Exploring Sensory Design in Therapeutic Architecture

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This thesis aims to explore how architecture optimize the healing process through the senses, making it imperative that vision only reinforce the other senses. With only sight, people become detached from a relationship with the environment through the suppression of the other senses. However by taking advantage of the other senses, is it possible to create a design for the body as opposed to it being visually and conceptually dominated? This will be applied in a clinical setting, to create a therapeutic environment. Following the concept that a healing space can be space which is not just experienced visually but through all the senses.

Abstract	i
Contents	ii
Introduction	6
1. Architecture and its Potential to Heal	8
2. The Integration of the Senses in Healthcare Design	26
3. Cancer Treatment Centre	41
4. Drawings	76
5. Bibliography	82
6. Citations	85
7. List of Figures	90

Introduction

Architecture exists primarily to be at the service of the body. Every day, we experience it without a second thought about how its design affects us physically, mentally and emotionally. Do we notice how different spaces and atmospheres can affect our emotions? David Leatherbarrow states in his book *Architecture Oriented* Otherwise “An atmosphere, like a mood, impresses itself on experience...”¹ As architects, how do we create this experience? One approach, is to cater to the senses.

How we perceive the world is through a sum of all our senses. It only has meaning when it is experienced, and all our senses are simultaneously engaged as the acts and rituals of our daily lives take place. However, we currently live in a world where visual stimulation takes precedence over the other senses and factors such as emotion, perception and memories are not factored into design. What would our world be like if a sensory response was a critical design factor, which was treated equally as structure and program?

This thesis aims to discuss sensory design, and how its incorporation into architecture affects the experience of the user. I will explore all the senses, and how they enhance an architectural experience. Furthermore, how it can be applied in a clinical setting. Can sensory design help to create an optimal healing environment, and improve the healing process? I intend to demonstrate that medical institutions should not be dictated only by its function, but by the experience and wellbeing of patients, through sensory design. It should provide pleasant spaces for all the participants in a healthcare setting.

This thesis aims to implement the use of sensory design in a health care setting, by proposing a cancer center. By integrating a cancer center with a stimulating environment and therapeutic facilities, an optimal healing environment can be achieved.

1
ARCHITECTURE AND
ITS POTENTIAL TO HEAL

AN INTRODUCTION TO SENSORY DESIGN

We experience our everyday lives without realizing how heavily we rely on our senses. So much of our consciousness is through our senses, and how we perceive our world is based on this. In the case where someone was born without senses, would they experience memories and emotions in the same way we do? This thesis will address the question of how our senses can influence the way we obtain information, and experiences from the world around us. Without our senses of vision, hearing, touch, taste and smell, life would be tasteless, odourless, colorless. Our brains would live in confinement within our skulls. There would be no communication between our bodies and our world. Simply put, without our senses, our world would not exist for us. In 450 B.C, the Greek philosopher Protagoras noted this when he stated “Man is nothing but a bundle of sensations.” Your world is what your senses tell you. But how do the senses influence design? What if all the senses were taken into account as critical design factors. What if sound, touch, taste and smell were as equally emphasized as sight? What would our built environment look, smell and feel like, and how would that effect us?

Sensory design emphasizes the role of a total sensory experience in influencing our attitudes, behaviours and wellbeing. It is an approach which focuses on the occupant, and how the composition of sensory stimuli in built environments are arranged to lift the quality of life and experience for occupants. With this approach, the effect of architecture on occupants can be better attuned through sensory design for healthier mind and body.

Sensory data is rarely central to design decisions, and as opposed to formal design concepts, designing for the senses seems like an unreliable design parameter in the architectural community.² In the book *Body, Memory and Architecture*, Kent Bloomer and Charles Moore, state that “architecture is a highly specialized system with a set of prescribed goals rather than a sensual social art responsive to real human desires and feelings.”³ There is an emphasis on the formal aesthetic of architecture, and it is favoured at the expense of the sensory and experiential concepts. Many believe that the primary purpose of a building is to keep the elements out, however it confines us to a view of the sensory environment as a distraction from the task at hand therefore, most often all the senses aren’t taken in to account in design. The senses, hearing, touching, taste and smell require closer contact and actual physical engagement, and what seems to happen is that most often, they are denied importance.

WHAT CONSTITUTES SENSORY INFORMATION?

We are surrounded by a world of objects and events, and without effort, we are able to sense and take in their properties such as their texture, appearance and smell. It is in our nature to touch, taste, smell, see and hear the world around us. It seems so natural and effortless to be aware of the environment that we take our senses for granted. Senses, taken as a whole, are an information seeking system. They interact with, and are stimulated by the environment, and in turn, transmit signals to the brain. Each of the five senses use different cues for exploring the environment and feature a different perception range. Touch, smell and taste provide information

in the immediate space around us, whereas vision and hearing are capable of representing objects or events from greater distances.

According to the psychologist James J. Gibson, there are two different definitions to the verb *to sense*. The first is to detect something, and the second is to have a sensation. When the senses are considered as perceptual systems, the first meaning of the term is being used.⁴ Gibson further categorized the 5 sensory systems into 5 perceptual systems. This supported his view that our senses are integrated information seeking mechanisms. In the place of the traditional sight sound taste smell and sight, Gibson integrated the visual, auditory, taste and smell, basic orienting and haptic systems.

TASTE AND SMELL

The most persistent memory of any space is often its odor, it has the power to capture and preserve the memory of any space. Everything has its individual scent and our sense of smell is extremely sensitive. Strong emotions and past experiences are often stimulated by their respective scents and new scents can be remembered and identified later. Since it is not possible to name all the odours, spatial qualities are often associated with certain smells. The expression “it is a hospital smell” is familiar to most people because of the smell associated with hospitals. Taste and smell are usually combined as they function in unison and can be regarded as alternate ways to experience similar phenomena. Our tongues can only distinguish 7-8 different types of taste, while the nose can identify hundreds of substances in minute quantities. The sense of smell amplifies taste. Food can be smelled however,

when it is tasted, the mouth and nose work together, making the food more enjoyable. These senses, when used in architecture, can create heightened experiences. Wouldn't it be great if clinics brought a sense of calm due to their smell?

VISION

Sight is often regarded as the most important and influential sense. How we perceive our environment is usually centered around what we see. The Aristotelian idea of contemplative happiness, *theoria*, takes its name from *theorein*— which is, to see, to observe.⁵ The eye collaborates with all the other senses. What the eye sees, the other senses confirm. When you enter a garden, you see and are aware of what it is. But you then smell the flowers, you touch the petals, you hear the trees in the wind, and you become fully assured of where you are.

AUDITORY SYSTEM

The sense of hearing is omni-directional, unlike vision which is focused. "A view at a building will not show the person watching the building but a building will return the sound of a person walking in it and listening to the sound. The sense of hearing provides a three-dimensional atmosphere."⁶ However, the use of sound, or the lack thereof, can be used to create certain atmospheres. In such buildings, the silence interacts with our perception, and in these moments, we are able to imagine. Because of this, these buildings acquire multiple meanings which are relative to each visitor. "We are not aware of the significance of hearing in spatial experience, although sound often provides the temporal continuum in which visual impressions are embedded."⁷

HAPTIC SYSTEM

The haptic system consists of any stimuli which involves touch. It is the process of recognising objects through its physical properties. The sense of touch is often referred to as unconscious vision, providing three-dimensional information to objects.⁸ Haptic experiences occur through the movement and the physical exploration of a space. According to Pallasmaa, touch is one of the most primal and natural experiences in architecture. In his essay *Hapticity and Time*, he argues the sense of touch is a mediator between ourselves and the world. He states, “Touch is the sensory mode which integrates our experience of the world and of ourselves”⁹. Pallasmaa brings up the point that all of the senses, are extensions of touch, and that all of our sensory experiences are related to tactility. By touching materials and surfaces, we experience more than by barely gazing at it.

BASIC ORIENTING SYSTEM

Our basic orientation system is based on the relationship between the horizontal ground plane and our vertical posture. It is involved with bodily equilibrium and is the means by which we pick up information about our orientation in relation to gravity, force and acceleration. It relates gravity to the movements of the body(i.e., walking along a ramp).

Gibson uses the example of a fire to explain perception. It is a source of four kinds of stimulation because it emits sound color heat and light. Therefore, providing information for the ears, nose, skin and eyes. Although vision provides the most detailed information, any one of the other stimuli will perceive the same fire. The world can be understood either alone or by any combination of the perceptual

systems working together.¹⁰

PERCEIVING THE ENVIRONMENT

The sensory and the perceptual systems are two completely different but complimentary systems. The understanding of a space relies not just on sensation, (information received through the senses) but also through perception (the data after it has been processed and interpreted). Perception, is rooted in the Latin word *percipere*, meaning to “obtain, gather, seize entirely, take possession of”.¹¹ Gibson speculated that the sensory system provides the qualities of an experience, and picks up information from our world. Through this we can smell flowers and appreciate silence.

The perceptual system, is what allows us to take in, understand and make our conclusions from the information gathered. (Fig. 1.0) For example, once we smell a certain flower, we remember the feeling and atmosphere of a garden and conclude in favour of that smell. In her book *Sensory Design* Joy Monice Malner stated that we experience three kinds of sensory responses: “First, an immediate physical response to stimulus.” This is an involuntary reaction of the sense organs to stimuli. The second is a “response conditioned by prior knowledge of its source”. It produces a variety of reactions depending on its character and our understanding of its source.¹² For example, are we familiar with that sound? Unfamiliar sounds and odors could be disturbing, or, they could potentially be exciting, however familiar sounds tend to be more reassuring. The third is a “response to stimulus as it becomes identified in ones memory with a particular time and place.” This is a remembered sensation, is familiar, and can still invoke other sensations so that the mind can reconstruct the dimensions of other particular places”.¹³

Figure 1.0 :Ranges of the Senses

*“Our bodies and movements are in constant interaction with the environment the world and the self inform and redefine each other constantly.”*¹⁴ The ease with which we use our senses (like the simple act of opening our eyes, or touching by simply pressing our skin against an object) hides the fact the perception is an important aspect of the sensory process. Perception calls on past memories and emotions in order to process and understand our current experiences. Therefore, to fully understand a space, it requires not only sensation, but your perception as well. In the preface to the 1991 issue of *The Architectural Review*, the editor states:

*“We appreciate a place not just by its impact on our visual cortex but by the way in which it sounds, it feels and it smells. Some of these sensual experiences elide, for instance our full understanding of wood is often achieved by a perception of its smell, its texture (which can be appreciated by both looking and feeling) and by the way in which it modulates the acoustics of the space.”*¹⁵

A sensory experience is important to understanding the nature of an architectural space. It allows you to not only take in sensory data, but to interpret it, bringing in past experiences and memories, allowing you to make your own conclusions on a space.

EXPERIENCING ARCHITECTURE

Every significant experience of architecture is multi-sensory. The qualities and aspects of the world around us including of matter, space and scale are measured by our bodies and require the use of all our senses to create an experience. Stephen Holl points out that while a picture or a film might give us some idea

of space:

*“Only the actual building allows the eye to roam freely among inventive details; only architecture itself offers the tactile sensations of textured stone surfaces and polished wooden pews, the experience of light changing with movement, the smell and resonant sounds of space, the bodily relations of scale and proportion. All these sensations combine within one complex experience, which becomes articulate and specific. Some may say that the building speaks through the silence of its perceptual phenomena”.*¹⁶

Experiencing architecture has less to do with what the building looks like but rather to do with how it engages with all of our senses. People experience a space with their entire body, through movement, memory and imagination. It is about the dialogue between a person and architecture. Memorable architecture involves an embodied experience, which is determined by the reach and grasp of our hand, the touch of our fingers, the feeling of heat and cold on our skin, the sound of our footsteps, the stance we have taken and the position of our eye. As we enter a space, we grasp the space through our senses and we measure and explore it with our bodies and movements. Sensual architecture deals not only with the structure, but rather with how it engages with our bodies in different ways, and at different times.

The experience of an arbitrary building is exhausted within its first visit, however, building which incorporates experiential qualities, can be visited many times. This type of design pays attention to how its spaces are ordered to house its activities, how it is built, how it is structured and what materials are used. All of these factors affect how a building is going to be experienced by those who inhabit it.

Space and material, light and shadow, sound and texture, are all combined in our everyday experiences. The surroundings communicate with you as one moves through each space. In his book *Atmospheres*, Peter Zumthor writes,

*“...when you touch and feel the texture of the walls, hear the footsteps echoing through long hallways, and feel a cold breeze on your neck. As you experience a scene like this, it is the combination of all the senses together, which create the ‘atmosphere’ or character of the space.”*¹⁸

These buildings, which offer an experience, are those that provide us with more than an image but offer spaces which engage each and every one of our senses. Maurice Merleau-Ponty (1908–1961), a French phenomenological philosopher, emphasizes the relationship between experience and sensory interaction when he stated:

*“My perception is [therefore] not a sum of visual, tactile, and audible givens: I perceive in a total way with my whole being: I grasp a unique structure of the thing, a unique way of being, which speaks to all my senses at once”.*¹⁹

Architecture only exists, when it is experienced. Its effect on us does not lie in the structure or in its form, but rather with its encounter with the body. As an experience, architecture can be intimate and deeply engaging. Towards the end of the eighteenth century, French architects began exploring architecture with an increasing reference to sensation and its psychological effect. Some speculate that the introduction of the attention to perception into architectural theory took attention away from the visual, which focused on physical proportions, to the entire body, which emphasized the importance of light and shade, surfaces and smells. Nicholas Le Camus de Mezieres (1721–1789), a French architect and theoretician, believed in the idea that

architecture should be pleasing to the senses and induce elevating impressions on the heart and mind. He focused on the sensuous experience of architecture and believed that buildings could evoke human sensations because it speaks to the mind and moves the soul. He used the Dome of the Invalides as an example when he exclaimed:

*“Let us examine, for example the Dome of the Invalids : what are our sensations! We are filled with astonishment and admiration; our souls are born aloft. Caught up in a kind of ecstasy, it seems that we participate in the greatness of the God who is worshiped here. If we consider the outside of the dome, its pyramidal composition and the base from which it so majestically rises, we are at once overcome by a sense of grandeur and magnificence.”*²⁰

He believed in architecture that could talk to you by invoking emotions. The Dome of the Invalids in Paris, which, according to Le Camus, “lifted the soul onto thoughts of God”, and brought feelings of astonishment and admiration. He believed this beauty was based on the harmony between architecture and the body, and argued that sensory architecture could uplift the heart and mind.

THERMAL BATHS

An example, within the last decade, of architecture which offers an embodied experience is Peter Zumthor’s Therme Baths which is situated within the small village of Vals in Graubunden, Switzerland (1996). The building is known for its intimate atmosphere, as well as for its celebration of the act of bathing. What is apparent in the Therme at Vals is an approach to architecture that addresses issues of experience and of sense which is revealed through the building’s program, place and narrative.

While the building is praised for the atmosphere it creates as well as its relationship to its topography, the interior spaces, and the narrative Zumthor creates are what visitors experience physically. Through materiality, lighting, massing, and stimulation of the senses, Zumthor creates an experience of waiting, imaging, and walking into the unknown. Within each bath, Zumthor creates a special and unique experience by forming a unique sensation between the bather and the spaces they inhabit.

The building (Fig. 1.2) is composed of two floors, a bathing area and a lower therapy floor. Access to the baths is underground through an artificially lit cavernous tunnel which immediately removes you from the world(1). The bather is then introduced to the main bathing level by a corridor with drinking fountains within the walls on one side, and changing rooms on the other(2). This corridor leads you to the bathing level (3), with a layout which encourages the bather to wander around the many spaces. Within this labyrinth of interconnecting blocks bathers become aware of the different spaces they hold and their distinctive atmospheres. These atmospheres serve functions which either require intimacy or benefit from it. This floor consists of both an indoor and outdoor bath as well as several others, which are confined within stone blocks. The two largest baths, are the indoor and outdoor baths. Due to the natural light, the outdoor bath(4), is the brightest area in the building and is kept at a warm 36 °C. The indoor bath, which also open, is at the center of the building. The baths were designed to engage all the senses through a series of blocks which stimulate each sense. These blocks consist of a fire bath (5), an ice bath (6), a flower bath (7) and a sound bath(8). The play between the openness of the outdoor bath(9) and the enclosed blocks are examples of how Zumthor plays with the compression and expansion of the body through space. Alternative types of therapies such as medicinal baths, mud treatments, massages and physiotherapy are offered the lower therapy floor.

Figure 1.2: Therme Vals, Floor Plan. Bathing Level

Sensory stimulation is acquired by the use of various spaces and systems to create moments which engage all the senses. Each space allows the body to touch the water on different textures and at different temperatures. The baths both emphasize, as well as bring together different elements, such as rock and skin, smell and water, hot and cold, and so on. These varying elements offer the bather a sequence of stimuli which is experienced as one moves through the space. To heighten this experience, Zumthor incorporates a progression from high to low daylight in order to dull the visual experience and allow the other senses an outlet. In a sense, it becomes a ‘playground for the senses’ as it allows the body to use each sense in fluctuating degrees.

THE DOMINATION OF VISION

The traditional senses, according to Aristotle (384 B.C-322 B.C), were not to be treated equally. The hierarchy of the 5 senses has been debated throughout history, by many philosophers. In classical opinion, cognition was respected and valued far above all the other senses. Descartes agreed with this, stating that the truth came from ideas and not feelings and thinking was separate from sensing. According to Aristotle, sight was the most significant sense as it was imperative for life. He believed that without sight, we would know nothing. In book 1 of Metaphysics, one of Aristotle’s major writings, he states:

*“All men by nature desire to know. An indication of this is the delight we take in our senses; for even apart from their usefulness they are loved for themselves; and above all others the sense of sight. For not only with a view to action, but even when we are not going to do anything, we prefer seeing (one might say) to everything else.”*²¹

This power that vision has over the other senses, has its origins with the ancient Greeks. In one of his fragments, Heraclitus writes “The eyes are more exact witnesses than the ears”. Clear vision was equated to understanding in the history of western thought.

The social and cultural shift from oral speech to the written word has allowed a change in our perceived ranking of the senses. Vision, had dominated the other senses since the Renaissance. The 5 senses were placed in a hierarchical system the highest, which was vision down to touch.

Many argue that our understanding of architecture is, and has always been predominantly visual. Since the late eighteenth century, architecture has been predominantly taught, practised and critiqued visually, often placing importance on its form and geometry. Most often, what a building looks like is usually what matters in our evaluation of architecture. Instead of it being understood as a space with different layers of experience, it is reduced only to the visual. We now seek instant visual satisfaction in our everyday life, and as a result, there is a lack of sensuality and experience in our lives. With the dominance of vision over the other senses, our perception of the world relies so predominantly on an image that our built environment has become sensually bland. Juhani Pallasmaa, a Finnish architect and critic, argues against this dominance of vision and pushes for the full integration of all the senses in architecture.

In his essay, *The Eyes of the Skin*, Pallasmaa states that because of the dominance of vision, we have now become spectators instead of participants in our surroundings.” In order to stop the alienation of architecture, we must strive towards a higher awareness of multi-sensory perception in contemporary architecture.”²³ He blames the mundane nature of many of our current built environments on the priority which is given to the visual qualities of design, and the exclusion or dulling of the other senses. Visualizing a space is only one aspect of a sensory experience. Buildings which only engage the visual cannot be understood

completely, and the experience is exhausted within the first visit or with merely looking at a picture. Pallasmaa argues for the ‘re-sensualisation’ of architecture in order to incorporate the other senses. Spatial information is constructed not only by vision, but by a combination of all the senses.

MATTER AND HAPTICITY

In a similar essay, Pallasmaa further explains the dominance of vision in our culture, which has essentially caused buildings to lose their “opacity, depth, discovery and mystery.” He points out that, in order to re-sensualise architecture, our senses need to interact with the space we inhabit. Specifically, Pallasmaa talks about hapticity in comparison to the other senses, claiming that all of our senses are an extension of touch. Light reflects off objects and into our eyes, sound bounces off different materials, allowing us to hear. We taste by touching food with our tongues, and smell by inhaling molecules in to interact with our olfactory receptor neurons which line the nose. The skin is the oldest and the most sensitive out of all our organs. He further explains that “touch is the parent of our eyes, ears, nose, and mouth” and refers to it as ‘the mother of the senses’²⁵. Indeed, touch physically integrates our experience of the world with ourselves.

The word *haptic* comes from the Greek term meaning “to lay hold of”²⁶. It involves the feeling of objects with the body. However a haptic experience isn’t only confined to the sense of touch. This involves all aspects of physical contact including pressure, pain, temperature, the kinesthetic..etc. Gibson defines it as the “apparatus by which the individual gets information about both the environment and his body”.²⁷ Haptic architecture engages and unites us with a space, whereas with only visual design, we remain spectators. Hapticity refers to experience through touch. To

differentiate the difference between touch and hapticity, touch can be seen as two dimensional while hapticity can be seen as three. The sense of touch is one of the most influential senses as it physically connects you to your surroundings. (Fig. 1.3) On the other hand, hapticity is more than touch, it incorporates time and memories and emotions.

Fig 1.3: The Lonely Metropolitan

Gaston Bachelard (1884-1962), a French philosopher, argues that images arising from matter project deeper and create more profound experiences, recollections, associations, and emotions than images evoked by form. The preference for pure geometric forms, and minimalist expression has weakened the experiential potential of matter. Strong materiality evokes haptic sensations which in turn, creates an experience. Each material and surface has a language and story of its own. “Stone speaks of its geological origins and its durability and strength, whereas brick reminds you of earth. Wood speaks of its two existences. Its first life as a tree and the second as a man-made object. All of these traditional materials speak of time, duration and use.”²⁸ As time passes, and the materials age, the story evolves, and becomes richer. The experience of a memorable building is for the most part characterized by how it is made. The patterns, textures and colors of its materials and the various methods used in the construction of the building.

PART 2
THE INTEGRATION OF THE SENSES
IN HEALTHCARE DESIGN

WHAT IS A HEALING ENVIRONMENT?

The concept of healing spaces has been explored for centuries. Many people have an image of what they think of as healing spaces however, when asked why places heal, their answers are not readily forthcoming. “Nature heals” the most common response. What specifically creates a healing environment is not usually apparent or usually overlooked. One way to discover what factors contribute to create a healing environment is by looking at precedents. I believe we can learn a great deal by looking at the past and applying what has been learned to evaluate places that are intended to provide healing today.

The term “healing” is derived from the Anglo- Saxon word “hælan” which essentially means to make whole.²⁹ That is to say, healing is not only limited to a physical cure but rather a process which results with one becoming whole. The belief that “healing,” or bringing the body back into balance by providing it with the appropriate stimuli and opportunities in order for it to become restored to wholeness, has been found throughout history and have been approached in different ways. However, healing is not the same as curing. A person can be healed without being cured. For example, people with terminal diseases, can learn to be at peace with themselves and even live a full life. For many, the type of environment they dwell in has an effect on their well-being in mind body and spirit, and this environment differs with each person. Thus, healing environments are designed to promote harmony of mind, body, and spirit.³⁰ In this thesis, it is imperative not to confuse a healing space with a hospital. Healing spaces can be found in several different environments and represented in different ways.

There are several studies which argue that places achieve a healing sense of place due to several different but often related types of environments which are provided in a space. In this thesis I plan to explore how these different environments achieve a healing

sense of place. Wilbert M. Gesler author of *Healing Spaces*, breaks down healing spaces into a combination of natural, built, symbolic and social environments all of which are important to the healing capabilities of a space.

THE NATURAL ENVIRONMENT

“Climb the mountains and get their good tidings. Nature’s peace will flow into you as sunshine flows into trees. The winds will blow their own freshness into you, and the storms their energy, while cares will drop away from you like the leaves of Autumn.”

-John Muir

Nature, the most commonly accepted notion of environment, is one of the most explored aspects of a healing space, and many cultures and societies in the world believe in its healing powers. Many believe that they can achieve physical, mental and spiritual healing by simply spending time outdoors or in remote, isolated spaces. Ralph Waldo Emerson (1803 –1882), an American essayist, lecturer and poet, believed that nature had medicinal and restorative powers. He believed that walking in the woods or along a seashore would relieve and individual burdened by work or a stressful urban environment. This is evident in his essay *Nature* (1836), where he states:

*“First, the simple perception of natural forms is a delight. The influence of the forms and actions in nature, is so needful to man, that, in its lowest functions, it seems to lie on the confines of commodity and beauty. To the body and mind which have been cramped by noxious work or company, nature is medicinal and restores their tone. The tradesman, the attorney comes out of the din and craft of the street, and sees the sky and the woods, and is a man again. In their eternal calm, he finds himself.”*³¹

Residing in a natural environment, whether the controlled greenery of the garden, or the chaos creates a place for recluse, a place where one can withdraw from the world and eliminate environmental stressors. However, why do we find nature so restorative? One school of thought holds that it is engrained in humanity. Roger Ulrich, an architect dealing with natural environments stated that, “We have a kind of biologically prepared disposition to respond favorably to nature because we evolved in nature. Nature was good to us, and we tend to respond positively to environments that were favorable to us.”³²

THE BUILT ENVIRONMENT

The *Built environment*, includes buildings and other man made constructions. The built environment has been shown to have an effect the healing process. The guiding idea, is that what people experience from their surroundings effects their moods and emotions and often, the ways in which they react. In addition, most aspects of human made environments affects the senses. The question of how physical surroundings affects emotions, and how emotional responses to architecture affect health is one that many architects, psychologists and neuroscientists have been experimenting with. Once this is known, people’s health could be taken into account in the design of buildings. Roger Ulrich’s research in a 1984 study of the effect of room design on patients, showed that the ways in which the environment around us is designed influences the healing process. He aimed to identify the features which gave certain buildings their “healing powers” and apply the same principles to healthcare design. Therefore, supplying architects and designers with the information they needed to build hospitals in a way which optimized the healing process. An awareness of how a space affects mood and behaviour, and in turn, our

health, helps architects design places that work with our bodies and promote healing.

SYMBOLISM

Symbolism plays an important role in healing environments, and often, people are affected by either concrete or abstract symbols. Many of the objects around us, or the ideas people express through these objects, have meaning because they symbolize something in our lives. People can learn to read an environment for its symbolism which in turn reveals people's inner thoughts and behaviours. Furthermore, the things people experience with their senses in a hospital create meaning for them beyond surface appearances. What people see, hear, touch, taste or smell in a healing space produces different meanings. However, how does symbolism help the healing process? Arthur Klienman, an American psychiatrist, suggested that:

“Healing occurs along a symbolic pathway of words, feelings and values, expectations, beliefs, and the like which connect events and forms with affective and physiological process”³

Abstract symbols also provide meaning in the healing process. Healing rituals and other symbolic actions have effects on physiology, experience, interpersonal interaction and social positioning. In many places rituals are rich with symbolic meaning and actions. There are many studies questioning the effectiveness and parallels of religious healing, shamanism, and western psychotherapy. This type of environment reveals the great diversity of healing practices found around the world as each type of symbolic environment is specific to a culture and participation in specific healing traditions may also contribute to individual and collective identity.

Symbolic healing can be specific to a culture. Anthropologists have documented many different healing practices, employed in different parts of the world.

Symbolism in healing may also be part of a person's broader identity. Taking part in ceremonies and, committing to a course of treatment may have broader meaning in a culture. For example, for many First Nations individuals in Canada, participation in pan-Indian spirituality and healing practices has become a way to cultivate and assert an Aboriginal identity in the face of rapid cultural change and forced assimilation.³⁴

THE SOCIAL ENVIRONMENT

Lastly, A social environment is necessary in any healing situation. All of the people involved, whether it be nurses, patients technicians, play an important role in the social environment of any healing space. Healing itself is a social activity, which involves interaction between many people in many different social roles. The quality of social relationships in a healthcare setting is important. What is more important is the relationship between the doctor and the patient. However, many scholars such as Ivan Illich, an Austrian philosopher, and Vicente Navarro, a sociologist, criticize the favouring of medicine to discourse with patients.³⁵ The idea that good social relationships was essential to providing healing environments was the central idea in the therapeutic community, and was incorporated into therapy in World War 2. This theory instigated the tearing down of the hierarchies and divisions between patients and staff in order to create a healing environment within a community.

There is a great deal of very rigorous research that links the physical environment of hospitals to certain health outcomes. When a space has the potential to influence a patients quality of life, the architect should consider the effect of their

design on the people who experience the space. Our environments, social, natural, symbolic and built, can shape our emotions, perceptions and in turn our health. All of these environments are found throughout history, and in several healing spaces and are represented in different ways. These four different environments, when combined, have the potential to create healing spaces.

ARCHITECTURE, AND ITS ROLE IN THE HEALING PROCESS

So far in this thesis, I have touched upon sensory design and healing environments. Far from being simple inert containers, certain buildings have been thought to contribute to the healing experience. However, is it possible to conceive and create buildings with spaces that heal? Exactly how does the built environment impact healing? Why should hospitals and other healthcare organizations even consider this in the design of their facilities? The idea that a physical space can effect a person's wellbeing and contribute to recovery has been proven with as little as a window in a hospital room, resulting in patients healing more rapidly. Roger Ulrich, a Professor of architecture at the centre for Healthcare Building Research led many studies on how hospital design can effect healing. He is one of the most influential figures dealing with evidence-based healthcare design. In his study, he investigated how physical surroundings affect a patient's emotions, and how these emotional responses to architecture affect health.

With this information, health could be taken into account in the design of buildings. His studies involved examining the hospital records of patients who had undergone gall bladder surgery in a suburban Pennsylvania hospital from 1972 to 1981. He looked at patients whose beds were near windows with views of nature

compared to those with view of a brick wall. Ulrich recorded each patients vital signs and found that patients with larger windows overlooking nature recovered faster than others. They also needed fewer doses of pain medication.

How does the type of environment we inhabit affect our rehabilitation? Research into how the space around us effects the brain, from the University of Gothenburg, showed that well designed spaces which incorporate sensory stimulation, increases a patient's ability to recover both physically and mentally.

³⁶ Our senses can be vital to the healing process, due to the fact that sensory information has the power to evoke a range of emotional responses. In addition, the emotional responses, triggered by the use of specific colours and materials, can effect physiological responses in patients. Recent studies from the University of British Columbia, illustrated that simply using wood in the design of a room lowered stress levels in patients.

Multisensory spaces have the potential to make rehabilitation more effective and reduce the amount of time spent in care. In his description of the design process of the Paimio Sanatorium (now a hospital) in Finland, Alvar Aalto exclaimed that his design concept was to create a progression of experiential situations. Aalto conceived the sanatorium as a carefully and empathetically studied instrument of healing for people at their weakest. He wanted the building to contribute to the healing process by conceiving the building as a medical instrument itself. Hospital design which integrates the 5 senses, aims to create a soothing and uplifting environment to promote healing. It should create experiences that induce beauty and cultural identity through design concepts that inspire and stimulate the senses.

Essentially, the underlying premise of a healing space is its potential to

promote improved outcomes as well as facilitating stress coping and restoration.³⁷ Medical environments should be designed in a way which support patients dealing with stress, by eliminating negative environmental stressors such as loud noise. The over stimulation if the senses can cause adverse reactions in the healing of patients. There are several characteristics, in the designed environment, which have an effect on clinical outcome for patients.

SPACE PLACE AND PRESENCE: SANCTUARY OF ASCLEPIUS

It was the ancient Greeks who perfected and evolved systems of medicine rooted within spirituality. Religion based medicine was deeply situated within the culture, so the sick would turn to gods for health. The notion of a healing space dates back to ancient Greece. Temples such as the sanctuary at Epidaurus (Fig. 2.0) were built for the god Asclepius, where ill people went in the hope of having dreams where he would reveal the cures for ailments. Built in the fifth century BC, these healing sanctuaries were established in several locations throughout Greece and these temples were usually located in settings of awe-inspiring natural beauty. However, what factors contributed to the very strong healing sense of place this temple offers?

For many centuries, temples to the God Asklepios, such as the one at Epidaurus, were designed to surround patients with nature, music, and art. Their primary role was to restore harmony and promote healing. This temple is the most celebrated healing centre of the classical world. To find a cure, patients would spend the night in a sleeping hall, (a concept which would later find itself in medieval hospital design), and in their dreams, the god Asclepius, would advise

Figure 2.0 : Sanctuary at Epidauros

Figure 2.0.1 : Sanctuary at Epidauros

them what they had to do to regain their health. People would come from across the empire with the hope to cure every ailment and disability. Any money raised was eventually used to build the adjacent theatre which was also used as a type of therapy. However, more important was the architecture of the temple which was designed to optimise the healing process.

The temple used the stoa as a patient care setting. The left side of the hall was built directly on the ground, while the right side of the hall was built on a basement, allowing patients to see the adjacent theatre from their beds in the long open hall. This also allowed patients to experience natural daylight and ventilation, as the beds were placed along the wall for the entire length of the hall.³⁸ The southern exposure was composed of a row of columns, oriented towards the sun to allow for maximum amount of daylight to penetrate the interior spaces. Other Asclepia were usually built on the lower slope of hillsides, nearest to a water source, however the most divine temples were situated on top of mountains. The natural environment became a central component of care.

The Asclepia, were more than often found in specific places believed to heal. However, what kinds of physical landscapes were they sited within? Hippocrates, the author of *Airs, waters and Places*, exclaimed in one of the volumes that a pleasant climate, good water quality and beautiful scenery were all conducive to good health. Asclepian sites should be healthy, and near fresh springs of water, away from pestilence. Usually these sites were in rural areas and the siting were based on the notion that the healing powers on nature were experienced within rural sites. The natural environment in Epidaurus was one of the main attractions. With its setting in a rural site provided patients with direct contact with untouched nature. Within this state

was the even more isolated sanctuary. To get there patients would have to walk over nine miles up hills. However this was intentional as the scenery along the path was though rugged, was extremely beautiful. James G Frazer, and anthropologist, wrote that through his journey, he passed through a “wild romantic revine” with “lofty precipitous bank” of a stream on either side of the path. Reaching the sanctuary, in an open valley he exclaimed that the whole scene had a pleasing sense of solitariness about it. The path to the temple becomes a healing process in itself, as the patient leaves the crowded town behind and journeys through the wilderness in order to arrive at the sanctuary.

EVIDENCE BASED DESIGN

Today, the generally accepted components of a healing space is a design that provides access to nature, light, good air quality, and privacy; pleasant or positive distractions as well as a reduction of environmental stressors such as unnecessary noise, and toxic or harmful substances.³⁹ Although much attention is paid to the medical care patients receive in our healthcare institutions, until recently little attention has been paid to the physical space where they stay for days, possibly weeks. Evidence-based design, as it is called by the Center for Health Design, is an approach to healthcare design that is anchored in utilizing proven design features that impact patient health, well-being, and safety, as well as employee health and morale. It is based on the premises that patients should be able to devote their energy to healing without having to deal with an unsupportive healing environment. Healthcare buildings are to be designed as living spaces for patients rather than warehouses for the sick. It has to be remembered that a hospital is not a factory in

which the assembly lines dictates all aspects of design but is a community in which the patient is fundamental to the successful working of the whole. Needs and expectations of the patients have to be visualized, analyzed and fulfilled.

Typical hospital design is usually designed to optimize the care of equipment rather than people. They are designed to deliver the best medical treatment in the most efficient way possible. Diagnosing, curing, and treating patients in noisy cluttered environments, was, and still is prioritized over their mental or psychological wellbeing. Many healthcare facilities are stark, cluttered and intimidating institutions. In addition, most hospitals today are designed to meet the needs of technology, rather than the spiritual and emotional and experiential needs of patients. For most patients, dealing with illness is not only physical, but it is emotional and spiritual as well. With patients who are faced with their mortality, sometimes a positive uplifting and sensuous environment can be an aspect in the healing process.

In the In early 1970, in most hospitals, the only area with air-conditioning was the radiology department because of the generated heat from the heavy equipment. The need for healing spaces in hospital design is especially needed in cancer centres because of machinery needed as well as the unique design required in this particular department. These centres are typically “machines for curing people” as described by architectural critic, Charles Jencks. Typically, people enter the cancer centre, receive their scheduled treatment and leave. Jencks was opposed to the design of healthcare buildings which was dictated only by the demands of hygiene and efficiency. With hard sterile surfaces, the maze of hospital corridors, and design which is built around radiation machines, Jencks argued that such space were merely institutional. He believed that architecture could become a sort of placebo, which

would aid in the recovery of cancer patients.

MAGGIES CENTRE

When Maggie Keswick, wife of Charles Jencks, was diagnosed with cancer, she realized through her experience, that in general, hospitals were not patient-friendly. In her book, *A View from the Front Line*, she exclaims the conditions she experienced as she went through chemotherapy.

*“...waiting in itself is not so bad – it’s the circumstances in which you have to wait that count. Overhead(sometimes even neon) lighting, interior spaces with no views out and miserable seating against the walls all contribute to extreme mental and physical enervation. Patients who arrive relatively hopeful soon start to wilt.”*⁴⁰

Trained in architecture and landscape design, Keswick conceived the defining concepts which eventually led to formation of Maggie’s Centres. Her main goal was to offer alternative care to go alongside clinical treatment received from hospitals.⁴¹ Maggie’s Cancer Caring Centres have become a network of drop-in centres found throughout Britain. The underlying concept is to use architecture to uplift and heal peoples spirits. The initiative has grown into an international network of drop-in centres. Many of these buildings have been designed by well known architects such as Frank Ghery, Richard Rogers and Zaha Hadid. The general design concept of Maggie’s Centres, is based upon qualities such as light, space, openness, intimacy, views, and nature. These qualities are employed keeping the patients experience through the space as a main concern. Typically the buildings are centred around a kitchen in order to create an relaxed, and informal atmosphere. Charles Jenks, an architectural critic, who founded Maggie’s Centres exclaimed “ they are

buildings that hug you, but don't pat you on the head"⁴². The scientific community has questioned the concept of the Maggie's Centre, claiming that it injects more architecture into these healthcare facilities than it needs.

The buildings take in to account the body what it experiences as it moves through the building. This is evident in the Maggie's Centre at Charring Cross Hospital in London. In this centre, the kitchen acts as the heart of the building, and the other, more personal spaces surround it. The building is separated and become isolated from the rest of the world through a solid bright orange wall which wraps around all four sides protecting it from its extremely exposed location. When entering the building, one is instantly protected from the busy streets and lead into the building. You are then immediately greeted by the sounds of a different community within the kitchen. From here, the entirety of the building can be seen. Jenks believed in somewhat of an "architectural placebo effect". He was opposed to the design of healthcare buildings which were dictated by the demands of hygiene and efficiency. Instead he believed that healthcare design should be centred around the patients and their experience within the building.

PART 3

CANCER TREATMENT CENTRE

Earlier, I defined healing as the act of making one sound or whole. A state of mental, spiritual and physical contentment. However, healthcare facility design typically focuses on concerns such as functional efficiency and providing effective platform for medical treatment. As a result of this, modern healthcare facilities do not invoke the sense or atmosphere of a healing place, nor are they associated with positive feelings. The psychological needs of patients are usually disregarded in the design of healthcare facilities. Recently, there has been a growing awareness within the healthcare community of the need to design facilities which help patients cope with the stress that accompanies illness. Functional patients centred facilities with supportive characteristics that reduce anxiety, lower blood pressure, and lessen pain can influence patient health care outcomes. An optimal healing environment, is created when the environmental characteristics creates a therapeutic space which supports and improves the quality of care.

There are several factors which effect this. Internal factors, such as memories, and past experiences have an effect on whether a space can impact a person positively. External factors, such as the environment, design components, access to nature, music, and light.

PROJECT IDEA

Healthcare buildings should be designed as a living space for patients, which provide an stimulating environment, in order to create the optimal setting for the healing process. Its design should not be dictated only by its function, but by the experience and wellbeing of patients. The needs and expectations of patients need to be understood, visualized and fulfilled. In addition, it should not only provide pleasant spaces for all the participants in a healthcare setting, but also conform to the cultural concerns of the community. This thesis

aims to implement the use of sensory design in a health care setting, in order to create an optimal setting for healing to take place. By integrating a cancer center with therapeutic facilities, an optimal healing environment can be achieved. Amongst other things, this thesis aims to:

- 1) Provide a drop-in Cancer Centre, which provides a variety of treatment, including radiation and chemotherapy.
- 2) In addition to Cancer focused therapy, the center also provides alternate therapies and recreational programs. Other programs include psychological support and patient and community education.
- 3) Design a building composed of sensory stimulating space, which together, create a therapeutic environment.
- 4) Using familiar and culturally relevant materials

DESIGNING FOR CANCER SENSITIVITIES

Far more people are surviving cancer now, than at any other point in history. However, this increase in survival rate, has brought awareness to the many side effects of treatment. The treatment of cancer is one source of several types of sensory change. The disease, itself as well as its treatment can cause abnormal sensory perception in patients. Approximately two out of every three patients receiving chemotherapy experience altered sensory perception depending on the nerves effected.⁴³

Damage to cranial nerves can result in:

Dry mouth

Odor sensitivity

Hearing loss

Vision Problems (blurred or double vision)

Damage to the peripheral nerves (the part of the nervous system which consists of nerves outside of the brain and spinal cord) cause:

Pain

Tingling

Numbness

Clumsiness

Sensation decrease

Each of these side effects of cancer, and or its treatment, can lower the quality of life for patients, and can hinder the healing process. In many cases, the symptoms improve as the underlying issue, in this case, the chemotherapy is completed. Treatments include relaxation therapy, physical therapy, distraction, acupuncture, and guided imagery.

Otherwise known as Dysgeusia, an altered sense of taste can occur either during or after the treatment of cancer. Nearly half of patients who receive chemotherapy, experience this side effect, and it usually leads to a loss of appetite and eventually weight loss. This happens because chemotherapy damages the receptor cells in the mouth which communicate to your brain what you taste. Patients usually notice that food tastes different or is now bland, and are usually left with a metallic taste in their mouths. Because smell and taste are closely related, it is important to talk about the smell patients experience during chemotherapy as changes to the sense of smell may affect how food tastes. Some drugs heighten the sense of smell,

so odors which were once unnoticed may now cause nausea. Many patients are able to smell the treatment used in chemotherapy, and it negatively effects how they perceive the treatment process. Often the most persistent memory of any space is its odor, therefore past experiences can often be brought back by certain scents. By creating a chemotherapy hall, with pleasant scents such as a nearby garden can make the treatment process pleasant. By creating a situation where the patients forget about the chemical odor of the drugs, and are introduced to the smell of a nearby garden, it takes them away from their current situation, and makes the experience a bit more pleasant.

Hearing loss has become one of cancer therapy's most underreported side effects. Like many of the other side effects listed, it is a side effect of a toxin commonly used in chemotherapy. Most of the time, patients don't recognize their compromised hearing until it is too late to receive treatment for it. In a case like this, the absence of sound becomes an asset in the design of a therapeutic space. In many situations, silence can be liberating. It can become an escape the world, and at this point, we turn inward to our bodies. In this silence an atmosphere is created. We move and act differently in a space without sound. The pace slows down, and because of the limited external stimuli, patients become relaxed.

Peripheral neuropathy is a result of nerve damage in the peripheral nervous system (the part of the nervous system which consists of nerves outside of the brain and spinal cord), often caused by chemotherapy. It is recognized by numbness and pain in hands and feet. This lack of sensation is often compared to wearing a stocking or glove.⁴⁴ Because of this, hapticity ought to take a bigger role in design. Hapticity is the process of recognising an object through its physical properties. When

Pallasmaa's idea -that all the senses are extensions of the sense of touch- is applied, materiality becomes a vital part of the sensory experience. In this circumstance, where touch is compromised to an extent, the other senses should compensate. The materiality should be visually stimulating, giving a sense of mass or weightlessness. It should give off sound as you walk, across. It should form an experience as you engage with it.

The treatment of cancer takes precedent over its side effects, however, it leaves patients with a lower quality of life. It is imperative that facilities take this into account in the design of the building. By recognising the condition of patients and designing in order to create altered smell can be eased by providing proper ventilation and or ensuring spaces are cool or at a room temperature. The metallic taste left in the mouth can be relieved by avoiding a dry mouth. Water fountains can be provided to relieve patients.

TRADITIONAL HEALING METHODS

The World Health Organization defines traditional medicine as “the sum total of knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve, or treat physical and mental illnesses”⁴⁵. In Ghana, many sick people seek the help of either herbalist, priests or spiritualists as a primary healthcare option. The WHO estimates that 80% of the Ghanaian population currently relies on traditional medicine.⁴⁶ The number of traditional healers greatly surpass that of trained doctors. After many years of resisting their influence, many

doctors and aid workers now work along with traditional healers in order to provide health care. Recognizing the cultural significance of traditional medicine, the integration of traditional medicine into modern healthcare is being promoted.⁴⁷ The traditional treatments include herbal remedies, acupuncture and spiritual therapies. These continue to be heavily relied on because it is readily available, and is cheaper than modern medicine.⁴⁸

Many Ghanaians believe that sickness is not only a physical weakness, but also a spiritual and mental one as well. Traditional medicinal potions are widely accepted and preferred over modern treatments because it is mostly compounded from natural products. For this reason, it is believed that there is a greater likelihood that the body will accept the treatment.⁴⁹ By combining both types of medicine, patients are treated with familiarity of traditional techniques and the efficiency of modern medicine. Unlike modern medicine traditional remedies aim to treat the whole person rather than isolated parts, and think of the relation to the patients emotional and physical environments. The concept of therapeutic pluralism⁵⁰ is constant in Ghanaian culture. It focuses around the idea that healing is not the result of a single action, but rather the result of many actions and people working together.

THE BUILDING AS THERAPY

A therapeutic environment is recognized when it has “*demonstrated measurable improvements in the physical and/or psychological states of patients...*”⁵¹. Such an environment is complimentary, and should contribute to the main course of care. Healthcare facilities in general portray a negative image when it comes to

patient experience. The therapeutic role of the physical environment should be taken advantage of and used as part of a patient's therapy. If the physical environment can assist in positive clinical outcomes, then it is the duty of the architect to provide such an environment which can contribute to the overall wellbeing of a patient. By taking advantage of spaces and creating atmospheres, it is possible to create an environment that encourages all types of healing.

SITE AND CONTEXT

Cancer is currently an emerging health problem in Africa, yet despite the growing issue, it continues to receive low public health priority. This is mainly because of limited resources and other public health problems such as AIDS and HIV which are often prioritized. Most often, the wealthy are able to receive specialized care outside of the country due to the inability of the public hospitals in Ghana to treat some forms of Cancer. Those who are unable to afford such treatment are left with the few healthcare facilities which treat cancer. In Ghana, Cancer is shrouded with myths and misconceptions which prevents many people from receiving suitable medical treatment. The main issue is due to low public awareness, late reporting to health facilities and limited resources for screening. In a study conducted by the Ghanaian Medical Association, one participant stated "In our Ghanaian culture when someone has a sickness or disease they do not talk about it. Because of this many diseases are not made public so I have not heard of cancer."⁵² Currently, there is a single private cancer treatment centre in Ghana, and it is one of the best-equipped facilities south of the Sahara. The Sweden Ghana Medical Centre is built and managed to the highest international standards. It is

managed by a group of professional and experienced hospital administrators from Sweden, Ghana and the United Kingdom. This center is a precedent of how a treatment center of international standards can be made available to Ghanaians.

Figure 3.0: Cape Coast, Ghana

CAPE COAST

Cape Coast (Fig. 3.0) is located south of Ghana, on the west coast of Africa. It is bordered by Côte d'Ivoire (Ivory Coast), Burkina Faso, Togo, and the Atlantic Ocean. This city has thriving fishing port which supports a population of about 169,894 people.⁵³ Cape Coast has an extremely rich history, rooted in slavery, and is now one of the most historical sites in Ghana. This was this city where many slaves were held, in the many castles along the coast, before going on to the Middle

Passage, and later to the Americas. Many of these castles are now World Heritage Sites. As a former colonial capital, Cape Coast contains more foreign influenced architecture than any other part of Ghana. The architecture reveals Dutch, Portuguese and British influence. (Fig. 3.1)

The traditional architecture and housing are very elaborate in terms of its function. They are also a true reflection of social values and environmental conditions.⁵⁴ The architectural styles in Cape Coast reinforce social organization and family unity. There are several types of residential structures, however the majority of people live in residential compounds which consist of several structures which enclose an open courtyard. Typically, a courtyard functions as a place to host a variety of domestic activities.(Fig. 3.2)

This has become a base for many different types of buildings. The courtyard houses were well adapted to the climatic conditions in this coastal area with ventilated ornamented screen walls, and partially roofed outdoor space as shelter from sun and rain. Coastal architecture in Cape Coast is adaptive to its environment, and takes advantage of the climate and material in the area.

Fig. 3.1: Mfantshipim School, Cape Coast, Ghana

An example of British influence in the architecture of Cape Coast

Figure 3.2 : Typical Courtyard house

Figure 3.3: Traditional Courtyard house

SITE ANALYSIS

The Fosu Lagoon (Fig. 3.4) is a shallow body (about 6.5 ft)⁵⁵ of water located in the South of Cape Coast. It is considered one of the most important closed lagoons in Ghana. The term ‘closed’ is used because it is separated from the sea by a sandbar which is usually removed either by heavy rainfall or manually as part of annual rituals. Traditionally, lagoons in Ghana have an important cultural and environmental value. (Fig. 3.5) Apart from its significance to the traditional heritage to the people of Cape Coast, it also acts as a local fishing ground for the surrounding community. The lagoon is also a large part of the Fetu festival which is celebrated by the people of Cape Coast. Historically, the festival originated as a prayer to gods to eradicate disease in the community.

The name Fetu translates to “Dirt cleansing”, and its original objective was about the cleansing of the community to avoid the repeat of epidemics their ancestors experienced.⁵⁶ The history site is rooted in the healing of the community, and this theme is still present. The lagoon is bordered by the main hub of Cape Coast to the right and the Cape Coast Metropolitan Hospital complex to the south. Located outside of the city, the site becomes ideal because of the existing healthcare facilities, and with the addition of a cancer therapy centre, it becomes somewhat of a healthcare village.

Ghana’s climate is generally warm and humid, with distinct alterations between dry and rainy seasons. Typically the rainy season has its peak in May–October. The annual rain fall along the coast is between 90 cm to 110 cm.⁵⁷ The heavy rain fall causes the lagoon to flood, and forces the sandbar, separating the lagoon and the ocean underwater. This area is prone to flooding during the rainy season as lagoons

Figure 3.4: The Fosu Lagoon

Figure 3.4.1: Rural vs. Urban

Figure 3.4.2: Water vs. Vegetation

Figure 3.5: Fishing in the Fosu Lagoon

typically have a less well defined drainage system.⁵⁸ The dry season is experienced between November and February, and this is usually the hottest time of the year. As this time average temperatures range between 24°C and 32°C.⁵⁹

PROPOSAL

Throughout this thesis, I have discussed sensory environments and their effects on our wellbeing. More specifically, the effects of a sensory filled therapeutic environment in a healthcare setting. Such buildings should be dictated, not only by function, and the provision of medical treatment. Such places are never viewed positively. I have discussed the growing awareness within the healthcare community, concerning the need of facilities with design characteristics that anxiety, lower blood pressure, and lessen pain. I can conclude that an optimal healing environment, is created when the environmental characteristics create a therapeutic space which supports and improves the quality of care. Furthermore, such an environment places the needs and expectations of patients at an equal value as treatment.

To apply these concepts, I am proposing a cancer treatment facility in Cape Coast. This facility aims to implement the use of sensory design in a health care setting, in order to create an optimal setting for healing to take place. Ultimately, the building should provide an experience through its atmospheres. This is done by providing stimulating environments and therapeutic facilities along with cancer treatment. In order to compensate for the sensory deprivation many cancer patients experience, spaces which engage with and stimulate the senses are offered to provide an experience within the building.

The building is divided into three general areas which perform different but complementing functions. (Fig.3.6) I will categorize these as Community, Therapy and Treatment spaces. The first, community, caters towards the public. It provides areas for patient and their families can learn about cancer and its treatment. It offers areas where the community can receive information and educate themselves. The subsequent floor, is partially anchored into the earth.

Figure 3.6: General Programming

This floor offers therapeutic spaces for patients. It caters to their altered sensory perceptions by providing spaces which compensate for them. This floor offers therapeutic spaces that complement treatment patients' experience. The lowest floor, offers several types of treatments for cancer. One type of treatment, radiation therapy, is provided by linear accelerators (LINAC) which are powerful x-ray machines which produce radiation. For this reason a majority of the programming in this floor is underground surrounded by a thickness of up to 5'. To offset the heavy medical atmosphere, the floor offers access to the central courtyard, gardens and the lagoon.

The layering of these spaces progress from spaces which are public and exposed to more intimate and closed spaces which are hidden in the topography. Therefore, as a patient moves through the building, they experience conflicts within different spaces. The expansion and compression of the body (Fig. 3.7), bright spaces with open views toward the lagoon vs. dark spaces anchored within the earth (Fig. 3.8).

Figure 3.7: Expansion vs. Compression of the body

Figure 3.8: Dark vs. Light spaces

BUILDING CONCEPT

The concept is an exploration of the predominant housing typology of the courtyard house. The central courtyard is one found repeatedly through residential Ghanaian architecture. When designing in warm climates, it is not only the architecture that must be considered, but the exterior space the building defines. This is because a great deal of time is spent outdoors. A traditional house consists of four buildings which create an enclosure around a central courtyard space.⁶⁰ They are traditional houses which can be built with local materials and techniques, which allows them to be built by low-income households. Most are built with traditional materials like rammed earth and sometimes sandcrete blocks (a combination of sand and cement).⁶¹

The central space encourages interaction and communal living while providing privacy. Its adaptability is what makes it a precedent for many multi-habitation buildings. The courtyard is used to host a variety of domestic activities. An example of a typical courtyard house is the Ashanti Shrine House (Fig.3.9). The incorporation of a courtyard allowed the building to be well adapted to the climatic conditions in the area. This typology allows for the play between interior and exterior spaces.

It is important to note the importance of water in Ghanaian culture as it is regarded as the dwelling place of healing gods. The tradition stresses a strong relationship with the environment and historically there were strict taboos especially related to interaction with water bodies. People would cleanse themselves of their illnesses in the water, and emerge healed. With this in mind, the building should communicate with the water. It should allow patients to experience the water physically, visually and spiritually, and offer an overall sense of healing.

Figure 3.9: Ashanti Shrine House

WALKTHROUGH

The site is located in a 6 meter deep bowl which hugs the lagoon, creating the potential for substantial views towards the water and the main city yet still remains remote enough to create a sense of isolation within nature. Its entrance is approached from behind the Cape Coast Metropolitan hospital. The building is generally composed of four components. The courtyard, a full height central space which acts as the heart of the building, community, therapy and treatment facilities. The design of the center was conceived to make the centre similar to the architecture of Cape Coast.

Landscaping is a fundamental component of the building. Given the relatively steep slope of the site, the form of the building is pressed into the landscape, giving the sense that it is emerging from the ground and gesturing towards the lagoon, creating the potential for views. This strategy allows the existing nature to complement and not to compete with the building. Part of the building is raised on one side which permits air to be drawn in by natural convection, and flow from under the building and into the courtyard space. This allows for a cool breeze in the courtyard and airflow through the building through operable courtyard windows.

Above I stated the importance of water in Ghanaian culture. This is addressed in the building through its circulation and the manner with which people descend through the building and out towards the lagoon. The method of circulation is essentially symbolic of a journey of illness to the healing potential of water. As the patient experiences the building, they are offered glimpses of the lagoon on each floor, and are eventually drawn to the lowest level, where they are in full view of the lagoon. The two seasons offer different experiences. In the dry season, when the water is at its lowest, the patient must experience the walk through the trees, out towards the water. However, due to the flooding that occurs during the rainy season, the water comes to, and surrounds the building creating the illusion that it is floating on the water. This allows patients to experience the lagoon at different levels, at different times of the year. (Fig. 3.10)

Figure 3.10: The Fosu in Rainy Season

Figure 3.11: North View

COMMUNITY

The underground entrance of the building acts as a point of departure from the world. The ramp pulls visitors in and onto the ground floor, with the only light coming from the entrance doors. As visitors walk through, their path narrows, and they emerge out into an open semi-exterior space where they are first introduced into the central courtyard. The bridge allows views down into the courtyard and the surrounding trees. As they are brought back indoors, into the community centre, they are introduced to the lagoon. This first floor serves the community and families of patients. The library provides a place where people can learn and educate themselves about cancer. This aims to disprove cultural taboos and educate the general public about this disease. The support centre offers support for people affected by cancer at any stage, be they patients, family members or friends. These two areas embrace a central lounge which opens up towards the lagoon. This area has a kitchen and promotes a casual atmosphere where someone can make themselves a cup of tea and have an informal conversation. The layout also allows visitors to wander, and find their own personal space within the floor.

Figure 3.12: Level 2 Bridge

THERAPY

The second level down caters towards patients and focuses on creating a therapeutic environment which takes into account the sensory changes which occur with treatment. The entrance to the floor introduces the patient to one of the areas which offer physical therapies. The spaces are kept open in order to encourage interaction. Within this area of the building, several types of therapies are offered. These include relaxation therapy rooms or comfort rooms. These rooms are areas which provide spaces for guided imagery⁶² and provide ample views to the lagoon. Rooms for several types of physical therapy⁶³ provided. Here patients are able to participate in exercises which aim to improve strength, range of motion and function which is usually compromised during treatment. Along the bridge, there is a perforated screen which separates the patient from the courtyard.

The design of this screen wall is similar to that of a typical Shrine house. (Fig.3.13) This screen provides a sense of time, through the movement of the sun and the shadows it creates through the day. The bridge brings the patient indoors. At this point, there is little to no exterior light entering the space, allowing for the other senses to compensate. The lack of sound (other than the wet footsteps of others walking) offers a calm and relaxing atmosphere. This area offers the senses different environments including hot, cold and massage therapy rooms, and hydrotherapy pools. The layout plays with the juxtaposition of hot and cold spaces against the body.

Figure 3.13: Screen Wall Panel

Figure 3.14: Heat Therapy Room

Figure 3.15: Cold Therapy Room

Figure 3.16: Heliotherapy Room

Figure 3.17: Heliotherapy Room Interior

TREATMENT

The building offers spaces for treatment on the lowest floor. One of the main issues in cancer centres is the comfort of patients during therapy. For research purposes, I had the opportunity to visit the cancer centre program of The Ottawa Hospital in Ottawa. Currently, the program is transforming its cancer program to focus on the patients experience. One approach they take is familiarizing patients with their environments. By providing tours of the cancer center, patients become aware of their surroundings and are comfortable. The Ottawa Hospital establishes that the cancer centre is a family centred program and are now accentuating the role the patients social environment in the center; whether it be family, or other patients. The spaces on this floor are kept open to encourage interaction. Once the patient enters the floor they are introduced to the courtyard.

The courtyard is characteristically a gathering place and the primary focus of the most social activities. It is at the heart of the building, and culture encourages this space to be a place for “music, cooking and religion” It is the heart of the building where social activities take place and patients are able to experience the natural environment. In his book *Architecture Oriented Otherwise*, David Leatherbarrow speaks of the relationship between interior and exterior spaces. He quotes Klumb when he states “architecture fuses man with his environment”. A courtyard provides the social aspect, out of the four healing environments proposed by Wilbert Gesler (natural, symbolic, social and built).

Figure 3.18: Courtyard

Figure 3.19: Courtyard

The cancer centre incorporates the traditional typology of the courtyard into a healthcare facility. In this scenario, the courtyard is a multi-use space. Here, at the heart of the building (1), is where traditional healing practices take place. The chemotherapy suite(2) is located on this floor. Within the suite is a scent garden. I have mentioned that many patients claim to experience a chemical odor during their therapy sessions. The scent garden covers this smell with the scent of plants such as mint and lavender. In addition, water fountain are provided to offset the metal taste some patients experience.

On the other side of the building is the radiation department(3). From my past experience as a volunteer at a cancer center, I have personally experienced the size of the machines used. They can be off-putting and rather intimidating. To offset this, clay relief designs can be found on the ceiling to provide a positive distraction from the treatment.

MATERIALITY

The building typology is appropriate to the locally available technical and material resources in the area. In the process of choosing materials, there were several factors which were considered:

Sensory stimulation and patient experience- This involved choosing materials that could offer more than a space but an experience, and how these materials effected each sense. Keeping in mind that most patients undergoing treatment experience altered sensory perception, the materials should compensate for these changes.

Culturally relevant materials- One of the issues faced, was choosing materials which was culturally relevant and blended with the architectural vernacular of Cape Coast, yet modern enough to hold the programs needed in a cancer centre.

Site- The location also influenced the choice of materials as the site is in a flood zone. Part of my approach was to take advantage of the changing water levels with the buildings materiality.

Program-There are several structural requirements in a cancer centre. As I stated earlier, due to the radiation emitted from the LINACs, the walls must be thickness of at least 5'.

The materials used are concrete (with clay relief patterns on the lowest floor), wood, and aluminum roofing. Like the traditional shrine houses, the lowest floor has reinforced concrete walls with a 100mm thick red clay facing which is moulded into different geometrical symbols. The top two floors have bamboo paneling, with brick interior walls. This provides breathable walls, which help to keep the building cool in the high temperatures which are often experienced in Ghana. However, in certain spaces, such as the saunas rooms, concrete is used. The aluminum sheet roofing typical to what is used in more recent shrine houses. The design of the building is intended to make use of local conventional construction methods and materials.

FOOD AND ARCHITECTURE

It is important to address the food within a hospital setting. The relationship between a architecture and the senses of sight, touch, and sound are easier describe. You cannot physically taste and smell architecture, however these senses can be used in an experience. Earlier on, I described how water is incorporated into the Cancer Center to provide relief from the side effects of Chemotherapy. However, I wanted to further question how taste and smell can work with the other senses to create a healing environment, and to enhance a patients experience. The cancer centre incorporates the making and eating of Fufu as part of the experience.

Fufu is a staple Ghanian dish which is usually accompanied by soup. It is usually made from either cassava, plantain or yams. The making and eating of fufu has its traditions and rituals. Like many meals in Ghana, fufu is usually prepared outdoors in a courtyard. Its preparation involves two people (usually a man doing the heavy pounding and a woman turning the mixture by hand). Pieces of boiled cassava, plantain or yam are pounded together with in a mortar and a large pestle until the mixture becomes dough like. It is then rolled into a ball and served with soup.

The act of pounding and turning fufu involves a skillset and style, as it involves repeatedly thrusting the pestle into the mortar. The process is about rhythm, which ensures the hand of the woman turning the fufu is not crushed. Eating fufu is also part of the tradition. It is always eaten with the fingers. It involves portioning

each morsel of fufu, moulding a indentation into the small piece, scooping soup with it and swallowing it without chewing.

For many Ghanians, fufu is a daily dish. Many compound houses mark thier evenings with a meal of fufu prepared in a shared courtyard. All aspects of the meal, from creation to consumption, involves the gathering of people, creating a social and symbolic environment. Although the meal itself cannot physically cure a person, the environment it brings has the ability to heal.

Figure 3.20: Fufu

Figure 3.21:
Preperation of fufu

Awareness towards the relevance of sensory design is becoming more prevalent. Knowing that so much of our consciousness is through our senses, and how we perceive our world is based on this, it is the job of the architect to explore ways to enrich our experiences. We rely heavily on our senses to obtain information about our world, however, with our preference for quick, visual gratification, the other senses become suppressed and underused. This reduces buildings to a mere image, with an experience which is exhausted within the first visit. However, sensory design provides a different experience with every visit. It allows you to hear the materials under your feet and see the sun move across the sky. It provides materials for you to touch and smell, and an atmosphere achieved by sound, or the lack thereof.

When these concepts are applied in a clinical setting, architecture has the potential to optimize the healing process. By creating spaces which can decrease stress and effect our moods, it is possible to design medical spaces with all aspects of the building (structure, materials, treatments) are geared towards healing. This is achieved when design is not dictated only by its function, but by the experience and wellbeing of patients. Healthcare buildings should provide a stimulating environment for patients and provide pleasant spaces for all the participants in a healthcare setting. Sensory design should serve as a typology for the design of significant spaces and should contrast the visually dominant model which dominates architecture today.

The Cancer Centre provides a place for people to come to terms with the reality of cancer. It provides people with a supportive environment, in order to help anyone effected by cancer. It isnt intended as a replacement for traditional cancer therapy but offers several types of complimentary therapies which when used with cancer trtreatments, can help to control many side effects. Most of all, the cancer center offers a healing environment for those who are confrinted with the possibility of death. The center offers a healing environment. Therefore, depite the fact that people facing death cannot be cured, they can be healed, made whole and at peace within themselves.

DRAWINGS

Figure 4.0: Plans - Level 3

Figure 4.1: Plans - Level 2

Figure 4.2: Plans - Level 1

Figure 4.3: Elevations - South

Figure 4.4: Elevations - West

Figure 4.5: Elevations - East

Figure 4.6: Elevations - North

Figure 4.7: North Cross Section

Figure 4.8: West Cross Section

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LIST OF FIGURES

Figure 1.	Ranges of the Senses	15
	Malnar, Joy Monice., and Frank Vodvarka. "The Visual Stimulus and the Eye." Sensory Design. Minneapolis: University of Minnesota, 2004. 151. Print.	
Figure 1.2	Therme Vals, Floor Plan. Bathing Level	21
	http://www.public.iastate.edu/~silvinal/floorplans.html	
Figure 1.3	The Lonely Metropolitan	25
	http://www.architecturaldigest.com/shop/2013-04/auction-house-sales-_slideshow_item4_5	
Figure 2.0	Sanctuary at Epidaurus	35
	http://www.utexas.edu/courses/medworld/lecture_9.html	
Figure 2.0.1	Sanctuary at Epidaurus	
	http://www.timetravelturtle.com/2012/07/epidaurus-theatre-sanctuary-greece/	
Figure 3.0	Cape Coast, Ghana	49
	http://commons.wikimedia.org/wiki/File:World_map_blank_without_borders.svg	
Figure 3.1	Mfantsipim School, Cape Coast, Ghana	50
	http://transnationalarchitecturegroup.wordpress.com/tag/colonialism/page/2/	
Figure 3.2	Typical Courtyard House	51
	http://ghanaseptdec2007-virginie.blogspot.ca/2007/10/about-our-life-in-jachie-1910.html	

Figure 3.3	Traditional Courtyard house	51
http://www.johangerrits.nl/galleries/?/1.Travel/Ghana/336+-+Ashanti+ancestral+shrine+house+at+Besease+.jpg		
Figure 3.4	The Fosu Lagoon	53
3.4.1	Rural vs. Urban	
3.4.2	Water vs. Vegetation	
Figure 3.5	Fishing in the Fosu Lagoon	54
http://facultas.wordpress.com/2010/07/20/participation-and-sustainable-management-of-coastal-lagoon-ecosystems-the-case-of-the-fosu-lagoon-in-ghana/		
Figure 3.6	General Programming	56
Figure 3.7	Expansion vs. Compression of the Body	57
Figure 3.8	Dark vs. Light Spaces	58
Figure 3.9	Ashanti Shrine House	60
http://kickoffghana.files.wordpress.com/2012/12/asante-building-with-iron-roof.jpg		
Figure 3.10	The Fosu Lagoon in Rainy Season	62
http://www.panoramio.com/photo/40597270		
Figure 3.11	North View	63
Figure 3.12	Level 2 Bridge	64
Figure 3.13	Screen Wall Panel	65
http://willdoherty.org/wordpress/?p=2774		
Figure 3.14	Heat Therapy Room	66
Figure 3.15	Cold Therapy Room	66

Figure 3.16	Heliotherapy Room	67
Figure 3.17	Heliotherapy Room Interior	67
Figure 3.18	Courtyard	69
Figure 3.19	Courtyard	69
Figure 3.20	Fufu	73

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Figure 3.21	Preperation of fufu	73
--------------------	----------------------------	-----------

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Figure 4.0	level 3	77
Figure 4.1	level 2	78
Figure 4.2	Level 1	79
Figure 4.3	Elevations South	80
Figure 4.4	Elevations West	80
Figure 4.5	Elevations East	80
Figure 4.6	Elevations North	80
Figure 4.7	North Cross Section	74
Figure 4.8	West Cross Section	74