand their personal space: they can sit by the window in their own room and still look into the patients' common area if they leave their door open; they can sit in one of the smaller lounge areas belonging to their own small patient group; they can watch other people's activities from a distance and a protected vantage point. In this kind of socialization process, it is essential for patients to have access to a room of their own where they can calm their anxiety and recuperate.

*Promote patients' independence!* Many psychiatric conditions are associated with low self-esteem, or even self-contempt. A patent's self-image can be further undermined by a care environment with locked doors. It is therefore critical that the architecture can nurture and support patients' self-image, independence, and ability to play an active role in their own care. Giving each a room of their own offers important opportunities for privacy and recuperation. They can lock up their personal belongings, and normally patients' rooms are not entered by the staff or used for treatment. The ability to walk out into a garden contributes to a sense of freedom. But the details of the design can be important as well—for example, the ability to open the window in their room, or understand how to regulate the lighting, heat, and motorized sunscreens.

*Offer views to the outside and free access to the exterior environment!* There was a beautiful park next to the old Lillhagen facility that housed the psychiatric care unit previously, but it couldn't be used much because compulsory-care patients had to be escorted by a member of the staff. And with such a tall building, it was also rather complicated to get from the floor of the unit down to the ground level and out into the garden. We proposed an alternative that was to some extent a new model for psychiatric care facilities in Sweden: there would be a garden *inside* the locked facility that would be easily accessible to all patients. It feels fundamental to be able to offer access to the outside weather, vegetation, and birdsong. Also fundamental is the ability for patients to look out over the natural environment from a window in their own room. Providing them with this garden within the unit also enhanced the desired open atmosphere and feeling of freedom. The use of natural materials, such as wood and stone, was seen as another way to relate to something pure and sensual. I believe that, along with the private rooms, the direct and enhanced *access to nature* contributed most to the good result at Östra Psychiatry.

*Balance the demands for a safe and healing healthcare environment!* Another important and decisive issue for the building's design is security. Security concerns are essential to the design and the perception of the facility. And they in turn are a direct consequence of how well the department administration can balance *security demands and a healing care environment* in an effective way. How can we create an environment that is secure for the surrounding community as well as the staff and patients? How does one evaluate the threat posed by each patient, and what happens if one of them escapes? How can we prevent self-harming behaviors and suicide? These questions are strongly linked to the earlier aspects of atmosphere, dignity, and normalcy.

The way the planning team for a psychiatric care facility views the above seven recommendations has a great impact on the final design. At the same time, they offer little concrete advice about how to actually design the place. Nevertheless, I believe that these recommendations provide a good basis for the department's internal working group to collaborate with the architect to find good solutions. It is not difficult for them to determine together whether a design proposal is dignified, looks normal, and has a free and open atmosphere. Nor is it impossible for them to discuss whether the balance between security and care is reasonable, or whether the architecture fosters social interaction.

In the course of the planning work, it is very important to imagine how the patients as well as the staff will experience the environment. When I be-

gan working on Östra in 2001, I had previously been on sick leave for depression resulting from adrenal fatigue, or "exhaustion disorder." It was a rather common condition at the time.[9] I went into the project with the intention to avoid potential conflicts with the administration and client, and instead devote much of my time to designing. I discussed with my therapist, whom I was seeing regularly at the time, whether or not it was a good idea for me to work with this kind of project in light of my own mental health and the fragility that had perhaps always been there but had been "exposed" by the depression. We never arrived at an answer. Perhaps my own illness gave me greater empathy and ability to understand some of the patients' situations and experiences, even though I had never been admitted for inpatient care. Perhaps a typical example of this was that at one point I compared inpatient mental healthcare to the traditional old resort, where one can expect a warm welcome, good company, good food, and restorative walks. The department administration found this view of psychiatry extraordinarily inappropriate! In spite of that, I think some of the solutions we came up with were informed both by the architect's depression and by Carl Larsson's romantic paintings of his own home in Sundborn. The illustrations for Larsson's book *A Home* came to symbolize the longing for tranquility and delight, values I regarded as universally important to all of us regardless of illness.

## 1.3 The Researcher's Evidence: Towards a Design Theory 2012

Now and then, especially since winning the Healthcare Building Award, I have been invited to speak about the planning of the Psychiatry Unit at Sahlgrenska Östra and asked to lead a tour of the facilities together with the departmental administration. In 2008, for example, I was invited to a conference in Stockholm to describe the thinking behind the design of facilities for inpatient psychiatric care. It was there I met the management of the psychiatric department for the Southern Älvsborg Hospital in Borås. Today, after seven years that have seen changes in the hospital's leadership, conditions, and plans, we are still working on what is known as their Psychiatric Quarter. During that time we needed to win an architectural competition to earn the opportunity to continue with the project. In the summer of 2013, our proposal won first prize in the category of

[9] Adrenal fatigue is an increasingly common diagnosis. See for example http://lup.lub.lu.se/luur/download?func=downloadFile&recordOId=1571703&fileOId=1585297

"Healthcare, Future Projects" at the WAN Awards and would later lead to new commissions—so it was a detour but well worth the effort.[10]

The following year, 2009, I participated in the same conference mentioned above. I brought with me newly printed copies of *Architecture as Medicine: The Importance of Architecture for Treatment Outcomes in Psychiatry*. One of the very first people to see the book was Roger Ulrich.[11] I had heard his name before in a variety of contexts, including a lecture he gave to some of my colleagues at one of the Healthcare Building Forum conferences. It was perhaps lucky that on this particular morning I was not yet fully aware of Ulrich's international reputation and fame—otherwise I may not have dared to pass him a copy of the anthology, and this story might have taken another direction. It was also fortunate that the book included an English summary. When Ulrich gave his lecture a little later the same day, he made reference to the anthology and to the fact that "the number of compulsory injections fell by almost one-third per quarter" and "restraint cases declined during the same period by almost half" (From and Lundin, 2009, p. 287). I remember him saying that if a new medication had been introduced with a similar effect, it would have been viewed as an international sensation.[12]

That encounter led to Ulrich visiting Sahlgrenska Östra a couple of weeks later that summer, and eventually three years later to the publication of a scientific article related to the building. For me, meeting Ulrich had a profound impact on my career, and on the writing of this thesis. He has been part teacher, part discussion partner, and part ambassador for Östra's psychiatry department and for me personally.

**Towards a Design Theory**

Roger Ulrich was impressed by what he saw in the Psychiatry Unit at Sahlgrenska Östra. Could a facility for psychiatric care really look like this?

[10] http://backstage.worldarchitecturenews.com/wanawards/project/the-new-psychiatric-clinic/?source=sector&selection=longlist

[11] Roger Ulrich is an internationally acclaimed environmental psychologist and sought-after specialist in hospital design. His breakthrough as a researcher came with the article "View Through a Window May Influence Recovery from Surgery" (1984), in which he demonstrated the importance of nature to patients' recovery. He later contributed to research and research surveys that have had a profound influence on the growth of the movement for evidence-based design in American hospital planning. His theories are founded in part on the goal of reducing the stress-causing elements of care. Ulrich was also active in the formation of the Center for Health Design and a professor in the school of architecture at Texas A&M University. He has recently taken up residence in Sweden, where he is now associated with the Centre for Healthcare Architecture at Chalmers University in Gothenburg.

[12] Unfortunately Roger Ulrich says he does not remember making this comment.

It was friendly and carefully appointed, with none of the hard character he had become accustomed to seeing in so many other places. It was like nothing he had ever seen before. The visit was also a chance to meet some of the staff, including Lennart Bogren, who was head of the department at the time. It soon sparked the researcher's desire to explain how the physical environment could work together with patient care. But instead of just marveling over the effects of the architecture, he sought to describe them as a logical consequence of what we had learned from research!

In an effort to provide support for the findings presented in the *Architecture as Medicine* anthology, Ulrich and Bogren decided to undertake a controlled study. By studying statistical data on the use of compulsory treatment measures during the years 2005-07 at another psychiatric facility that had a similar patient population but had not undergone any fundamental changes in its operations or facilities. Although some data was not available, they were able to confirm, as expected, that the use of compulsory treatment measures had increased at the control facility. Ulrich and Bogren asked me for comments on their article, and after some discussion they asked me to join them as a third author. The paper was presented at the research conference ARCH 12[13], held at Chalmers University in Gothenburg in the fall of 2012, under the title "Towards a Design Theory for Reducing Aggression in Psychiatric Facilities" (Ulrich, Bogren, Lundin, 2012).

Aggression and violence are a growing problem for psychiatric care around the world, including emergency rooms at somatic care facilities. One explanation for the violence is the stress a person undergoes in such circumstances. Attempts to alleviate that stress have given too little attention to the opportunities presented by architecture. In psychiatric care, especially in cases of involuntary admission, forced confinement itself is a source of great stress. In addition, the underlying type of illness, the patient's current stage in treatment, and the momentary stress of the situation of course play important roles. The article sketched out a theoretical framework based on prior research—the kind of research that is not normally done in psychiatric contexts. This research, which is based on the theory of stress reduction, can be summarized in ten points under the heading *Environment Designed to Reduce Stress* (see below).

[13] Architecture Research Care Health Perspectives on Nordic Welfare Environments 2012.

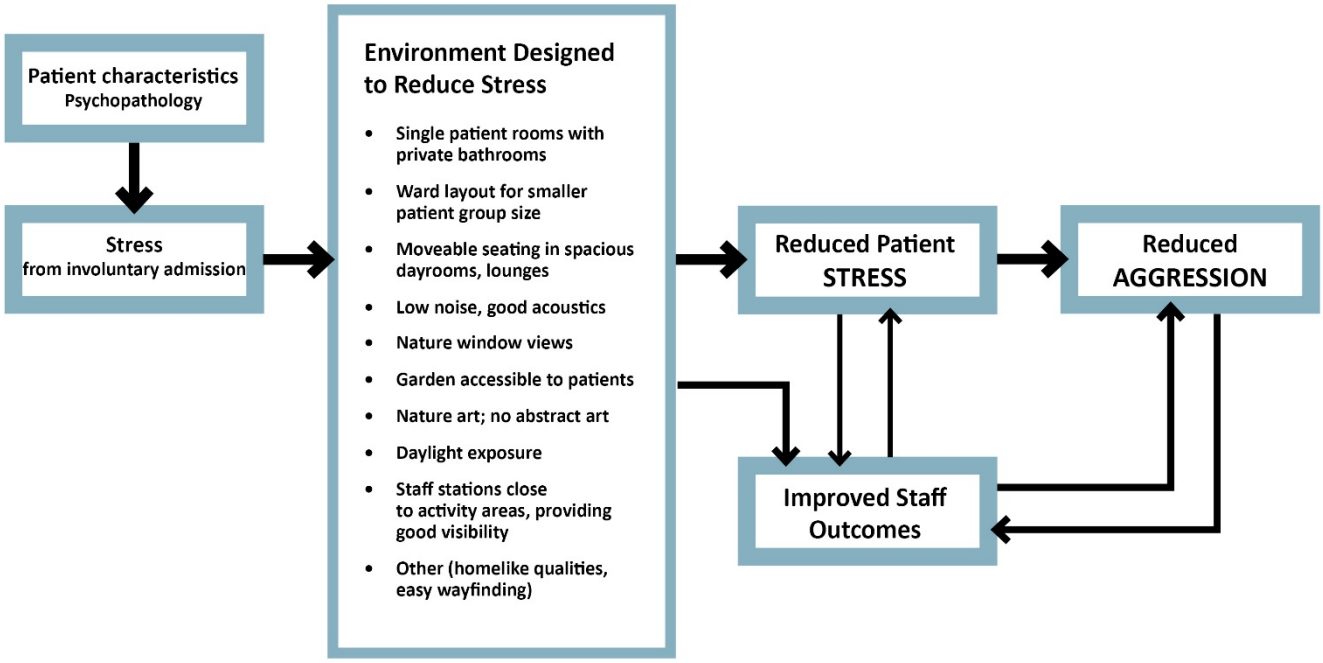



*Figure1: A design Theory for Reducing Aggression in Pschyciatric fascilities* (Ulrich, Bogren, Lundin, 2012). New design by the author.

The points in the figure above, which are for the most part quite familiar to anyone engaged in this field of evidence-based research, can be summarized in the following way. To have control over one's own room and an adjoining bathroom and shower reduces the stress level compared to a living situation in which patients share sleeping quarters and bathrooms with one or more others. The single room offers an opportunity to withdraw, thus giving patients a way to contain their own anxiety. Limiting the size of the care unit helps reduce the feeling of crowding, thus leading to fewer confrontations. Giving patients the ability to rearrange their furniture also reduces the likelihood they will feel their personal space is being invaded. Loud, unwanted noises also contribute to stress, and should be reduced. Contact with nature, either through a view from a window or by direct access to an outdoor space, and exposure to art with natural scenes (not abstract) are among the more well-known and researched approaches to stress mitigation. Good access to daylight has also been shown to reduce depression in certain patient groups. In addition, the ability to maintain good visual contact between patient and staff has been shown to be very beneficial to both. Other factors that are judged to contribute to stress reduction are a clear organization of the facilities that makes it easy to orient oneself and a homelike or cared-for character (Ulrich, Bogren, Lundin, 2012).

Together these attributes are assumed to contribute to a lower stress level among patients, but also among staff. And a lower level of stress among patients likely creates opportunities for the staff to provide them with better care. Furthermore, less stress for the staff should also contribute to a corresponding improvement in patient health. These factors work together in a positive feedback loop that should lead to a "spiraling reduction of stress."

Only hours after Chalmers University of Technology published a press release for the ARCH 12 conference and the article above, it appeared on the websites of several Swedish newspapers. It was then also published in scientific journals in several other countries. Together with Peter Fröst, a professor in the architecture department at Chalmers and head of the Centre for Healthcare Architecture, I was invited to visit the psychiatric inpatient care unit at Sahlgrenska Östra Hospital and to speak about "healing architecture" in a Swedish Radio science program (*Läkande arkitektur*, 2012). The greatest publicity success, however, was Roger Ulrich's article in the *New York Times*, "Designing for Calm" (Ulrich, 2013). That article would later play a certain role in a small consulting job for a project in Toronto. It was gratifying to feel I had contributed in some way, and the article was even accompanied by a picture of our design for Östra. It credited White Architects and me personally by name. But wait—Hans Wretling, the photographer, was cited as the architect, and his name spread like lighting across the western hemisphere….

## 1.4 Where did all this come from?!

We have only just begun to look at two different ways of explaining why the use of compulsory treatment measures on patients at Östra declined when they moved into the new facility—the practitioner's way and the researcher's. One is rooted in personal experience and the other in science. But did the practitioner's ignorance of scientific findings lead to an explanation that was fundamentally different from the researcher's? And if so, how was it different?

I believe that my practitioner's explanation is thoroughly captured in the scientific article. My reasoning about social interactivity is touched on in the article through arguments for movable furniture, small care units, and single patient rooms. The free and open atmosphere is described in a discussion about the placement and design of the nurses' station. Nevertheless, there are some differences. I didn't describe the importance of daylight, even though the design scheme makes use of it, and I did not discuss

noise. The reason is probably that as an architect I took these two parameters as given aspects of the design process. A third “oversight” was the importance of artistic decoration, of which I was unaware at that point in time.

Was there anything, then, in my practitioner’s explanation that couldn’t be found in the scientific article by Ulrich, Bogren, and Lundin? The article’s scientific findings do not relate to the concepts of *dignity* or *normalcy* that I used, and only vaguely to the concept of *a free and open atmosphere*. And the article does not address how *the view of security issues can impact the quality of the care environment*.

The scientific article, “Toward a Design Theory for Reducing Aggression in Psychiatric Facilities,” compares three different psychiatric facilities—the old Östra, the new one, and a control facility—in terms of how well each provided for the ten stress-reducing environmental factors. The control hospital and the old Östra satisfied one or two of the ten factors, while the new facility scored on nine, which should explain its success as “healing architecture”—that is, how the building’s design has contributed to the reduction in the use of compulsory treatment measures on patients. But how was that possible? On several occasions when Roger Ulrich and I have discussed the design of the new Östra, he stretched out his arms and asked, “Stefan, how is it that you got everything right when you didn’t know what you were doing?” Where did all this come from? Did you pull it out of a hat?

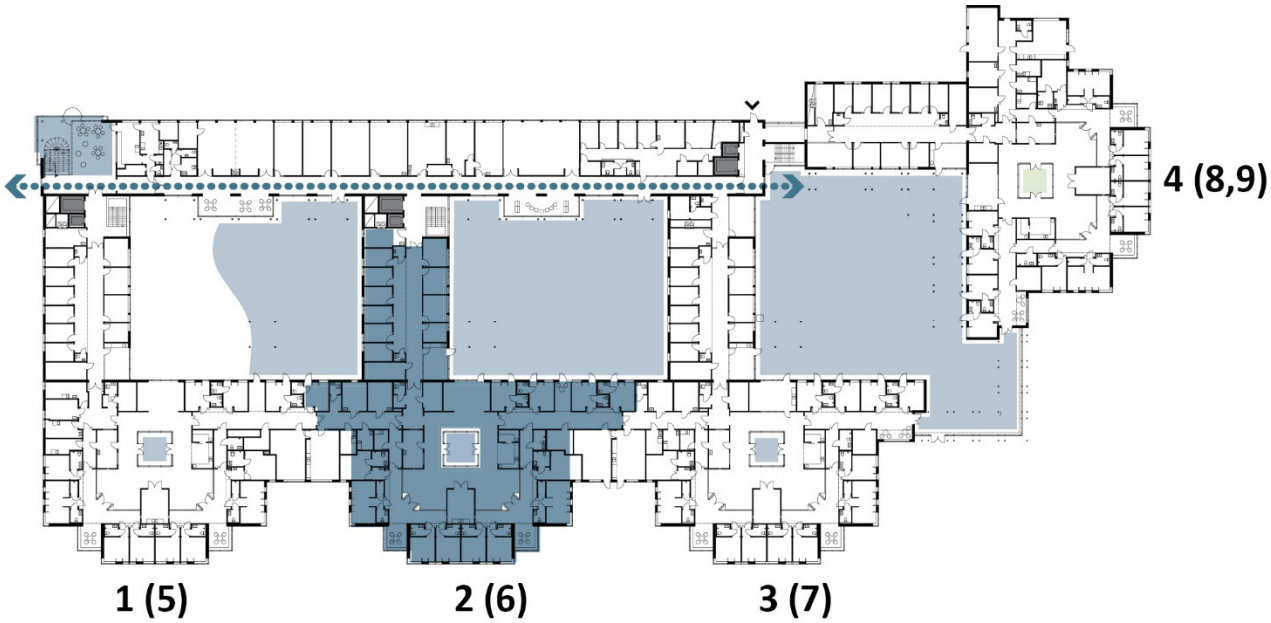
Naturally Ulrich was not oblivious to the various sources of knowledge, but he still wanted to understand how we could have arrived at and taken advantage of most of the conditions in the physical environment that were indicated in the research, which I was still completely unaware of even at the conclusion of the project. In a later chapter I will reflect on where that knowledge may have come from.

## 1.5 Östra Psychiatry: A Brief Presentation

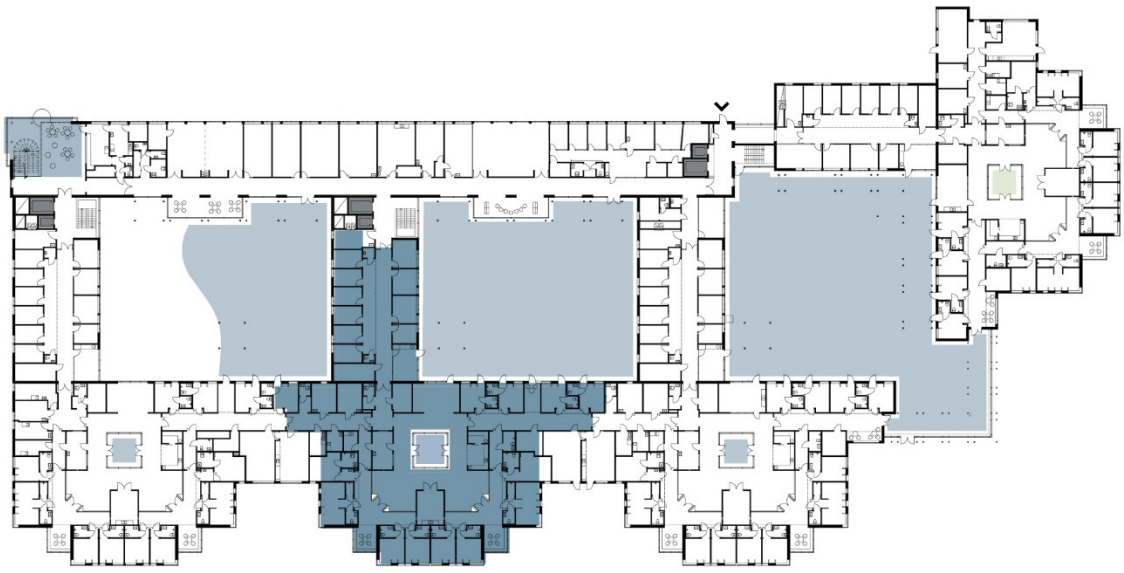
For several years I devoted almost all my time as an architect to a single project: the psychiatric care unit at Sahlgrenska Östra Hospital. I was afforded the time to become fully invested in the design and planning in a way that an experienced architect seldom if ever gets to do. It was probably also the project that best reflects whatever talent I have as an architect. And finally, it was the project that ultimately won the Healthcare Building Award, which led to the writing of *Architecture as Medicine*, which in turn led me to write a scientific article and begin my doctoral studies. This project thus occupies a special and central role in my professional life.

The project's programmatic conditions, in summary form, have already been described in Chapter 1.2. Anyone who cares to delve deeper into the program will find more in the chapter "The Architect Speaks" in *Architecture as Medicine.* The design-oriented aspects of the building are described in the same book's chapter "Focus on the Building."

Nevertheless, I will provide the reader with an opportunity here to get to know the building, with its ambition to balance the issue of security with a healing care environment, to create a free and open atmosphere, and to give patients a sense of normality and dignity.

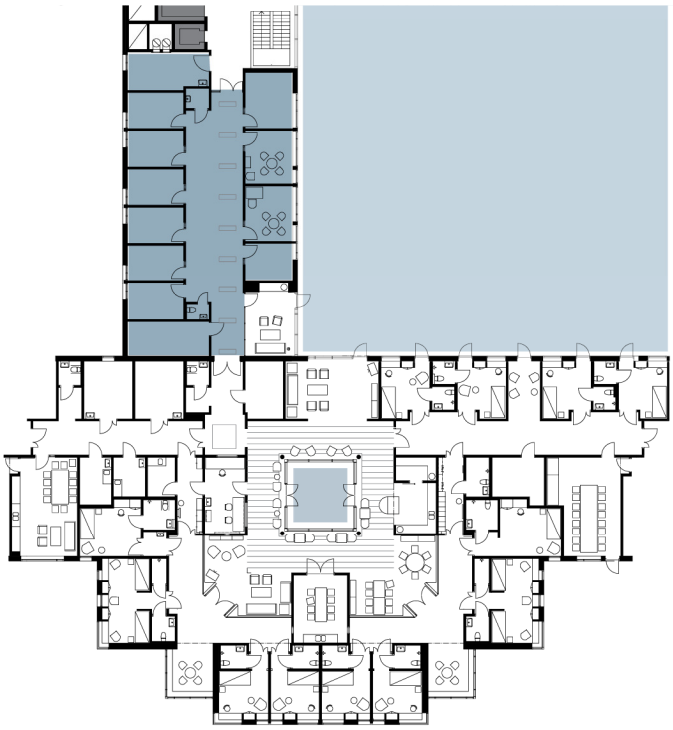



**9 wards, 124 beds and three internal courtyards**

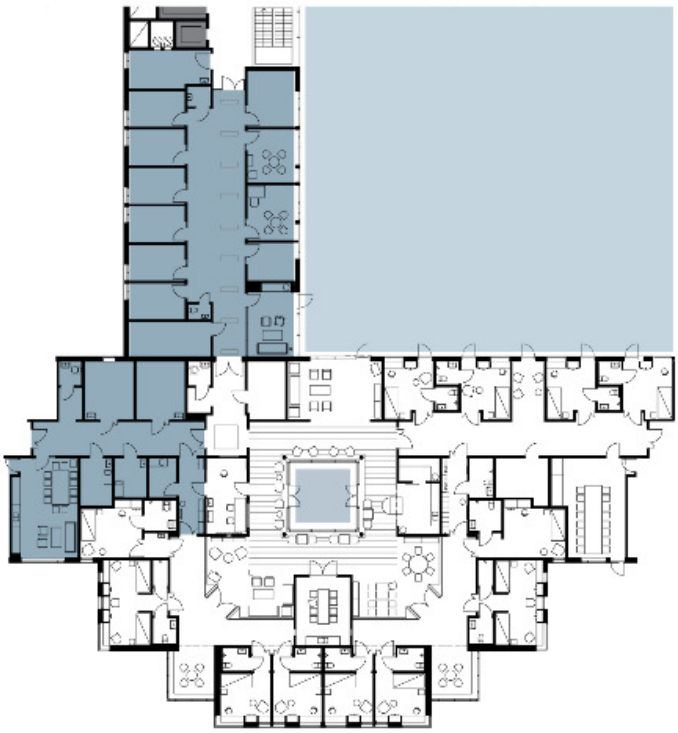


**Ward 14 beds**

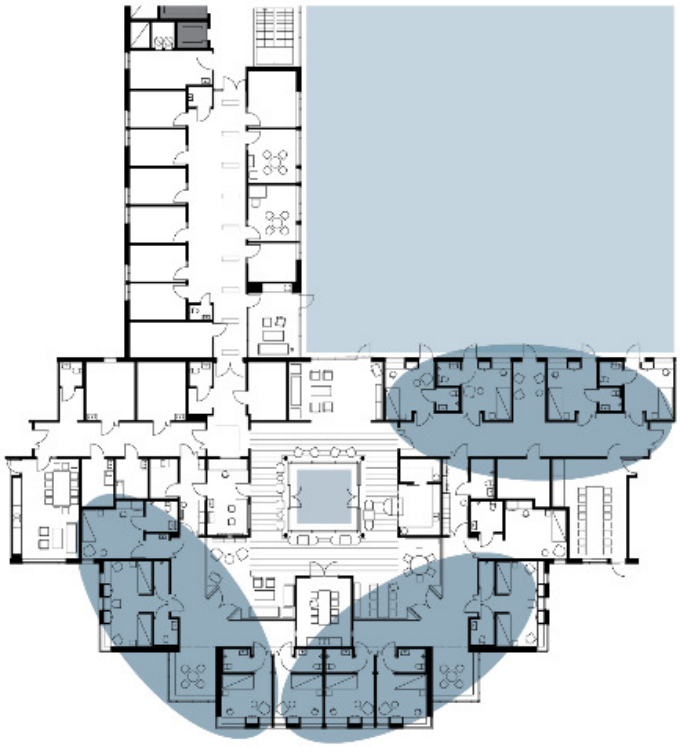
**Entrance, nurse station and atrium**



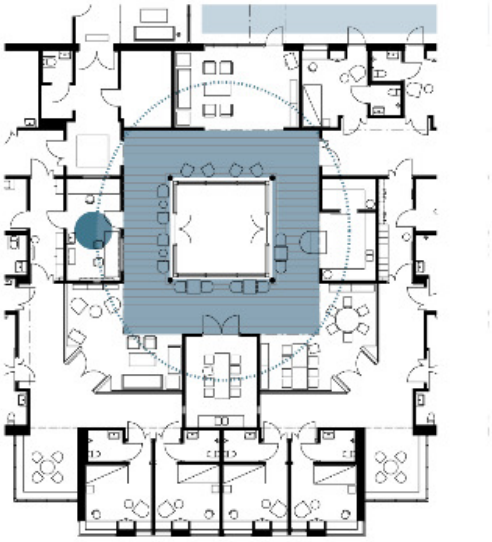
**Administration and therapy/consulting rooms**



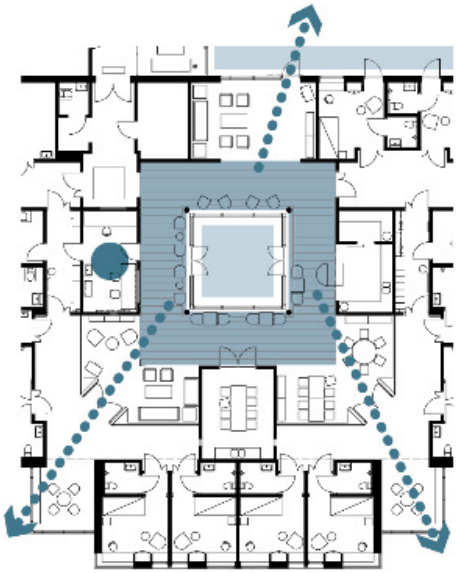
**Areas that can be closed at night**



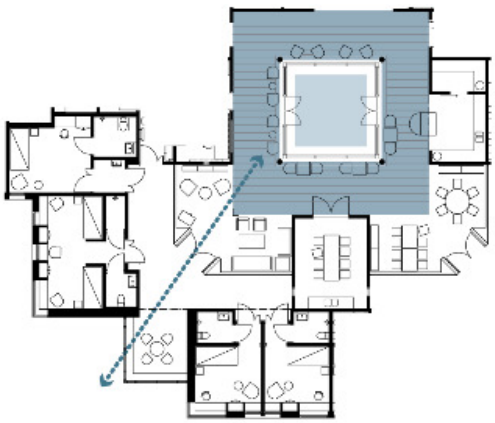
**Smaller wardunits 5 + 5 + 4 beds**



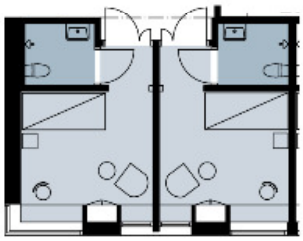
Overview of patients' common areas



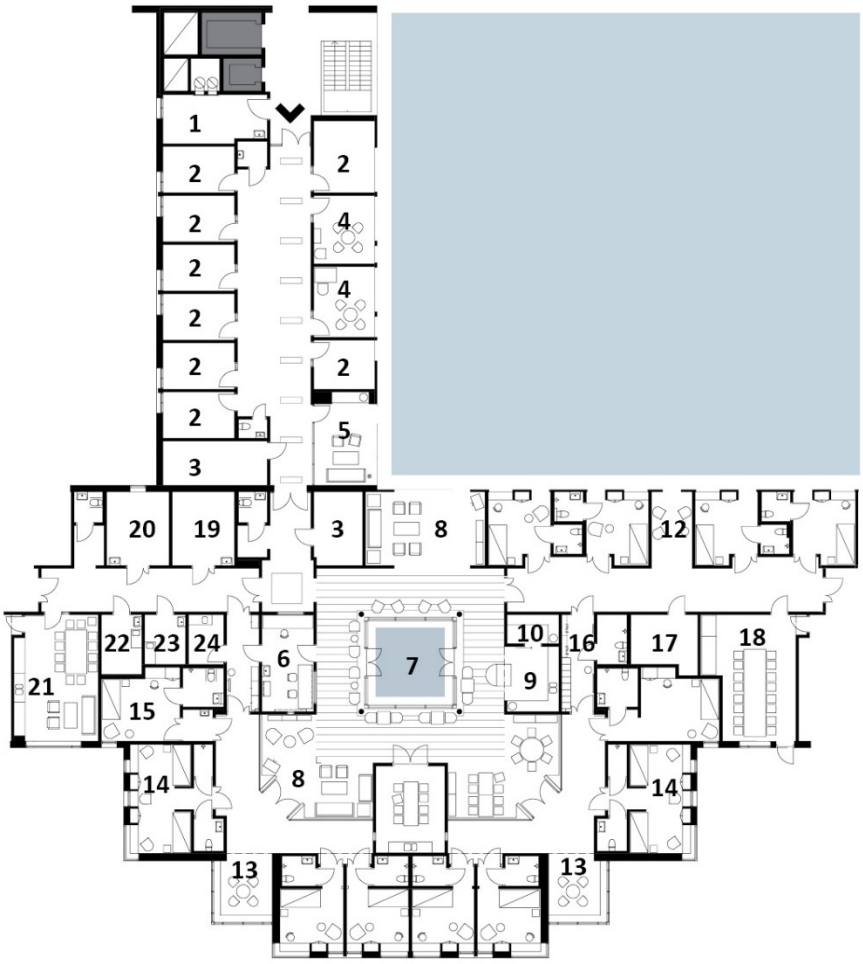
Views out



Wardunit 5 beds



Patient room




# Ward

1. Recycling room
2. Office etc.
3. Services
4. Therapy/consulting rooms
5. Reception room
6. Nurse station
7. Atrium
8. Lounge
9. Kitchen
10. Larder, lockable
11. Dining area
12. Activity room
13. Common room
14. Patient room (2 beds)
15. Patient room, with isolation sluice
16. Cloakroom
17. Store
18. Team room/conference room
19. Treatment room
20. Restraint room
21. Staff room
22. Dirty utility room
23. Laundry
24. Clean utility room

# Fact sheet

| | |
|---|---|
| **Use** ..... | Psychiatric inpatient care, emergency care, administration and education |
| **Number of care units** ..... | 9 |
| **Number of patient beds** ..... | 124 |
| **Gross floor area** ..... | 18,800 $m^2$ (200,000 $ft^2$) |
| **Design start** ..... | 2001 |
| **Opening** ..... | 2006 |
| **Property owner** ..... | Västfastigheter, Gothenburg: Per Åke Andréasson |
| **Client** ..... | Sahlgrenska University Hospital, Östra, Psychiatry: Erik Brenner and Lena Walther |
| **Building architect** ..... | White Architects AB: Maria Wetter Öhman (principal), Stefan Lundin (design lead), Krister Nilsson (project managing architect), and Stig Olsson (project managing engineer) |
| **Interior design** ..... | White Architects AB: Elisabeth Rosenlund (principal) and Elisabeth Sandberg |
| **Landscape architect** ..... | Landskapsgruppen AB: Ulf Rehnström |
| **Photo .....** | Hans Wretling |

# 2.

# Background

## 2.1 The Concept of Healing Architecture

What do we actually mean by *healing architecture*? If we search for synonyms for *heal* we find words such as *cure*, *nurse*, *mend*, *repair*, and *restore*. These describe various ways we can be freed from illness and returned to health. We associate perhaps to a doctor who provides a treatment that results in a cure and restores us to health. But do we mean that the architecture *in and of itself* can actually achieve those things? Could a broken leg or ruptured appendix be fixed by architecture? That hardly seems reasonable. But what significance can architecture be said to have? To begin with, I propose that we see architecture as an asset for supporting recovery, for making the process both more pleasant and more rapid for the patients. The architecture's contribution can thus be compared in certain respects to the kind of care hospital staff provide in order to support a patient's recovery. But can we make a fundamental distinction between cure and recovery and consider them two independent quantities? In other words, does the quality of the healthcare staff's work in itself contribute nothing to the healing? That doesn't sound reasonable either. Do the quality of care following an operation, for example, and the architectural setting for that care have no bearing on whether a patient is cured or not, but only on how rapidly the patient recovers? Can we not imagine situations in which how thoughtfully the staff cares for a patient tips the scales to determine whether or not that patient survives a crisis? From this point of view, both good care and good architecture must be considered important to healing. Even if the work of caring for patients[14] and the architecture are not *primarily* intended to serve "purely medicinal purposes," I maintain that we still can and should consider them medicinal in the sense that they do actually contribute to the healing process.

I therefore posit the following paradox for discussion:

- *Architecture is a non-medicinal measure that can contribute to medicinal outcomes.*

The question of architecture's relative importance for healing and recovery in comparison with other treatments is of course relevant, and will be addressed shortly. And of course architecture's contribution to healing is less than that of surgery and medication, but that contribution is not insig-

[14] The staff's duties include not only caretaking but certain medicinal procedures as well.

nificant. It thus behooves those of us professionals who work with planning and construction to try to respect and better understand architecture's positive impact on recovery and healing.

In English the term *healing architecture* can be a little unclear to Swedish readers. The word *healing* is often used in Swedish to refer to the New Age movement and to exotic and occult phenomena that are regarded with much skepticism and given little credibility. But the corresponding Swedish word *helande* has a more positive ring in Swedish ears. *Läkande* (the word I use for "healing" in my title) refers only to the body's physical return to health, while *helande* also encompasses a psychological recovery and therefore refers to the healing of the "whole person." When a wound is healing we say *läkande*, but when a person is healing we say *helande*.

Another important term, *restorative*, is used in gardening and landscaping contexts to describe the importance of nature's recuperative effect on us.

In this context, it is worth noting that an organization such as the Center for Health Design (CHD)[15] doesn't use the term *healing architecture* as a catch-all, but rather emphasizes the importance of the physical design for several different attributes, of which healthier environments is only one. When the organization was founded, its website proclaimed that "…design could be used to improve patient outcomes in healthcare environments" and "CHD's mission is to transform healthcare environments for a healthier, safer world through design research, education, and advocacy."[16] In comparison with these descriptions, my intended definition of healing architecture is more directly tied to *the patient's experience of the architecture.* "Indirect effects" that can also benefit patients, such as a more compact supply storage system that allows staff to spend more time with patients, are not captured in my narrow definition. The same is true for the improved patient security made possible by functional lighting in the medication room, which reduces the incidence of incorrect medication. According to this line of reasoning, the functional attributes of the environment—that is, how the spaces support the activities for which they were intended—can be described as *indirect*.

The discussion of healing architecture tends to focus on the gravely ill patients who spend a prolonged amount of time in the unit. But of course there are other healthcare situations in which architecture plays a role—for example, the design of lobbies, reception areas, circulation axes, and examination rooms for a variety of diagnostic or treatment environments

[15] The Center for Health Design. https://www.healthdesign.org
[16] https://www.healthdesign.org/chd/about [accessed 12 March 2015].

that are often dominated by technological equipment. In these situations too we can consider architecture as a potentially positive force for enhancing patients' wellbeing, for example, and for reducing various kinds of stress that might otherwise lead to poor diagnostic and treatment outcomes.

The organization Hälsofrämjande sjukhus[17] (Health-Promoting Hospitals) strives to create a better healthcare environment for patients and staff. Part of the thinking around health-promoting hospitals builds on the idea that the buildings themselves should facilitate more physical activity, for example by making stairways visible. In our comprehensive reasoning it is important to see the architecture from a broader perspective, which includes the ongoing transition from a system designed for acute, reactive treatment to one designed for proactive care, and with a greater portion of care given in the home. These ideas naturally have implications for architecture in all its forms—how good architecture contributes to better living and longer life, for urban planning and development, for the design of housing and schools, and so forth. These are issues of great importance, of course, but now we have broadened the scope of our view too far and are looking beyond the framework for this thesis.

**When Did the Concept of Healing Architecture Emerge?**

When did the concept of an architecture that can in itself contribute to healing come to light? How long has it existed in the public consciousness, and how long has the concept been in use? At what point in time did I actually begin to suspect, and then believe in and describe, the healing dimension of architecture? I cannot remember any discussion of healing architecture when I worked on hospital design projects during the 1980s and 90s. It probably wasn't until the early 2000s, after I had begun design work on the psychiatric unit at Sahlgrenska Östra, and after personally struggling through periods of depression and sick leave myself. Perhaps it was only then that the relationship between the patient's experience and the physical environment took on more dimensions and became more significant in my mind. Or did I hear the concept for the first time from one of my architect colleagues who had been to hear Roger Ulrich lecture at a Healthcare Building Forum conference? I cannot recall the concept being

[17] The Swedish network Hälsofrämjande hälso- och sjukvård (Health-Promoting Healthcare, or HFS) was established in 1996. It is part of an international network, Health-Promoting Hospitals (HPH), started by the World Health Organization in 1993. Sweden's HFS network today includes nineteen county councils, regional administrations, and healthcare organizations and four individual primary-care hospitals. http://www.hfsnatverket.se/sv/om-oss/

part of the discussions surrounding the acclaimed Anthroposophical Vidarkliniken in Järna during the 1970s and 80s.[18]

Thus the concept has been in use in Sweden for nearly fifteen years. In the United States it came into use perhaps fifteen years earlier than that, as evidenced by the formation of what would later become the Center for Health Design. The current understanding of the concept *healing architecture* has only a quarter century of history behind it, but I have found it to be in widespread and frequent use in healthcare contexts today. I believe that is good. As an academic, however, I can't help but raise an eyebrow in concern that this newfound general interest might lead to oversimplification and an uncritical approach that might cause problems in the future.

## 2.2 The History of Healing Architecture

It is hard to imagine a discussion of healing architecture that does not include at least some look back through history. What follows here, then, is a brief review that begins with a borrowed image from today's healthcare construction as presented by American researcher Esther M. Sternberg in her book *Healing Spaces: The Science of Place and Well-Being.* Sternberg asserts that today's state-of-the-art hospitals are primarily places designed to hold state-of-the-art equipment, and where people are expected to adapt to the demands of technology (Sternberg, 2009, p. 3). When did the focus shift from the patient and the healing process to diagnosis and treatment, she wonders rhetorically—it hasn't always been that way (Ibid, p. 4). That characterization probably doesn't describe her actual impression of contemporary hospital design—nor mine—but it does provide a polemical point of departure for a history that builds up to an appeal for healthcare and architecture that put the patient experience at the center.

What we now often call healing environments historically have often been places where *nature itself* was deemed to have a great impact on healing and recovery. These ideas have been expressed in a variety of ways throughout history. Buildings for healthcare and rehabilitation have often been located in peaceful, beautiful places with dramatic views of landscapes and bodies of water. The life-giving force of water is cited in early

[18] In *Arkitektur* (The Swedish Review of Architecture), neither architects nor critics use the term *healing architecture* in the 1988 review of the Vidar Clinic. However, Gary J. Coates uses the term in describing the clinic in his 1997 book *Erik Asmussen, Architect*.

descriptions of garden paradises, medieval bathhouses, and later thermal spa resorts for bathing and recuperating. Cultivating the land and working in fresh air has been a model for many mental hospitals. After the First World War it started to become clear that providing returning soldiers with activity in gardens and natural areas could help them deal with post-traumatic stress disorders resulting from harrowing war experiences, and since then the therapeutic potential of the natural world has been an interesting topic of research.

The legendary English nurse Florence Nightingale (1820-1910) also emphasized the importance of bringing patients into harmony with nature, for example by providing them with fresh air, pleasant views, and plenty of daylight, and also by shielding them from disturbing noise. She set out her ideas in the book *Notes on Nursing: What It Is and What It Is Not.*[19] She is best known to the general public for the demands she formulated on hygiene based on her experiences from the Crimean War in the 1850s. The mortality rate among soldiers dropped dramatically—from over 40% to just 2%—under her supervision.[20] Nightingale appealed to good personal hygiene, cleanliness in hospital facilities, and proper waste water systems. Along with a number of doctors and contemporary scientists, she began to suspect the mechanisms for the spread of contagious disease, but the knowledge did not become common among the general public until the latter part of the nineteenth century. It had been established, for example, that childbed fever (puerperal infection) was six times more common when babies were delivered by doctors, who also performed autopsies on cadavers, than when they were delivered by midwives. And the incidence of death resulting from amputations performed at home in the English countryside was just a quarter of what it was for the same procedures in city hospitals. Better hand hygiene changed that situation.

Insights on the spread of disease and measures to prevent it came to have a profound impact on the design of hospitals, and the so-called "pavilion hospital" was one result. It was to some extent a new era of hygienic awareness in the history of healing architecture—a general increase in awareness of the physical environment's importance in healthcare outcomes. But new opportunities and new problems emerged, and have continued to emerge ever since. For example, penicillin came as a "savior" in the 1940s, only to be overcome by resistant bacteria in the following dec-

[19] I have read the 1989 Swedish translation of Nightingale's book, *Anteckningar om Sjukvård … ur vårt tidsperspektiv*.
[20] Nightingale also came to be highly regarded as a statistician. See for example Moberg, 2007, p. 26.

ade. Because of genetic mutation and increasing worldwide travel, bacteria now spread around the globe faster with each year. At the time of this writing, in 2015, a great Ebola epidemic is in the process of breaking out. Among hospital planners the world over, the single patient room is winning more and more proponents in the fight against the spread of infectious disease. The incidence of hospital-acquired illnesses, the preponderance of which are infections, still constitutes a major problem, and approximately one of every eleven beds in Swedish hospitals is occupied by someone injured or infected in the course of treatment for some other illness.[21]

But Florence Nightingale's ideas also encompassed ideas about *caregiving* itself, and today she is something of an icon in caring science. She established the first educational degree program for nurses in London in 1860. She also emphasized the importance of other "soft" values in addition to hygiene—the ability to look out a window or gaze at flowers, to sleep in a clean bed and eat tasty and nutritious food, to feel physical contact from another, to relieve the monotony and be comforted or amused while confined to a bed. Perhaps we can interpret and define these measures as various ways to try to enrich a boring confinement with positive feelings. We might also find these older ideas expressed in the vocabulary of modern therapeutic treatment in terms such as "prescription for culture," "tactile massage," and "prescription for physical activity." An environmental psychologist might possibly call these positive distractions—distractions that redirect a patient's attention away from his or her illness.

The breakthrough of Functionalist architecture in Sweden was part of a hygienic trend that flourished during the latter half of the nineteenth century, particularly in the big urbanized and mechanized cities. Sunshine, daylight, and fresh air were buzzwords that were also reflected in the architecture of the 1930 Stockholm Exhibition. Gunnar Asplund and other of the most prominent architects of the day created there an inspiring architecture that won the hearts of the architectural community. At the time Sweden had perhaps the lowest housing standard in Europe. Overcrowding into small, unsanitary apartments in heavily exploited courtyard blocks was to be replaced with freestanding slab buildings oriented north-to-south for maximum light and air.

It was an era characterized by optimism, confidence in the future, and belief in scientific progress. That attitude came to be symbolized not by architects and artists, but by engineers. The faith in science and pure reason

[21] 8.6% hospital-caused illnesses according to a 2008 report by the Swedish National Board of Health and Welfare, *Vårdskador inom somatisk slutenvård*. Socialstyrelsen: 2008. p. 14.

contributed to the marginalization of subjective views. Dimensional studies of kitchens and standardization of interior furnishings, for example, became for the first time important elements of the architect's daily practice. Another motto that typified the age was "form follows function": the beauty of an object depended on the designer's ability to find the most practical form. It was a time when aesthetics took a back seat to function—in theoretical discussions if not always in practice. And it is here that a kind of discontinuity arises in the history of architecture. No one was interested in discussing aesthetics or beauty anymore, and that evenutually contributed to an impoverishment of architectural education that had consequences for the following generations of architects and architecture. In retrostpect, many of the pioneers of modernism realized that mistake. But not before polititians and builders had taken on a more prominent role in the planning and construction of the built environment—to some extent at the expense of architects.

In 1956, endocrinologist Hans Selyes (1907-82) first published *The Stress of Life* (Seyle, 1978). Stress can be defined as the body's answer to the physical and mental strain our surroundings place on us. Stress is of course an important human and functional mechanism shaped by the forces of evolution, but under conditions of prolonged strain it can be harmful and impact our health. We began to understand that our way of living and our feelings and perceptions could have a direct influence on health. Illness is not entirely an "act of God," but something we can influence by the way we live, by our lifestyle. In the 1950s nurses also began to study the importance of nurturing to the overall healthcare environment. During the 1970s, partly in Finland, it developed into a scientific discipline of its own known as *caring*.

The science of man's relation to and interaction with our physical environment developed into the field of *environmental psychology*. The field can be said to have emerged from the intersection of architecture and psychology. It studies how man experiences his surroundings and is influenced by them, and how he interacts with the environment and can influence it through his behavior. The research often examines the role individual environmental factors play in our experiences. In about 1960, environmental psychology began to be established internationally. At the first international conference, held in Salt Lake City, the term *architectural psychology* was introduced. The second conference was held in Scotland and the third in Lund, Sweden, in 1973.

Sweden has a strong tradition of environmental psychology. Architect Sven Hesselgren's 1954 book Arkitekturens uttrycksmedel (Architecture's

Means of Expression) was one of the first doctoral theses in the field of architecture, and offered a very early link to environmental psychology. It provided a review of existing psychological research on man's perceptions.[22] The subject must have attracted a great deal of interest at the time given the number of well-known people, including art historians and architects, who came to be involved in the work in various ways.[23] I encountered this "all-encompassing" thesis during my own studies in the late 1970s, and was enamored with the monumental scope of the work, with its ambition to give a definitive answer to the question of how architecture should be designed.

In 1964 Sweden's third degree program in architecture was launched in Lund. Sven Hesselgren applied for the professorship in design, but it was given to Carl-Axel Acking, with whom Hesselgren had shared a professional practice until 1955. So Hesselgren went to the Royal Institute of Technology (KTH) in Stockholm to do research on architectural psychology. Acking and three others were responsible for structuring the curriculum in Lund, and he brought psychologist Rikard Küller onto the faculty and saw to it that environmental psychology became one of the ingredients in the architectural design portion of the program. They established a research environment that would garner international attention. It became an incubator for several other impactful researchers, including Gunnar Sorte and later Patrik Grahn, who is now conducting internationally significant research on "green environments," rehabilitation and well-being at the Swedish University of Agricultural Sciences (SLU) in Alnarp. In the late 1970s, a few years before his international breakthrough with the 1984 article "View from a Window May Influence Recovery from Surgery," Roger Ulrich was also here as a guest lecturer.

In 1974 Acking edited a book entitled *Bygg mänskligt. En sammanfattning av den ömsesidiga påverkan mellan människan och den byggda miljön* (Build Humanely: A Summary of the Mutual Influence between Man and the Build Environment). The subtitle reveals that this is a work of environmental psychology. Acking gathered contributions from many important Lund figures in the anthology, including Associate Professor of Neuropsychology David Ingvar, who wrote, "One might reasonably conclude that the modern city's simplified, impoverished architecture is harmful and a

[22] Information on Sven Hesselgren comes in part from an in-progress licentiate thesis by Mats Ohlin: http://www.matsohlin.se/Hessel_webb/hessel_pro.htm [Accessed 24 May 2015]

[23] Art historian Gregor Paulsson had been Hesselgren's reading advisor as well as the primary opponent for his thesis defense. The secondary opponent was the architect Sven Silow. One architectural historian, Erik Lundberg, had read the manuscript and another, Elias Cornell, had reviewed the work for errors.

partial contributor to the psychological problems that afflict the inhabitants of our cities today" (Acking, 1974, p. 78). In the research on environmental psychology of the mid-1970s Acking saw a way out and a way forward—a way to move beyond the faceless, large-scale development and destruction of urban neighborhoods and toward a holistic view in which architectural values have an importance that goes beyond the purely economic, technical, and practical—beyond what can be rationally described and quantified. The architectural psychology research of the day, according to Acking, was on a path to providing us with the evaluation methods that were needed to prove the kind of thing that these days can so often simply be waved off as subjective opinion and thereby ignored. He suggested that one explanation for the prevailing problematic conditions in the field of architecture could be found in the anti-aesthetic attitude adopted by the architects themselves:

> *The architect went so far in his functionalist orthodoxy as to renounce his customary role as an artist. Nevertheless, the most interesting and best work in the spirit of this new era has been done by architects using—as in their earlier work—strong artistic skills, even if they are now reluctant to talk about that (Acking, 1974, p. 20).*

In 1977 Sven Hesselgren published *Vad vacker är*. *Varför vi vill ha vackra hus och städer* (What Beautiful Is: Why We Want Beautiful Buildings and Cities). It was an attempt to offer more of a popular science summary of his research in order to reach a larger audience of architects and the general public. In 1978 Harald Thafvelin took over as a professor of design in Lund, and for a variety of reasons environmental psychology assumed a more peripheral role in the architecture debate in spite of its established place in the architecture school. It was also widely regarded with skepticism by architects in the decade that followed. And in 2009 when I wrote the chapter "Purely Scientifically Speaking" in the *Architecture as Medicine*, I adopted a very critical attitude and delivered a few jabs that were well-deserved by many I know were dismissive of Lund for what they supposed to be its narrow-minded view of architecture. In recent years, the discussions of evidence-based architecture do not appear to have given environmental psychology any new momentum or renewed standing among architects. Today environmental psychology in Lund's architecture school focuses primarily on assisted living for the elderly and mentally ill and on lighting—topics for which there has been funding available. Although research and design live side by side in the school, and have several points in common, the exchange between the two is limited today.

A 1984 study by environmental psychologist Roger Ulrich, as mentioned previously, came to have an epoch-making impact. The paper was published in the prestigious American journal Science, which is oriented toward technology, natural science, and medicine. The title of the article was “View Through a Window May Influence Recovery from Surgery” (Ulrich, 1984). Could a view of nature really have a restorative effect? (Ulrich presented evidence that patients who had a view of nature from their window didn’t stay in the hospital as long after their operations, received fewer negative evaluation comments in their nurses’ notes, and took less pain-relieving medication than those whose windows faced the windowless brick wall of a neighboring building. Ulrich could therefore show that physical environments were significant for patients’ recovery and well-being. The article is regarded as a milestone in this area of research. Rachel and Steven Kaplan are two other important researchers in the field, with their theories on directed attention and fascination.

Research in the decades that followed the Second World War often looked for measurable physiological effects. The results were often measured in pulse, blood pressure, perspiration, hormone secretion, and so forth. With new technology comes new opportunity, and today the PET scan offers a new tool in the search to uncover what our feelings do to our bodies. A PET scan shows in real time which areas of the brain are influenced by various stimuli, experiences, and feelings—a technique that is particularly interesting given the great interest today in the brain’s mechanisms. Since 2003 there is also a special organization, the Academy of Neuroscience for Architecture (ANFA),[24] that focuses specifically on the relationship between the brain and architecture. In her book *Healing Places: The Science of Place and Well-Being*, Esther Sternberg describes how modern brain research is contributing to the understanding of the importance of our emotional lives for healing and recovery. We will return to her work toward the end of this thesis.

**CHD and CVA: Advocates for Evidence**

In 1985 the first Symposium on Healthcare Design was held in California. It was initiated by the dynamic Wayne Ruga. It seems to have been a raucous collection of people and ideas that were critical of the current systems for providing healthcare and building hospitals. A recurring theme appears to have been the question, “Why not use design to improve patient outcomes?”[25] From this context emerged in 1993 the Center for

[24] http://www.anfarch.org/

[25] According to a conversation with Roger Ulrich, March 15, 2012.

Health Design (CHD). CHD is an independent non-profit organization that has become a world leader in the development of healthcare construction founded on evidence of the physical environment's importance for healthcare outcomes. In an unpublished article from 2012, CHD looks back over its quarter-century of history:

> *Ever wonder how long it takes new ideas to become mainstream? Twenty-four years ago, our founder began a quest to prove that the design of the built environment can and does affect the quality of healthcare.*[26]

The organization's mission was for the design of healthcare buildings to create a more healthy, secure, and effective system of care: "We improve healthcare experience by helping build better buildings."[27] In 1996 CDH initiated a research survey entitled *Status Report (1998): An Investigation to Determine Whether the Built Environment Affects Patients' Medical Outcomes.* I will discuss that survey more thoroughly in the next chapter. An increasing number of organizations began to appear with the intent of contributing knowledge and research results to planned and ongoing hospital projects. For example, in 2000 CHD launched the Pebble Project, a research collaborative whose membership had grown by 2012 to include seventy-five hospitals. CHD's conferences have attracted a growing number of participants, with over four thousand attendees at the annual meeting. Since 2006 the event has been held in conjunction with the American Institute of Architects' (AIA) Academy of Architecture for Health. CHD's work has also made an impact on the *Guidelines for Design and Construction of Health Care Facilities*, which is published jointly by the AIA and the Facility Guidelines Institute. In an effort to promote evidence-based design research, in 1998 CHD established the Evidence-based Design Accreditation Certification (EDAC). The scope of its educational activity has grown steadily, and by 2012 more than a thousand people had been certified. In 2007 they launched the *Health Environments Research & Design Journal* (*HERD*), an interdisciplinary publication aimed at identifying research results, disseminating them, and "translating them into practical tools." The Ripple database, started in 2008, was "an open source, searchable web-based database" for research in the field developed by CHD on half of Kaiser Permanente.[28] CHD also publishes books and other

[26] *Outline History of the Center for Health Design*, an unpuplished document produced by the Center and given to me by Roger Ulrich in March of 2012.
[27] Ibid.
[28] Kaiser Permanente is a managed healthcare corporation established in California with about 182,000 employees, 8.9 million patients, and $4.8 billion in revenue in 2011.

literature. Their website, http://www.healthdesign.org/, was launched in 1998 and today provides a portal to all the organization's activities.

The Forum for Healthcare Building Research (now the Healthcare Building Forum) was formed in 1993 to provide a platform in Sweden for discussion, development work, and research.[29] From its inception one of the Forum's primary tasks has been to create a meeting place for researchers and practitioners in the field of healthcare design and construction, thereby disseminating the findings from various research and development projects. The organization emerged in the space created by the development of SPRI, Sweden's Institute for Healthcare and Social Assisance Planning and Rationalization.[30] Two of the Forum's first leading members were architects, Associate Professor Göran Hultén and Professor Sven Thiberg, both on the faculty at KTH in Stockholm. At first the organization held conferences and certain working committees, but soon they seized on the idea of establishing an adjuct professorship in healthcare architecture. In May of 1998 they succeeded at Chalmers in Gothenburg, thanks in part to support from Lennart Ring, the chairman of the Forum and later head of planning at Sahlgrenska University Hospital. Åke Wiklund, a highly experienced hospital architect, was the first to hold the professorship, and established a curriculum for both undergraduate and graduate students that enjoyed a good reputation among the Forum's membership, the healthcare industry, and his students. Wiklund also invited guest lecturers such as Roger Ulrich to Chalmers and to the Forum's continuing education program for architects and planners. To support the professorship, the Forum established a board of advisors that included representatives of the Forum, Chalmers, and various architecture firms.

When Wiklund retired in 2007, his position was taken over by Peter Fröst, a practicing professional with a PhD in architecture and a primary interest in the early stages of design. His 2004 doctoral thesis was titled *Design Dialogues in Early Phases of Building Projects: Methods and Tools for Customer Engaged Workplace Design.* Fröst's ideas about design dialogues had shown promising results when used in several healthcare projects. His responsibilities as the new professor of healthcare design included initiating research in the field of hospital architecture. In the spring of 2010, with the rector's approval and a show of interest from funders, universities, and architecture firms, Professor Fröst's efforts resulted in the estab-

[29] This description of the Forum is based on its tenth anniversary publications http://www.vardbyggnad.se/om_forum/jubileumsskrift/forum10ar.pdf and http://www.vardbyggnad.se/om_forum/jubileumsskrift/Forum_2003_2012.pdf

[30] The Institute was founded in 1968 and gradually dissolved during the 1990s.

lishment of the Center for Healthcare Architecture (CVA). It was something of a twenty-year younger sibling to the Center for Health Design (CHD). Today CVA is a national arena for the exchange and dissemination of knowledge about healthcare architecture. The organization arranges lectures and seminars, and contributes to both the architectural degree program and continuing education. In its public role, CVA initiates and executes research and development and implementation projects. At about the same time CVA was being formed, Roger Ulrich became a visiting professor for the organization, and in the fall of 2011 he left the faculty of Texas A&M University to take up permanent residency in Sweden. Peter Fröst and I were classmates and friends in architecture school in the early 1980s, and have been discussing architecture ever since. As a practicing architect in the field of healthcare design, he invited me to join CVA's board of advisors in 2007, and I agreed enthusiastically. Today Fröst is an always-available advisor and discussion partner for the research I have begun.

**The Architectural Profession and Research**

What kind of standing has research into architecture in general and healing architecture in particular had among Swedish architects during the last few decades? Of course it would be impossible to give a simple answer to that question. But I have my own opinion, which was founded during architecture school, and it is one that I believe many architects my age share. Architectural research during the 1970s and 80s did not engender much trust among practicing professionals, at least not in private architecture firms. Reading research reports and scientific articles was never a significant element of either my education or my professional practice. Nor was an academic career or a doctoral degree much of a springboard to a successful career path at that time. In the poor job market of the 1970s, doctoral studies were seen in part as a way for newly graduated architects to remain in the field and have a salary without getting a job in a firm. Issues related to comprehensive planning and social consequences came to the fore, while artistic and design matters receded to the margins. In the 1990s there began to be discussions about undertaking research that would be more closely tied to professional practice.

The Arkus Foundation was formed in 1986 and now comprises forty-five member firms, providing funding for practice-related research.[31] White Architects, where I work, has been setting aside money for a research

[31] See http://www.arkus.se/om-arkus/ [Accessed 17 May 2015]

foundation since the 1970s. But it wasn't until the firm merged with the Stockholm-based Coordinator in 1990 that the research really took off. In the following years a greater collaboration between architecture firms and universities developed. In 1989 Claes Caldenby, professor of architectural theory and history at Chalmers, was brought in by White's CEO, Mats Karlsson, to join the firm's so-called Knowledge Project (*Kunskapsbygge*). Caldenby has since been succeeded by Fredrik Nilson, another Chalmers professor and now the head of the architecture department there. Nilson is also my formal advisor. But White was hardly alone in its commitment to research. Several other large firms embraced the idea of an internal "academy" and set aside money to fund it.

Architecture firms also began to see themselves to an increasing degree as knowledge companies on a par with law firms and medical practices, where continuing education and research constitute a more or less integrated part of the profession. Academic titles, for which architects had typcially held little regard, were considered important in the medical community with which we collaborated on healthcare projects. In about 2005 White began to discuss the possibility of funding a handful of doctoral students in the industry. They had already financed a number of adjunct professorships in Sweden's architecture schools. The idea of dividing one's time between practice and research seemed like a good model for a practice-oriented researcher. Three necessary conditions were established for a successful research project: a relevant subject, an interested White employee, and a research partner—especially one who could bring funding from a client or academia. However, it turned out that this good combination was harder to achieve than originally imagined. In 2010, with Fredrik Nilson's urging, at the age of fifty-six I became White Architects' first "industrial doctoral candidate."[32]

[32] Chalmers defines an "industrial doctoral candidate" as a doctoral student who is concurrently employed by a company (or equivalent) while pursuing a doctoral degree at Chalmers, studying at least half-time within the framework of his or her employment. The employer typically provides the student with his or her full salary during these studies. http://www.chalmers.se

# 3.

# Evidence

# 3.1 From Believing to Knowing: Entering the World of Research Rågården Forensic Psychiatry, 2010

In 2006, after working on the inpatient psychiatric care unit at Sahlgrenska Östra Hospital in Gothenburg, White Architects was commissioned to participate in the planning of the new forensic psychiatric care facility in Rågården, northeast of the city. It was one of three new facilities intended to provide forensic psychiatric care for the Västra Götaland region. Our experiences designing for general psychiatry at Sahlgrenska Östra were considered valuable, and we would be asked to reinterpret them in the forensic psychiatric care context—a context that placed higher demands on security because some of the patients could be afflicted with serious disorders that could make them at times unpredictable. The patients in forensic psychiatric care have been sentenced to confined treatment, often with the provision that their release from care is determined by court order rather than by their doctors. The average length of time in care is also substantially longer than in general psychiatry—about five years instead of three weeks. Once again we were confronted with an engaged and committed administration—maybe even more than at Östra. The departmental leadership invested a great deal of energy to get the entire staff involved in a comprehensive effort to establish their values in preparation for a process of transformation. That effort went on for several years. It was in conjunction with the design of Rågården that I began my research in late 2010.

My work on the *Architecture as Medicine* anthology overlapped to some extent with the design of Rågården. In my mind I tried to remember, experience again, and analyze our experiences from the psychiatric unit at Sahlgrenska Östra. The anthology was an attempt to expand knowledge about architecture for psychiatry and also increase the field's trust in us architects. For the ARQ Research Foundation, for White Architects, and for the contributing authors it was an unusually large commitment—an unusually ambitious effort. Associate Professor Helle Wijk, who had been on the jury for the 2007 Healthcare Building Award, and Lennart Ring, who was then chair of both the Healthcare Building Forum and the planning department for Sahlgrenska University Hospital, reviewed the anthology and submitted written comments. Their reaction was that what we presented was interesting but could not be considered research, which

was true and correct of course. But our ambition had never been to do research, even if interesting issues emerged during our work. The anthology belonged in the category of "responsible project follow-up," suggested the occasionally sharp-tongued Ring, which every serious consultant does. That was of course quite irritating to me at the time, though professional conduct would never have allowed me to show it. I have forgotten whatever positive feedback the two critics offered. But in December of 2009 I felt quietly and secretively like a pioneer and an inspiration when Ring together with Frances Hagelbäck Hansson and Elsa Ivarson (the head of administration and the project leader for the Västra Götaland region's forensic psychiatric care system in Gothenburg) asked the Institute of Health and Care Sciences at the University of Gothenburg and the Sahlgrenska Academy, through Helle Wijk, to formulate a research project to "study the physical environment's impact on the delivery and perception of care provided in the forensic psychiatry system"[33] in the region.

**Healing Innovative Environments for Forensic Psychiatric Care**

*Architecture as Medicine* was an evaluation of Sahlgrenska Östra's psychiatric department done in retrospect and without scientific aspirations. For the forensic psychiatry research project now being planned, this time measurements and studies were to be conducted according to good scientific practice, with the intention of evaluating the existing care and its facilities before relocating to the new buildings. The study would also require posing hypotheses for anticipated findings as part of the scientific method.

The research plan was given the heading *Healing Innovative Environments for Forensic Psychiatric Care to Support Person-Centered Care in Västra Götaland.* The plan was developed in 2010, with plenty of time before the opening of three new forensic psychiatric care facilities in Gothenburg, Vänersborg, and Falköping. A large, and in my estimation qualified, research team was formed. Several professors from the Institute of Health and Care Sciences and the Center for Healthcare Architecture (CVA) at Chalmers were engaged. The project team would also include Roger Ulrich, who had for some time been a guest professor at CVA. I found myself on the periphery of this project, and in the late autumn of 2010 I was awarded a grant by the ARQ Research Foundation to spend three years

[33] From the grant application "Helande nyskapande miljöer inom den rättspsykiatriska verksamheten till stöd för en personcentrerad vård i Västra Götaland" (Healing Innovative Environments for Forensic Psychiatric Care to Support Person-Centered Care in Västra Götaland) http://www.researchweb.org/is/vgregion/ansokan/158131 [Accessed 25 May 2015]

studying the project as a half-time industrial doctoral candidate. I would now be allowed to stand with one foot in professional practice and one in academia, and to strike a blow for so-called practice-oriented research. Within the framework for this research project my ideas were to transition from believing to knowing.

The collaboration between the Institute of Health and Care Sciences and the Center for Healthcare Architecture was interesting, and appeared to have a lot of potential. Both institutions were trying to better understand the physical environment's influence on healthcare. Their subject areas are relatively new as sciences, and both are striving to define their areas of research more clearly. For the first time I realized that the science of healthcare is not primarily a medical science—a kind of "medical school lite"—but rather at its core is about caring for patients. The traditional research methods of natural sciences used by medical schools would not be directly applicable in the field of healthcare science, so the two institutions were looking for inspiration from other more humanistic sciences. Research in the field of architecture, too, was searching for a distinctive identity and an appropriate scientific methodology.

But there were also differences. In healthcare science, first-year doctoral students were trained in scientific methodology in a clearly more structured and fundamental way than those in architecture schools. Doctoral students also seemed more directly tied to their advisors' instruction. For better or worse, I felt much more free to think and question than my colleagues in healthcare science—which may not have been entirely for the best. When the research project was formulated around forensic psychiatry, I questioned the approach just as I was accustomed to doing. I found the healthcare science candidates eager to utilize already developed instruments for measuring *if* any changes had taken place in the care environment, while we architects were primarily interested in *why* those changes had occurred.

Four different questionnaires were immediately distributed in the three old existing forensic psychiatric facilities. Two of the surveys were intended to measure patients' own assessment of their quality of life and to what extent they perceived their care as patient-centered. The other two would evaluate the staff's perceptions of how patient-centered their work was and of the quality of care. The intention was for these quantitative surveys to be complemented later with more qualitative studies, including observations and conversations with patients about their own photographs of their rooms. However, these qualitative studies were never executed to the extent originally intended due to the failure to secure ade-

quate funding. The healthcare scientists asked if we architects hadn't already developed any research instruments that could be used to measure the importance of architecture for healthcare. They even made suggestions of some such instruments they had heard of.[34] But neither I nor my assistant advisor felt any spontaneous interest in these. Could they really measure architectural quality? We were skeptical. Nor did we actively search for other instruments. Ours was perhaps an amateurish and unscientific approach, or rather the lack of an approach. And perhaps also an approach strongly influenced by the fact that my regular job as a practicing architect tended to consume all my waking hours. My research suffered, and during this period it was limited to occasional bursts of effort on nights, weekends, and vacations.

Looking at the psychiatric inpatient care unit for Sahlgrenska Östra in retrospect, by studying the statistics for the years before and after the move to the new facility we could conclude that the use of compulsory treatment measures on psychiatric patients had declined. The fact that compulsory treatments such as injections and restraints were used less was interpreted by us, and later by Ulrich and others, as an indication of "healing architecture." For the planned studies of the new forensic psychiatric care facilities we were thinking along the same lines—intending to link changes in the physical environment to what we expected would be faster healing by the patients. In the case of Rågården, the challenge was to apply a more methodical and scientific working method in hopes that we would thereby be able to make the transition from *belief and intuition* to *proof and certainty*. In 2008 a national quality registry had been established for forensic psychiatric care, known as *RättspsyK.* It provided statistics for a number of parameters that might be interesting to follow over time. Besides the use of compulsory treatment measures, the registry tracked patients' estimations of their own health, criminal recidivism, and more. The idea was that any positive changes in these parameters over time might be directly related to changes in the physical environment, and the effects of those changes could thereby be said to result in "healing architecture."

However, there were conflicting ideas about how the statistical data ought to be used, and doubts about the quality of the data as well. For example, is it reasonable to imagine that a patient's return to crime is unrelated to the diagnosis for which he or she has been treated? The data had nothing to say about that. Wouldn't we also need to know how long the

[34] A later evaluation of some twenty of these instruments was conducted by Elf, M. et al (2015) "Assessing the Quality of the Physical Healthcare Environment: A Review of Measurement Instruments" (submitted for publication).

patient had been in care before committing the crime? How should we evaluate mentally ill patients' estimations of their own health? Were their responses frequent enough? The recidivism statistics were probably not complete either. The number of patients in these groups—the sample size—was small. Even in the best case, how could we relate all these changes specifically to the architecture? This was especially problematic because we knew that the staff had adopted some new practices that were likely to have changed the culture of caregiving in important ways. Ingegerd Bergbom, a professor of healthcare science who was initially engaged in the research project and the writing of our grant applications, raised a great many such critical questions and was doubtful as to whether our loosely articulated research ideas could lead to any scientific conclusions.[35]

Confronted with these facts and the difficulties they entailed, the task at hand began to appear increasingly difficult to me—overwhelming, in fact. Under these circumstances, it would never be possible to "find proof of architecture's positive values." It was becoming increasingly clear to me that as an amateur researcher I had gotten my hopes up too much and would need to temper my expectations for the project. My research would also need to look into other areas. Ironically I benefitted from the fact that two of our grant applications were denied, putting the project on hold. How was it possible? Didn't our applications fit in with the conception of science held by the jury and its medical experts? Could they forego an evaluation of the region's political commitment to invest more than a hundred million euros (although that of course was not the purpose of the grants)? Or was it simply that the design of our research project was too weak? We certainly didn't want to believe that! In any case, this led to our research project moving forward with subdued intensity. By now, in 2015, the forensic psychiatric care facilities in Gothenburg, Falköping, and Vänersborg have all been completed and are already in use. The one in Vänersborg, called Brinkåsen, has won both the 2013 Helge Zimdal Prize for architecture and the 2014 Healthcare Building Award. Our surveys have been conducted according to plan, and several smaller, qualitative studies are underway. A first article based on the questionnaires and the first baseline measurements[36] were ready for publication as of June 2015.

So where should I turn next? The forensic psychiatry system was not going to be able to provide me with the empirical data I had been hoping for.

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[35] I contacted Ingegerd Bergbom by email in December of 2010. In her reply of January, 2011 she offered comments on my questions about the potential for success in linking improved care to positive changes in the parameters outlined by RättspsyK.

[36] In a scientific study, the "baseline measurements" first establish the existing conditions at the start of the study, and are used to compare measurements taken later.

What kind of research had Ulrich and others been doing to show the importance of architecture for clinical outcomes? What kind of *proof* was there—or rather *evidence*, as I would later learn to call it? What is in the toolbox of physical design elements architects use in attempting to create healing architecture? These were the questions to which I would devote much of the time I had for doing research in 2011 and 2012. These questions related more to surveys of theoretical research than to making new concrete observations based on the project in which I was participating.

## 3.2 What Is Evidence? Is It Obvious?

**Evidence**

Evidence-based design is a rather fashionable concept among hospital planners and architects in Sweden today. While everyone has heard of it, few know what it is, and as far as I know no one has fully applied its principles.

Much of the interest in evidence-based design (EBD) has come from the field of hospital construction. That is not surprising given how much of the ideas on which it is based come from the world of medicine and the emergence of evidence-based medicine (EBM). As in architecture, the underlying concept for evidence-based medicine is essentially quite simple: healthcare practices should largely be founded on evidence. And who could argue with that? But can architecture be based solely on evidence? Let us leave that question open and return to it later. We must find our way back to the emergence of evidence-based medicine, but first, what do we actually mean by evidence?

In our everyday lives we look for evidence to help convince us of the state of things. What is true and what is false? Evidence is important in many disciplines, but the demands for providing and managing evidence vary from one to another. In a court of law you can be convicted if the evidence against you is “beyond a reasonable doubt.” In mathematics and logic we expect absolute proof. There is only one correct answer to the question of what one plus one is. And in these areas of law, mathematics, and logic there is a well-developed protocol for handling evidence, but that is not the case in many other fields. When it comes to the humanities and to architecture, nothing is really certain anymore, and each field develops its own methods for “finding the truth” over time. Even in medicine, which indirectly provided the model for evidence-based architecture, there are no simple models for the chain of evidence. In medicine the

word *proof* is avoided in favor of *evidence.* Here *evidence* means the best possible scientific data that is available at the time but cannot be considered absolute proof. For doctors this goes without saying. For me, and probably for many other architects, the "relativism" of the medical community came as something of a surprise.

**Grading of Evidence**

*Evidence* is thus a concept that lacks the kind of absolute meaning that *proof* or *truth* have; instead it refers to greater or lesser degrees of certainty. Is the evidence strong or weak? In medical contexts this distinction is of great importance and is central to medical science, since the strength of the evidence can be considered a measure of the quality of a scientific study. That quality can be judged based on the methods used, the sample size, the response rate, and so forth. It is also difficult to compare research conducted on different occasions and under different conditions. What evidence can separate studies provide? In the year 2000 a research and development project was begun with the goal of developing a new system for evaluating the level of evidence in scientific studies that could replace several older interpretive models. The new system was given the name GRADE (Grading of Recommendations Assessment, Development and Evaluation),[37] and outlines four different levels of evidence:

- *High scientific evidence*
- *Moderate scientific evidence*
- *Low scientific evidence*
- *Very low scientific evidence*

In Sweden today this is the system most used by organizations such as the Medical Products Agency,[38] the National Board of Health and Welfare,[39] and the Swedish Council on Health Technology (SBU).[40] SBU, which is an independent governmental authority, has been given the task of evaluating healthcare methods from a consolidated medical, economic, ethical, and social perspective.

[37]http://www.gradeworkinggroup.org/FAQ/index.htm [Accessed 23 July 2012].
[38] Läkemedelsverket: https://lakemedelsverket.se/english/
[39] Socialstyrelsen: http://www.socialstyrelsen.se/english
[40] Statens beredning för medicinsk och social utvärdering: http://www.sbu.se/en/

**Evidence-Based Medicine (EBM)**

The history of evidence-based medicine is short. Again that surprises me: it has only been around a little more than two decades! In the early 1990s EBM was promoted as a new paradigm in medical education and practice. The fundamental idea was that systematic efforts were required in order to guarantee that the diagnoses being made and treatments provided were truly based on the most reliable knowledge available at the time. Starting in the United States in the 1980s, it became possible to process large quantities of data using computers. Data was becoming increasingly accessible, thereby making it possible to simply compare the outcomes from various medical procedures. Through so-called "outcomes research" it became possible to identify significant differences in what had previously seemed random variation in the performance of different districts, hospitals, and even individual doctors. For elected officials and civil servants it would have been considered unethical to accept such differences. That provided an incentive for more systematic studies to determine what kind of medical interventions actually gave the best outcomes. A comprehensive effort was begun to systematically bring together all the scientific research that had been done in each field. The publication itself of the outcomes research studies gave rise to other effects. Hospitals began to compete over which could take the most effective steps toward improvement. Increasing transparency and openness in some cases gave the public an opportunity to decide which hospital, and perhaps even which doctor, they wanted to treat them. The other side of this coin, however, was that many hospitals began to leave the more complicated procedures up to other hospitals and other colleagues.

At the start of the 1990s some other new scientific tools were established, including the format for so-called "systematic reviews." These are summaries and evaluations of the collected research in a given field. The type of scientific study that carries the most weight in these systematic reviews is the "double-blind test" or "randomized control trial" (RCT). These studies are well suited to prescription drug testing, for example, where the effectiveness of a new drug can be tested against a placebo given to a control group. Neither the study participants nor the person distributing the pills knows who gets the drug and who gets the placebo. After the allotted time the participants are interviewed to determine the effects, and only then told which they were given. What is remarkable and fascinating about these tests is that some of those who are given the placebo also experience an improvement in their condition. This "placebo effect" can sometimes be quite significant, and there have been studies in which it accounts for thirty percent or more of the perceived improvements. At the

conclusion of this paper I will describe and discuss the phenomenon in greater detail.

One of the organizations that undertake systematic reviews is the Cochrane Collaboration, a non-profit formed in Oxford in 1993. It is a network of more than 31,000 people in over 120 countries that are working to help healthcare staff, decision makers, patients, and caregivers make well-informed decisions about the healthcare services they provide by preparing, updating, and promoting access to the Cochrane Reviews. Since its founding the organization has provided some 5,000 such systematic reviews, nearly all of which are built on double-blind tests.[41] We will soon have a close look at some reviews of research related to the physical environment's importance in healthcare, one of the more important of which was produced by the Cochrane Collaboration.

**The Evidence-Based Practice and the Evidence Movement**[42]

However, when the evidence generated by research is to be used in medical practice, in clinical situations, some difficulties have appeared. For one, it has not been so simple and easy to make this immediate and direct link between scientific evidence and clinical application. The original concept for evidence-based medicine (EBM), which was developed at McMaster University in Toronto, is intimately tied to an authoritarian attitude and outspoken skepticism toward established truisms and expert recommendations.[43] Medical students were educated to dig into and interpret the original medical data, then make their clinical decisions based on it. That method is often called *critical appraisal*. But only a small portion of doctors, it turns out, have the time and expertise to do the kind of thorough evaluation of primary research prescribed by critical appraisal. The main criticism of this approach, therefore, is that it is not a realistic model for everyday use in practical clinical situations.

Meanwhile another branch of the EBM movement has been about striving to achieve just this kind of simple and pragmatic application of evidence. By applying rules and formalized procedures, it hopes to minimize the element of individual evaluation—an approach that naturally aims for a more

[41] See, for example, http://en.wikipedia.org/wiki/Cochrane_Collaboration [Accessed 17 May 2015] and http://www.cochrane.org/about-us [Accessed 17 May 2015].
[42] The arguments in this section are primarily taken from a highly recommended anthology (in Swedish only): Bohlin, I. and Sager, M. (eds.) (2011) *Evidensens många ansikten. Evidensbaserad praktik i praktiken* (The Many Faces of Evidence: Evidence-Based Practice in Practice).
[43] McMaster University previously also contributed to so-called "problem-based teaching," a form of instruction that influenced the architecture curriculum at Chalmers University in Gothenburg in the mid-1970s, when I was a student there.

effective working method. Instead of advocating for unaffiliated, independent practitioners, this model builds more on the use of carefully developed guidelines for treatment of patients, which is sometimes disparagingly referred to as “cookbook medicine.” This approach is in turn criticized for reducing doctors to technicians who execute given procedures with little or no room for critical thinking. Critics say the use of these routines tends to lead to the objectification of the patient. Some therefore consider this approach a kind of de-professionalization of the medical profession.

The above descriptions could possibly be seen as a conflict between *methodological rigor* and *practical relevance*, which in turn is linked to the tension between *independent evaluation* and following *formalized procedures.* But we can never completely eliminate individual judgment. Thus it is not a matter of choosing between two alternatives, but rather striking a balance between them and finding a way for them to work together. Most patients are so unique that individual clinical evaluation is needed to determine the appropriate treatment in each case. Even those who advocate for more evidence are aware that clinical evaluation is an indispensible component of many situations. The ability to distinguish these two perspectives from each other is interesting in principle, but perhaps should not be overemphasized. Following in the footsteps of Sherlock Holmes, the former head of the Swedish Society of Medicine, Peter Aspelin, described the state of EBM in Sweden in his preface to the book *Evidence-Based Medicine*:

> *When the concept of EBM first began to be used, critical voices were heard warning, for example, of the risk that clinical judgment could be replaced by cookbook medicine. Since then EBM has found its form and few now question the direction it has today, aiming to integrate clinical expertise with the best available information developed with the help of systematically executed clinical research. (Nordenström, 2004, p. 7)*

Advancements in evidence-based medicine made a strong impression in many different contexts and a variety of fields. Medical methodology appeared to be a factor that determines success in many fields in spite of the differences among them. We can note the emergence of an “evidence movement,” which quickly achieved worldwide success and could be applied to a wide variety of areas, including architecture.

I needed to review the history of evidence-based medicine due to the decisive impact it has had on the theoretical structure of evidence-based design. In spite of the differences between the two, the kinship is clear, and many of the issues discussed in EBM are also relevant in EBD:

- *The discussion of individual critical thinking vs. user guides*
- *The discussion about professionalization vs. de-professionalization*
- *The risk of creating a distance between staff and patient (or between designer and building) as a consequence of the use of standardized processes or guidelines*

## 3.3 What Evidence Is There? Research Reviews

The jury for the 2007 Healthcare Building Award wrote that the Psychiatry Building at Sahlgrenska Östra Hospital provided outstanding support for the concept that architecture plays an important role in recovery and healing after an illness (Forum Vårdbyggnad, 2007). But what can we say with certainty about that issue? What evidence do we have? We will soon have a look at several research reviews—studies that survey, evaluate, and summarize existing research. For research papers to be considered for these reviews they must have been peer reviewed before publication. In other words, the scientific quality of each has been guaranteed by independent experts in the field. The first systematic review of this kind of which I am aware was published in 1998. It was undertaken by the Quality of Care Research Department at the renowned Johns Hopkins University and given the title *Status Report (1998): An Investigation to Determine Whether the Built Environment Affects Patients' Medical Outcomes* (Rubin, 1998).

What other concrete measures can be said to contribute to the broad phenomenon of healing? In the context of research, it is difficult to relate a physical intervention to such a comprehensive and abstract performance metric as "healing architecture." If we are to get anywhere with this we must *operationalize* the concept—we must look for more concrete "partial metrics" that can be said to represent it. In the case of inpatient psychiatric care at Sahlgrenska Östra, examples of such operationalization include the reduction in two kinds of compulsory treatment measures: restraints (when patients are forcibly bound to a stretcher) and involuntary

injections. But in addition, the staff's diminished perception of threats and violence and the reduction in the amount of sick leave they took can be interpreted as operationalized performance metrics for healing architecture. The operationalized metrics we encounter in this paper, which are primarily taken from studies of somatic care, include fewer infections, improved sleep, reduced medication, and shorter stays in the hospital.

### Whether the Built Environment Affects Patients' Medical Outcomes, 1998

The first research review we shall look at was undertaken for the Center for Health Design (CHD) in 1998, and evaluates the impact of the physical environment on medical outcomes. The report also thanks several CHD members for their support, including Roger Ulrich and D. Kirk Hamilton, with whom we will soon become acquainted. As already noted, CHD is an American organization that emphasizes the importance of a good physical environment as an element in improving healthcare in general. A scientific presentation of positive research findings would give the organization increased respect and recognition. Ulrich disclosed in an interview that it was something of a risk for CHD, because they weren't entirely certain what kind of findings the study would produce (Ulrich, 2012b). In retrospect it is clear that the report was important in that for the first time it provided a collection of studies that described the contours of the research field.

The literature review undertaken for the study comprised articles written in English and published in 1966 or later. By September of 1998 they had reviewed 78,761 articles, of which only 84 were judged to be acceptable from a scientific standpoint (Rubin, 1998, p. 3). The overwhelming majority of the articles were determined to have substantial methodological flaws. 53 of the 84 articles related to music, noise, and ventilation, including relative humidity and temperature. 25 were about sound and acoustics in relation to prematurely born babies. Studies of furnishings were in the context of geriatric or psychiatric care. The issue of single-bed patient rooms was addressed in only three or four of the selected articles. Vegetation and views were named in only two, one of which was Ulrich's "View Through a Window." The literature review also asserts that studies that made use of "weaker" scientific methods were more likely to produce the anticipated results than the "stronger" ones! (Ibid, p. 3). The review also describes the knowledge that can be gained through clinical research as limited. Unfortunately it is likely that certain "environmental effects" (Ibid, p. 8) can never be isolated for proper study, and the authors suggest

that many decisions regarding building design will therefore be forced to "continue to rely on best guesses" (Ibid, p. 8).

At the same time, the research in this field is judged to be undeveloped in light of the enormous potential for economic savings and improved healthcare outcomes that can be expected from such research (Ibid, p. 22). The review also points out that performance-based healthcare as a consequence of physical interventions will not come into its own until after years of scientifically informed discussion among architects, clinicians, and patients (Ibid, p. 17). In summarizing its findings, the review in principle solidifies the link between environmental features and improved health outcomes. At the same time, it points out that the need for research in the field is great, and that in the future much more emphasis must be given to the rigor of the scientific methods used (Ibid, p. 8). In spite of the cautious descriptions of problems and opportunities offered by researchers, which are perhaps appropriate given the research context, the introduction to the review is still characterized, paradoxically, by great optimism.

The primary evidence shown in this 1998 research review that "can be applied pragmatically" (Ibid, pp. 7-16) comes from four different areas:

1. **Quiet in the CCU (Coronary Care Unit)**
2. **Music during Minor Surgery**
3. **Air Quality**
4. **Exposure to Daylight and Sunlight**

Do these four points indicate new and unexpected outcomes that can change the way architects work in planning hospitals? No. The results appear thin even if we can say there is a scientific basis for applying them in practice. They provide no significant new insights or tools for the architect's work. What's more, at least three of the four measures are in whole or in part the responsibility of other professions, in areas of expertise over which architects have little influence on the choices made. The insights appear, even considering the level of knowledge available at the time, to mostly belong in the category of "long sensed, understood, and applied."[44]

I have often wondered about the 78,761 minus 84 articles that ended up in the trash. Did they throw the baby out with the bathwater? Were there not among all those discarded observations, ideas, and hypotheses, also

[44] Referring to my own question, "Is it the case that the research I have referred to merely seems to confirm what has long been sensed, understood and applied already?" (Lundin, 2009, p. 231).

some that were correct—perhaps even brilliant—but whose methodology was so inadequate that the results could not be substantiated? What became of all that work?

**A Once-in-a-Lifetime Opportunity, 2004**

If the 1998 research review had been a little doubtful and cautious and aimed to determine if there was sufficient evidence, by six years later the issue appeared to have been at least partially resolved. In 2004, evidence-based physical interventions could offer hospital planning "a once-in-a-lifetime opportunity."[45] The background to the 2004 research review provided a snapshot of the American healthcare system at the time. It found that hospitals were dangerous and stressful places for patients, visitors, and staff. More people were dying of medical errors or infections contracted in the hospital than of AIDS, breast cancer, or car crashes (Ulrich, 2004, p. 2). Staff turnover among nurses was estimated at twenty percent annually. All that was happening during a period of historically large investments in American hospital construction (Ibid, pp. 2-4). The authors of the review concluded that these constituted a tremendous need for well-founded decisions in the field of healthcare, including the physical environment with which we are concerned here:[46] "improved physical settings can be an important tool in making hospitals safer, more healing, and better places to work" (Ulrich, 2004, p. 3).

The research review became a great success. Ulrich and others were called for radio and television interviews around the country. Articles were published in the most important newspapers and magazines. The authors were also invited to testify before important health authorities to present their findings. The study also opened doors to the boardrooms of all the larger architecture firms. At this point, expertise on the physical environment's significance became a prerequisite for being asked to bid on larger architecture commissions. Every self-respecting architecture firm now claimed to have such expertise and the ability to use it (Ulrich, 2012b).

The research team had executed a literature search of databases and libraries, but did not disclose what search words they used. The team had expected to find about 125 relevant articles, but found about 600 instead,

[45] The complete title is *The Role of the Physical Environment in the Hospital of the 21th Century: A Once-in-a-Lifetime Opportunity*.

[46] Note the similarity with CVA's characterization: "Healthcare buildings constitute important and long-term investments by society and therefore ought to be founded on a solid foundation of knowledge." http://www.chalmers.se/sv/institutioner/arch/centrum/Centrum%20f%C3%B6r%20v%C3%A5rdens%20arkitektur/Sidor/default.aspx .

most of them published in authoritative journals. 200 of these articles were referenced directly in the review text. As a complement to the research review, they published an Abstracts Table Supplement in which 240 articles were analyzed. The review suggested that the volume of evidence now made it possible to move forward and discuss evidence-based design of hospitals as a parallel to evidence-based medicine. In the conclusions, the authors found that the time had come to begin applying knowledge of the physical environment's effects in practice. Their findings are presented in four groups (Ulrich, 2004, p. 3), the numbers in parenthesis indicate the number of articles referenced in each group (Ulrich, 2005):

- *Reduce staff stress and fatigue, increase effectiveness in delivering care (9)*
- *Improve patient safety (88)*
- *Reduce patient stress and improve outcomes (139)*
- *Improve overall healthcare quality (6)*

The research findings are summarized below *(Ibid, pp. 26-27)*:

- *Provide single-bed rooms in almost all situations. Adaptable-acuity single-bed rooms should be widely adopted. Single rooms have been shown to lower hospital-induced nosocomial infections, reduce room transfers and associated medical errors, greatly lessen noise, improve patient confidentiality and privacy, facilitate social support by families, improve staff communication to patients, and increase patients' overall satisfaction with health care.*
- *New hospitals should be much quieter to reduce stress and improve sleep and other outcomes. Noise levels will be substantially lowered by the following combination of environmental interventions: providing single-bed rooms, installing high-performance sound-absorbing ceilings, and eliminating noise sources (for example, using noiseless paging).*
- *Provide patients stress reducing views of nature and other positive distractions.*
- *Develop way-finding systems that allow users, and particularly outpatients and visitors, to find their way efficiently and with little stress.*
- *Improve ventilation through the use of improved filters, attention to appropriate pressurization, and special vigilance during construction.*

- *Improve lighting, especially access to natural lighting and full-spectrum lighting.*
- *Design ward layouts and nurses' stations to reduce staff walking and fatigue increase patient care time, and support staff activities such as medication supply, communication, charting, and respite from stress.*

The greatest change from the 1998 research review to the one conducted in 2004 lies in the emphasis on the single-bed patient room. At the same time, the claim of music's importance in treatment had been eliminated. I assume that the reason for this is that the researchers consider sound systems to be auxiliary equipment rather than an integral part of the building, which is how we normally see them in these contexts.

**Literature on Evidence-Based Healthcare Design,[47] 2008**

The research review from 2008 built on the work done in 2004. The number of contributing authors grew from five to eight, but Ulrich and Zimring were again responsible. The introductory description of the state of American healthcare is also the same. The title for the review, however, has been given a more reserved tone: instead of pointing to a singularly promising opportunity for success, it takes a more neutral academic tenor, which I appreciate.

The 2004 study was entitled *The Role of the Physical Environment in the Hospital of the 21st Century: A Once-in-a-Lifetime Opportunity*. Its goal, as described in the introductory abstract, was to provide an overview and evaluation of literature that "extracts the implications" of the physical environment for the design of better and safer hospitals. Like earlier research reviews, this one finds that a well designed physical environment plays a significant role in creating safer and more healing hospital environments for patients and staff.

The 2008 review again emphasizes that the amount of research has increased in essentially every area, but particularly in issues of infection. One measure of this general growth in related research could be the number of articles referenced. The 2008 edition of the review also adopts a more formal scientific structure in its organization.[48] Thirty-two keywords

[47] http://www.healthdesign.org/sites/default/files/LitReviewWP_FINAL.pdf.

[48] The review begins with an abstract, and continues with the sections *Objective, Background, Methods, Result, Conclusion* and *Keywords*, following the more common format for scientific research reviews.

were used in the literature search, of which thirteen are presented as examples in the study. It searched special databases and the Internet for relevant articles in English. The search also included studies whose titles or abstracts made reference to the physical environment in healthcare buildings. Additional articles were found among the references in the first articles selected. The quality of the articles was then controlled in terms of the methodology of each study and whether they were published in peer-reviewed journals. When it comes to the use of keywords, Ulrich mentioned in a later conversation that ultimately the search was not strictly limited to a number of predetermined keywords; the work proceeded in an intuitive and ad hoc rather than entirely systematic fashion, and new keywords emerged over time to complement the original list (Ulrich, 2012c).

The 2008 review is the one I studied most thoroughly and on which I base the reasoning that follows, so I will give a relatively detailed presentation of it here. The reader is asked to read the following sections carefully, since they form the basis for the argument to follow. The 2008 review improves on the 2004 edition by simplifying its structure and headings. The order of the sections has been revised, with the staff-related issues coming last instead of first, which seems natural in an era of patient-centered care. The chapter "Improve Overall Healthcare Quality" has been eliminated, and its subheadings have been worked into other sections. The chapter titles have also been reformulated to make even clearer the direct causal connection between physical attributes (Design Strategies/Environmental Interventions) and results (Healthcare Outcomes). The review is divided into three parts:

I. **Improving Patient Safety Through Environmental Measures**
II. **Improving Other Patient Outcomes Through Environmental Measures**
III. **Improving Staff Outcomes Through Environmental Measures**

All of the subheadings in this review correspond to desired outcomes—that is, to the positive results that can be achieved through various attributes of the physical environment. How each of these effects can be achieved is described under a separate heading. That in turn means that each physical intervention (e.g. access to daylight) can be found under different headings, since each can influence a variety of different outcomes (e.g. depression and medication errors). This structure was not followed so strictly in the 2004 review. It can make the study seem ponderous if

one reads it all at once, since certain articles are references several times, but that drawback is more than offset by the benefit of the clarity it affords.

**Table 1**
**Summary of the relationships between design factors and healthcare outcomes**

| Healthcare Outcomes \ Design Strategies or Environmental Interventions | Single-bed rooms | Accesss to daylight | Appropiate lighting | Views of nature | Family zone in patient rooms | Carpeting | Noise-reduced finishes | Ceiling lifts | Nursing floor layout | Decentralized | Acuity-adaptable rooms |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Reduced hospital-acquired infections | ** | | | | | | | | | | |
| Reduced medical errors | * | | * | | | | * | | | | * |
| Reduced patient falls | * | | * | | * | * | | | * | | * |
| Reduced pain | | * | * | ** | | | * | | | | |
| Improved patient sleep | ** | * | * | | | | * | | | | |
| Reduced patient stress | * | * | * | ** | * | | ** | | | | |
| Reduced depression | | ** | ** | * | * | | | | | | |
| Reduced length of stay | | * | * | * | | | | | | | * |
| Improved patient privacy and confidentiality | ** | | | | * | | * | | | | |
| Improved communication with patients & family members | ** | | | | * | | * | | | | |
| Improved social support | * | | | | * | * | | | | | |
| Increased patient satisfaction | ** | * | * | * | * | * | * | | | | |
| Decreased staff injuries | | | | | | | | ** | | | * |
| Decreased staff stress | * | * | * | * | | | * | | | | |
| Increased staff effectiveness | * | | * | | | | * | | * | * | * |
| Increased staff satisfaction | * | * | * | * | | | * | | | | |

* Indicates that a relationship between the specific design factor and healthcare outcome was indicated, directly or inderictly by empirical studies reviewed in this report.

** Indicates that there is especially strong evidence (converging findings from multiple rigorous studies). Indicating that a design, intervention improves a healthcare outcome.

*Table showing the relationship between design strategies and health outcomes.* (Ulrich, 2008, p. 53). New design by the author.

The final chapter, "Conclusions and Design Recommendations," offers "a number of design strategies and interventions that can influence outcomes." It uses a simple matrix—the only illustration in the entire review—to describe the direct link between causes and effects, the relationships between the design features and healthcare outcomes. The illustration indicates sixteen different healthcare outcomes that can be

achieved—three in “patient safety,” nine in “other patient outcomes,” and four related to the staff. A total of eleven design strategies or environmental interventions are identified that can lead to these outcomes. The sixteen outcomes and eleven strategies in the matrix result in sixty-seven points of intersection, of which eleven are founded on a higher grade of evidence. These eleven higher-level links between cause and effect “indicate that there is an especially strong evidence (converging findings from multiple rigorous studies) indicating that a design intervention improves a healthcare outcome,” while the weaker link in the remaining fifty-six indicates that “a relationship between a specific design factor and healthcare outcomes was indicated, directly or indirectly, by empirical studies reviewed in this report” (Ulrich, 2008, p. 53). The review does not disclose how the strength of the evidence was evaluated. The outcomes listed in the table are the same as those described previously in the report under their own headings, with the exception of “reducing spatial disorientation.”

From the above matrix we can discern which factors can achieve a given effect. For example, we can only find a single factor that can reduce the number of hospital infections, namely the use of single-bed patient rooms. By contrast, there are six or seven different factors that can increase patient satisfaction, reduce the number of falls, reduce stress, and increase staff effectiveness.

If we wish to be “completely certain” that the physical interventions we make will have the desired effects, by employing the ones with the highest level of evidence, then we can only influence nine of the sixteen outcomes. Read in this way, the greatest opportunity we have is in reducing stress and depression among patients. Other certain effects are the impacts on infections, pain, sleep, privacy, communication, patient satisfaction, and on-the-job injuries.

If we read the matrix from the other direction, looking instead at how many effects each intervention can cause, we find that each can influence between one and twelve of the sixteen outcomes. The physical interventions that influence the most effects are the single-bed room (12 of 16) followed by appropriate lighting (11 of 16) and noise-reducing finishes (10 of 16). If again we want to be “completely certain” of the effects of our physical interventions, the interventions that the *architect* normally influences, then we can only make use of four interventions (with the exception of “appropriate lighting” and “ceiling lifts”). The numbers in parenthesis below indicate how many of the listed healthcare outcomes are impacted by each measure:

1. **Single-bed rooms (5/16)**
2. **Access to daylight (1/16)**
3. **Views of nature (2/16)**
4. **Noise-reducing finishes (1/16)**

The 2008 research review was published in the first issue of the newly launched *Health Environments Research & Design Journal* (*HERD*). *HERD* is an interdisciplinary and peer-reviewed journal that aims to contribute to increased knowledge and practical application of evidence-based design in healthcare. It covers topics such as patient safety, clinical results, operational effectiveness, economy, and human experience. *HERD* was at the time being published by Vendome Health Media in collaboration with the Center for Health Design in four issues per year. One of the editors is the architect D. Kirk Hamilton, and one of the twelve members of its editorial advisory board is Roger Ulrich.

**A Rapidly Growing Body of Evidence?**

The EBD literature often suggests that the volume of evidence for the importance of the physical environment is growing rapidly. The 2008 research review asserts, "The state of knowledge of evidence-based healthcare design has grown rapidly in recent years" (Ulrich, 2008, p. 1). The number of articles has increased from over 650 in 2004 to almost 1200 in 2008. The number of articles cited, according to my count, increased from about 200 to about 480. It would therefore appear likely that the amount of research in the field has increased. But does that automatically mean that the volume of findings has increased at the same pace? Let us look at the three reviews initiated by the Center for Health Design. The 1998 review states that "four different 'design principles' are suggested to be applied pragmatically" (Rubin, 1998, p. 8):

1. **Quiet in the CCU (Coronary Care Unit)**
2. **Music during minor surgery**
3. **Air quality (natural and full-spectrum)**
4. **Exposure to daylight and sunlight**

In the 2004 review the authors again write, "The large research literature surveyed in this report point to several actions we can take immediately" (Ulrich, 2004, pp. 26-27). Six more actions were added to those listed above for 1998, while the "music aspect" and "air quality" were eliminated, perhaps because these latter two were not considered related to the physical environment, or at least to the architect's responsibilities.

1. **Provide single-bed rooms**
2. **Adaptable-acuity rooms**
3. **Quiet hospitals**
4. **Views of nature**
5. **Other positive distractions**
6. **Develop way-finding systems**
7. **Appropriate lightning**
8. **Design wards and nurses' stations to reduce staff walking and fatigue**

In the 2008 review, several more physical interventions are added that have significance for health outcomes. If we limit ourselves to the interventions that have a high level of evidence, we can add only one new strategy, "ceiling lifts," while "develop way-finding systems" and "positive distractions" have been eliminated. The positive distractions normally cited, such as art, entertainment, socializing, etc., cannot be tied directly to the physical environment, even if space must be provided for these things and activities (compare with previous argument regarding music). "Adaptable-acuity room" and "Design wards and nurses' stations to reduce staff walking and fatigue" have a lower grade of evidence. Altogether, then, we have a list of six relevant physical interventions given in the 2008 review:

1. **Single-bed rooms**
2. **Access to daylight**
3. **Appropriate lightning**
4. **Views of nature**
5. **Noise-reducing finishes**
6. **Ceiling lifts**

From this brief examination we can see that the volume of evidence is not great, and the accepted estimation of the relevance of certain interventions has changed over the years. If, in addition, we consider "appropriate lighting" to be primarily the purview of another profession and "ceiling lifts" to be a matter of equipment, we are left with only four points. The volume of evidence thus cannot be said to be growing quickly. It may be that the level of evidence has improved. Thus even if the quantity of studies and possibly the quality of the research has increased, they have not led to a rapid increase in the volume of evidence—regardless of whether we take as our point of comparison Ulrich's 1984 article in *Science*, the

1993 founding of the Center for Health Design, or Johns Hopkins University's first research review in 1998. And therefore the argument that we must constantly familiarize ourselves with the latest research findings, an absolute requirement in the research community, seems somewhat exaggerated.

**A Danish review**

There are also other research reviews and studies that discuss EBD besides those developed in collaboration with the Center for Health Design. However, I have not closely evaluated any others for this paper. From Denmark, the review *Healing Architecture*[49] appeals for an evidence-based working method in a Nordic context, which makes it interesting and relatively accessible to a Swedish audience that has little difficulty reading Danish.

Denmark has faced and continues to face a comprehensive reorganization of its healthcare system, and in conjunction with that reorganization the construction of several new so-called "superhospitals." According to the authors, there is a demand for science-based knowledge that can clarify the link between the physical environment and optimal treatment outcomes. The Danish *Healing Architecture* was developed with the ambition both to give an overview of the existing research in the field and to inspire those who work professionally with healthcare planning to do more in-depth practical and theoretical work. Thus the authors want to encourage architectural decisions that are based on research, which they say are more reliable than those based on personal opinion. As part of their work, the research group also visited fourteen different facilities in the Nordic region and northern Europe, as well as interviewing the architects responsible for each building. One of these was the Psychiatric Care Unit at Sahlgrenska Östra, and two pictures of the hospital were included in the overview.

In 2012, Sweden's Center for Healthcare Architecture (CVA) published the report *Evidensbas för vårdens arkitektur 1.0. Forskning som stöd för utformning av den fysiska vårdmiljön* (Evidence Basis for Healthcare Architecture 1.0: Research to Support the Design of the Physical Healthcare Environment). It is a concise and simply written text in Swedish that summarizes the most important findings about the relationship between the physical environment and positive health outcomes. The author was Roger Ulrich.

[49] http://vbn.aau.dk/files/17765285/Helende_arkitektur.pdf.

**Is There Evidence for the Single-Bed Patient Room?**

Several years ago, the case for single-bed patient rooms was a hot issue in healthcare circles. At White Architects in Gothenburg, for example, we hosted a seminar on the topic in November of 2011 with Roger Ulrich and Sven Britton[50] participating. The purpose of this portion of the paper is not to determine whether or not there is sufficient evidence for the single-bed patient room, but rather to show that the research is not always unanimous in its conclusions. That fact poses problems for elected officials, planners, and architects.

At Sahlgrenska University Hospital, a new healthcare building was just completed with a mixture of single-, double-, and triple-occupancy patient rooms. But another new building in the same region, the so-called T-House in Borås, had been built only a year or so previously with exclusively single-bed rooms. Was the distribution of room types in each case based on evidence? If so, why did they choose to pursue different strategies? At its Health Technology Assessment (HTA) Centre,[51] in 2011 Sahlgrenska University Hospital released a statement in response to a question from the regional Programming and Prioritization Committee in Västra Götaland. Below are three quotations from the statement:

> *Against the background of the demands placed on the healthcare system to provide effective and high-quality care that optimizes the use of available economic resources, the design of hospital and hospital wards should be based on good scientific documentation.*
>
> …
>
> *It is obvious that most of the specific questions related to the primary question of whether single-bed rooms offer any advantages over multi-bed rooms are not answered with sufficient strength of evidence in scientific studies of the kind we use today in evidence-based medicine.*
>
> …
>
> *Regardless of which outcome metric we analyze, the systematic evaluation of published studies shows that there is*

[50] A specialist in infectious diseases at the Karolinska Institute, Sven Britton has spoken out against the single-bed patient room in articles such as "Enkelrum – dyrt, farligt och tråkigt" (Single-Bed Rooms: Expensive, Dangerous, and Boring) in the Swedish medical journal *Läkartidningen*, 14 June 2011.

[51] Health Technology Assessments (HTA) evaluate methods and technologies used in the healthcare industry. The HTA Centre is a regional support organization for helping other organizations conduct health technology assessments. HTA is a scientifically supported basis for decisions in the form of a questionnaire with twenty-five questions, including a systematic literature review. http://www.sahlgrenska.se/SU/Forskning/HTA-centrum/

> *not sufficient scientific evidence to support the assertion that hospital wards should be made up exclusively of single-bed rooms. (Samuelsson and Berg, 2011)*

At the Healthcare Building Forum Conference in the fall of 2011, Roger Ulrich publicly criticized this report, noting several important studies that it had omitted. Uncertainty fosters more uncertainty. What are architects—and hospital administrators, planners, and elected officials—to believe? What action should we take? How much faith can we have in research?

**Cochrane Muddles the Picture, 2012**

At a research summit about the three forensic psychiatric care facilities in the Västra Götaland region I was given a flier by Hans Andersson, the head of organizational development for Forensic Psychiatric Care in Gothenburg. The flier made mention of a research review entitled *Sensory Environment on Health-Related Outcomes of Hospital Patients (Review)* by the Cochrane Collaboration in 2012.

The so-called "inclusion criteria," or the criteria an article must fulfill to be included in Cochrane's reviews, are strict, normally requiring randomized controlled trials (RCT) in medical contexts. When it comes to this review, however, the report states that RCTs can be hard to execute for studies of the physical environment's health effects. This review therefore also includes non-randomized controlled clinical trials (CCT), controlled before and after studies (CBA), and interrupted time series (ITS). For CCTs to be included, two simultaneous trials must be undertaken in different locations, and each must be controlled before and after the intervention. ITSs must include three controls both before and after each intervention. All studies must be planned in advance before any measurements are taken. With these inclusion criteria as prerequisites, the Cochrane review concludes that interventions in the form of art, access to nature and internal gardens, sound-attenuating ceiling finishes, way-finding measures, and windows have not been able to be evaluated because they do not fulfill the criteria. However, the authors point out that it would be possible to conduct significantly better studies than the ones that have been done to date, and that future studies must be executed with a more strict methodology (compare with the recommendations from the 1998 *Status Report*). Until these improved studies have been completed we will have to wait for authoritative findings. However, the fact that none of the articles included can provide evidence and a clear cause-and-effect relationship should *not* be interpreted as proof that their claims are true or false, only

that the research methods they used cannot be said to reliably support their veracity.

The research review began with a literature search that gave more than 78,000 hits, of which 2,029 abstracts and 529 full papers were studied. In the end 102 studies were found to satisfy the established inclusion criteria (Drahora et al, 2012, p.7). Of these fully 85 were about music. As mentioned previously, no studies were included in the review that related to access to nature, noise reduction, way-finding, or access to windows (Ibid, p. 8). The authors conclude that "there are not very many well designed studies to help with making evidence-based design decisions" (Ibid, p. 2).

Under the heading Agreements and Disagreements with Other Studies and Reviews, they determine that the 2008 review by Ulrich et al had more lenient inclusion criteria than Cochrane's, and that it made more positive interpretations of the data. The Center for Health Design, whose goal is to "transform healthcare environments for a healthier, safer world through design research, education and advocacy,"[52] can be assumed to have an interest in the acceptance of such positive interpretations. As a reader I've had a hard time interpreting the English text and understanding whether the Cochrane study is neutral in pointing out this conflict of interest, or whether it is actually a criticism of the interpretations made in the 2008 review:

> *On the whole, compared to the present review, Ulrich 2008 is a more inclusive review, with the resulting conclusions reporting more confidently on the positive impact that hospital environments may have on patient outcomes. The present review has more stringent inclusion criteria and assessment of risk of bias and as such does not draw the same degree of positive conclusions. (Drahora et al, 2012, p. 4)*

A series of interventions are advocated in Ulrich 2008, which are not supported by the present review either through lack of evidence or interpretation of the findings. (Ibid, p. 5)

[52] https://www.healthdesign.org/chd/about.

## 3.4 Can Architecture Contribute to a Faster Recovery?

My first attempt to summarize my ideas about evidence-based healthcare design was my contribution to the research conference ARCH12 (Architecture, Research, Care, Health Perspectives on Nordic Welfare Environments) at Chalmers University in the fall of 2012. I determined there that EBD would not lead to a rapid or dramatic change of the architectural profession and that the majority of the decisions made in the construction industry going forward would not be based on evidence (Lundin, 2012, p. 11).

We have now gone through a number of research reviews. Do they confirm the Healthcare Building Forum's assertions? Do they support the claim that architecture can to a substantial degree promote patient recovery, and that it provides opportunities to achieve a good healthcare environment? While Ulrich et al can be said to respond affirmatively to that question, the authors of the Cochrane review are more reserved. They maintain that at present there have not been enough scientific studies of sufficiently high quality for us to form an opinion on the matter. The Cochrane study, with its 360-page scope and its methodical, evidentiary attitude, struck me as highly credible. As a layman, it does not appear to me that the existing research at present can give us practitioners any unequivocal answers. Educated minds may disagree. A cautious and possibly pragmatic interpretation could be that Ulrich et al 2008 suspect they have found weak but growing evidence, while Cochrane refuses to give an opinion until they know for sure. However, as Cochrane notes, the fact that they haven't been able to find evidence for a given intervention's impact on health doesn't mean that it has no impact, only that the research conducted to date has not been able to authoritatively confirm it. At the same time they leave us with a somewhat bleak statement, in a soberly stringent and reserved tone: "…physical changes made to 'improve' the hospital environment on the whole do no harm" (Drahora et al, 2012, p. 2).[53]

Where had my studies gotten me at this point? All I knew for certain was that the evidence was in question, or at least limited and weak. I had come no closer to answering the question of how healing architecture should be designed. Having come this far, I felt a kind of emptiness and

[53] The text comes across as a little odd, however, and perhaps even a bit sarcastic. In addition to giving us an opinion about the positive attributes they found in these physical interventions, shouldn't Cochrane have studied whether they had any negative attributes? This point was raised by Gunnar Sandin in a seminar on this thesis on June 17, 2015.

disappointment. Had I achieved no more than to criticize and undermine what others were trying to build up? What was my own constructive contribution to our understanding of healing architecture?

# 4.
# Intuition

# 4.1 Intuition

**A Successful Balancing Act!**

Roger Ulrich once asked me about the source of the knowledge we used to achieve such a successful design for the inpatient psychiatric ward at Sahlgrenska Östra Hospital. He marveled at the fact that we were able to apply nine of the ten physical interventions indicated in the research without even knowing they existed (Ulrich, Bogren, and Lundin, 2012, Table 1). How was it possible? That knowledge must come from somewhere, of course, and it definitely didn't come from the research or science communities. In this chapter I will explore how we might possibly have acquired this "alternative knowledge", and the source from which it originates. It is a highly personal quest, but one supported by references to existing research.

Ulrich's question also sparked the interest of the American architect, teacher, and editor D. Kirk Hamilton when he read the research article "Towards a Design Theory for Reducing Aggression in Psychiatric Facilities." Hamilton is one of the founders of WHR Architects[54] and has a large number of hospital projects in his portfolio, both in the United States and internationally. He was also a colleague of Ulrich at Texas A&M, where he is still on the faculty. I met Hamilton at a workshop hosted by the Center for Healthcare Architecture at Chalmers University in the summer of 2013. He took up the question in an editorial column for the *Health Environments Research & Design Journal* (*HERD*), under the title "Intuitive Hypothesis and the Excitement of Discovery":

> *Stefan Lundin, the architect of Östra /…/ claimed that he had no prior knowledge of Roger's 10 concepts. His designer's intuition, knowledge of the client, and empathy for the patients had led him to a design solution that had, apparently entirely by coincidence, matched the research-informed guidelines produced by a recognized scholar. An intuitive decision need not be a poor decision. (Hamilton, 2014, p. 142)*

Much of the "verbal fencing" to come, writes Hamilton, will revolve around the concepts of intuition and evidence. If my understanding differs from his, it is about how we view the impact of EBD on the architect's work and results. He notes my own concern that "an evidence-based process might rob [Lundin] of some of his intuitive and subjective creativity"

[54] See http://www.whrarchitects.com/.

(Ibid, p. 142). He is right about that, but I also suspect that Hamilton has his own concerns, and they influence his actions and his view of architectural practice. He is worried about arbitrariness—worried about an intuitive way of working that *could* lead to arbitrary results.

Hamilton's column in *HERD* concludes with a reference to Esther Sternberg:

> *Esther Sternberg, MD, of the National Institutes of Health, has written that a "happy balance can be established between intuitive design and technological advances, to improve health, mood, and cognition and to foster a sense of well being in hospital patients and staff" ... The same might be said about a happy balance between intuitive design and research-informed design. (Ibid, p. 142)*

In my comments to the editor's column "In Search of the Happy Balance: Intuition and Evidence," I expanded on my ideas and suggested that Hamilton's assertion that "an intuitive decision need not be a poor decision" (Lundin, 2015, p. 3) should be replaced with "an intuitive decision is mostly a good decision." Hamilton replied, "A carefully examined and tested intuitive decision will most often be a good decision" (Ibid, p. 4)—and his requirement that a decision be *examined* and *tested* refers to the process by which I mean an architect's intuitive proposal should be exposed to outside evaluation rather than accepted without question. I was greatly encouraged by the fact that *HERD* wanted to publish my comments. Surely that meant there was something of substance in my ideas—without that feedback it was impossible to know just sitting in front of my computer. It was at that moment that I began to be confident in my version of the story—that evidence, intuition, and dialogue are one, and that this unity could provide a theme for my thesis.

**Intuition: Tacit Knowledge**

Intuition is *not* the same as guessing. Nor is it the same as luck or chance. It is not rolling the dice. Instead we should see intuition as an expression for a kind of knowledge that is hidden from our immediate consciousness. It can rise to the surface in a variety of ways, however, as the feeling of having new insights. Allowing ourselves to be led by a feeling, by our intuition, actually gives us more ability to handle the questions we face. That means that someone with extensive experience should normally be better able to use intuition to access their subconscious knowledge, and thereby

have a better chance of success. That knowledge is also described variously in research literature as hidden, silent, or wordless.[55]

Insight, or getting a glimmer of how a problem can be resolved or a question answered, sometimes follows after a period of intense work and almost always comes as a bit of a surprise. Perhaps it happens when we let go of our concentration on the task at hand. It is then that our intuition can lead the way. Sometimes it is described as "a bolt of lightning out of the blue," but it should not be interpreted or understood as if the ideas come from nowhere. The comparison with lightning tends to mystify rather than explain the real sources of intuition. My belief is that our intuition is actually based on our interaction with reality through our senses—on the way we interact with our surroundings through our senses, and store our impressions in the indivisible unity of mind and body. What that interaction with our surroundings looks like naturally depends on the physical environment in which we find ourselves, but also on the exchange with other people. We are raised by our parents and others close to us without much critical reflection, while later education based on scientifically founded knowledge hopefully is conveyed in a conscious and pedagogical way. With practice and under the guidance of our elders we sharpen our senses. But experiences from other situations in everyday life also prepare us to have insights and to take on architectural challenges.

**Intuition Precedes Knowledge**

When I write that our intuition is built on our interaction with reality, I mean that it happens that way in a purely physical sense. The brain is shaped by what happens in our surroundings—by the sensory impressions we take in through sight, sound, taste, smell, and touch and by how we integrate and interpret these. Thus your brain is changed by reading this text. This implies a kind of "materialism" in the sense that what happens is a human process that has its roots in a physical, material world interpreted through our senses. It can thus be said that spiritual, religious, or artistic notions do not exist, since our thoughts and ideas cannot emerge out of nothing. In this sense, there is no "free imagination." Author Robert M. Pirsig expresses this relationship in the following way: "It's not just 'intuition,' not just 'talent.' It's unexplainable 'skill.' It's the direct result of contact with basic reality" (Pirsig, 1974, pp. 277-278). Einstein made a

[55] See for example Molander, B. (1996) *Kunskap i handling* (Knowledge in Action); Gustavsson, B. (2000) *Kunskapsfilosofi. Tre kunskapsformer i historisk belysning* (Philosophy of Knowledge: Three Forms of Knowledge Illuminated by History); and Polanyi, M. (1966) *The Tacit Dimension.*

similar argument in the hunt for universal laws: “There is no logical path to these laws; only intuition, resting on sympathetic understanding of experience, can reach them.”[56] The conclusion of these arguments is therefore that intuition also precedes knowledge, or as the seventeenth-century philosopher Descartes wrote, “Nothing is in the imagination that was not first in the senses” (Banach, 2006).

Thus I maintain that it must be considered unscientific to exclude intuition as part of a working method. In a conversation with Roger Ulrich, he described the role of intuition in his research as that of “an unavoidable friend,” but one that can be “unreliable,” one whom he must always keep an eye on and monitor. Architects cannot do their work without relying on complementary knowledge—their intuition—and neither can medical doctors. The doctor is dependent upon intuition—evidence and proven experience are not sufficient in every situation, and now we’re talking not about something so banal as the design of a building, but our health, and ultimately about life and death!

In what follows, it is not my intention to explore *art* as such, but it is a commonly used term in architectural contexts and therefore hard to avoid. Art has some similarities with intuition, though the two cannot be considered synonymous. We use “art” to indicate that a piece of handicraft has been beautifully executed or is interesting in some other way, and that the person responsible for it has artistic talent. However, like intuition, art is built on experience gained through living and practice—by interacting with the world around us.

It may perhaps seem foreign to some to see art as a kind of knowledge as well. But it could be interesting to be aware of how the term is used in other languages. The Swedish word for art, *konst*, comes from the Old German *Kunst*, which in turn derives from *können*, meaning knowing. The English words *sense* and *sensibility* share the same root, corresponding to the two Swedish terms *förnuft* and *känsla*. In both languages, sense and sensibility are linked, two sides of what constitutes knowing. The phrase “art of building” (*byggnadskonst*) is a traditional synonym for architecture in Sweden, just as medicine can be referred to as “the art of healing” (*läkekonst*). This suggests that the element of art has, at least in the past, been considered both a natural and an essential part of both professions.

When it comes to the importance of feelings in the work of the architect, I am tempted in my zeal to refer to the Portuguese neurologist Antonio R.

[56] Remarks by Albert Einstein in his paper “Principles of Research” given at Max Planck’s sixtieth birthday celebration in 1918. http://www.site.uottawa.ca/~yymao/impact/einstein.html.

Damasio who, in his book *Descartes' Error: Emotion, Reason, and the Human Brain*, suggests that sensible decisions cannot be made without engaging our emotions.[57]

## 4.2 Mutual Fears

D. Kirk Hamilton wrote that I was afraid of losing access to my intuitive and personal creativity in my work as an architect, and I agreed with him. But ultimately *my own actual fear* is that the work of the architect and the design process will be seen in a simplified and incorrect way that thereby marginalizes the importance of the architect and the profession of architecture. I have had this diffuse fear for more than thirty years, ever since the master's thesis project I did together with Ulla Antonsson—a close examination of the ideological roots of romantic nationalism and especially functionalism in the early twentieth century (Antonsson and Lundin, 1981).

**The Fear of Arbitrariness**

The fear I thought I could detect in Hamilton, whom I lazily refer to as "my opponent in the EBD movement," is the fear of *arbitrariness*. Arbitrariness is the result of poorly founded decisions, and of course we must avoid that! But the fear of arbitrariness is also tied to the fear of subjective and intuition-based decisions—often with a barb directed at architects whose aesthetic preferences can seem difficult to understand, and perhaps in some cases difficult or impossible to discuss with any authority. In my eyes, the EBD movement is hunting for a more rational foundation for the architectural profession.

But where do our respective fears come from? It is reasonable to believe that we have been colored by the general trends that prevail in contemporary life, and that these change over time. I am influenced by the situation in Sweden and Kirk by that in the United States. Even if different kinds of influences tend to spread with increasing rapidity around the world, that doesn't mean that those influences automatically have the same meaning in every region. Beyond the purely ideological discussion

[57] Here is it possible that I am over-interpreting. However, Damasio does assert that people who have sustained injuries to the centers of the brain linked to our emotions have difficulty making sensible decisions even when they possess what we would consider functional logic skills.

about what's right and wrong, economic and political power relationships also play a role. I will make use now of a few quotations in order to shed some light on the above arguments about expectations for a more rational architecture that is free from arbitrariness and free from doubts about aesthetic judgment.

At the time of the breakthrough of Swedish functionalism around 1930, there were great hopes in the architectural community for a rationally created architecture free from aesthetic and subjective arbitrariness. In my estimation, that hope or idea has had a profound influence on Sweden in the post-war period and during the national social housing era known as *folkhemmet*. But those ideas were viable well into the 1970s, and they still have their proponents today, popping up occasionally among "evidence zealots":

> *… an aesthetic judgment is by its very nature subjective and therefore arbitrary. […] You can never get past that until the purely personal aesthetic interest has been consigned to a place so deep beneath our consciousness that it never gets a chance to lure our practical will into a misstep—that is, into corrupting the results on subjective, arbitrary grounds. (Sundbärg, 1928)*

Similar arguments to those we encountered above can be detected in David O. Weber's introduction to *Status Report (1998): An Investigation to Determine Whether the Built Environment Affects Patients' Medical Outcomes*, the first research review undertaken for the Center for Health Design in its effort to advocate for evidence-based hospital design:

> *Continued expenditure for structures whose layout, ambience, and appurtenances are informed by guess, fad, or the personal preferences of designers, administrators, healthcare professionals, or even patients themselves—absent solid efforts for aesthetic leanings and unsupported theories with outcomes data to the extent scientifically possible—is frivolity we can no longer afford. (Weber, 1998, p. X)*

Where was the scientific proof or evidence? On what basis were decisions being made? The criticism of "the arbitrary" came to be directed mostly at a building's aesthetic values, and that criticism closely resembled the debate over architecture in Sweden around 1930. It was common in 1930 to hear, "The functional *is* the beautiful"—proclaimed with the kind of

punchy motto typical of the era. Traditionalists like Ragnar Östberg, architect of the Stockholm City Hall, protested. In a letter to the United Nations he made a biblical reference, reminding them, "Man does not live by bread alone" (Åhrén, 1931).[58] Architecture and design were in an extremely dynamic phase, and the discourse of that era was emphatic and polemical. It was flavored with issues of sociology and politics, and whether a new aesthetic based on function would better reflect the modern man. Uno Åhrén, one of functionalism's strongest advocates and theoreticians, argued against Östberg, asking how art could produce 100,000 housing units at half the market price (Ibid). He further asserted that one could not be content with spiritual nourishment, "for bread is the staff of life."[59] The idea that the spiritual component of life, which was provided by *art*, was something we should do without was a completely foreign concept for Östberg. In retrospect it would be interesting to read and better understand his thinking on the matter. The values associated with what Östberg called "spiritual nourishment" were no longer talked about in the anti-aesthetical thirties. Åhrén himself later realized the mistake of leaving aesthetic and artistic arguments out of the discussion, asserting, "The *comfort* factor was rather overlooked in all our haste" (Åhrén, 1942). Comfort was just one of several factors that were to be studied from a view of architecture in which the whole could be broken down into its smallest components and understood. In our master's thesis project of 1982, Antonsson and I described the development in the thirties as "a break between art and knowledge" (Antonsson and Lundin, 1981, booklet p. 5).

## 4.3 The Oscillating Pendulum

It is obvious that the two previously quoted gentlemen, Sundbärg and Weber, had no faith in intuition and the like. Intuition was to be regarded as a relic from days gone by that has no place in "rational contemporary thinking." But even in our own enlightened era, the age of evidence-based design, I find remnants of this extreme faith in reason among clients, project managers, and developers who have often been educated and shaped in the cultural sphere of the technical natural sciences.

We can find examples throughout history of various approaches to the rational as opposed to the artistic way of looking at life and architecture. In

[58] See also Matthew 4:4.
[59] Remarks by Martin Andersen-Nexö quoted in Åhrén, U. (1942) *Arkitektur och Demokrati* (Architecture and Democracy).

certain times we have relied mostly on analysis and science, in others on synthesis and art. These changes occur like a wave or an oscillating pendulum that swings back and forth with time. Each period, each extreme, is soon followed by an uncompromising and implacable certainty about the ideological errors of the era that immediately preceded it. It is obvious that over the course of history, architects have been influenced in their actions and their thinking by this oscillation. These differences in thinking can be illustrated and captured by word pairs with opposite meanings, such as sense and sensibility, science and art, objective and subjective, measurable and non-measurable, hard and soft, cold and warm, and so on.

For me there is nothing right or wrong with either point of view. However, it is obviously true that architects have found inspiration in different ways of thinking about and seeing things from one era to another—which in itself has been and will continue to be a source of inspiration. It is logical that functionalism, having been born from the industrial mass-production and development of cars, ships, and airplanes, saw the future in terms of technological progress, with the engineer and scientist—rather than the artist—symbolizing the striving of the era. There have been other such swings of the pendulum earlier in history: reason was revered as the ideal during the Renaissance and the Enlightenment, for example, while a greater "sensitivity" was encouraged during the Baroque, Romantic, and Art Nouveau. Even if these attitudes evolve and span over centuries, there are also smaller and quicker shifts, like wrinkles in a billowing surface. Functionalism was followed by the romantic mood of the 1950s, which in turn was followed by two decades of industrialization. These were succeeded by postmodernism and then neo-rationalism, and so it goes.

How we view architecture changes, and naturally the scientific or artistic influences on it have also meant that the way architects are educated has varied from one time to another. The view of architecture as primarily a scientific or artistic endeavor also varies from one country to another, and that view often determines where a degree program is offered. Thus in continental Europe, architecture schools have traditionally been associated with an artistic and humanistic education at various academies of art. That's how it was in Sweden, too, until the modern-era architecture schools were established as part of the natural science education at the technical universities in Stockholm, Gothenburg, and Lund. What's left of the humanist tradition is a one-year continuing education program at the Royal Academy of Fine Arts in Stockholm, and in 2011 a new architecture school was established on the arts campus at Umeå University.

## 4.4 Best Practices

The exchange between Hamilton and myself was primarily about the inadequacy of evidence and the need to accept intuition as an important source of knowledge in the architect's practice. But in this context there is reason to pause for a moment and reflect a bit on the third and perhaps least controversial piece of the knowledge puzzle: best practices. The term is used frequently in medicine, but also in Swedish healthcare legislation: "Members of the healthcare staff shall perform their work in accordance with science and best practices."[60] But is not easy to precisely define what this term refers to, and there are also fundamental questions about it and whether it should even be used in medical contexts.[61]

**Copying**

If we set aside what "best practices" are for a moment, we can consider what "common practice" might be. In simple terms, it could be seen as the expertise we gain through the experiences we have in life on different levels over time. A child acquires this expertise by copying, but also by experiencing the results of his or her actions. Certain ways of acting lead to pain or injury, while others are reaffirming and pleasant. Social behavior is learned through acceptance or rejection by the surrounding community. Thus we learn to mimic—to do what everyone else is doing. It is an effective way of learning to deal with all of life's constantly recurring similar situations. Our actions are in that respect unreflective and require neither effort nor questioning. It is an almost automatic, unconscious way of being and acting. And this is how it is with most of what we do even as adults. Our everyday activities and the environments we spend time in are "integrated" within us. Our conceptions are rooted in the force of habit, including when we build hospitals. As an architect I have often had the experience that healthcare staff at first want their new facilities to be very similar to the old ones, though of course a little larger. I want to emphasize that it is not easy to think of new and different ways, and that holds true for us architects as well.

[60] Law 1994:953 on the responsibilities of healthcare workers, 2 §. http://www.riksdagen.se/sv/Dokument-Lagar/Lagar/Svenskforfattningssamling/Lag-1994953-om-aligganden-f_sfs-1994-953/

[61] See, for example, SBU http://www.sbu.se/sv/Vetenskap--Praxis/Vetenskap-och-praxis/1991/ (Swedish only).

### *Tabula Rasa*: There is No Unbiased Way to Look at Life

Thus as people we are shaped by our personal experiences. Their impact on us is so strong that in reality it is impossible for us to confront a problem or design challenge without having a number of preconceptions about how to solve them. There is no *tabula rasa* (blank slate) or blank page. We always have our own kind of preconceptions—even in brainstorming sessions and workshops. For architects, having extensive experience of a specific type of building normally makes us well equipped to design them and effective at doing so, but at the same time that experience can make it hard to question our established routines and look for new solutions. In some cases, that can be a reason for a client to give an opportunity to a young talent that may be less invested in established solutions and more able to question and find interesting approaches to both old and new problems. The architect Ragnar Uppman describes this phenomenon, saying of younger architects, "…Their inexperience has been an asset. Their youthful lack of experience has made the impossible possible. The naïve don't notice the obstructions experience puts in their way" (Uppman, 2006, p. 259).

But let us return to best practices. They do not come from personal and unconscious experience, but rather through shared, tested, and established—though not scientific—experiences. We could describe best practices as shared and carefully considered knowledge. A best practice could be a form of treatment that has been in use for many years, for example, or a floor plan template for how a care facility or clinic is usually organized. Here there is of course a great difference between a child's first personal experience and a shared experience that has been tested and evaluated over a long period of time. But the testing that has been done, and perhaps has been underway for some time, has not been methodical and structured enough to be regarded as scientific, and therefore cannot be acknowledged as evidence.

### Should We Follow a Recipe?

Best practices and evidence can be documented in a variety of different forms as advice, guidelines, or checklists. We are supposed to be able to use evidence and collections of best practices effectively in healthcare, or in our case in hospital design. The former Swedish Institute for Health Services Development (SPRI) produced such collections from time to time in the 1990s. Today that role is filled by Locum's (a healthcare property

owner) concept program[62] or in the documents produced by the Center for Healthcare Architecture on behalf of the Program for Technical Standard (PTS) Forum,[63] which establishes standards for facilities such as healthcare wards, high-technology healthcare environments, and administrative workplaces.[64] In addition, the PTS Forum has produced materials to support building programming and detailed typical room drawings.

Without trying to evaluate the usefulness and quality of various resources, I can note that the Center for Healthcare Architecture, under the leadership of Peter Fröst, is studying how these resources should be designed to be of most use to facility owners. Fröst uses the concept of a *dynamic planning model* as a replacement for the more *normative* model of the past. The idea is that the planning model should encourage facility owners to "use this way to think about and discuss your unique project" instead of just instructing them to "do like this in this and all future projects and you'll be fine." In this context we can recall the discussions surrounding evidence-based medicine, in which many feared "cookbook recipes" that would have healthcare practitioners blindly following treatment guides instead of returning to the original scientific articles to make an independent critical interpretation. Many thought that these efforts at effectivization would remove the doctor's responsibility for diagnosing and prescribing treatment, thereby promoting an attitude among practitioners of being instruments in a system, which could easily distance them from their patients. This was also tied to a discussion about the credibility of the medical profession. I maintain that in our own field of hospital design, we are now confronting similar issues.

**Copycats**

Let's face it: architects are copycats. We copy as a completely natural facet of our daily work, and generally see nothing shameful in it. We borrow a floor plan and a roof section here, a window design and storefront detail there. If that borrowing or copying is too obvious, the architect might be accused of "theft." If you're going to steal, it's best to do so with a little finesse. There are different kinds of copying—it can be purely practical in character, but often it is rather a matter of aesthetics. Whether

[62] For the concept program (in Swedish), see http://www.locum.se/Sok/?query=konceptprogram .
[63] Program för Teknisk Standard (PTS) is part of a guidance system for facility development and management that aims to ensure effective quality control continual improvement of functional and sustainable facilities for healthcare. In 2015 its members include fifteen different county councils and regional administrations in Sweden. www.ptsforum.se/ .
[64] See www.ptsforum.se/ .

you're going to copy, borrow, or steal a detail or make use of entire portions of a building, it's better to copy something recent, so at least you're up-to-date. It is clearly better to be the first in a series of copycats than the last—otherwise you risk being branded an imitator. In the eyes of posterity and the public, in the eyes of the "man on the street," this has hardly any importance. But in the eyes of the profession it can be critical for an individual architect. That difference can easily spark a lively discussion about the contrast between architects' taste and the general public's taste. It is an interesting and important discussion, but one that must be left out of this thesis. Nevertheless, I can confirm that in the case of Sahlgrenska Östra's Psychiatric Care Unit, plenty of things have been borrowed from other architects and other buildings.

## 4.5 The Different Forms of Knowledge

I have now presented the three different forms of knowledge I think go into the architect's work: evidence, best practices, and intuition. We thereby find ourselves within the framework for what is known as the theory of knowledge, or epistemology.[65] In an attempt to bring clarity to my reasoning, I have chosen to attempt to replace wordy arguments with the simple illustration below. The size of the squares is not a grading of the relative size and significance of the different forms of knowledge, but it is hard to avoid comparing them. D. Kirk Hamilton talks about meeting an acclaimed physician who suggested that about fifteen percent of healthcare today is based on evidence. Hamilton then speculates that about 5% of the evidence base is accessible for today's healthcare construction industry.[66]

[65] Epistemology (from the Greek *epistē'mē* "knowledge" and *-logi'a* "study") is the theory of knowledge. See for example the Stanford Encyclopedia of Philosophy: http://plato.stanford.edu/entries/epistemology/ (2015-08-29).

[66] Hamilton, K., khamilton@arch.tamu.edu. (2012) *A citation*. Message to: Lundin, S., stefan.lundin@white.se. 29 October.13:03.

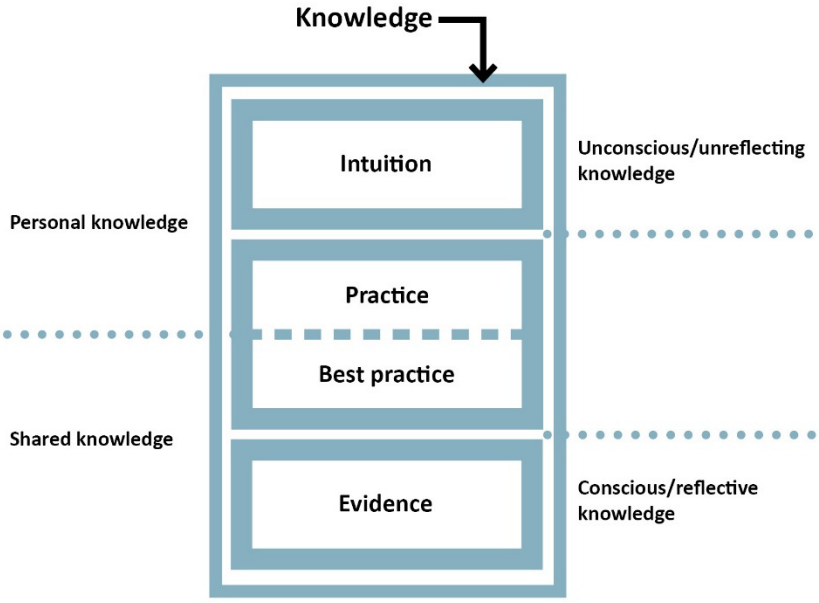


*Diagram of the principal forms of knowledge involved in the architectural profession.*

As a summary of the foregoing knowledge discussion, below is a manifesto on architectural knowledge in ten points presented for reflection and consideration.

**10 ASSERTIONS ABOUT KNOWLEDGE AND ARCHITECTURE**

1. **The architect's knowledge is made up of evidence, best practices, and intuition**
2. **Architecture cannot build on evidence alone**
3. **Experience gives us a tool to handle everyday issues smoothly**
4. **Thinking in a new way requires experience, but experience can sometimes inhibit creativity and innovation**
5. **Innovative thinking and creativity require a great deal of effort**
6. **Intuition builds on our interactions with reality**
7. **Intuitive knowledge is hidden, tacit, and subconscious**
8. **Intuition is a tool for innovation and progress that precedes science and evidence**
9. **Intuition can lead us astray, and therefore must be subject to examination and critical discussion**
10. **Rational decisions require access to the world of emotion**

## 4.6 Conclusion

In *Architecture as Medicine* I tried to describe what I thought had contributed to the good outcome we achieved in the psychiatric ward of Sahlgrenska Östra Hospital. I did that as a practicing architect reflecting on my own work. But what did I actually mean by "describe what contributed to the good outcome"? The idea, of course, was that the advice and reasoning that I—and to some extent my colleagues—offered would be insightful and important enough to contribute to the success of new facilities of the same type. However, others called my attention to the fact that what I had written could not be considered scientific. The natural response was to study the research evidence for architecture's importance in well-being, recovery, and healing.

The research I have done since then, however, has convinced me that the evidence generated by research is not substantial enough at this point to create good architecture. That opinion is widespread among architects, most of the other people who participate in the planning and construction of healthcare buildings, and even among the "evidence proponents" (including Hamilton), although I have at times accused them of differing on the matter. However, for me these issues are of particular interest and significance. If evidence doesn't generate enough knowledge, then what kind of knowledge do we need to create good architecture? In addition to best practices, we need our intuition to contribute to the architect's work if we are to achieve a sterling result that might also have healing properties. We need an intuitive knowledge that is not directly accessible to our consciousness but that emerges from the interaction with the reality that surrounds us.

# 5.

# Dialogue

# 5.1 Search, Evaluate, Propose, Measure: The Work of Continual Improvement

**The Knowledge Society and Lifelong Learning**

We live in a knowledge society. There are studies of subjects as young as preschool age in which the students are given independent and problem-based challenges to resolve. At the high school level, we learn to compose our papers in accordance with the established scientific format, with abstracts, methodology descriptions, and references. The university undergraduate level these days always prepares students to conduct research, and concludes with writing a thesis paper, even in the programs that traditionally have a practical, vocational, or artistic orientation.[67] We invest an increasing amount of time and money in research and development. That leads to new discoveries and inventions that change our everyday lives in a way that was uncommon just a couple of generations back in time. But it's not just about technology and product development. Attitude and process issues regarding the service sector are being explored with increasing regularity.

Knowledge has become an increasingly important means of competition among different companies and countries. The rapid development that is underway demands that we continually acquire knowledge in what is known as lifelong learning. Patent law tries to protect the knowledge edge gained by individual companies and private individuals. In the world of research, knowledge has to some extent become a cost issue. Scientific journals and databases often require payment for access to articles and other information. At the same time there is an opposite force, a trend that is making knowledge increasingly accessible via open-source networks. We speak of "open source" in terms of scientific articles and "creative commons"[68] when it comes to "shared copyright" for design, and so forth. Sharing knowledge freely is also increasingly seen as a way for a private company to enhance its public image.

For knowledge dissemination, sharing, and collaboration, the Internet and the proliferation of various kinds of accessible databases have contributed to a revolution—a revolution we now take for granted. For the field of architecture in Sweden, we now have Archileaks. The idea behind it is that

[67] Compare, for example, to the Carl Malmsten School, now part of the Technical College at Linköping University.
[68] See, for example, http://www.creativecommons.se/# .

one way architects should be able to collaborate is through sharing documents and files over the Internet, thereby strengthening the profession and contributing to better architecture.[69]

**Working for Continuous Improvement and the Demands for Measurability**

Since the Second World War, the manufacturing industry has pursued a pattern of improving quality by introducing different kinds of quality control systems. Today most larger service companies have such systems in place—including White Architects, which for many years has been relying on a quality leadership system under ISO9001, which includes submitting to continuous monitoring by a specially certified outside company. Evaluating our company's operations requires various kinds of measurements, and these make up an important part of the system. For example, has the number of construction errors resulting from the quality of our construction documents increased or decreased? Are clients satisfied with the documents we deliver? But much of the architectural community has come to recognize that this measuring is also problematic: does the system really measure architectural quality? No, they don't. This calls into question the very term "quality system." The need to be able to take measurements and to establish appropriate metrics for real architectural quality can be seen as a real problem. What is it we're actually measuring? Could it even be that we're just measuring what is convenient to measure, while decisive qualitative aspects are not being captured by the system at all because there is no reasonable method for measuring them?

The "measuring attitude" can be defended with arguments such as, "You can't prove what you can't measure" (Hamilton, 2013, p. 186), while the "anti-measuring attitude" responds, "Everything that we can measure counts, but not everything that counts can be measured."[70] Whether various things can be measured or not has been a topic of discussion not only in architecture but also in medicine and healthcare science. Twenty years ago, for example, it was widely considered impossible to measure "quality of life," whereas today there are some who claim they can.[71]

[69] See http://archileaks.se/ .

[70] Albert Einstein quoted in Nasraway, J (2007) "Sitting on the Horns of a Dilemma: Avoiding Severe Hypoglycemia While Practicing Tight Glycemic Control" in *Critical Care Medicine 35(10)*, pp. 2435-2437 from Hamilton, 2013, p. 186.

[71] Comment by Marie Elf, Senior Lecturer and Associate Professor at Dalarna University, in a seminar at Chalmers on April 21, 2015.

**Search, Evaluate, Propose, Measure!**

Architects must allow their own work to be informed by all the available evidence. But how do we find that evidence? In his book *Evidensbaserad medicin i Sherlock Holmes fotspår* (Evidence-Based Medicine in the Footsteps of Sherlock Holmes), Jörgen Nordenström gives an example of a structured and scientific search, a four-step scientific working method: *formulate* the question, *search* for information, *evaluate* it critically, and *apply* the results (Nordenström, 2008, p. 12). The American architects Hamilton and Watkins have developed a corresponding nine-step evidence-based design process (Hamilton and Watkins, 2009, pp. 209-217) for use in their firm, WHR Architects. Steps 4-7 in this process correspond to Nordenström's: *convert design issues to research questions*, *gather information*, *critically interpret the evidence*, and finally *create evidence-based design concepts*. In other words, we must begin with a thorough search for relevant information to establish a basis for design.

Will such comprehensive systematization soon become standard in the planning of our hospitals? It sounds possible, and some are advocating for just that. My view is that we devote too little time today to systematically reviewing the conditions for a project in the early stages of design. There is no literature search for relevant scientific articles, and the search for similar organizational operations and building types is conducted rather spontaneously without much systematization—at least in the projects I've worked on. But perhaps the work being done at the Center for Healthcare Architecture is an indication that a change is in store. There is an emerging desire for more systematization in our work, systematization that in part is moving toward a more scientific way of looking at the world. That would then make it appropriate to engage scientifically trained people in the project—and not just to gather and evaluate data but also to evaluate assumptions and hypotheses. If we are to achieve the goal of continual improvement and a truly scientific process in our work, we must propose hypotheses about architecture's effects and then measure and evaluate those effects. Beyond that, the results of these efforts—whether successful or not—should be published. That, however, rarely happens.

Very little research is done in Swedish healthcare design using systematic data collection and evaluation to inform a design proposal that is followed up by measurements and evaluation. There are examples in other countries, including the members of the Pebble Project in collaboration with the Center for Health Design in the United States. But in Sweden too we are beginning to realize that we need to do something about the low scientific standard in hospital design research. Given the amount of money we invest in healthcare buildings, we must do better. In an article entitled

"Så kan vi sluta att bygga in ohälsa i vården"[72] (How We Can Stop Building Illness Into Healthcare) in the journal *Dagens Medicin* (Medicine Today), authors Helle Wijk, Peter Fröst, Anna-Carin Dahlberg, Hans Sandqvist, and Erik Pålsson cite statistics from Sweden's municipal administrations, county councils, Chalmers University, and the Sahlgrenska Academy, and conclude that of the 1.4 billion euros we invest in healthcare buildings each year, barely 1 *million* is invested in research. That is less than *one-tenth of one percent*. But change is on the way. Jönköping's regional healthcare service administration is the first in the game, earmarking over 200,000 euros annually in 2015 and 2016 for a new Research Fund for Long-Term Property Investments in Healthcare Construction.[73]

## 5.2 The Design Dialogue

**Dialogue Prevents Arbitrariness**

My article in *HERD*, "In Search of the Happy Balance: Intuition and Evidence," which was a commentary to Hamilton's earlier article, had rather a catalytic effect on our ongoing argument. It was a chance for us both to begin to see the contours more clearly, and to stop seeing intuition with the shameful mark of arbitrariness. The explanation for this is the monitoring or control inherent in a multi-faceted collaborative working group—because the intuitive work architects do is not left to the individual architect in isolation, but is a shared responsibility of the group as a whole. In the Swedish model, the architect has evolved into an equal member of a multi-disciplinary team, no longer an authority who can't be questioned. The architect's ideas, sketches, and design schemes are subject to what we can call the *test of knowledge*—that is, a careful evaluation and questioning by competent participants from a variety of disciplines.

> *The positive outcomes (e.g., the decreased use of patient restraints) observed at the psychiatric facility at Östra are described in Hamilton's column as a result of an intuitive way of working. I don't think this success is due just to intuition.* It was dependent on the interpretation, affirmation and rejection of proposals that the architect's intui-

[72] http://www.dagensmedicin.se/artiklar/2014/05/30/debsa-kan-vi-sluta-att-bygga-in-ohalsa-i-varden/?x=MjAxNS0wNS0xMCAxMTozOTowMg [Accessed 25 May 2015].
[73] Jönköping County Council decision on May 19, 2014.

> tive ideas spawned among the members of the multidisciplinary steering committee overseeing the project!
> *(Lundin, 2015, pp. 123-126)*

In Sweden today, in 2015, we more or less take this method for granted as a condition for our work with the planning of healthcare facilities. But it is easy to lose sight of the fact that, from an international perspective, this approach is by no means universally accepted as the way to conduct planning processes. And I believe Hamilton can see that in this Swedish model, with its dialogue and collaboration processes, the architect's intuitive working method is no longer a threat but rather an opportunity. It is a way to prevent arbitrary designs getting built because of a lack of discussion and questioning.

The work of planning in the county councils during the last four decades has been characterized by close collaboration between architects and the councils' administrative staffs. It has been in part a consequence of an ongoing discussion of democracy and the workplace environment, a discussion that has revolved around collaborative forms of planning. The objective has been to better align facilities with operations, while respecting the working environment of the staff. But a lot can be said about how this work has been conducted and how it should be conducted. The Center for Healthcare Architecture is currently working on a preliminary study for the PTS Forum on how the healthcare facility planning process may be organized. My hope is that this will make it possible for some of the issues I have only been able to address superficially in this text to be explored more thoroughly.

**Dialogue Clarifies an Organization's Real Needs**

When we work toward transformation, as when a healthcare operation switches from an existing facility to a new one better adapted to their work, there is a preconception that we should begin by describing the organization's needs and desires in a formal and simple way in order to provide guidance for the architects' work and a basis for the final design. That seems straightforward and logical. However, experience and science have shown that our way of working with these issues does not benefit from this approach. In reality, it is extremely convoluted to begin the project by describing all of the often complex and varied objectives, demands, and

desires the organization has. Design theory proposes an alternative approach.[74] One of the fundamental ideas of design theory is that *an organization's demands and desires are best formulated through proposals for resolving them*. If we present the organization with a proposal, they can evaluate and comment on it, it can be adapted to accommodate those comments, and then it can be evaluated and commented on again. This allows the design team and the organization to successively dig into the issues together. The evaluation of concrete proposals generates knowledge, which can then be used to improve the next round of proposals in a circular, iterative process until a satisfactory solution is achieved.

The initial proposals from the architects build on their repertoire of experiences.[75] Those proposals can at first be abstract or conceptual in order to provide a productive basis for dialogue, rather than specific designs for the building's final form. The contributions users and organizations bring to the dialogue are based on practically grounded knowledge. This form of knowledge is sometimes referred to as *tacit knowledge*[76]—things we know but often are not conscious of. That makes tacit knowledge hard to communicate, but it can come to the surface when we are presented with concrete design proposals. Thus this process can be seen as a conscious way to uncover knowledge that can in some cases contribute to innovative solutions to support an organization in its work planning the new facilities. The building users' tacit knowledge is a parallel to the tacit knowledge of the architects, which comes out in their intuitively generated design proposals.

In this dialogue process, it matters which artifacts—which manmade physical items—are chosen to represent reality and to support the design process in different phases. In some phases a conceptual sketch could be the best choice, while others demand more concrete and realistic models. Sometimes analog representations are better than digital, and sometimes it's the reverse. Architects rely on their experiences from various processes to guide them in this work. The conditions on which this interactive design process is based are in turn dependent on first establishing productive social interaction and a non-hierarchical structure. Professor Peter Fröst describes the process outlined above more thoroughly in his doctoral thesis, *Design Dialogues in Early Stages: Working Methods and Tools for Client-Engaged Workplace Design* (Fröst, 2004, in Swedish).

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[74] For an overview description, see se Fröst (2004) ch 2-3. See also Schön (1983).
[75] *Repertoire of experiences* is an expression from Schön, D. (1983) *The Reflective Practitioner.*
[76] See, for example, Polanyi (2003) Molander (1996).

# 6.
# Summary

# 6 Summary

*Sitting here at my computer on a spring evening, I'm trying to remember exactly where I intended to go with this project from the beginning. With some trepidation, I think back and try to recall what inspired me to get engaged enough to write "Purely Scientifically Speaking." What made me ask the question, "What's in it for me as an architect?" and give my first paper the working title "EBD: A Disservice to Architecture?" How could a handful of research findings and a sketch for a method of applying them get so deeply under my skin? Why was I so outraged? There was something there between the lines, suggested but unspoken—a suggestion that architects needed to be curbed, that they were driven by self-interest, made decisions arbitrarily, and lacked both empathy and concern for society. I imagined new players coming on the scene to keep architects in check, themselves guided only by indisputable science. That is, of course, a dour and highly personal interpretation—a dystopia, but it was my dystopia. And I felt provoked by it. I wanted to strike down the ignorant, with their withered and shrunken view of architecture and the architectural profession. No way were we architects going to sit quietly by and let a bunch of outsiders tell us what to do!*

*(Gothenburg, some time in the spring of 2013)*

The basic position of Evidence-Based Design (EBD) is built on a strong faith in a scientific design process, with decisions based on a foundation of evidence. The idea has its ideological roots in the tradition of natural science research, which is characterized by a rational view of knowledge and the belief in progress. Evidence-based medicine led the way, setting a successful example with the power to launch a worldwide evidence movement. The term "evidence" commands attention in a wide variety of different fields of civic engagement and research. Today evidence is a term we associate with positive values such as credibility and professionalism. A quick search on the Internet turns up "evidence" in corporate names for everything from real estate agents to psychotherapy education programs and pet insurance. Even politics should be based on evidence, according

to the authors of a recent article in the Swedish newspaper *Dagens Nyheter*.[77] The cosmetics company Yves Rocher even sells beauty products in a line called *Comme une Évidence*.

Today researchers have felt obliged in many contexts to include the term evidence in order to maintain their credibility, and obliged to adapt or change the term based on the specific conditions of their own discipline.[78] This paper is an attempt to stake out a position on the use of evidence in the field of architecture, and specifically in the design of hospital and care facilities.

**EBD: A Rationalistic Movement**

The EBD movement is rationalistic in character and builds on a reductionist and simplistic view of knowledge. In other words, in spite of its insistent rhetoric, the movement is not actually rational in either its approach or action. Below is a bullet list of a number of critical questions and viewpoints that confirm my assessment:

- *Are the effects of physical interventions truly clear? In its research review* (Sensory Environment on Health-Related Outcomes of Hospital Patients 2012), *the Cochrane Collaboration questioned the research results that Ulrich et al presented in their research review. Cochrane found that many of the studies included had been done with faulty methods, and that the authors' interpretation of the results had been too optimistic. Cochrane believes that, given their strict standards for scientific methodology, at present there is no evidence for the positive effects of physical interventions. However, they do concede that there may in fact be a connection between physical interventions and health outcomes, but maintain that such a connection cannot be confirmed at present. These different interpretations of course lead to uncertainty among*

[77] From a debate in *Dagens Nyheter* entitled "Kunskap måste gå före ideologi och populism" (Knowledge Must Come Before Ideology and Populism) on May 31, 2015 http://www.dn.se/debatt/kunskap-maste-ga-fore-ideologi-och-populism/ [Accessed 9 August 2015].

[78] Representatives of the field of healthcare science, for example, have been very critical to the influence of the medical science tradition over their field. Despite their critical attitude, they have proposed yet more terms that includes the word "evidence," such as *odontological evidence.* See Martinsen, K. and Eriksson, K. (2009) *Å se og å inse. Om ulike former for evidens.*

*architects and planners regarding the importance and application of the proposed physical interventions.*

- *The number of physical interventions shown to influence healthcare outcomes has been small, and has not been growing as rapidly as proponents had hoped. In 2008 Ulrich et al identified eleven interventions that can impact health outcomes. Acquiescing to the demands for a higher level of evidence, that number is reduced to six and the number of positive outcomes is reduced to nine. If we further eliminate aspects that are not under the architect's control, even fewer effective interventions remain. The advocates for evidence-based design predicted a dramatic increase in new findings as a result of the growth in research, but that increase has not materialized. Furthermore, we still don't know much about the absolute and relative importance of the various physical interventions. And finally, it is not clear if these interventions have a positive or negative impact on one another, and if so how.*

- *The evidence that Ulrich et al claim exists to show, for example, the importance of the single-bed patient room, daylight, greenery, and views of nature has long been suspected, understood, and applied by experienced architects. Tom Danielsen, an architect with the Danish firm of C.F. Møller, is one of those who have taken the most interest in understanding and applying EBD, including using it in a competition for Aarhus University's new "superhospital" in Skejby, Denmark. In retrospect Danielsen now sees EBD as "old wine in new skins," and maintains that architects have had that knowledge for a long time. For him EBD has become a roundabout way to firmly establish these ideas among the other participants in project planning groups. And here he warns of the risk for a stilted bureaucracy that be overly conservative and inhibit innovation. (Danielsen, 2012)*

- *Scientific knowledge, evidence, is heavily favored at the expense of other kinds of knowledge. Conversely, knowledge acquired through apprenticeship and hands-on work, which is in part subconscious, is undervalued. The concerns about utilizing an intuitive and artistic working*

*method mean less opportunity to create a richer and more outstanding architecture.*

- *Lack of a holistic perspective. Evidence-based designers build on knowledge of a limited number of aspects or parts of the physical environment, which they rely on to provide a foundation for their work. Thus they focus on the importance of the parts, risking that they are overvalued at the expense of the whole. In my architectural education and professional practice, we have always taken for granted that the whole must be the point of departure for our actions and our judgments. The expression "The whole is greater than the sum of the parts" has been something of a mantra. Architects share this attitude, which is called "holistic" in many contexts, with other fields in the social sciences. In the scientific discourse, this distinction is considered essential:*

  *The holistic approach in various sciences, from physics to psychology and sociology, means that the attributes of the different parts that make up a whole cannot explain the attributes of the whole. On the contrary, in the holistic approach, the design and function of the parts are characterized by the attributes of the whole.*[79]

  *Throughout my professional career, holistic thinking has been the given point of departure. Thus it has been more important for me to develop my own attitude to or understanding of architectural issues than detailed knowledge of a certain design. Never in my professional practice have I thought of architecture as the collective outcome of the causes and effects of a series of physical design details.*

- *The lack of interest in aesthetic questions leads to the exclusion of important issues from the discourse on healing architecture. This ultimately undermines architects' knowledge and skill in the area, and leads to an impoverishment of architecture itself.*

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[79] http://www.psykologiguiden.se/www/pages/?Lookup=holism [Accessed: 21 October 2014].

In this summary of the ideas in the EBD movement, I have regarded it as homogeneous and cohesive. To some extent I have fashioned my own EBD movement with the intention of finding something concrete to work with and criticize. But in reality there is no such uniform movement driven by a clearly formulated manifesto. The lowest common denominator is the idea that architecture should be based on evidence, and possibly also that evaluations of building performance should be conducted using scientific methodology. In actual fact, the movement takes on a different face and a different character in each research review, article, or book. As a result, my reading in the subject has included a lot of reading between the lines. What is each text saying and not saying, consciously and unconsciously? The uncertainty fostered in me a restrained frustration, and perhaps also a fear for what certain simplistic arguments might ultimately mean for working conditions in the architectural profession and for the opportunities to create a healing architecture. My interpretation of these unspoken ideas and conceptions has provoked a reaction in me that is irritating enough that I feel the need to offer a comment.

I have a strong reaction to the way architects are portrayed. Sometimes we are seen as irresponsible and sloppy, wasting our energy on aesthetic ruminations and trying to express our own personalities in the buildings we design at the expense of functional and technical issues with no moral compass to restrain us. Examples of such behavior have occurred internationally, and perhaps in Sweden as well, and perhaps it is true that some architects have just the combination of ego and authority to preclude a nuanced discussion or questioning of their work. But in Sweden today, that characterization is anachronistic—that stereotype is simply no longer accurate. That doesn't at all mean that the aesthetic dimension is no longer important to architects. Explicitly anti-aesthetic statements are seldom found in the EBD literature, but aesthetics aspects are often expressed with lukewarm enthusiasm, a kind of whispered acknowledgement to avert anticipated criticism.

The anti-aesthetic attitude is a different problem. In the long term I see the impoverishment of the aesthetic discourse in the architectural community as a huge threat and danger, if such strong words are appropriate to the context. When architects themselves either emphasize or ignore aesthetic aspects, whether consciously or unconsciously, there is a risk that the same attitude spreads to their clients, project leaders, and builders. That makes it even more difficult to address aesthetics, with the risk of undermining the credibility of the architectural profession. I have already described a situation like that, which followed the breakthrough of functionalism in Sweden. The solution is not to eliminate aesthetics from

the agenda, but rather to raise it as a topic for discussion. Nevertheless, it is not a simple discussion to have, and there are no ready answers. But if it is conducted in the form of a dialogue, with mutual respect for each side's expertise and responsibilities, then effective and innovative solutions can be achieved.

I fear that in a world of EBD ascendant, architectural discourse will not be afforded the space it deserves. It can be perceived as complicated and irrational, devoid of logical progression. I sense great expectations for EBD among clients, project leaders, and builders. They hope architecture can be given a clear and instrumental role fulfilling demands and filling in checklists, as though that would provide a guarantee of good architecture. But evidence cannot guarantee good architecture, nor can it provide a foundation from which other architectural qualities can spring. My fear is that the negative version of EBD I have outlined above will be enthusiastically embraced by my clients, and that it will create a gap between them and us architects by further eroding their understanding of how architects work. Given that our backgrounds are often different from the more natural-science-oriented education of most clients and builders, it would appear to be an urgent task for us as architects to expand our own knowledge and insight in order to better communicate with them. Often this is about issues surrounding aesthetics and intuitive work processes. In my most pessimistic moments, I have even thought of the EBD polemic as a *disservice to architecture*—or as a Trojan horse, a gift that hides what in the long run will turn out to be catastrophic for its recipient.

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Is evidence therefore evil? Is there no value in the work done by the Centre for Health Design? Are Roger Ulrich and D. Kirk Hamilton flag-bearers for an undeserving cause? Of course not. Finding evidence for the relationship between architecture and healing is certainly important, even if the growth in such research has not been as rapid or widespread as the EBD movement's proponents anticipated. Below are some of its positive contributions:

- *Awareness and knowledge of the relationship between the physical environment and healthcare outcomes has increased among architects, planners, and healthcare providers—and also among elected officials, which is extremely positive. The Internet, new websites, organizations with educational programs, and scientific journals devoted to the subject now provide good conditions for disseminating this knowledge.*

- *A number of different aspects related to the importance of design for healthcare environments have become topics for discussion, even if they haven't yet been subjected to completely scientific testing. These discussions illuminate issues that architects and planners who stay up-to-date can benefit from to inform their design work.*

- *Architects engaging in a discussion about the planning of hospital environments on a more scientific plane, including making use of evidence and the scientific method, has generally given medically trained staff a keener interest in architecture. In this way it has also increased their trust in architects.*

- *How do our new buildings perform in terms of operations and economy? That question is asked more and more often, which should lead to more projects being evaluated and to an increase in the number of projects planned with scientific ambitions and academically trained researchers involved.*

On a personal level, the EBD movement has been something of a thorn in my side, and has provoked a lot of ideas. It sparked a lot of my discussions with Roger Ulrich, and also with D. Kirk Hamilton. As I attempt to identify and simplify the movement's advantages and shortcomings, it is time for a rather belated apology for the way I may have portrayed both Ulrich and Hamilton. I'm sure I have unfairly attributed to them both a lack of insight and some simplistic opinions. My development owes a great deal to the discussions and correspondence I have had with these two men in particular, and they have also made an effort to illuminate and answer the most pressing questions I have posed. Below I will conclude by featuring a few quotations related to Hamilton's writing that demonstrate our fundamentally similar views of the conditions for practicing architecture.

> *There will always be a mix of intuitive decisions, decisions grounded in accepted best practice, and a small number of decisions in which one seeks credible evidence from research to guide the choice. (Hamilton, 2014, p. 142)*

In terms of healthcare design, Hamilton on one occasion estimated that today this mix includes an evidence basis amounting to only about five percent of the total volume of knowledge. Hamilton was a co-author of the very programmatic *Practitioner's Guide to Evidence-Based Design*, which invites architects to make personal interpretations and describes

art as a part of the architect's work: "The interpretation of research results is as much art as science. It is not a mechanistic or formulaic process, in which you 'punch in numbers' and out pops an answer" (Harris, 2008, p. 17). Elsewhere he asserts that architects "must learn to make a decision on the basis of incomplete knowledge…" (Hamilton and Watkins, 2009, p. 215).

In studying the ideas behind evidence-based design, I was forced to try to understand what other kinds of knowledge we rely on when we design buildings for healthcare services. It was easy to identify the great importance of best practices, along with the difficulty in freeing oneself from their at times stifling effect on the search for new and more effective solutions. I found intuitive knowledge learned through training in school and apprenticeships, which is often unconscious and unspoken, to be a precondition for excellence in architecture. Intuitive knowledge in turn requires evaluations that are based on more than just evidence and experience. We can avoid the arbitrariness that can result from intuitive and personal ideas by cultivating a properly formed dialogue in a working group made up of diverse individuals from complementary disciplines. In such a dialogue, medical care facility design issues will ultimately come to influence the organization and effectiveness of the operations.

Issues of evidence, intuition, and dialogue have been addressed in the context of a growing interest and acceptance throughout Sweden for evidence-based design ideas. The Healthcare Building Forum's sponsoring of a professorship, the greater focus on research, and the formation of the Centre for Healthcare Architecture have to some extent established a home for research on issues in the field of healthcare design. With support from the county councils and regional property management administrations, more concrete building issues have been assembled in the growing PTS Forum. Questions about research into the design of healthcare buildings have also sparked great interest among elected officials in a time when we are confronting the need to make unprecedented investments.

To conclude this chapter I would like to highlight the attitude toward evidence adopted by the Centre for Healthcare Architecture (CVA). They emphasize the need for research and evidence, but at the same time assert that architecture *cannot* be created from these alone. In making presentations on CVA's work, Peter Fröst usually shows two slides with three assertions that have been particularly important to me:

- *Good architecture cannot be created from research alone*
- *But research is an important foundation for good architecture*
- *Knowledge acquired through research must be translated and interpreted through feelings and intuition to be transformed into architecture.*

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As both a practicing architect and a researcher I have tried to express my thoughts about the tension between the two fields. As a practicing professional I have been treated with respect in research contexts, and as an academic I have been shown respect in the design projects on which I work. On the whole, the combination has brought me greater credibility as a professional. It has also bolstered my self-image. And now to summarize this summary. EBD is not the answer for how to create healing architecture, nor has anyone really claimed that it is. It neither confirms nor denies the statement by the jury for the 2007 Healthcare Building Award that "…architecture can do a great deal to promote patient healing" (Forum Vårdbyggnad, 2007, p. 2). Nevertheless, most of us are convinced of the veracity of that statement. In retrospect, my ambition to be able to describe what healing architecture is may seem naïve, and hopefully that can be forgiven in light of my curiosity. That curiosity lives on in my desire to continue to dig deeper into the issues surrounding healing architecture. In the next and final chapter, I will offer some ideas for what form such further research might take.

# 7.

# Further Research

In this final chapter I return to the original question I posed about healing architecture. I will do that in part by pointing out several of the more interesting phenomena I have encountered over the course of my studies—*attractiveness*, *placebo*, and *emotions*—and in part by considering what further research might be conducted.

## 7.1 Attractiveness

In 2012 the Centre for Healthcare Architecture (CVA) published *Evidensbas för vårdens arkitektur 1.0. Forskning som stöd för utformning av den fysiska vårdmiljön* (Evidence Basis for Healthcare Architecture 1.0: Research to Support Design of the Physical Care Environment). It was the first summary done in Swedish to describe the relationship between the physical environment and positive healthcare outcomes. Roger Ulrich concludes the publication with a chapter on *attractiveness*. It is an interesting textual phenomenon to which I will refer below. In the 1950s the researchers Maslow and Mintz experimented with placing people in spaces that were either "ugly" or "beautiful" and then asking them to estimate the well-being of people they were shown in photographs. On average, the subjects in the beautiful room estimated the well-being of the people in the photographs as higher than those in the ugly room. In other words, the attractiveness of the space, or its lack of attractiveness, affected the subjects' judgment of the people they saw in the pictures. But would similar judgments of healthcare quality, for example, be influenced by the attractiveness of the facilities? It would certainly seem so. The evaluation of attributes we can't see with our own eyes is highly influenced by what we *can* see in the physical environment that surrounds us. In other words, patients' judgment of how they are received, the quality of their treatment, and ultimately their own satisfaction are directly influenced by the attractiveness of the facilities. And that influence was described as disproportionately large. To an architect this sounds perfectly reasonable—it's music to my ears. It's what we architects have been saying all along: what architecture looks like really matters! This is satisfying in that it does not limit architecture's importance to a few aspects for which it's possible to find evidence; on the other hand, it doesn't provide any specific direction as to how to design the lobby….

In this context it is interesting to note that the subjects in Maslow and Mintz's study were assessing the well-being of the people in the photographs using a direct, emotional, holistic judgment. The interpretation of the subjects' judgments was therefore never broken down into discrete, operationalized components.

Several studies conducted in the United States have shown that there is good reason to assume that the design of the physical environment has a critical impact on patients' assessment of the quality of the care they are given. The fact that the physical environment is so important to that assessment, the studies find, is because it provides "concrete visual clues" that the patients can themselves experience and evaluate. This distinguishes the physical environment as a source of information from the wealth of other data that remains hidden unless one actively seeks out some way to uncover it. One very comprehensive study (comprising nearly five thousand primary and pediatric care clinics in the United States and some 1.2 million patients treated) demonstrated the importance of "comfortable" versus "uncomfortable" waiting room environments. As an example, the satisfaction among those who spent less than five minutes in the uncomfortable waiting rooms was 44%, while for those who waited more than half an hour in very comfortable rooms the satisfaction rate was 91%. In other words, "Offering an attractive waiting room is … more important than a short waiting time for giving patients the sense of good quality of care" (Fröst, 2012, p. 2).

The studies referenced above give no answer as to what individual environmental factors or groups of factors contribute to the attractiveness or comfort of the spaces. Although such observations were not noted in the studies, we might reasonably assume they are the kinds of qualities that Ulrich et al cite in their 2008 research review, such as access to nature, views, daylight, or opportunity to rearrange the furniture. But here other factors are surely at work for which there is no evidence today, including spatial articulation, detailing, color scheme, and material choices, as well as the orderliness and cleanliness of the space, the date on the waiting room magazines, and so forth.

The argument above regarding attractiveness and comfort leads me to a reflection on my own experiences of today's Swedish healthcare environments both public and private. Let us for a moment assume that *all publicly funded care is good* and is driven by positive incentives, while *all private care is bad* and has "evil" incentives. As part of this simplistic and hypothetical conception, private care providers invest more care and money in the design of their facilities than public institutions do. Why did my son's ear clinic have elegant tubular steel furniture, a nice view, fresh flowers, and current magazines? Why was there a Persian rug in the clinic where I went for immunization before a vacation trip? Naturally we might conclude that the private clinic is a profitable business, but also that its patients are more well off and more accustomed to a better environment, and they to their target customers by giving them a sense of belonging

and status. However, it is not primarily these aspects that interest me, but rather the effects we touched on earlier. Can private care clinics actually be perceived as providing their patients with better care merely by investing in more attractive and comfortable environments? In other words, do patients rate the quality of the care they receive based on the physical environment's visual qualities with little knowledge of a whole range of hidden criteria that are not obvious and visually accessible?

In the simplistic hypothetical scenario I have outlined, profit-driven private care providers are aware of the impact that architecture has on their customers' perceptions. They consciously devote themselves to manipulating their customers' perceptions and winning their trust by investing in cosmetic interventions in the physical environment while skimping on investments in actual medical care without much concern for the ethical consequences. The public care provider, who we expect to be motivated by interest in the public good rather than profit, reasons in a different way. The public provider instead invests in medical equipment and competent staff—much more interested in offering in good care than a nice rug in the lobby!

But perhaps we can take this argument one step further. Imagine if my unconscious appraisal of the building's physical quality as a patient does have an impact on my ability to heal and recover! What if my trust in the care provider influences my healing and recovery? If I feel positively received by the physical environment, and consequently I indirectly assess the care to be competent (it isn't necessarily, but according to my earlier reasoning it might seem so), does it increase my chances of getting better? Is there any logic in thinking that way? Yes. If an "attractive" physical environment increases our trust in the quality of care provided, then a poor environment would correspondingly decrease our trust. An attractive environment would increase our sense of well-being, but also increase our *expectations* of healing and recovery. And as we will see in the next section, expectation is a powerful force. According to this line of reasoning, some of our public healthcare providers should be criticized for providing the citizenry with physical environments with an inadequate degree of attractiveness. By this logic the public care providers suddenly seem narrow-minded—at their patients' expense!

Below are two assertions and one question for discussion:

- *If we perceive a physical environment as attractive, then we estimate the way we are treated and the medical expertise as higher than if the environment were unattractive.*

- *If we perceive the treatment and medical expertise as high, we have a better chance of recovering quickly.*

If we consider these physical interventions that give patients positive experiences as measures that are primarily non-medical in nature, can we still claim that they generate medical results as a kind of "secondary" effect?

## 7.2 Placebo and Positive Expectations

Below I will give an overview of another interesting phenomenon: the placebo effect. Its importance has been well know for centuries, but the scientific community is still largely uncertain about the mechanism by which it works, although knowledge appears to be growing rapidly in this area. If, for example, a patient is given a medication that is considered medically inactive, it is called a placebo. If the patient experiences an improvement in his or her condition as a result of that placebo, we call it the placebo effect.

In the modern sense, the placebo effect refers primarily to the randomized double-blind tests of medications that came into general use in the late 1950s. The trial subjects are randomly divided into two groups, a test group and a control group. Those in the test group are given an active medication and those in the control group are given a placebo. Neither the subjects nor the people administering the treatment know who gets the medication and who gets the placebo. When the effects are later evaluated, it is often discovered that some of the subjects in the control group experienced an improvement in their condition in spite of being given only a placebo. The amount of improvement appears to depend on the character of the illness, and in some cases can be substantial. For example, the placebo effect is largest with surgical interventions, smaller with injections, and smallest of all with pills. For pills, the effect is stronger with caplets than with tablets. The color and size of the pills also makes a difference. If a medication is more expensive, the placebo effect is larger, which may indicate that exclusivity and social status also have a significant impact. It also matters if the treatment is administered by someone in a white coat with a clearly visible name badge, and the subject's pulse is higher if it is administered by a doctor than a nurse. Finally, it turns out

that the demeanor and empathy of the person administering the medication—the words they use, for example, and the trust they instill—is extraordinarily significant for the outcome.[80]

It is not uncommon to see a placebo effect of 30%—that is, 3 of 10 subjects perceive an improvement. When we evaluate the effects of a medication, therefore, we must account for the placebo effect on the test group. If 4 of 10 perceive the treatment as effective in the test group and 2 of 10 in the control group, the medicinal effect of the medication can be said to be 2 of 10, or 20%. Controlled studies like this have many times found surprisingly small medicinal effects from long-established treatments. The placebo effect therefore has a legitimate medicinal effect. The ethical question, however, is complicated. Is it irresponsible to just give a patient a placebo?

The explanations for these improvements should be understood primarily as the research subjects' *expectations* of a positive outcome *actually contributing to the outcome*. In other words, expectations alone have a powerful effect on the outcome! In this way, the placebo must be considered medically active, although we began by defining it as inactive.[81] Initially the placebo effect was judged by some researchers to depend on those who experienced it having a lower intellectual level, but that is not the case. The effect has also occasionally been described as psychological or imagined. But today the placebo effect is regarded as a bio-physiological result of our expectations. Research shows that expectations alone can lead to the formation of medically active substances in the brain and body that affect our well-being. For example, if a doctor gives us hope that a medicine will work, the chances that it does work increase. It is likely that this explains much of the effectiveness of alternative medicine treatments and supplements.

Can we assume that the physical environment can have a corresponding effect? Could the *expectation effect* explain the impact of attractive architecture? A beautiful healthcare environment gives us expectations of recovery, and an ugly one doesn't. In my own design projects I have often

[80] A good and interesting introduction to the subject (in Swedish) may be found at http://media.medfarm.uu.se/play/kanal/172/video/2640. [Accessed: 28 August 2015].
[81] Sandal et al. proposed the term *context effects* instead of *placebo* to explain these effects. "Context effects are defined as the effects of a given treatment, not directly caused by the treatment itself, but rather caused by the context or environment in which the treatment is given. Context effects may be considered as a parallel to placebo effects, which have been one of the most debated topics in modern medicine. Several authors have objected to the term placebo, as they argue that the definition is self-contradictory and inadequate. Placebo is classically defined as giving an inert substance or treatment. However, if placebos are inert, they cannot have an effect, and if they have an effect, they cannot be inert." See (Sandal, 2015, p. 2)

made the assertion that “first impressions last”—that it is very important to give visitors a positive, welcoming impression of the building when they arrive for the first time. It is very difficult to win back the overall credibility of the care if the building itself is not perceived as good. Thus, as I’ve already suggested, the question is whether buildings—which might be considered medically inactive interventions—could have medicinal effects. Simply put, can architecture have a healing effect?

## 7.3 Emotions

We now return as promised to Esther Sternberg’s interesting book *Healing Spaces: The Science of Place and Well-Being*. Her point of departure is the positive effect that surroundings of natural beauty and sacred places can have on our mood and emotional state. Sternberg attempts to show how a well-designed physical environment can improve our well-being and recovery—even in more ordinary environments like hospitals. Sternberg is a well-known researcher, writer, and lecturer who specializes in how the immune system interacts with the central nervous system. She also gives examples in her book of “healing spaces,” which she says have helped her deal with everyday stress as well as deep sorrow.

She wrote about the trees outside her window “in a suburban Pennsylvanian hospital”:

> *… there is something about trees that promotes healing. Could it be their color—the soothing greens of nature? Could it be that trees provide more movement, more activity, more life to observe, so that you don’t need to invent counting games to keep yourself occupied? Could it be that the light streaming through the window changes how you feel and how you heal? (Sternberg, 2010, p. 25)*

In his 1984 article, Ulrich was able to show that the trees outside their hospital window made patients feel better and recover more quickly. The theoretical explanation was that the level of stress was lowered when the trees were in view. But Sternberg wanted to go further—not just to demonstrate that this happens, but also to know why it improves our chances of recovery. What are the biological processes that occur in the mind and body? How do we take in impressions from our surroundings—primarily through our senses of sound, sight, and smell—and how are these communicated to the brain, giving rise to feelings, interpretations, and appropriate responses from the body? It is a very sophisticated and

complex bio-physiological system. With today's modern technology of PET scanners and MR imaging we can now study in real time which regions of the brain are activated by various kinds of stimuli, and how these affect our feelings:

> *With the modern techniques /…/ we can piece together how the elements around us, which we perceive through our senses, can trigger different areas of the brain in order to generate feelings of awe or fear or peace and comfort. (Sternberg, 2010, p. 14)*

In another place Sternberg writes:

> *What we do know is that the same nerve chemical and cell processes that create mood and imbalance of mood are also involved in our perception of the world around us. (Sternberg, 2010, p. 15)*

If I understand her correctly, then, there are processes—connections between cells, hormones, and so forth—that are active elements in our perceptions and also participate in the formation of our feelings. And then parts of the brain that link to the body's systems for pain relief, desire, and reward are also involved. In other words, it is not just a matter of counteracting negative feelings of stress (as in the stress-reduction theory), but also creating positive feelings that contribute to healing. All this sounds exciting, but can the design of our hospitals really generate emotions to such an extent that it can impact our health?

When it comes to the placebo effect, Sternberg's position agrees with my earlier reasoning—that it is a result of hope, faith, or expectation. It is rooted not in imagination or some other "psychological effect," but rather in powerful biological reactions. Expectation can produce the body's production of the natural opiates that reduce pain, or the dopamine and endorphins that increase our positive feelings, in both cases improving our prospects for healing.

Sternberg's story of unity between body and mind has fascinated me, and it seems that many people today are hoping for more knowledge and new discoveries in this area. For example, the 2014 Nobel Prize in Medicine was awarded to Norwegians May-Britt and Edvard Moser "for their discoveries of cells that constitute a positioning system in the brain."[82] Since 2003 there is also a special organization, the Academy of Neuroscience for

[82] http://www.nobelprize.org/nobel_prizes/medicine/laureates/2014/ [Accessed: 9 August 2015].

Architecture (ANFA),[83] that focuses specifically on the relationship between the brain and our manmade surroundings. Their mission "is to promote and advance knowledge that links neuroscience research to a growing understanding of human responses to the built environment."[84] Of course we architects don't need to become neurologists, but perhaps neuroscience can inspire us and reveal new connections in the field of architecture.

The three terms with which we began this chapter—attractiveness, placebo, and emotions—are all to some extent about the same things: they deal with the important role that expectations play in the effectiveness of healthcare treatments, and they deal with the way the physical environment shapes our view of those treatments and the way we are received.

## 7.4 Further Research

My research never really addressed the question of architecture's healing effects, whether in healthcare generally or in forensic psychiatric care in particular. In that sense this thesis is unsuccessful. But what expectations was it reasonable to have for such studies? What kind of answer did I really expect? I never actually thought much about that question. Did I really expect to be able to explain what architects have been trying to describe and express for hundreds—perhaps thousands—of years?

In recent years I have probably spent a good deal more time reading research reviews, articles, and books about evidence and evidence-based design than all the hours I've spent reading about architecture in general during my nearly four decades as a practicing architect. How much has it influenced my thinking? Has it changed the language and terminology I use? Probably. It therefore feels necessary to take a step back now and look at healing architecture again from the perspective of architecture and architects.

Have my research so far contributed for any practical application? I consider this a critical question to discuss before considering further research. And what kind of studies going forward would be most relevant to professional practice? Should my future research continue to be theoretical, or should it have more practical elements, including gathering my own empirical data? Or could I continue to rely on "second-hand empirical data" gleaned from research literature? What knowledge can be gained from

[83] http://www.anfarch.org/
[84] http://www.anfarch.org/mission/ [Accessed: 9 August 2015].

each of these two choices? Today my heart lies with the theoretical field, which I believe can provide interesting contributions to architects and healthcare planners even in the near term.

It seems logical to me that the first thing to be done is the homework I've long neglected: I have never done a systematic literature search for the term *healing architecture*. Nor have I done one for EBD or for criticism of EBD. That may seem strange, but it can be explained—for right or wrong—by my judgment that I would not be able to cope with more data than I have already accumulated from various sources. There is good reason to believe that such a search would generate more ideas for new and different studies than I could conceive of today.

The practical research track leads back to the built works of architecture. What buildings are considered to have healing attributes and what architectural characteristics do they have? Characterization studies would be one way to make progress in the search to identify the attributes of healing architecture. Conversations with the architects about the inspirations, thoughts, and ideas that went into the design of the buildings should be ble to uncover a few shared traits and ideas. Those traits might possibly be gleaned from the architects' own project descriptions in professional journals and in some cases books. However, the architects I know have seldom expressed much familiarity either with general theoretical arguments or with the more concrete conceptual ideas underlying their work. But shouldn't our observations, in combination with qualitative studies, be incorporated into a more theoretical and scientific frame of reference? My immediate answer is yes. But maybe that answer should be questioned: maybe sometimes we should allow our observations to stand alone, pure and unadulterated, instead of trying to force them into a tight and ill-tailored suit—a too narrow theoretical framework.

It should be possible to identify interesting people to interview among the larger architecture firms of the Nordic region, where there are currently a large number of ongoing healthcare projects. Perhaps there is also reason to visit some of the smaller and more idealistic facilities, such as Maggie's Centres and the anthroposophic Vidar Clinic, which are built on more outspoken ideological foundations.

I already planned a study intended to identify the concepts normally used to describe architecture by architects compared to evidence theorists. I was concerned that I might almost have forgotten what those concepts are. What terms did the jury for the Kasper Salin Prize, Sweden's highest architectural honor, use to describe the best architecture in Sweden in each of the last twenty years? I would like to come back to that study.

But why ask architects for advice? Why not go directly to the people who are most affected by the work I am trying to do—the patients and possibly even their families. Wouldn't that be natural? Of course, that's where the data is! I can't immediately think of any reason not to other than that the patients are probably relatively unaware of their feelings and unlikely to be able to relate them to architecture. Perhaps I should look to the healthcare workers—they have a longer and more systematic experience, experience that has already contributed to the development of healthcare science theory. What would be the result if I now, almost ten years after the completion of Sahlgrenska Östra's psychiatric care facility, spent some time there to observe and to interview the patients and staff?

But the question of architecture and construction is not merely a question for architects and patients. How do our clients view their responsibility as developers of buildings as a consequence of political agendas and legislative decisions? What does healing architecture mean in their world—a world in which time and money naturally are key parameters? We architects usually claim that the architecture can be no better than the client demands. It is up to us architects, then, to try to convey our knowledge about the importance of healing architecture to our clients—a tricky challenge considering how limited our own understanding of the subject is. But I would like to be able to engage my clients more in my research, not just my design work for them. In this context, it would be interesting to study what the county councils' property management departments have to say about the importance of healing architecture in their publications. I doubt there is much to report there. One exception would be the nearly twenty-year-old booklet *Vårdens Rum. Att forma rum för människan i vården* (Healthcare Spaces: Designing Space for People in Care),[85] written and illustrated by the interior architect Olle Anderson for the property management department of Bohuslän County.

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Sometimes the science of architecture is described as a young and underdeveloped discipline. What are the genuinely architectural questions, and what are the appropriate methods to use in answering them? I do not have enough knowledge today to better describe or comment on them. But it is reasonable to expect architectural science to strive to find its own authentic area of knowledge. At the same time, it must relate to other scientific disciplines to find inspiration and also to identify its limits. Is it primarily a natural science or a humanistic science I'm looking for? Architecture is traditionally seen as belonging to the humanities, while medicine,

[85] (Anderson, 1996)

for example, is regarded as a natural science. But perhaps this question is of little or no importance—isn't it obvious that it belongs to both? However, the discussion about the relative importance and legitimacy of the natural sciences and the humanities is often intense and vocal in academic settings.

Natural science research is primarily *quantitative* and often based on statistical analyses of measurements. The humanities, on the other hand, are primarily *qualitative* and descriptive, intended to increase our understanding of a specific phenomenon. Natural science research is normally short and concise in the way it is presented, while humanistic studies are often extensive. A related issue is whether the research makes use of measurements, and here I return to a quotation I used previously: "Everything that we can measure counts, but not everything that counts can be measured."[86]

Is it possible to measure every imaginable aspect of architecture? If not, is that only because of the inadequacy of the available methods, measuring instruments, and so forth? Will it some day be possible to measure everything, at some point in the near or distant future, when the right methods and tools become available? Some researchers have decided to consciously reject measurement, and to make no attempt at all to compete with measurement-based research. Not everything that counts can be measured! Instead they have decided to make use of the humanities' traditional descriptive approach as a more or less concrete tool for architects' practical action. Ola Nylander's book, tellingly entitled *Bostadens omätbara värden* (The Non-Measurable Qualities of the Home), is representative of this attitude in my paper. Personally I feel a certain kinship with that position. But at the same time, there is no reason to question measurement itself when the conditions are right for it. What good would Roger Ulrich's 1984 article have been without the numbers? Without really taking a position on measurement as a phenomenon, one can easily see that research findings presented in simple numeric form are extremely forceful. If not for Lennart Bogren's numbers tracking the reduction in the use of compulsory treatment measures in the new psychiatric building, which he presented in *Architecture as Medicine*, I would not have met Ulrich and

[86] A. Einstein quoted by Nasraway, J (2007) Sitting on the horns of a dilemma: Avoiding severe hypoglycemia while practicing tight glycemic control. *Critical Care Medicine 35(10)*, s 2435-2437 enl. Hamilton, D.K. (2013) *Rigor and Research in Healthcare Design. A decade of Advocacy.* P. 186.

the building would not have gained nearly as much attention as it did.

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On the more theoretical track I also see an urgent need for us architects to try to understand patients' and their families' feelings and experiences about their illness and their stay in the hospital. It is critical for architects to be able to put themselves in another's situation in order to be able to create environments that bolster their well-being. There are several sciences that can lead the way and provide inspiration. One path leads through psychological studies and through neurophysiology. I think continued study in *healthcare science* and more knowledge about *hermeneutic phenomenology*[87] could be of interest. Thinkers such as Martin Heidegger, Maurice Merleau-Ponty, Edmund Husserl, Hans-Georg Gadamer, and Gaston Bachelard would be on the reading list, along with phenomenology-inspired architects and architectural theoreticians such as Christian Norberg-Shulz, Juhani Pallasmaa, and Peter Zumthor. Perhaps *psychotherapy* can also make a contribution to increased empathy and understanding. In the field of healthcare science there are also studies and definitions of terms such as health, well-being, etc., which we architects need to define for our own context. The path through neurophysiology, then, is not primarily about understanding the biology of the brain but rather about the general findings and understanding they provide, which can inspire and inform our thinking about architecture.

In this context, I also see it as desirable to make myself familiar with the theory of perception. How do we understand our surroundings, and how do we react to them? How do we take in stimuli, how do our senses convey these, and how are our actions affected by our interpretations? In Gestalt psychology, there are also ideas about perception of the surrounding world in the form of "Gestalts" that are also related to ideas about the character of the whole.

However, as one friendly advisor noted, "That looks to me like a jungle from which no man emerges with his sanity intact." Aesthetics: I've been warned against taking on that issue. But how long can it be avoided?

[87] Hermeneutics is a form of interpretation that involves creating an understanding for the meaning, implication, and values in a text, and action, a decision, an article of clothing, etc. It is particularly concerned with the background and the context in which the interpreted in anchored. A hermeneutic interpretation gives us an explanation by locating a phenomenon in its proper human, historical, social, economic, or artistic contest. http://www.psykologiguiden.se/www/pages/?Lookup=hermeneutik [Accessed: 15 August 2015].

What do we mean by beautiful, pleasant, or attractive? What is it that instills in us a feeling of well-being? Is taste completely subjective, based on cultural background and so forth, or are there universal values on which to base architecture? Positive experiences of a building, which can in part be described as aesthetics, perhaps correspond to some of the qualities we're searching for and which we assume ought to promote healing, recovery, and well-being. I believe that earlier thinkers can help me sort through the concepts even if the field of aesthetics is huge and includes questions about artistry, etc. that are not always linked to feelings of well-being.

In the history of modernism's aesthetics I hope to find help in understanding and addressing ideas about "form follows function" and "the functional *is* the beautiful," two expressions from the flowering of modernism. These are slogans whose meaning is hard to fully realize even today, and hard to free ourselves from—they are unavoidable intruders in any attempt to describe the feelings inspired by beauty.

My lack of knowledge about *scientific theory* and *contemporary architectural theory* is monumental. It might be possible to remedy that within the framework of doctoral program research.

Summary of practical studies:

- *Characterization of modern healthcare architecture.*
- *Interview healthcare architects.*
- *What do patients and staff say? Return to Sahlgrenska Östra for interviews?*
- *What do our clients think about healing architecture?*
- *Language and terminology used in EBD literature and by the Kasper Salin jury.*

Summary of theoretical studies:

- *Database searches for "healing architecture."*
- *Database searches for EBD and EBD criticism.*
- *Healthcare science, including concepts.*
- *Hermeneutic phenomenology and its architectural theoreticians.*
- *Perception.*
- *Aesthetics.*

Of course we know that architecture influences us—we feel it intuitively. But exactly how does it happen? That we know very little about—surprisingly little. It is both remarkable and fascinating that we architects, who have been around for hundreds of years—in some places thousands—

have such a hard time concretely demonstrating how our architecture influences human experience, and perhaps even human behavior. And that is not just about hospitals, healing, and recovery from illness; it's about how the entire consciously manmade physical environment, our architecture, impacts our health and well-being. Surely, then, there is a reason to reflect on what the research to date can actually tell us, and what we might expect from further research. In any case the pursuit of that knowledge is an indication of our human inclination to strive for good and to satisfy our curiosity.

*Gothenburg, Sweden. September 1, 2015.*

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