

**HEALING BY DESIGN:**  
HOW SUSTAINABLE DESIGN STRATEGIES THAT PERTAIN TO THE  
BUILT ENVIRONMENT CAN BE FOUND IN THE FRAMEWORKS AND PRINCIPLES  
OF COMPLEMENTARY & ALTERNATIVE MEDICINE

A thesis  
Presented to the Faculty of the Graduate School  
of the State University of New York Fashion Institute of Technology  
in Partial Fulfillment of the Requirements for the Degree of  
Master of Arts in Sustainable Interior Environments

by  
Michael Wickersheimer  
May 2013

Mentor: Janus Welton

©2013 Michael Wickersheimer

This is to certify that the undersigned approve the thesis submitted by

Michael Wickersheimer

In partial fulfillment of the requirements for the degree of Master of Arts in  
Sustainable Interior Environments

---

Grazyna Pilatowicz, Chairperson

---

Janus Welton, Mentor

---

Mary Davis, Dean, School of Graduate Studies

## ABSTRACT

This investigation of complementary and alternative medicinal therapies aims to demonstrate that sustainable design strategies that relate to the built environment can be found in the principles of complementary and alternative medicine. The concept of health and healing as it relates to the human body, the built environment, and sustainability is discussed, including an examination of biophilic design as a possible framework. Alternative medical systems including traditional Chinese medicine and Indian Ayurveda are surveyed, in addition to other complementary and alternative therapies, in order to determine potential elements relatable to sustainable design. Five topics culled from complementary and alternative medicine are designated and discussed: Harmony, Nutrition, Spirit, Orientation & Circulation, and Senses. Further investigation into alternative medical systems is suggested in order to generate additional relevant concepts.

## BIOGRAPHICAL SKETCH

The author graduated *cum laude* from Carleton College in Northfield, Minnesota with a BA in Sociology & Anthropology. After relocating to New York City, he spent nearly a decade working for various internet companies before returning to school and graduating *summa cum laude* from the Fashion Institute of Technology with an AAS in Interior Design. He currently works in NYC as an Interior Designer with a primary focus on healthcare interiors.

## DEDICATION

I would like to dedicate this thesis to everyone who works, each in his or her own way, towards a healthier, happier and more sustainable planet.

## ACKNOWLEDGMENTS

I would like to thank Grazyna Pilatowicz, for both her tireless dedication to the SIE program and her limitless patience with me; and Janus Welton, for helping me to give shape and form to many of the ideas presented here.

## TABLE OF CONTENTS

|   |      |
|---|------|
| ABSTRACT .....  | iv   |
| BIOGRAPHICAL SKETCH .....   | v    |
| DEDICATION .....  | vi   |
| ACKNOWLEDGMENTS .....   | vii  |
| TABLE OF CONTENTS.....  | viii |
| CHAPTER 1 INTRODUCTION .....  | 9    |
| CHAPTER 2 REVIEW OF LITERATURE.....   | 14   |
| Examination of the Healthcare Built Environment and Its Relationship to<br>Sustainability .....       | 14   |
| Concept of Healing As It Relates to the Human Body, the Built Environment and<br>Sustainability ..... | 17   |
| From Biophilia to Biophilic Design, and Lessons Therein.....  | 20   |
| CHAPTER 3 ANALYSIS .....  | 22   |
| Alternative Medical Practices .....   | 22   |
| <i>Chinese Medicine and the Traditional Practice of Feng Shui</i> .....                               | 22   |
| <i>Indian Ayurveda and the Traditional Practice of Vastu</i> .....                                    | 27   |
| <i>Naturopathy and Homeopathy</i> .....   | 33   |
| Remaining Categories of Interventions and Therapies.....  | 34   |
| CHAPTER 4 RESULTS .....   | 36   |
| Harmony .....   | 36   |
| Nutrition.....  | 38   |
| Spirit.....   | 39   |
| Orientation & Circulation .....   | 41   |
| Senses.....   | 42   |
| CHAPTER 5 CONCLUSION .....  | 44   |
| REFERENCES .....  | 46   |

## CHAPTER 1 INTRODUCTION

This investigation of complementary and alternative medicinal therapies aims to demonstrate that sustainable design strategies that relate to the built environment can be found in the frameworks and principles of complementary and alternative medicine. In this manner, design theories can be both adapted and adopted from non-Western medical models in order to inform a new understanding of sustainable interior environments as they relate to human healthcare.

Throughout the course of the 19<sup>th</sup> century, it was infectious diseases like smallpox, tuberculosis, typhoid and pneumonia that were responsible for the majority of deaths (Guenther & Vittori, 2008, p. 25). The easy and rapid communication of these diseases was associated with poor housing conditions, overcrowding, limited access to air and light, contaminated drinking water and a proliferation of waste. These diseases were ultimately controlled through the concerted and combined efforts of doctors and urban planners and architects via increased sanitation, better city planning and improved building regulations. Now, in the 21<sup>st</sup> century, the dominant diseases are chronic long-term illnesses like cancer, heart disease, stroke and diabetes as well as chronic respiratory illnesses like asthma and environmental-based allergies. Does a causal link exist between these diseases and the built environment? Moreover, is there a way that the built environment can address and ultimately confront these chronic long-term illnesses?

While modern clinical medicine – which broke away from preventive medicine in the early 1900s, shortly after the conquering of infectious disease noted above (Guenther & Vittori, 2008, p. 29) – is most-often utilized in North America and Europe to fight today's disease, there is a long history of alternative medicinal practice, some botanically-based and others cultural or behavioral, which attempts

to alleviate some if not all of our collective ills. These alternative medicines can be used alone or complemented with existing modern techniques to provide non-conventional therapies which attempt to fight illness and promote health and wellness. According to the *American Journal of Public Health*, both traditional and complementary and alternative medicine have claimed an increased public awareness over the last twenty years, and “studies have documented that about half the population of many industrialized countries now use [complementary and alternative medicine], and the proportion is as high as 80% in many developing countries” (Bodeker & Kronenberg, p. 1582).

A survey of complementary and alternative medicine use among adults and children in the United States compiled from the 2007 National Health Interview Survey found that almost 40% of adults had used an alternative or complementary therapy in the previous twelve months, while one in nine children had done the same (Barnes, Bloom & Nahin, 2008, p. 1). The use crossed all ethnicities – ranging from 50% of Native Americans surveyed to 25% of African Americans – and showed that “when worry about cost delayed receipt of conventional care, individuals were more likely to use [complementary and alternative medicine] than when the cost of conventional care was not a worry” (Barnes, Bloom & Nahin, 2008, p. 1). The results supported an earlier study of health plan members of a managed care organization in Minnesota from 2002 which found that “users of [complementary and alternative medicine] tended to be female, younger, better educated and employed... [and] reported more physical and emotional limitations, more pain, and more dysthymia but were not more likely to have a chronic condition” (Gray, Tan, Pronk & O’Connor, 2002, p. 17).

Concurrently, sustainability has become an important factor in the design and construction of the built environment. Sustainable building practices, recognized through accreditation processes like LEED and the Living Building Challenge, aim to produce buildings which minimize their ecological footprint,

conserve energy and water, provide a toxin-free environment and encourage cradle-to-cradle thinking and practice. It is widely recognized that healthcare spaces in particular can benefit from sustainable practices by focusing on conservation and efficiency; indoor environmental quality including air quality, lighting and acoustics; appropriate materials use; and bioregionalism and biophilia. Investigating the principles of complementary and alternative medicine should yield effective sustainable design ideas that can be adapted for use in the built environment.

While the ancient Chinese philosophical practice of feng shui “operates on many levels: superstitious and practical, sacred and profane, emotional and physical” (Rossbach, 1984, p. 2), its history is rooted in an understanding of the innate connection between nature and humanity. For instance, in ancient China, it was always taught that one builds a house halfway up a mountainside facing south in order to maximize daylight and protect from harsh winds and flooding while still remaining near a viable source of water. Literally translated as “wind” and “water,” feng shui “supports the modern idea of conservation and ecology...its message is: harmonize with, do not disrupt, nature, [as] tampering with nature might disrupt its equilibrium” (Rossbach, 1984, p. 9-10). Feng shui’s relation to complementary and alternative medicine, especially its understanding of qi (energy), will be further explored.

This investigation will seek to discover those aspects of complementary and alternative medicine which can be adapted into general considerations when designing and building sustainable healthcare spaces. Just as modern sustainable building methods often mine our architectural past to discover elegant solutions to seemingly complex problems, the rich heritage of alternative medicinal practices from cultures around the world should provide similar guidance into how best to design our healing spaces in order to maximize the benefits to and protection of both the patient and the planet.

Alternative medicine can be understood as those practices which seek to heal but fall outside the realm of modern conventional, also known as “Western,” medicine practiced by medical doctors (MD), doctors of osteopathy (DO), physician assistants (PA), nurse practitioners (NP) and other health professionals such as physical therapists, psychologists and registered nurses. Complementary medicine refers to the use of alternative medicine in conjunction with conventional medicine. For purposes of this investigation, the abbreviation “CAM” – referring to complementary and alternative medicine – may be used to refer to the broad range of alternative therapies including, but not limited to, acupuncture, Ayurveda, Chinese medicine, chiropractic, holistic medicine, homeopathy, naturopathy, yoga, and various forms of massage.

According to the National Center for Complementary and Alternative Medicine (NCCAM) at the National Institutes of Health, CAM practices can be divided into broad categories of biologically-based practices, those using herbs, vitamins, minerals and probiotics; mind-body-based practices, those focusing on the interactions between the brain, body and behavior; body-based practices, those concerned with structures of the body such as bones, joints, tissues and circulatory and lymphatic systems; energy-based practices, those involved with the manipulation of various electromagnetic and bio-energy fields; and whole medical practices, complete systems which have developed over time in various cultures apart from conventional medicine such as Ayurveda in India or traditional Chinese medicine.

For purposes of this investigation, sustainability is defined as the design practice through which buildings meet a series of ecological, conservation and human health goals in order to minimize the harm to the global and local environment and to the eventual inhabitants and users of the built space. Other important aspects of sustainability, including social equity and the economic factors which impact human culture and its business practices, will be considered only

where applicable. Additionally, the term holistic design is used in many industries to denote a process which considers how multiple and complex parts function with one another as well as within a larger whole which is itself part of an even larger system. Holistic design thinking appears in such widely varied fields as computer programming, robotics, education, product design, medicine and architecture.

In *The Philosophy of Sustainable Design*, Jason McLennan writes that “successful sustainable design requires a shift in status quo thinking about how things are put together, how they are operated and how they are maintained... If the sustainable design process had a single name it would be holistic thinking” (McLennan, 2004, p. 218). Likewise, holistic medicine considers that all aspects of an individual’s health – including physical as well as mental, behavioral, psychological, social, economic and cultural – should be considered. The holistic thinking found throughout both sustainability as well as the fundamental frameworks of complementary and alternative medicine should inform many of the results of this investigation. These design ideas and theories will be concerned with sustainability by their very nature, having been born of traditional and cultural medicinal practices which are intrinsically holistic and interested in treating the whole of human health instead of a series of disparate parts.

## CHAPTER 2 REVIEW OF LITERATURE

While much has been written about the healthcare built environment and its relationship to sustainability, the majority of spaces studied and theorized have been those that practice conventional medicine. Little attention has been paid to the practice of complementary and alternative medicine and how it relates to the design and construction of healthcare spaces, especially the core concept of healing that can be found in many complementary and alternative medicinal therapies. The following is provided as a review of relevant existing literature and is not intended to give a full account of these concepts but rather provide an outline of pertinent background information.

### **Examination of the Healthcare Built Environment and Its Relationship to Sustainability**

Before evidence-based design began to exert an influence on the creation of Western healthcare spaces, researchers had already initiated the process of linking design decisions with patient health. By the 1980s, many environmental characteristics had already been found to affect healthcare outcomes, such as the reduction of excessive noise; the inclusion of windows in patient rooms offering views to the outdoors; access to daylight, especially sunshine; the designation of single-patient rooms; an informed choice of flooring materials and furniture arrangements; as well as other factors like color, music, art, nature and air quality (Ulrich, 2001). Later research suggested that aesthetics play an important role in human health (Caspari, Eriksson & Nåden, 2006), and new information technologies were found to influence the quality of delivered care through increased “communication and interaction patterns among both clinical staff and patients” (Becker & Parsons, 2007, p. 265).

It has been noted that environmental stimuli of an emotional or cognitive nature “may act through psychological processes as a result of sensory perceptions” (Dijkstra, Pieterse & Pruyn, 2006, p. 167) whereby the presence of plants in a healthcare environment, for instance, reminds patients of home, thereby decreasing anxiety and promoting recovery. Additionally, stress reduction in healthcare settings is important not only for patients – through such things as a sense of control over one’s environment, as well as social support and adequate diversions – but also the staff, as “undue stress generates negative effects on caregivers just as it does on patients” (Berry, Parker, Coile Jr., Hamilton, O’Neill & Sadler, 2004, p. 7).

A concurrent set of literature has begun investigating the effects of sustainable design in the built environment. A study undertaken by furniture manufacturer Steelcase and reported on in *Environmental Design + Construction* revealed that, while much of the research on the impact of sustainable design is focused on measureable outcomes like energy and water conservation, “many of the prominent features of green buildings are likely to have their greatest impact on cognitive and psycho-social well-being” (Heerwagen, 2000, p. 25), such as contact with nature improving mood or relaxation areas enhancing social interactions and fostering a sense of belonging. In a green design and operations survey, the quality of the indoor environment for staff, patients and families scored nearly as high as lower energy costs as “very important” factors influencing a hospital’s decision to pursue sustainable construction and renovation, while “demonstrates environmental and social responsibility” and “positive impact on surrounding community” scored highly as well (Carpenter & Hoppszallern, 2008).

In a workshop summary of the Roundtable on Environmental Health Sciences, Research and Medicine, the authors assert that while sustainable healthcare design is economical, long-term and prudent, it is also aspirational –

in aiming not only to avoid additional harm to already sick patients but also to enhance their overall well-being – and contextual, yielding benefits “not only within their own walls, but also in the context of the community” (Frumkin, Coussens & US Institute of Medicine, 2007, p. 3). In addition, a survey given to healthcare facility administrators found a synergistic correlation between evidence-based design and “eco-effective design” (Shepley, Baum, Ginsberg & Rostenberg, 2009), concluding that these two design philosophies overlap substantially. In this manner, sustainability aims to increase the health and wellness of the inhabitants of interior environments through the informed choice of construction and finish materials, the provision of toxin-free environments, an adequate access to daylight and views to the outdoors, attention to proper space planning techniques, the regulation of indoor air quality and the inclusion of bioregionalism and biophilia as functional design precepts.

Over the course of the last thirty years, write Robin Guenther and Gail Vittori in *Sustainable Healthcare Architecture*:

[Many Western healthcare buildings] have adopted a range of typological models – the medical mall, hospitality, and the corporate headquarters. Healthcare has not evolved a unique typology in response to cultural or philosophical notions of health, community history, or meaning. In contrast, sustainable design challenges the standardization of building typology. (Guenther & Vittori, 2008, p. 340)

This is accomplished in a variety of ways. For instance, there are bioregional differences in climate, where meteorological factors such as temperature, levels of humidity and the prevalence of wind require architectural solutions which respond to these varying factors. Using indigenous materials, those sourced locally and regionally, can help support the growth of unique architectural

solutions as well as strengthen local economies and save the economic and ecological costs of transporting building materials from far away. By using local resources, people are also more apt to recognize what is familiar and feel a keener sense of connection to a place. Additionally, it is important to recognize that hospitals and other healthcare facilities, occupied as they are by individuals experiencing varying levels of ill-health and stress, need interior spaces which acknowledge the emotional, psychological and spiritual aspects that this entails. In other words, we design and construct sustainable healthcare spaces which make people feel welcomed, help them feel at home and give them a place where, free from anything which might inadvertently make them more sick, they have a chance to rest, recuperate and heal.

### **Concept of Healing as It Relates to the Human Body, the Built Environment and Sustainability**

It may seem unsurprising that the concept of healing as it relates to the human body can be viewed as the ultimate goal of any health-related intervention. While the process of healing is one of “recovery, repair and the return to wholeness” (Jonas & Chez, 2004, p. S-1), the word “healing” itself derives from the Anglo-Saxon word “haelen,” which means to make whole, and “one way to understand the term is as harmony of mind, body, and spirit” (Zborowsky & Kreitzer, 2008, p. 35). The Samueli Institute, a nonprofit organization dedicated to research on healing, has created a model of Optimal Healing Environments (OHEs) which suggests that healing is “the result of intention, personal wholeness, relationships, healthy lifestyle, collaborative medical care, healing organizations, and healing spaces” (Zborowsky & Kreitzer, 2008, p. 35), where the physical manifestation of the healthcare interior environment plays an important role alongside appropriate medical intervention and the interpersonal

relationships between patients, their families and friends, and medical staff. Researchers investigating the views of healthcare patients and clinicians on the concept of healing found five common themes: it is multidimensional & holistic; it is a process or journey; its goal is recovery and restoration; it requires an individual reach a place of personal balance and acceptance; and relationships are essential (Hsu, Phillips, Sherman, Hawkes & Cherkin, 2008). Some of these echo the stated goals of OHEs, which will be discussed in depth later in this section.

These same researchers found that “there has been little empirical research on healing in modern healthcare, and we have little evidence on how physicians and other members of primary care clinical teams see their roles in healing” (Hsu, Phillips, Sherman, Hawkes & Cherkin, 2008, pp. 307-308). They also acknowledge that while “anthropological research on healing tends to focus on documenting non-biomedical practices and eliciting deep symbolic and structural meanings from healing practices,” it is actually complementary and alternative medicine which “often examines systems of healing outside the scientific biomedical model” (Hsu, Phillips, Sherman, Hawkes & Cherkin, 2008, p. 307). Without explicitly stating so, these researchers seem to suggest that Western models of medical care should consider complementary and alternative medicine’s views on healing in order to engender a more comprehensive understanding of it.

OHEs, as stated earlier, focus on healing in the interactions between personal conviction, medical care and architectural spaces as well as “concentrate on the patient in the multifaceted context of the health care setting beyond the standard facility priorities of efficiency, costs, conventional treatments, and staff-centered perspectives” (Horowitz, 2008, p. 300). The physical environment found in many Western healthcare spaces can play an important and often detrimental role in the behaviors, actions and interactions of

patients, families and staff; for instance, “many hospitals are stark, cluttered, intimidating institutions with multiple entrances, unclear signage, and disorienting corridors” (Schweitzer, Gilpin & Frampton, 2004, p. S-72), “most hospitals today are designed to meet the needs of technology more than spiritual needs of patients, families, or staff” (Schweitzer, Gilpin & Frampton, 2004, p. S-72), and “some have gone so far as to compare hospitals to prisons” (Zborowsky & Kreitzer, 2008, p. 36).

OHEs encompass seven major elements which attempt to foster a more holistic approach to the integration between the medical care which a patient receives and the environment, both physical as well as psychological, in which the patient receives it. These elements – developing awareness and intention, experiencing personal wholeness, cultivating healthy relationships, practicing healthy lifestyles, applying collaborative medicine, and creating healing spaces (Jonas & Chez, 2004, p. S-3) – attempt to bridge the apparent gap between one’s immediate environment and the course of action through which one begins the process of healing. Though the development of the OHE model may be somewhat unique in the relatively short history of modern Western healthcare, similar strategies have been in existence elsewhere for millennia:

Other models that emphasize physical design in connection with healing to varying degrees include: Feng Shui, the ancient Chinese study and art of the natural and built environment to promote good qi (energy flow); Vastu, the ancient Indian Vedic concept of harmony between all aspects of the internal and external environment; sacred geometry (e.g., the Native American orientation to the Four Directions); the spa, as it typically entails a caring staff that addresses clients’ needs of stress reduction, health issues, and pampering; the Planetree hospice model that underscores continuous review of the health care setting from the patient’s perspective; and Rudolph

Steiner's holistic anthroposophic medicine and architectural ideas that influenced village-like clusters consisting each of a healing center, school, gardens, and other facilities in Europe. (Horowitz, 2008, p. 302)

In fact, "there is a growing amount of research showing how an environment based in positive intention, wholeness, and relationship-centered care can enhance the healing process independent of the tool used, be it drugs or acupuncture needles" (Rakel & Jonas, 2007, p. 15). This investigation into the precepts and practices of complementary and alternative medicine will attempt to shed further light on how interior environments interrelate with the process of healing as it relates to the human body as well as sustains the greater environment in which we live.

### **From Biophilia to Biophilic Design, and Lessons Therein**

Although many of its core concepts are born from within, not all ideas and theories which relate to the built environment come from the realms of art, architecture, engineering and design. Take, for example, biophilic design – the "innovative approach that emphasizes the necessity of maintaining, enhancing, and restoring the beneficial experience of nature in the built environment" (Heerwagen, Kellert & Mador, 2008, p. vii) – which developed out of the theory of biophilia, a term originally coined by the social psychologist Erich Fromm and further developed by the biologist Edward O. Wilson in the 1980s. Wilson posited that the sociological shift towards urbanization which started with the Industrial Revolution was robbing humanity of a necessary connection to the natural world, and he subsequently "pioneered a new school of thought focused on the need to bring humans back in contact with nature" (Terrapin Bright Green, 2012, p. 5).

The concept of biophilia holds that humans not only require a connection with nature on physical as well as mental and social levels, but that “this connection affects our personal well-being, productivity, and societal relationships” (Terrapin Bright Green, 2012, p. 5). Furthermore, humanity’s innate desire for this connection to nature reflects millennia of evolution in a predominantly natural world as opposed to an artificially-constructed one where “the evolutionary context for the development of the human mind and body was a mainly sensory world dominated by critical environmental features such as light, sound, odor, wind, weather, water, vegetation, animals, and landscapes” (Heerwagen, Kellert & Mador, 2008, p. vii). In this manner, then, we can turn to biophilic design in order to help incorporate these elements into our artificially-built environments and attempt to resuscitate our innate connection with nature which we have largely ignored over the course of the past several centuries.

It is not coincidence that concepts found in our biological imperatives have a direct influence on how we interact with the world which surrounds us, whether the natural world at large or the artificial built environments we construct in order to provide shelter from the elements and maintain a level of safety and protection from the very same natural world with which we require constant contact. If the “ancient assumption that contact with nature is critical to human functioning, health, and well-being” (Heerwagen, Kellert & Mador, 2008, p. 4) is manifest in the concepts of biophilia and practically applied to the theory of biophilic design, can analogous “ancient assumptions” found in the principles and frameworks of complementary and alternative medicine provide a similar insight into design precepts aimed at exploring a connection between these medicinal practices and their interrelationship with human health and well-being? This investigation aims to uncover any causal links which may exist and determine what, if any, potential design elements which relate to the sustainable built environment can be found in complementary and alternative medicine.

## CHAPTER 3 ANALYSIS

According to the NCCAM, which was established by an act of Congress in 1998, there are five categories of alternative and complementary medicine that exist outside of Western-based medicine. The first comprises alternative medical systems which are complete approaches to the practice of human healthcare, including traditional Chinese medicine, the Indian practice of Ayurveda, naturopathy and homeopathy. The second through fifth categories constitute various specific therapies grouped according to the kind of intervention taken: mind-body-based, biologically-based, body-based, and energy-based. For purposes of this investigation, traditional Chinese medicine and Ayurveda will be examined in greater detail, in addition to several therapies in each of the remaining categories.

### Alternative Medical Systems

#### *Chinese medicine and the traditional practice of feng shui*

Traditional Chinese medicine can be best understood as a broad range of medicinal practices which originated in China and, over the course of the last 3,000 years, slowly spread throughout Southeast Asia and eventually around the globe (Larson, 2007, p. 3). These practices all share a common theoretical and philosophical framework and include acupuncture, herbal medicine, massage, and certain forms of exercise and dietary therapy. Typically, they present an understanding of the human body free from specific anatomy; rather, they utilize the identification of certain biological entities responsible for regulating breathing, digestion, temperature maintenance, aging and other factors. In this

manner, a patient's health can be viewed as the interaction of these entities working in harmony with one another, while disease is based on an apparent disharmony of interaction.

According to Chinese Taoist philosophy and, by extension, its medicine, yin and yang are the two universal phenomena into which everything in the universe can be divided. For instance, things as varied as the sun-filled and shaded sides of a mountain, water and fire, the moon and the sun, female and male, cold and hot, and even down and up can be seen as examples of this natural dichotomy. Yin and yang are also applicable to the human body; the upper part of the body and the back is yang, while the lower body is seen as yin. This also applies to various bodily organs and functions as well as disease symptoms; for instance, the fu organs (stomach, intestines and bladders) are yang while the tsang organs (heart, lung, kidneys, liver and spleen) are yin. If yin dominates over yang in a particular body, the individual may feel cold, weak and tired; whereas if yang dominates yin, one might feel hot, feverish or sore.

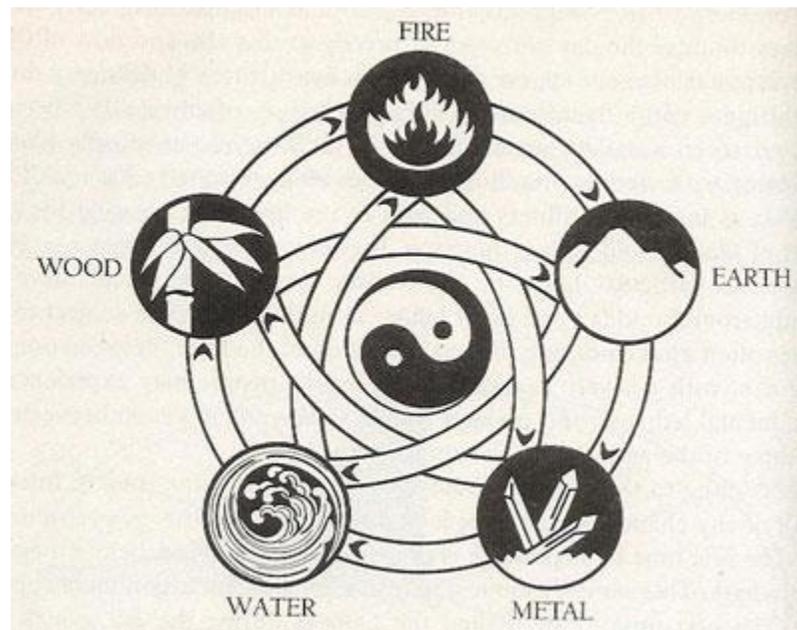


Figure 1. Wu Xing, the Five Elements (<http://touchlifespirt.squarespace.com/home/tag/five-element>)

Furthermore, all phenomena that occur in the universe can be broken down into five main elements, known as Wu Xing (Fig. 1), though these are sometimes also called “phases”: Wind, Water, Wood, Fire and Metal. There exist strict rules which apply to the five elements/phases in terms of which interacts with which and which exerts influence over the other. For instance, water exerts its influence over fire by having the capacity to extinguish it. Likewise, fire will melt metal and change its fundamental nature. Yin and yang sit comfortably at the center of the intersection of the five elements, since their relationship is the one that influences all of the others.

Qi, literally translated as “breath” or “air” (and sometimes written as “chi” or “ch’i”), is the concept in traditional Chinese medicine of the life energy which inhabits all living entities. It is believed that qi flows throughout the body, providing the cohesion which is required to maintain a properly functioning biological system. There are five main functions of qi as they relate to Chinese medicine: actuation, warming, defense, containment, and transformation (Aung & Chen, 2007, p. 11-12). Actuation qi describes the physical processes of the body, including the circulation of fluids throughout it, while warming qi inhabits the body itself, specifically the limbs. Defense qi fights against the invasion of disease, containment qi regulates bodily fluids by keeping them contained within, and transformation qi turns ingested food and liquid into bodily fluid.

In traditional Chinese medicine, the concept of disease appears as a disharmony or imbalance between yin and yang, qi and the interaction between a particular body and its immediate environment. In fact, all disease has two predominant aspects, known as entity and pattern. An entity refers to a symptom present in a sick individual, while the pattern is the collection of specific, affected entities present. Since the therapy chosen for a particular patient is based on pattern and not entity, two different individuals possessing the same symptoms might receive different therapies if their illnesses present in different ways. There

exist, however, six disharmony patterns, called the Six Excesses, which describe common occurrences and which are named after climactic factors: wind, cold, fire, damp, dry, and summer heat. Each excess has specific clinical signs which indicate its presence in a sick individual, and they can also exist in multiple combinations such as wind-damp-fire.

Pattern discrimination can be understood as the estimation of which pattern is currently operational in a particular patient based on the Eight Principles, which are four pairs of the fundamental qualities of disease: exterior/interior, heat/cold, vacuity/repletion, and yin/yang (Wiseman & Ellis, 1996, p. 128). Each of these principles outlines specific clinical criteria which can be utilized in the process of diagnosis; for instance, the exterior principle describes a disease which exists in the outer layers of the body, like the skin or hair, while the heat principle describes a red and painful throat and rapid pulse. The process of diagnosis includes five methods, usually performed in order: inspection (of the face and tongue), auscultation (listening for unusual sounds), olfaction (checking for body odor), inquiry (asking questions about the range of specific symptoms), and palpitation (feeling the body for pulses and areas of tenderness).

There are several types of Chinese medicine practiced today, and each plays a specific role in the determination of disharmony and disease outlined above. Herbal medicine encompasses the treatment of illness with mostly plant-based remedies, though some mineral and animal products are also utilized, where approximately 2,000 Chinese herbs are “processed as pills, capsules or powders – but the raw, dried forms common for centuries are still used” (Mayo Clinic, 2010, p. 146). They are categorized in various ways – for instance, via the “four natures,” the “five flavors,” the energetic pathway which they treat or by specific function – but are generally classifiable by the perceived action which they take in the body (Sutton, 2010, p. 75). Concoctions typically contain between

ten to twenty items each, and they are prescribed for any variety of illness diagnosed through the procedures listed above.

The process known as acupuncture involves the insertion of needles into the skin, subcutaneous tissue and muscles of the body – usually at acupuncture points (also known as “acupoints”) – which are then manipulated to remove blockages in the flow of qi throughout the body (Sutton, 2010, p. 75). Qi travels along “life-energy pathways [which] are called meridians and are accessible at approximately 400 different locations, or points, on the human body” (Mayo Clinic, 2010, p. 121), and preliminary studies suggest that acupuncture is effective in the treatment of migraines, neck disorders, tension headaches, and some types of osteoarthritis and fibromyalgia while results were inconclusive for efficacy in treating shoulder pain, lateral elbow pain, and low back pain (Mayo Clinic, 2010, p. 121). Tui na, also known as acupressure, is a form of massage where rubbing and pressing is applied to the body at some of the same specific points outlined above in order to influence the flow of qi without the insertion of needles into the body.

The Chinese system known as feng shui was historically used to orient buildings in a way which would maximize qi and bring prosperity to their occupants. It originally flourished during the T'ang dynasty (618-907 A.D.), growing out of the earlier practice of k'an-yu which involved the “understanding of the Earth's energy” (Wong, 1996, p. 30). While it was suppressed during the Cultural Revolution of the 1960s, the practice of feng shui has subsequently flourished and been more recently adopted by design practitioners in the West interested in its promises of material wealth and spiritual fulfillment.

A traditional explanation of qi in the built environment as it relates to feng shui includes the cardinal orientation of a structure by its compass directions, its age, its topography, and its interaction with the surrounding environment including the slope of the land, the flow of water, and vegetation and soil quality (Brun, 2008, p.60). It also considers the immediate surroundings of a house –

including issues of protection from the elements and harmful or benevolent objects and structures in the vicinity, like roads and rivers – as well as the internal environment of a house including its shape and its floor plan. It is important to note that in feng shui, it is believed that “through division and differentiation things acquire their individuality and identity, but underneath their transient nature, all things share an underlying structure” (Wong, 1996, p. 223). In other words, the whole of the structure is more than just the sum of its parts.

### *Indian Ayurveda and the Traditional Practice of Vastu*

Ayurveda – literally translated as “the science of life” – is an all-encompassing term for traditional Indian medicine which “uses herbal medicines, minerals, animal products, food, massage, air, water, heat, earth, surgery, detoxification and tonification to bring about health” (Pole, 2006, p. xix). It deals with health in all of its aspects, including physical, mental, spiritual, social, environmental and dietary. It also attempts to treat and manage specific diseases through the application of both orthodox principles – those adhering to the religious Indian texts known as the *Vedas*, which developed over the course of the last 4,000 years – and heterodox principles, those traditions which arose “outside [the] ritual fold and [were] based on the direct experience of medical physicians where herbs, minerals and surgery were the healing tools” (Pole, 2006, p. 7). In this manner, Ayurveda includes both the ritualistic and experiential approaches of the doctor, who effectively acts as both medical practitioner and de facto priest.

In Ayurveda, Purusha – a representation of pure consciousness – plays the role of a supreme intelligence which is all-knowing and beyond both time and space, the embodiment of what is understood as masculine energy. Feminine energy is represented by Prakriti, known as the creative force and the base essence of all substances in the universe. The five tanmatras, understood as the

“‘primal measure’ [which] are the causal root energies that hold the potential of all sensory and elemental manifestation” (Pole, 2006, p. 18), illustrate the five-pronged energy structure of the universe and are related to the five human senses: Akasa (sound through the ears) as space/ether, Vayu (touch through the skin) as air, Tejas (sight through the eyes) as fire, Jala-Ap (taste through the tongue) as water, and Prathvi (smell through the nose) as earth. The tanmatras are analogous to the five elements of Xu Wing in Chinese medicine discussed above, with each having an influence on the other four.

The so-called organs of action, which “enable us to communicate and manifest ourselves” (McIntyre, 2012, p. 38), are also connected to a complementary sense and, by extension, these same five elements: the mouth (expression) as space/ether and sound, the hands (grasping) as air and touch, the feet (motion) as fire and sight, sex (regeneration) as water and taste, and the anus (elimination) as earth and smell. The role of sensory perception in Ayurveda is conceptually important:

The critical importance of these cognitive sense organs, the resting place of the senses, ...cannot be emphasized enough. These sensory faculties make possible direct contact with the outside material world. This connotes the importance of the idea of the necessary and valuable experience of contact with the sensory world. (Ninivaggi, 2008, p. 54)

In other words, the sensory organs are the both the conduit through which the human body makes contact with the natural world in which it lives as well as the entry points through which the healing properties that can be found in that world are taken in by the body.

Furthermore, everything in the universe is a combination of the three gunas which constitute Prakruti: Sattva, Rajas and Tamas. Sattva, known as the “highest quality of light, virtue, happiness, clarity and intelligence” (McIntyre,

2012, p. 40) is responsible for the five sense organs as well as both ether and air. Rajas, the "quality of movement, distraction, turbulence and activity" (McIntyre, 2012, p. 40) is responsible for the five organs of action as well as fire, air and water. Tamas, the "quality of dullness, darkness, decay, inertia and rest to enable regeneration" (McIntyre, 2012, p. 40) is responsible for the five elements as well as earth and water. From the three gunas come twenty main attributes – ten pairs of opposites, more numerous than but analogous to the Eight Attributes in Chinese medicine – which represent both the positive and negative aspects of all forces and material objects in the universe: hot/cold, static/mobile, wet/dry, dull/sharp, heavy/light, soft/hard, gross/subtle, smooth/rough, dense/flowing, and cloudy/clear. The presence of these dualities in the natural world gives us the ability to understand the nature of both pathology and physiology and acts as "a vital part of this medical system that relates the 'energetic' condition of an individual with the particular remedy that is 'qualitatively' appropriate for them" (Pole, 2006, p. 20). For instance, a disease considered hot and dry receives a treatment which is, by its nature, wet and cold.

Doshas are the collective traits that each human being possesses, including things such as heredity as well as individual traits, tendencies and personalities. We are each born with a unique combination of the doshas, of which there are three: Vata, Pitta and Kapha. Vata, seen as a combination of ether and air, embodies the principle of movement and acts as the energizing force for both the body and mind. It can be found primarily in the circulation of blood and the involuntary impulses of the nervous system. Pitta, a combination of fire and water, embodies the principle of transformation and is responsible for chemical processes in the body and the regulation of its metabolism. Kapha, a combination of earth and water, appears as the principle of potential energy and holds the body together via growth, development and nourishment and makes up the bulk of our structure. The concept of doshas in Ayurveda is important to recognize, for

“Ayurvedic evaluation is based on an assessment of the state and interaction of the doshas in the body, [and] the essence of treatment...is based on efforts to correct vitiations, imbalances or disruptions in the doshic system” (Ninivaggi, 2008, p. 60).

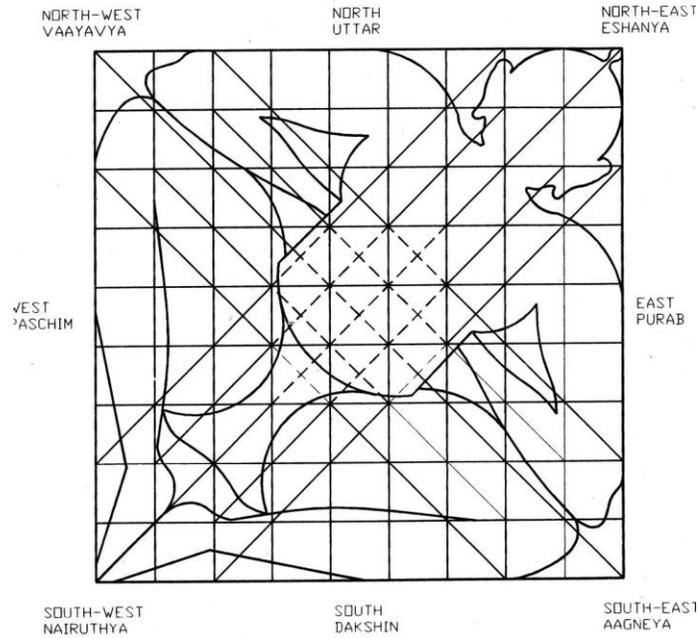
Doshas circulate in the body via the srotas, channels similar to meridians in Chinese medicine, which link various bodily systems with both the mind and life energy known as Prana (analogous to Chinese qi). For a healthy body to function properly, srotas must be unobstructed to allow circulation throughout the system. When an imbalance of doshas begins to occur, due to illness or a build-up of waste, the srotas can become blocked. If this occurs, toxins known as Ama begin to build and circulate in the body. Such blockage of the srotas is recognized in Ayurveda as the beginning of disease, and Ayurvedic therapy works to eliminate Ama and restore healthy circulation throughout the body. There are five main classes of srotas which contain sixteen primary channels, each categorized by function: intake of nutrients, nutrition of tissues, elimination of wastes, emotional functioning, and sexual reproduction. The main reasons for disturbance of the srotas are excess flow (like vomiting), deficient flow (like congestion), blockage of flow (like emphysema), and overflow (like internal bleeding) (Pole, 2006, p. 41). In this manner, srotas either function normally or suffer from a combination of constriction, inflammation or construction which must be addressed therapeutically.

In Western pathology, “diseases are classified according to the systems they involve, while in Ayurveda a complex symptomology of channel-system disorders exists” (McIntyre, 2012, p. 78) where the srotas must be examined through various diagnostic measures in order to determine the type of disease, its location in the body and the extent of its presence in the system. A central tenet of Ayurveda is that “in order to optimize your health you must clear the accumulation of the doshas from your system..., [which] exit via the orifices;

primarily the bowel, bladder, stomach, lungs (via the mouth), uterus and skin” (Pole, 2006, p. 47). This is accomplished through a series of treatments such as herbal remedies, meditation, yoga, seasonal daily regimens and diet. One ancient Indian text states that “there is nothing in the world which does not have therapeutic utility when applied in appropriate conditions and situations” (Pole, 2006, p. 59), and the practice of Ayurveda is the natural embodiment of this belief.

Vastu, the ancient Indian building practice, is sometimes referred to as the “feng shui of India,” though it comes directly from the *Vedas*, the sacred texts of Hinduism, where it meant a dwelling or site. It was originally used “in city planning, temples for the gods, and palaces, and forts, and residences for the Hindu upper classes” (Cox, 2000, p. 17), but in modern usage it can apply to any sort of dwelling, be it a cabin in the woods, a hospital in the inner city or a suburban office building. Often considered the “sister” science of yoga and Ayurveda, Vastu is the traditional Indian science of building design and spatial configuration based on principles of measurement, rhythm and proportion. For instance, the square is considered the most sacred shape in Vastu, symbolizing harmony and balance through its symmetric and fixed form. Long before Leonardo da Vinci illustrated his famous “Vitruvian Man,” Vedic priests realized that the measurement of the arms of a person extended fully outwards to the right and left of the body equals the measurement from the feet to the top of the head. In this way, the height and width of a human being fits into a perfect square and mirrors the perfect qualities of the cosmos.

The Vastu Purushu mandala is a diagram of a crouched man in a squatting position which reflects this cosmic spirit and is utilized when constructing a building or designing an interior space (Fig. 2). According to the ancient Indian text the *Mayamata*, it is declared that “the Spirit of the building has six lines, a single heart, four vulnerable points and four diagonals, and that he lies upon the ground.”



**Figure 2. The Vastu Purusha mandala**

(<http://www.sanskrit.org/www/Hindu%20Primer/Images/hinduarchitecture1.jpg>)

In Vastu, it is believed that marmas – vulnerabilities in the form of Vastu Purusha – mirror vulnerable points in the human body. As such, “specific joints and body parts of the spirit, such as the navel, heart and lungs, must not be hurt during construction and must be considered in the interior design and location of the furniture in a room” (Cox, 2000, p. 44). Furthermore, the diagonal lines seen in the diagram mirror the nerves and arteries of the human body, analogous to the energy channels which flow through a particular building or room. The squares in the diagram, called padas, represent the order and harmony found in the mandala and are each watched over by a specific deity. In the Vastu Purusha mandala, the five main deities – Brahma and four other guardian gods – are each connected to one of the five elements stated above: water, fire, earth, air and ether.

## *Naturopathy and Homeopathy*

Naturopathy is a generic term which covers a wide range of modalities including hygienism, nutrition, vitamin and mineral therapy and massage therapy which “leans strongly towards a vitalist perspective of health and disease” (Di Stefano, 2006, p. xxv). Through the application of supporting, naturally-derived medication and treatments, individuals have the natural capacity of the human body’s detoxification processes activated for the purposes of healing. Naturopathy’s six basic principles include the healing power of nature, identification and treatment of the cause of disease, first doing no harm, the doctor as teacher, treatment of the whole person, and prevention (Larson, 2007, p. 5). Philosophically, “the naturopathic approach is aligned to an holistic appreciation of our essential connection with nature and natural forces” (Di Stefano, 2006, p. xxv) where we utilize our capacity for self-healing through the use of natural substances and the regulation of lifestyle choices.

Homeopathy, developed in the nineteenth century by the German doctor Samuel Hahnemann, is based on the principle of similars which stated that “one could choose therapies on the basis of how well symptoms produced by remedies were a match for the symptoms of the disease” (Larson, 2007, p. 7) – conventionally known as “like cures like.” It can be considered “a vitalistic system of therapeutics that makes use of medicines prepared through the methods of succussion [vigorous shaking] or trituration [repeated grinding]” (Di Stefano, 2006, p. xxv) where extremely small quantities of animal, vegetable and mineral products are continually diluted and recombined in an inert medium such as a water-alcohol mixture. The resultant potion – which contains a minute amount of curative, if any at all – is considered to be more effective, not less, through a transfer of energy not readily understood. As such, homeopathy is often considered controversial within the various practices of complementary and

alternative medicine, since most of the research into it has shown little no efficacy in its treatment methods.

### **Remaining Categories of Interventions and Therapies**

The four remaining broad categories of complementary and alternative interventions and therapies – mind-body-based, biologically-based, body-based, and energy-based – each contain a particular focus shared by the various practices found within the category. For instance, mind-body-based therapies place an emphasis on the role of the mind in generating healing propositions. This includes practices such as yoga, the “sister science” to Ayurveda and Vastu, which is interested in breathing techniques and the attainment of specific postures; and tai chi, a formalized sequence of flowing movements that also focuses on breathing and awareness in much the same way as yoga. Other mind-body-based therapies include meditation, hypnosis, relaxation, and biofeedback. In such mind-body approaches to health and healing, “the mental state of the patient is seen as contributing to the illness or disease state” (Larson, 2007, p. 32) and a significant change in one’s thought process can exert substantial influence and dramatically improve health.

In biologically-based interventions, natural remedies interact on a biological basis to provide a therapeutic outcome or biological imbalances in the body are regulated through diet, exercise and nutritional supplementation if required. Herbal medicine, for instance, takes many forms and “can be classified mostly as the traditional practices of the indigenous peoples of various locales” (Roush, 2003, p. 23) in the manner in which they use plants to treat illness and disease, in many ways a precursor to modern pharmacology. This also applies to the use of vitamins and minerals to treat certain diseases and disorders, which has been widely understood and utilized for a long time. The study of

electromagnetism and related energies involves their measurement, quantification and application as well as research into the consequences of large-scale electromagnetism and its effects on the human body and the planet.

Body-based manipulation therapies include osteopathy and chiropractic care, both of which require certification in order to practice, as well as other interventions like therapeutic massage which has a long history of application in cultures throughout history as a method of relieving pain, tension and anxiety. In chiropractic care, there exists a core contention that trapped negativity – whether through physical injury or emotional distress – becomes entwined in the human nervous system and can be released through specific manipulation of the spine and other musculoskeletal systems. This includes the theory that “entropy, or deterioration in systems, is caused not only by gravity and the wear of friction over time, but also by the ‘memory’ that the body’s systems hold within themselves, of thoughts and emotional impact borne by the larger organism” (Roush, 2004, p. 34). Osteopathy, developed by the North American doctor Andrew Taylor Still in the mid-nineteenth century, is a “powerful therapeutic system based upon the restoration of structural integrity, and the normalization of nerve supply, blood supply and lymphatic flow throughout the body” (Di Stefano, 2006, p. xxviii). It differs in subtle ways from Western medicine in its approach, as it considers the body a collection of systems that work together – a holistic understanding not often seen in Western medicine.

Energy-based therapies such as reiki (also known as therapeutic touch) as well as more metaphysical interventions like shamanism and spirit in medicine focus on the energy centers of the body known as chakras. Many aspects of energy medicine have roots in both traditional Chinese medicine and Indian Ayurveda, as previously discussed, and these therapies can also contain a spiritual foundation through which illness and disease can be fought (Larson, 2007, p. 41).

## CHAPTER 4 RESULTS

As previously discussed, many aspects of complementary and alternative medicine contain aspects which are holistic at their very core. For instance, there is a central tenet of most of the alternative and complementary therapies which states that one does not treat specific symptoms but rather the whole of the body. If a patient arrives at a Western medicine-based clinic and complains of a sore throat, she will most likely be given a prescription for a throat spray or lozenge and sent on her way. Were she to seek advice from a practitioner of alternative medicine, her sore throat would be considered as one factor along many others which could be impacting her current state of health and treated as but one component of a larger framework of potential issues which must be addressed in order to fully heal her body.

Many of these attributes can be further categorized into a series of guidelines that relate not only to health and healing but can also be extrapolated to yield connections to the sustainable built environment. The five topics which shall be considered here are Harmony, Nutrition, Spirit, Orientation & Circulation, and Senses, each developed directly from the previous analysis of complementary and alternative therapies. Each offers something unique in the larger context of sustainability and its connection to the greater environment in which we all live, work, play, build, grow, and eventually die.

### **Harmony**

In complementary and alternative medicine, harmony – a consistent, orderly, and often pleasing arrangement of parts in a system – plays an important role in both the regulation of health and the various processes through which the

healing of a disharmonious system takes place. In the practice of traditional Chinese medicine, sickness and disease manifest as a state of disruption in a living body, and the “aim of treatment is restore the balance of energies both within the patient and between the patient and their environment” (Di Stefano, 2006, p. 72). Indian Ayurveda posits that humans exist as part of a whole, in alignment with universal principles, and “separation from this alignment, be it physical, spiritual or emotional, creates disruption, resulting in disease” (Larson, 2007, p. 31). Health and healing, conversely, occur when alignment is brought back into a harmonious state through the various Ayurvedic therapies available to the practitioner.

Harmony is equally important in relation to the sustainable built environment. Just as humans are not “infinitely adaptable beings capable of accommodating all the impositions and excesses of the humanly engineered environments within which many of us live out our lives” (Di Stefano, 2006, pp. 104-105), so too is the greater environment which sustains *all* life not infinitely adaptable to the increasing strains which we have been placing on it for the last 150 years. Steady advances in building and engineering technologies have allowed us to develop systems which defy nature; we can now put lakes in the desert, for example, but at what cost to our dwindling fresh water supply? We have long conquered environments hostile to human habitation through the unfettered and costly consumption of energy primarily derived from natural and finite resources while we continue to pollute our oceans with the byproducts of these processes. We must carefully weigh the impact which our buildings have on the ecosystems in which they reside and carefully consider if they are acting in disharmony with the surrounding environment. “To be healing,” writes Christopher Day, “a place must be harmonious...This means bringing change as an organic development so that new buildings seem not imposed aliens but inevitably belong where they are, responsive to their surroundings” (Day, 2004, p. 20).

## Nutrition

Many of the therapies which exist in complementary and alternative medicine have a component which advocates for proper nutrition as a necessary factor of health and healing. Chinese herbal medicine, certain key aspects of Ayurveda and much of homeopathy treat vitamins, minerals and other supplements as well as plant and animal sources as a way to reincorporate vitality into a bodily system which is not functioning properly and require the ingestion of specific items to spur healing. For instance, ghee – clarified butter which is cooked in order to remove its initial water content and milk solids, making it lactose-free and rendering it stable at room temperature without preservatives or refrigeration – has been used in Ayurveda for thousands of years. It has beneficial nutritional functions in addition to its therapeutic ones, and it plays several important roles in the body including “stimulating and optimizing the energy of Agni (digestive fire and metabolism); reducing all three doshas, especially Pitta, to normal levels; and promoting longevity, memory, strength, eyesight, and the soundness of the...skin system” (Ninivaggi, 2008, p. 209).

In the built environment, especially as it relates to healthcare interiors, the efficacy and safety of the building and finish materials used in construction has moved to the forefront in the debate over occupant health. Red lists have emerged as a way to keep products containing harmful chemicals from being used in particular projects, and concepts like transparency, ingredient lists and health product declarations have attempted to level the playing field and force manufactures to divulge what is in their building products so that their consumers, in large part architects and interior designers, can make more informed decisions. But the case of ghee raises an interesting point: the removal of key components of its structure – in this case, water and milk solids – renders a product which would eventually spoil even with proper refrigeration virtually

indestructible and, in fact, in possession of healthful properties which replace its formerly less healthy ones. We must continue to focus on the “nutrition” of our building products in order to develop ways of turning our environmentally harmful finishes into healthier and more sustainable ones.

Additionally, nutritional decisions are often left in the hands of those tasked with bringing food home from the store. The father who goes grocery shopping for his family and avoids purchasing processed foods in favor of fresh fruits and vegetables and whole grains will not only individually benefit from these selections, but he will also lay the foundation for the future health and strength of his children (Di Stefano, 2006, p. 71). Likewise, by paying attention to the de facto nutritional value of the building materials utilized, developers, architects, designers and builders can lay a similar foundation for the health and welfare of their buildings’ occupants for years to come.

## **Spirit**

Any discussion of spirit in a non-religious context is bound to contain complications in terms of definition and intent, though most complementary and alternative medicinal therapies include some form of spirit or spirituality in their structure. For instance, it is understood that the energetic concept of qi in traditional Chinese medicine encompasses the notion that it permeates all living things and exists as a conduit for the healthy functioning of biological, ecological and even artificially constructed systems like buildings and other structures. In Ayurveda, Prana – the life force strongly associated with its vehicle, the breath – designates direction, attention and intake and “both holds together and animates the physical body, the mind and consciousness” (Ninivaggi, 2008, p. 298). Even though the fact that “widely diverse cultures have given linguistic expression to perceptions of energy...points strongly towards their universality” (Di Stefano,

2006, p. 130), no accepted model of how such energy functions therapeutically exists, and this spirit element of complementary and alternative medicine is often implied rather than stated explicitly.

There are very few areas in the built environment where the notion of energy or spirit is acknowledged, precisely for many of the same reasons outlined above. One place which attempts to bridge this gap is the Living Building Challenge, a building certification system originally developed by the Cascadia Green Building Council in the Pacific Northwest of the United States. The nineteenth of twenty imperatives outlined by the Living Building Challenge is entitled "Beauty + Spirit" and states that "the project must contain design features intended solely for human delight and the celebration of culture, spirit and place appropriate to function" (International Living Building Institute, 2010, p. 42). In this manner, beauty and spirit are integrated into the built environment in order to provide a sense of gratification for the occupants, one which will hopefully extend to future generations of users of the space who will ideally choose to keep the structure standing as opposed to tear it down.

And this is precisely where we can find spirit in our existing architectural stock: in those historically preserved spaces which continue to provide the delight explicitly stated in the Living Building Challenge. When one walks along the ramp into the expansive interior of Grand Central Terminal in New York City, for example, there is not a more appropriate word to describe the experience. Or the feeling one gets when mounting the Acropolis in Athens and the Parthenon first comes into view. What better way to espouse the virtues of sustainability than by building a structure which will last for generations to come?

## Orientation & Circulation

While little reference to orientation exists in relation to complementary and alternative therapies (as humans, generally speaking, are not rooted in place but circulate freely), it does surface in feng shui which uses a lot of the same terminology and conceptual framework as traditional Chinese medicine. As stated earlier, feng shui dictates the cardinal orientation of a structure via qi – the prevailing energies of a particular location – through compass directions, the topography of that land on which it sits, and its interaction with the surrounding environment including the slope of the land, the flow of water, and vegetation and soil quality (Brun, 2008, p.60). Houses would be constructed along mountainsides with southern exposures in order to maximize sunlight while protecting from wind and flood. These are many of the same hallmarks that exist in sustainable design today, with a focus on appropriate daylighting and a building orientation which takes full advantage of prevailing winds for effective natural ventilation.

Circulation, on the other hand, can be found in relation to complementary and alternative medicine and, in fact, plays a large role in both systems like traditional Chinese medicine and Ayurveda as well effective sustainable design strategies. For instance, the meridian system which regulates the flow of qi throughout the body can get blocked and needs to be freed through a therapy such as acupuncture. In Ayurveda, the srotas are the channels which flow through the body and can become blocked when there is an imbalance in the doshas. If this occurs, Ama – conceptualized as toxins and recognized as the beginning of illness – begins to build in the body and must be eliminated through therapy which aims to restore circulation and promote health and healing.

If the proper circulation of energy throughout the body is an important concept in many complementary and alternative therapies, it is an equally important concept in sustainability as it relates to the built environment. A useful

illustration of this is wayfinding, generally defined as the way that one orients oneself in a space while simultaneously navigating that space in order to get from one point to another. In this respect, it involves both orientation and circulation and often becomes an issue in very large buildings such as hospitals which often do not provide adequate wayfinding for patients, visitors and even staff who can get lost quite easily if appropriate measures are not taken. Research has shown that poor wayfinding can cause unwanted stress for patients, visitors and staff alike (Ulrich, 2001) and improving the circulation of a building can only assist in making it a healthier place.

## Senses

It is no accident that both traditional Chinese medicine and Indian Ayurveda focus so intently on the five senses of sight, hearing, smell, touch and taste. It is our senses which connect us to the world in which we live and to each other, and they also serve as the entry points for the various therapies meant to promote health and healing within the body. As stated earlier, for instance, the five tanmatras in Ayurveda illustrate the energy structure of the universe and are also directly related to the five human senses, which also have associated organs for purposes of therapeutic intervention. In both traditional Chinese medicine and Ayurveda, the process of diagnosis includes a visual inspection followed by listening for unusual sounds, checking for body odor, asking questions about symptoms, and feeling the body for various pulses. Both of these practices recognize the value of a sense-based approach to diagnosis, something which sustainable design has begun to incorporate.

Take the example of Robin Turner, an orthopedic surgeon in Hove outside of Brighton, England who integrated a “hospital quiet room created by the godfather of ambient music [Brian Eno] where patients can ‘think, take stock, or

simply relax' and an Eno music piece in the reception of the new...Montefiore hospital" (Brown, 2013). According to Turner, he intends to examine the effect that being in the quiet room has on patients by monitoring things like pulse, blood pressure and levels of anxiety. If the expected results hold true to form and the room does have a calming influence on patients, it is expected that other hospitals in England might follow suit. In his book *The Eyes of the Skin*, Finnish architect Juhani Pallasmaa writes that "in Western culture, sight has historically been regarded as the noblest of the senses, and thinking itself thought of in terms of seeing" (Pallasmaa, 2012, p. 18). Later he advocates for buildings which offer multi-sensory experiences, as architecture "is essentially an extension of nature into the man-made realm" and "strengthens the existential experience, one's sense of being in the world" (Pallasmaa, 2012, pp. 44-45).

In other words, architects and designers – as well as artists and most everyone else, for that matter – have historically given precedence to the visual sense above the others, even though our senses all operate on a similar plane of experience and all equally connect us to the world which surrounds us, whether the forest or a football stadium or a hospital. This fact is important to sustainable design for sustainability's connection to the natural world is readily apparent in many of its aspects, and designs which incorporate the varied topographies, the hewn textures, the joyous sounds, the indigenous smells and explosive tastes of the world which surrounds us bring us that much closer to answering the biophilic yearning we feel in our increasingly electronic and impersonal artificial environments. Incorporating all five senses into sustainable design strategies can effectively and elegantly address this deficiency.

## CHAPTER 5 CONCLUSION

While sustainable design strategies that relate to the built environment can be found in the frameworks and principles of complementary and alternative medicine, those presented here are by no means a complete list of design ideas that can be generated from these various therapies. Further investigation into both traditional Chinese medicine and especially Indian Ayurveda is warranted, for this examination only scratched the surface of material available on each of these medical systems, and there is certainly much more information which can potentially be adapted to the sustainable built environment.

The protection of our planet and its limited resources as well as the health, safety and welfare of humanity remains a central concern of sustainability, and this investigation into its connection to health and healing through the lens of complementary and alternative medicine hoped to uncover useful strategies for moving forward. Writes Vincent Di Stefano:

The work ahead of us will require more than elaborate recycling systems and a reduction of the amount of energy that we consume, although these are essential elements of any program that seeks to limit further damage. The healing of the earth will be accomplished not so much by developing new technical solutions to the present problems, but by becoming more conscious of our integral relatedness to each other and to the earth and by acting accordingly. We are a part of nature and not apart from nature, and will inevitably suffer the consequences of any disturbance we may cause, whether individually or collectively, to natural systems. The growth of interest in complementary medicine that occurred during the latter decades of the twentieth century needs to be understood in the broader context of such realities. (Di Stefano, 2006, pp. 164-165)

Let us move forward with the knowledge that we still have much to learn, and there are always new avenues to explore in the quest for sustainability.

## REFERENCES

- Aung, S. & Chen, W. (2007). Clinical introduction to medical acupuncture. New York: Thieme Medical Publishers.
- Barnes, P., Bloom, B. & Nahin, R. (2008). Complementary and alternative medicine use among adults and children: United States, 2007. *National Health Statistics Reports*, 12, 1-23.
- Barrett, B., et al. (2004). What complementary and alternative medicine practitioners say about health and health care. *Annals of Family Medicine*, 2(3), 253-259.
- Becker, F., & Parsons, K. (2007). Hospital facilities and the role of evidence-based design. *Journal of Facilities Management*, 5(4), 263-274.
- Berman, J. & Straus, S. (2004). Implementing a research agenda for complementary and alternative medicine. *Annual Review of Medicine*, 55, 239-254.
- Berry, L., Parker, D., Coile Jr., R., Hamilton, D., O'Neill, D., & Sadler, B. (2004). The business case for better buildings. *Frontiers of Health Service Management*, 21(1), 3-24.
- Bishop, F., Yardley, L. & Lewith, G. (2007). A systematic review of beliefs involved in the use of complementary and alternative medicine. *Journal of Health Psychology*, 12(6), 851-867.
- Bodeker, G. & Kronenberg, F. (2002). A public health agenda for traditional, complementary, and alternative medicine. *American Journal of Public Health*, 92(10), 1582-1591.
- Bratman, G., Hamilton, J.P. & Daily, G. (2012). The impacts of nature experience on human cognitive function and mental health. *Annals of the New York Academy of Sciences*, 1249, 118-136.

- Brown, M. (2013, April 18). Surgeon prescribes Brian Eno to patients. The Guardian. Retrieved from <http://www.guardian.co.uk/music/2013/apr/18/surgeon-prescribes-brian-eno-to-patients>
- Bruun, O. (2008). *An introduction to feng shui*. New York: Cambridge University Press.
- Carpenter, D., & Hoppszallern, S. (2008). Greening up: Hospitals getting savvier on sustainability. *Health Facilities Management*, 21(7), 15-21.
- Caspari, S., Eriksson, K., & Nåden, D. (2006). The aesthetic dimension in hospitals – An investigation into strategic plans. *International Journal of Nursing Studies*, 43, 851-859.
- Cesario, S. (2009). Designing health care environments: Part I. Basic concepts, principles, and issues related to evidence-based design. *Journal of Continuing Education in Nursing*, 40(6), 280-288.
- Chakrabarti, V. (1998). *Indian architectural theory: Contemporary uses of Vastu Vidya*. Richmond, Surrey: Curzon.
- Clarke, I. (2009). Design and dignity in hospitals. *Studies*, 98(392), 419-428.
- Coulter, I. & Willis, E. (2004). The rise and rise of complementary and alternative medicine: a sociological perspective. *Medical Journal of Australia*, 180, 587-589.
- Cox, K., & Karn, A. E. (2000). *Vastu living: Creating a home for the soul*. New York: Marlowe & Co.
- Day, C. (2004). *Places of the soul: Architecture and environmental design as a healing art*. Oxford: Architectural Press.
- Di Stefano, V. (2006). *Holism and complementary medicine: Origins and principles*. Crows Nest, NSW: Allen & Unwin.
- Dijkstra, K. (2009). *Understanding healing environments: Effects of physical environmental stimuli on patients' health and well-being*. Enschede:

- University of Twente.
- Dijkstra, K., Pieterse, M., & Pruyn, A. (2006). Physical environmental stimuli that turn healthcare facilities into healing environments through psychologically mediated effects: systematic review. *Journal of Advanced Nursing*, 56(2), 166-181.
- Ernst, E. (2000). Prevalence of use of complementary/alternative medicine: a systematic review. *Bulletin of the World Health Organization*, 78(2), 252-257.
- Ernst, E. (2000). The role of complementary and alternative medicine. *British Medical Journal*, 321, 1133-1135.
- Farrell, A. (2010). Intelligent eco-physiological architecture, a primer for a sustainable built environment. Proceedings of the CIB World Building Council.
- Frost, G. (2004). The Spa as a model of an optimal healing environment. *Journal of Alternative and Complementary Medicine*, 10(S1), S85-S92.
- Frumkin, H., Coussens, C., & Institute of Medicine (U.S.). (2007). *Green healthcare institutions: Health, environment, and economics : workshop summary*. Washington, D.C.: National Academies Press.
- Geist-Martin, P., & Bell, K. (2009). "Open your heart first of all": perspectives of holistic providers in Costa Rica about communication in the provision of health care. *Health Communication*, 24(7), 631-646.
- Gesler, W. (2003). *Healing places*. Rowman: Landham, MD.
- Gray, C., Tan, A., Pronk, N. & O'Connor, P. (2002). Complementary and alternative medicine use among health plan members: a cross-sectional survey. *Effective Clinical Practice*, 5(1), 17-22.
- Gross, R., Sasson, Y., Zarny, M. & Zohar, J. (1998). Healing environment in psychiatric hospital design. *General Hospital Psychiatry*, 20(2), 108-114.
- Guenther, R., & Vittori, G. (2008). *Sustainable healthcare architecture*. John Wiley & Sons, Inc.: New York.

- Hartig, T. & Marcus, C. (2006). Essay: Healing gardens—places for nature in health care. *The Lancet*, 368, S36-S37.
- Haugen, D. M. (Ed.). (2008). *Alternative medicine*. Detroit: Greenhaven Press.
- Heerwagen, J., Kellert, S., & Mador, M. (2008). *Biophilic design: The theory, science, and practice of bringing buildings to life*. Hoboken, NJ: Wiley.
- Heerwagen, J. (2000). Do green buildings enhance the well-being of workers? *Environmental Design + Construction*, 3(4), 24-30.
- Horowitz, S. (2008). Optimal healing environments: A prescription for health. *Alternative and Complementary Therapies*, 14(6), 300-305.
- Horsburgh, C. (1995). Healing by design. *The New England Journal of Medicine*, 333(11), 735-740.
- Hsu, C., Phillips, W., Sherman, K., Hawkes, R., & Cherkin, D. (2008). Healing in primary care: A vision shared by patients, physicians, nurses, and clinical staff. *Annals of Family Medicine*, 6(4), 307-314.
- International Living Building Institute. Living Building Challenge 2.0. [PDF document]. Retrieved from [http://living-future.org/sites/default/files/LBC/LBC\\_Documents/LBC%202\\_1%2012-0501.pdf](http://living-future.org/sites/default/files/LBC/LBC_Documents/LBC%202_1%2012-0501.pdf)
- Jonas, W. & Chez, R. (2004). Toward optimal healing environments in health care. *Journal of Alternative and Complementary Medicine*, 10, Supplement 1, S1-S6.
- Kellert, S., Heerwagen, J. & Mador, M. *Biophilic design*. (2008). John Wiley & Sons, Inc.: New York.
- Koh, J. (1982). Ecological design: a post-modern design paradigm of holistic philosophy and evolutionary ethic. *Landscape Journal*, 1(2), 76-84.
- Larson, C. A. (2007). *Alternative medicine*. Westport, Conn: Greenwood Press.
- Leibrock, C. & Harris, D. (2011). *Design details for health: Making the most of design's healing potential*. Hoboken, NJ: Wiley.

- Marberry, S. (2006). *Improving healthcare with better building design*. Chicago, IL: Health Administration Press.
- Mayo Clinic. (2010). *Mayo Clinic book of alternative medicine*. New York, NY: Time Inc. Home Entertainment.
- McIntyre, A. (2012). *The Ayurveda bible: The definitive guide to Ayurvedic healing*. Firefly Books: Buffalo, NY.
- McLennan, J. (2004). *The philosophy of sustainable design*. EcoTone: Kansas City, MO.
- Meeker, W. & Haldeman, S. (2002). Chiropractic: a profession at the crossroads of mainstream and alternative medicine. *Annals of Internal Medicine*, 136(3), 216-227.
- Miller, W., & Crabtree, B. (2005). Healing landscapes: patients, relationships, and creating optimal healing places. *Journal of Alternative and Complementary Medicine*, 11, 41-49.
- Ninivaggi, F. (2008). *Ayurveda: A comprehensive guide to traditional Indian medicine for the West*. Westport, Conn: Praeger.
- Pallasmaa, J. (2012). *The eyes of the skin: Architecture and the senses*. West Sussex, UK: Wiley.
- Pierce, J. & Jameton, A. (2004). *The ethics of environmentally responsible health care*. New York: Oxford University Press.
- Pole, S. (2006). *Ayurvedic medicine: The principles of traditional practice*. Edinburgh: Churchill Livingstone.
- Rakel, D. & Jonas, W. (2007). Creating optimal healing environments. In D. Rakel (Ed.), *Integrative medicine* (pp. 15-22). Philadelphia: Elsevier.
- Rastogi, S. (Ed.). (2012). *Evidence-based practice in complementary and alternative medicine: Perspectives, protocols, problems and potential in Ayurveda*. Berlin: Springer.

- Roberti di Sarsina, P., Alivia, M. & Guadagni, P. (2012). Traditional, complementary and alternative medical systems and their contribution to personalisation, prediction and prevention in medicine—person-centred medicine. *The EPMA Journal*, 3(15). Retrieved from <http://www.epmajournal.com/content/3/1/15>
- Roush, R. (2003). *Complementary and alternative medicine: Clinic design*. Haworth Integrative Healing Press: New York.
- Schultz, S., Bokern, A. & Rashid, K. (2007). *Relax: Interiors for human wellness*. Amsterdam: Frame Publishers.
- Schweitzer, M., Gilpin, L., & Frampton, S. (2004). Healing spaces: elements of environmental design that make an impact on health. *Journal of Alternative and Complementary Medicine*, 10, Supplement 1, S71-S83.
- Shepley, M., Baum, M., Ginsberg, R., & Rostenberg, B. (2009). Eco-effective design and evidence-based design: Perceived synergy and conflict. *Health Environments Research and Design Journal*, 2(3), 56-70.
- Sternberg, E. (2009). *Healing spaces: The science of place and well-being*. Cambridge, MA: Belknap Press of Harvard University Press.
- Sutton, A. L. (Ed.). (2010). *Complementary and alternative medicine sourcebook*. Detroit, MI: Omnigraphics.
- Terrapin Bright Green. (2012). The economics of biophilia: Why designing with nature in mind makes financial sense. [White paper]. Retrieved from [http://www.terrapinbrightgreen.com/downloads/The%20Economics%20of%20Biophilia\\_Terrapin%20Bright%20Green%202012e.pdf](http://www.terrapinbrightgreen.com/downloads/The%20Economics%20of%20Biophilia_Terrapin%20Bright%20Green%202012e.pdf)
- Tonelli, M. R., & Callahan, T. C. (2001). Why alternative medicine cannot be evidence-based. *Academic Medicine : Journal of the Association of American Medical Colleges*, 76(12), 1213-1220.

- Ulrich, R. (2001). Effects of healthcare environmental design on medical outcomes. In A. Dilani (Ed.), *Design and Health: Proceedings of the Second International Conference on Health and Design* (pp. 49–59). Stockholm: Svensk Byggtjänst.
- Ventegodt, S., Morad, M., & Merrick, J. (2004). Clinical holistic medicine: classic art of healing or the therapeutic touch. *The Scientific World Journal*, 4, 134-147.
- Wiseman, N. & Ellis, A. (1996). *The fundamentals of Chinese medicine*. Brookline, MA: Paradigm Publications.
- Wong, E. (1996). *Feng-shui: The ancient wisdom of harmonious living for modern times*. Boston: Shambhala.
- Yee, R. (2002). *Healthcare spaces, No. 1*. New York: Visual Reference.
- Zaccai, G. (2009). Designing the future of healthcare. *Studies in Health Technology and Informatics*, 149, 49-57.
- Zborowsky, T. & Kreitzer, M. (2008). Creating optimal healing environments in a health care setting. *Minnesota Medicine*, 91(3), 35-38.

Differentiating Passive vs. Active Design Passive design results when a building is created and simply works "on its own". The plan, section, materials selections and siting create a positive energy flow through the building and "save energy". Active design uses equipment to modify the state of the building, create energy and comfort; ie. Fans, pumps, etc. Here we can see how a simple roof overhang acts as a shading device on the south side of the building. North facing glazing will only receive diffuse light for the majority of the year, and so no shading devices are required. When we design our elevations to be solar responsive, this will mean having different facade treatments to respond to sun angles and the degree of exposure of the facade. Sustainable design refers to the design process that integrates an environmentally friendly approach and considers nature resources as part of the design. Sharlyn Underwood, American Society of Interior Designers (ASID) Virginia chapter president and interior designer with SmithLewis Architecture, defines sustainable design in the architectural sector this way: "Sustainable design is the practice of designing buildings so that they exist in harmony with natural systems." Below are some ideas on how to implement sustainability in design for each design area: Form. Overall, the above design principles take into consideration the environment, people, economy, and culture. Every product or service design should consider these four factors.

For the design, construction and operation of a facility, there is an especially important interface between the indoor and outdoor environments, that of the building envelope. The building envelope is comprised of the outer elements of a building—foundations, walls, roof, windows, doors and floors. Following are sustainability recommendations pertaining to the design and construction of the building envelope. Optimize Site Potential. Create a High Performance Luminous Environment—design the glazing systems to maximize the use of daylight. Make sure that the electric lighting is controlled to respond to daylight levels to maintain a consistent light level on the work surface in the perimeter spaces. First attempts to relate sustainable development and projects can be found in literature and practice. However, the challenges and potentials of relating sustainable development and project management have not yet been researched in depth. In this conceptual paper, we bring these two concepts together to see how project management can be further developed by explicitly integrating the principles of sustainable development. In this conceptual paper, we bring these two concepts together to see how project management can be further developed by explicitly integrating the principles of sustainable development. For relating sustainable development and project management, we developed a model, which is based on a process-related sustainability definition.