

ABSTRACT

Title of Thesis: THERAPEUTIC EXPRESSION: AN
ARCHITECTURAL PATH TO MIND AND
BODY

Selina Michelle Dandy, Master of Architecture,
2023

Thesis Directed By: Chair, Peter Noonan, Architecture

To design with the intent to influence a user's psychological and physical well-being.

Neuroarchitecture constructs an understanding of how the brain of its occupants works. This is designed by providing users with spaces that arouse their stimuli. When correctly done a space can effectively influence behavior, well-being, cognition, emotion, and perception. In attempts to grow our built environment, neuroarchitecture will help enhance our connection to the natural world as well as create the importance of human health and well-being. By implementing natural light, views/access to nature, materials, spatial layout, acoustics, temperature, and air quality, these principles will promote positive emotions and sensory experience. These design principles will be shown throughout the project. Allowing the user to connect with their mind and body where one can find their therapeutic expression. Although this does not present a cure but based on research with architecture and neuroscience at play, it can positively affect the outcome of human stress levels and mood. All of which are goals that will be set throughout this therapeutic retreat.

THERAPEUTIC EXPRESSION: AN ARCHITECTURAL PATH TO MIND AND
BODY

by

Selina Michelle Dandy

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of the requirements for the degree of
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Preface

If needed.

Foreword

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Dedication

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Chapter 1: Neuro-Architecture

To first understand the term “Neuro-architecture” we must first understand where the term originates from. Neuroscience is the study of the function and structure of the brain and the nervous system. Similar to a computer, the brain is hard-wired with several neural connections which allows for the brain to send messages and receive information.

Neuroscience can help better understand human conditions such as down syndrome, ADHD, addiction, epilepsy and more. When understanding these conditions, it becomes easier to develop strategies to treat these health issues and how environmental factors can also play a role. Research in ADHD shows that individuals display lower activity in attention and lower cognitive control. People with ADHD also experience difficulties with planning and decision making due to atypical activity in the brain’s reward system.

Section 1 Health and Wellbeing

Architecture and health can be linked by identifying some of the causes of the illness, such as environmental factors. For instance, “chronic exposure to unwanted noise can increase blood pressure and hinder adolescent neural development. Insufficient daylight can impair sleep quality” (Sarah Ruth Paynea 2015). There have been several studies done showing the correlation between raised in a city and the increase of depression and chronic anxiety. Meaningful social interactions can be harder in a city setting which is why it is crucial to design spaces with mental health in mind.

Psychotherapist April Snow breaks down notable factors that can impact your mental health based off your surrounding environment;

- Aesthetics: Cluttered spaces can create feelings of overwhelm and anxiety, while tidy spaces can invoke a sense of calm. To help with this, Snow says to have colors and objects in your environment that are meaningful, which can boost mood.
 - Sensory: “The lighting, temperature, sounds, smells, and color palette of an environment are very important to how comfortable, relaxed, and safe you feel,” Snow says. For example, harsh lighting and loud noises can lead to anxiety or agitation, while dark and cold spaces can lead to feeling unmotivated.
 - People: Indirect or inconsistent communication, conflicts, or unreliable people in the environment can be very stressful to manage. However, Snow says sharing a space with someone you trust, such as a partner or spouse, roommate or friend or loved one, can create a sense of calm.
 - Culture and Values: “It’s important for people to connect with others that share their culture and values and to be understood at a deeper level,” Snow says. Otherwise, feelings of isolation and depression can arise.
 - Familiarity: Positive associations in the environment such as a family keepsake, photos, or familiar objects can boost mood and a sense of connection.
- (Lindberg 2021)

Subsection 3 Neuro-Architecture

Taking the study of Neuroscience and applying it in the realm of architecture creates a discipline that links the two together to the built environment and its users. The perception of the built environment can then be used to design strategies that produce a positive outcome for the user. It has been proven that buildings affect our mood and well-being. Neuro-architecture “assumes that the environment has a direct influence

on the most primitive patterns of brain functioning, which escape from conscious perception. The application of Neuro Architecture consists in trying to create environments that can stimulate or inhibit some of these determined patterns, depending on the purpose of the space in question.” (Neuroau 2018) With this information an architect or designer can now create modern buildings that serves its users unconscious, emotional, behavioral and perceptive needs.

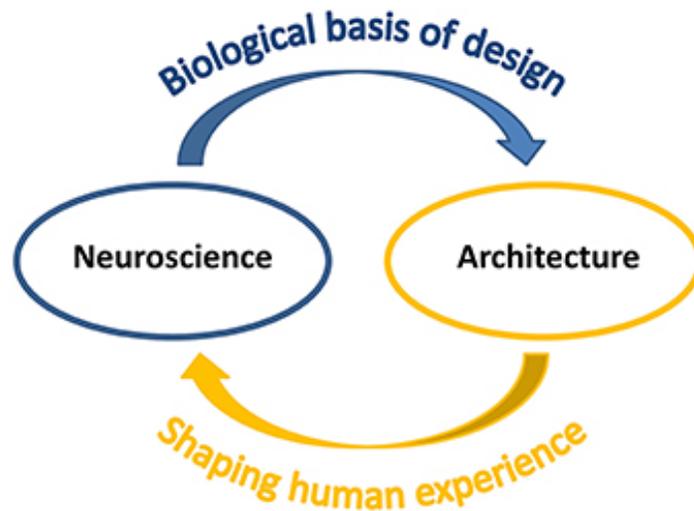


Figure 1: Connection between neuroscience and architecture, 2016

For instance, paint colors used in interiors can affect learning, social behavior, and emotional wellness. The color red can improve performance of detail-oriented cognitive tasks. The color blue can enhance creative thinking, and green is known to improve mood. (Alex Coburn 2017) There are case studies that apply these ideas of stimulating the human experience of the built environment. The first is the Hazelwood School, in Glasgow. A school for 60 sensory impaired children. The building was developed in groups of spaces that allowed the children to guide themselves through the school. The architects created an environment that supports the needs of the children all while allowing them to use their senses that are still

intact, such as touch. A cork wall is placed in the hallways to help with guidance. Students can run their canes along it as well as their hands to feel when there is a break in the hallway. In addition the materiality of the structure and the cladding were all incorporated due to their sensory stimulation. The cladding contained textured materials such as naturally weathering larch boarding. This material provided tactile qualities for trailing but also stimulates the sense of smell. This school was able to capture the needs of the students and the teachers by the selection of materials, colors and textures in the building design.

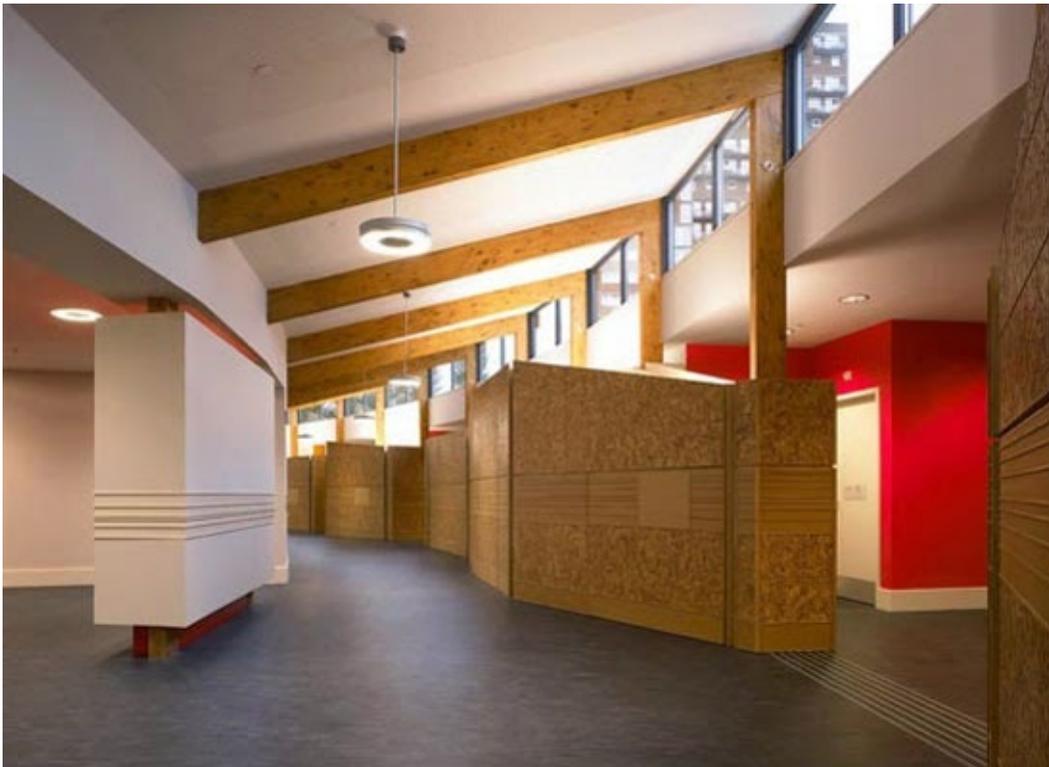


Figure 2: Hazelwood School, 2008

Neuroarchitecture Principles

Neuroarchitecture can be used to make personal well-being and the efficiency of healthier spaces. A well-designed building or space must accommodate its users psychological and physical needs. The field neurophysiology has helped users explain how they perceive the built environment that surrounds them in ways of cognition, problem-solving, and mood and how they are effected by this environment. There are five functional requirements that The Academy of Neurosciences for Architecture have developed. First being *Sensory Perception*: “Perception is a multi-sensory event which involves memory, emotions and the experiences of sensory organs. It impacts behavior and imagination, as well as the way new information is processed and people's reaction to the environment.” (The United Workplace 2019). The second are *Routes*: “Points of reference and routes found in any given space are two characteristics which define both its form and its function, while simultaneously helping to signify spatial perception . Research shows that, within spaces that can be traversed in two different directions, each is represented by different patterns of neuron activity, so that our brains treat each direction as a separate environment. It can be inferred that spaces which foster free exploration will create representations which are less informed by routes, thus improving personal experience.” (The United Workplace 2019). Third is *Learning & Memory*: “Spatial memory requires visual cues to determine our location and orientation within any given environment. When these points of reference are missing, location learning is delayed and the stress response is activated. This underscores the importance of incorporating design elements which support spatial recognition and recall.” (The United Workplace 2019). The third element is *Emotions*: Built environments are initially perceived through emotion, a fast and effective system provided by evolution so that we can distinguish good from bad, safe from dangerous, and so on, in order to survive. Before the sensations evoked by a building acquire conscious expression, we have already passed judgment on its

materials, spatial relations, proportions, scale, rhythms, comfort, and so on.” (**The United Workplace 2019**). The final is *Space & Place*: “Although places are mostly associated with spatial environments, the notion of “place” differs from that of “space” in one fundamental aspect: an individual's interaction. The internal representation of a place is deeply informed by the way in which people move through it. A glass partition—which impedes movement but not viewing—can be enough for the brain to perceive two physically adjacent spaces as different. This means that sense of place is built through movement and the spatial connections that can be made, together with one's personal spatial configuration.” (**The United Workplace 2019**). With these five design aspects an architect can begin to establish the fundamental aspects of neuroarchitecture. The next phase is incorporating the seven neuroscience principles to enhance spatial orientation, cognitive task performance, and to facilitate positive emotions and stimulus. First is the *Chronobiology & Circadian Rhythms*: Sunlight is fundamental for the regulation of the immune and endocrine systems, and it impacts how well circadian rhythms function throughout the day and the seasons. When we lack an adequate supply of light, there can follow issues such as alterations in the sleep-wake cycle, fatigue, lack of concentration, depression, stress, and so on.” (**The United Workplace 2019**). Second are *Ceiling Height*: “high-ceilinged spaces foster conceptual thinking and activate a sense of freedom and imagination which stimulates creative thinking, low-ceilinged spaces improve concentration and activate a type of thinking that is more concrete, focused and detail-oriented.” (**The United Workplace 2019**). Third are *Outside Views*: “There are a significant number of studies which confirm an empirical reality that is verified in every single workplace: the possibility of having a view of the outside—especially if the outside is a natural environment—improves employees’ wellbeing and state of mind. Apparently, green landscapes provide the best effect, while bodies of water seem to be preferable to urban vistas.” (**The United Workplace 2019**). The fourth principle are *Proxemics*: “The concept of

proxemics refers to the physical distances which people maintain with regard to one another in order to remain within a comfort zone as dictated by their mutual relationship and the nature of their interaction. There are four basic spatial distances: intimate, personal, social and public. Any violation of these boundaries of personal space causes different degrees of discomfort . The workplace would seem to dovetail with people's social environment, where private spaces have diminished drastically in the last few years, giving way to public areas.” **(The United Workplace 2019)**. The fifth principle is *Eye Contact*: “According to research conducted by the Centre for Brain and Cognitive Development at the University of London , eye contact is the basis of human connections both biologically and culturally speaking. Seeing other people activates “mirror neurons”—fundamental for socialization—which react with greater intensity during face-to-face contact. Looking at each other allows us to obtain feedback from our interlocutors; it works to signal synchronicity and it allows us to interpret other people's disposition.” **(The United Workplace 2019)**. The sixth is *Noise*: “Noise in the office is a major cause of distraction, dwindling efficiency, increasing stress and professional dissatisfaction. Noise-induced stress can lead to the release of cortisol, a hormone which helps the body restore homeostasis after a negative experience. Excess cortisol affects emotional processing, learning, reasoning and impulse control, thus altering our capacity to think clearly and retain information.” **(The United Workplace 2019)**. Lastly is *Morphology*: “The shapes in which a workplace materializes can provide sensory triggers. A study conducted by scientists at Harvard Medical School indicates that we prefer curves and soft outlines to sharp ones because we feel instinctively afraid of sharp objects, and it was discovered that the amygdala was more active when people looked at sharp objects. It can be inferred that angular shapes benefit a state of alertness and concentration whereas soft and rounded ones might satisfy our emotional need for security and protection.” **(The United Workplace 2019)**. With these seven neuroscience principles and architectural elements

joined, neuroscience can reveal the reactions of a user's mind and body to the built environment.

Chapter 2: Human Factors

Interior Environments

People share a relationship with space on both a psychological and physical spectrum.

Space can affect our quality of life. It's where our needs become most exposed.

According to Maurice Merleau-Ponty, whom was a French philosopher said "the body and mind inhabit space and by doing so we construct a meaning of space"

(Merleau-Ponty 1945). When expressing space in the realm of architecture we create

an understanding of the thought of space. This shapes our interiors by our inner

thoughts, memories, and dreams a person has. External images and influences also

play a role when shaping our interiors whether it's consciously or unconsciously.

When designing interiors, it becomes a collection of images that together create a

reflection of our inner selves. This is represented in a material sense. Our inner self

has a very complex link to the place we live, and work in. These influence the level of

our perception and one's emotions to the reaction of the environment.

Subsection 1 Biophilia and Human Health

Exposure to nature increases feelings of affection, friendliness, playfulness and

happiness. In contrast urban settings have the opposite effect, increasing levels of

depression and stress. Urban and natural landscapes produce changes differently in

the psychological aspect.

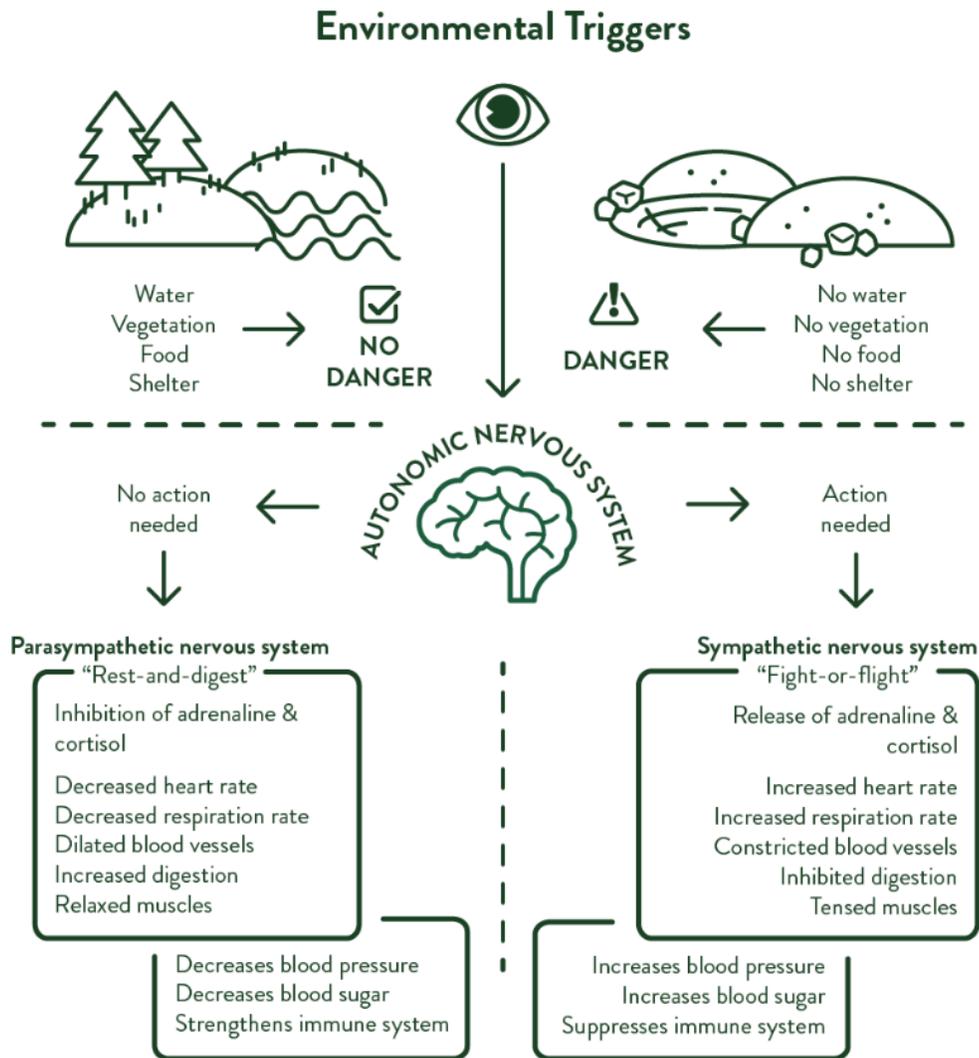


Figure 3: Environmental triggers of Biophilia, 2017

Environments that lack essentials for survival effect the sympathetic nervous system which allows us to make localized adjustments, such as sweating in hot temperatures. When placed under stress this causes the entire sympathetic nervous system to be activated relating in “fight-or-flight” response. In a modern environment that lacks water and vegetation our brain struggles to go into a state of “rest-and-digest”. There are three types of contact with nature; Outdoor Nature Contact, Indoor Nature

Contact, and Indirect Nature Contact. It is important to know that “exposure to natural elements is known to reduce stress and anxiety, improve mood, energy levels, sleep quality and cognitive performance, decrease blood pressure, maintain stable blood sugar, aid in faster recovery, inhibit pain, and strengthen the immune system” (Diana E Bowler 2010). As more modern architectural designs include these environmental elements the more support our psychological, emotion, and functional well-being will have. The link between health and architecture can continue to be made through identifying environmental factors related to illnesses. For instance, “chronic exposure to unwanted noise can increase the blood pressure and hinder adolescent neural development. Insufficient daylight can impair sleep quality” (Sarah Ruth Paynea 2015). Several studies have been done showing correlation between growing up in an urban environment and an increase of depression and chronic anxiety. In addition, meaningful social interactions can be harder in a city setting which is why it’s crucial to design spaces with mental health in mind. Psychotherapist April Snow breaks down the notable factors that can impact your mental health based off your surrounding environment.

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anxiety or agitation, while dark and cold spaces can lead to feeling unmotivated.

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- **Familiarity:** Positive associations in the environment such as a family keepsake, photos, or familiar objects can boost mood and a sense of connection.

(Lindberg 2021).



Illustration 1: Meditation Garden & Sensory Garden (Source Author)

This is one of the gardens incorporated into the design of the Therapeutic spaces.

Allowing users to connect with nature to gain a biophilic response as the space safety, connection, and comfort.

Chapter 3: Human Perception of the Built Environment

Section 1: The Science

We spend more than half of our lives inside of buildings, but we understand extraordinarily little of how the built environment affects us beyond visual perception. Buildings affect our behavior, emotions, conscious and unconscious thoughts, and our well-being. Through our senses we send stimuli to our brain based using the external experiences we perceive. Consciously and unconsciously our mind gives notice to different reactions:

- Emotion
- Attention
- Memory
- Motor Response

Deeper understanding of both mind and body can help architects design with the distinction of how buildings affect human well-being. Vittorio Gallese is an expert in the study of neurophysiology and neuroscience. He explains how “science is informing us that our perceptual engagement with the environment, including the built environment, is enacted at the most basic level as a multisensory whole-organism experience. Implicit in this view is the idea that architectural design is more than a symbolic or conceptual language – it is a process by which minds,

bodies, built environments, and cultures interact with each other on multiple levels over the course of generations.” (Gallese 2017)

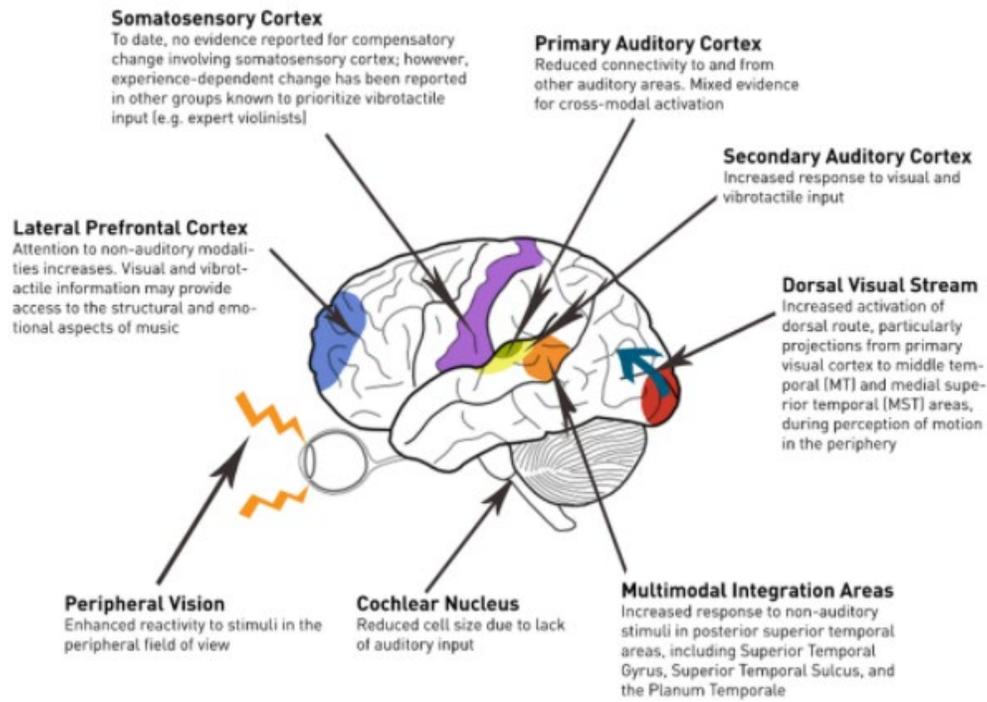


Figure 4. Changes in the deaf brain relevant to music perception.

The human brain maps space into two regions: pragmatic interaction and personal space. Pragmatic interaction is the space that can be reached by simply stretching out our arm. What is beyond our reaching point is our extra personal space. Personal space is mapped by the motor neuron system which controls the virtual stimuli, tactile stimuli, and events that produce sound all around the body part that is in motion which in this case is the arm reaching outwards.

This part of our brain simulates what we can do with objects in space in relation to others. This is an integral part of our perception of object of space and others. We have a direct access to objects and the physical space around us. The notion of touch, and contact activates the tactile attribute.

When entering an area, the brain is more engaged than just the visual system. Emotional, tactile, and motor system are also engaged. Our perception is naturally synesthetic, which is experiencing one of our senses through another sense. The relationship between embodied simulation and imagination is important when addressing aesthetic experience. Perception is a relation to our body knowledge and how we perceive the built world. The fundamental pragmatic nature and motor behavior. The aesthetics in architecture and the relation between our perception architectural space and of buildings and our body in nature. If we were purely visual creatures, we would not be able to appreciate architecture fully due to our bodies use of nature, gravity and light. For example, we have a bodily perception of elevation when entering a Gothic cathedral. This elevation processing allows us to appreciate the depth of space (Gallese 2017).

There are two different types of visual perceptions, one that recognizes objects that enter our awareness. The second, involves our peripheral vision which tracks movement and settings around us even though we might not consciously be aware. Peripheral vision allows us to move out of the way if something was to make contact with us by utilizing our visual preceptors.

A Finnish Architect, Keijo Petaja used to say, “Architecture is constructed mental space”, architecture is a materialized expression of human mental space; and our mental space is itself structured and extended by architecture. Buildings are not only places that we seek shelter and refuge, but a place that encases our mind, body and souls (Robinson and Pallasmaa 2015).

Subsection 1: Nonvisual Experiences of Architecture

The human experience of a building goes beyond relying on visuals. The remaining four senses can be used to experience the built environment in intriguing ways. For example, scent can affect our emotional response to a building by creating a link between the sense of smell and the limbic system. The limbic system is the part of the brain that controls the behavioral and emotional responses. This link between smells and the limbic system can revive memories of a place or person experienced in childhood. The key is to use this sensorial perception in the way that circulates throughout the building.

Sound is another sense that can allow a user to experience a building. It can help provide information on the size and shape of a space based off the acoustics. Sound can also be used on a spiritual and tranquil level by integrating sounds of nature, water, leaves, and wind blowing. Understanding the materiality of interiors is also crucial in selecting textures which can dampen or amplify sound.

Additionally, building temperatures can contribute to a user's experience, whether it's warm and gives a feel of welcoming, or cold. The impact of textures can be felt without always having to touch. For instance, a modern glass concrete building would give an occupant chill through their body as they walk through the hallway's vs a more natural material such as wood that gives us a sense of warmth and comfort. Both consciously and unconsciously, we experience architecture on a multi-sensory level.

Smart Architecture

Human intelligence has always been able to receive raw information and immediately interpret if an environment is healthy, safe, or dangerous. We process this information and link it to the physical reality that our eyes and brain perceive. This intelligence is a unifying principal to the process of architectural design. Smart Architecture can be perceived as a process that goes beyond controlling modern conveniences but influences the buildings form and design. Technology drives the building by encompassing connectivity, health and wellbeing, safety, power, energy, cybersecurity, and sustainability. Our environment and how it is built affects the quality of human life. These distinctions of building design directly affect its users and the impact of the building footprint. Designers, architects, contractors, and engineers all must follow industry standards that are developed with quality of life and building structure in mind. These standards ensure the safety of the building, construction, and the creation of sustainable buildings. But what is smart architecture? A smart building can be thought as a living, breathing organism. It is a way to incorporate passive and active technological and architectural strategies into a building. The brain of the building controls other systems throughout the building such as the HVAC, lighting, plumbing, processing equipment, and more.

Chapter 4: Community

Section 1: Dunbar's Number

In order to create a successful community, we must first understand its structure.

Robin Dunbar is an anthropologist and psychologist that has researched behavioral, cognitive mechanisms that are the base of social groups. While trying to solve why primates devote so much time and effort to grooming, he began research on humans. Dunbar says “We also had humans in our data set so it occurred to me to look to see what size group that relationship might predict for humans” (Konnikova 2014). Based on the neocortical volume to the size of the human brain Dunbar was able to use total brain volume and mean group size to determine what the appropriate size is for social networks. Dunbar organized his findings into three groups. The first number is 150, these consist of casual people you'd have around. Following is 50, these are people you would see often but not considered intimate friends. Next is 15, these are the close group of friends you would keep around. Lastly, the most intimate number is 5, these are your close support friends. These are the numbers Dunbar believed are needed to start a community. Looking back on historical evidence, he found consistency for his beliefs. Our entire evolutionary existence has been dominated by small-scale societies. For example, the Roman empire in the sixteenth century to the twentieth-century, armies would consist of 150 soldiers. Which would then be broken into smaller units of 50 and then furthermore divided into sections of 10-15. More

examples through history that support Dunbar's case, are Neolithic farming communities of 150 people. Work environments of 150 people benefit from these close groups. Name badges aren't needed or line management systems. Smaller work environments become more committed and communal when following Dunbar's numbering structure.

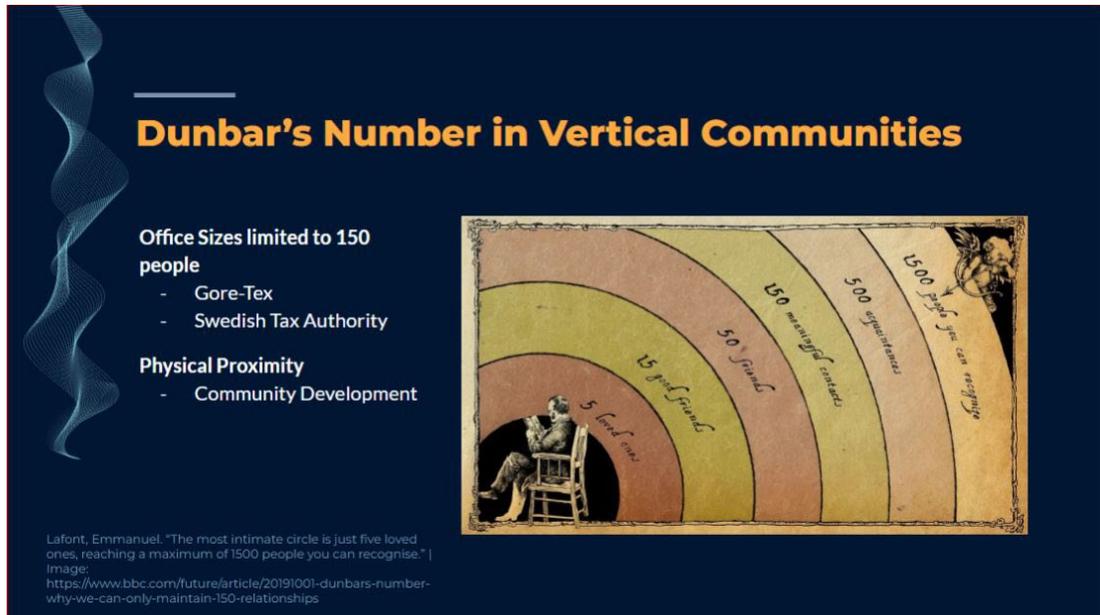


Figure 5: T Krouse ARCH 408, *Vertical Communities*, 2022

Once Dunbar confirmed his theory could be seen in history his next approach was to relate his numbering system to architecture. The first case study was Elemental's Quinta Monroy housing development in Chile in 2003. This project consists of 100 dwelling units, divided into 5 clusters of 20 households. The goal was to achieve enough density in the community but to not make it feel overcrowded. Additionally, for economic reasons the city wanted to increase property value and strengthen the family economy of the project.



Figure 6: Alejandro Aravena, *Quinta Monroy Housing*, 2013

Once exploring this case study the precedent influenced the amount of overnight units that would serve the therapeutic retreat. A total of ten overnight units will be designed. This allows for each of the users to establish a close knit and intimate experience with the fellow attending retreat guests.

Chapter 5: Site Analysis

Section 1: Site Demographics

La Jolla San Diego is home to the Salk Institute for Biological Studies which was founded in 1960 as well as Neuroscience facilities and more. There is a strong mix between residential real estate here and educational/ research developments. The research done here can be taken and placed into the development of this thesis. Salk Institute utilized neuroarchitecture to create sa-paces that can adapt to technological advances and help emphasize the well-being of employees. Louis Kahn had set a precedent for neuroarchitecture when designing this project. Making this a great site to coordinate a relationship to Louis Kahns profound precedent.



Figure 7: Salk Institute, 2013

The area consists of a steep topography allowing the chosen site to sit on top of the mountain overlooking the Pacific Ocean and away from the main urban setting of La Jolla.

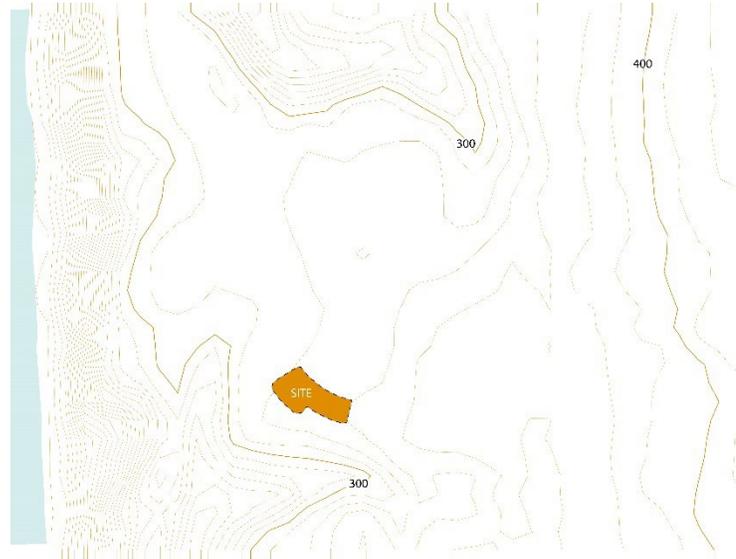


Illustration 2: Topography Map (Source Author)

The main street access to the site is from Torrey Pines Scenic Dr. This is not a main busy road due to it only serving Salk Institute employee parking and locals who are coming to hike the local trails or paraglide.



Illustration 3: Site Access (Source Author)

With a section cut through the site the scale becomes evident. This site truly sits on top of a mountain away from any disturbance.



Illustration 4: Site Plan (Source Author)

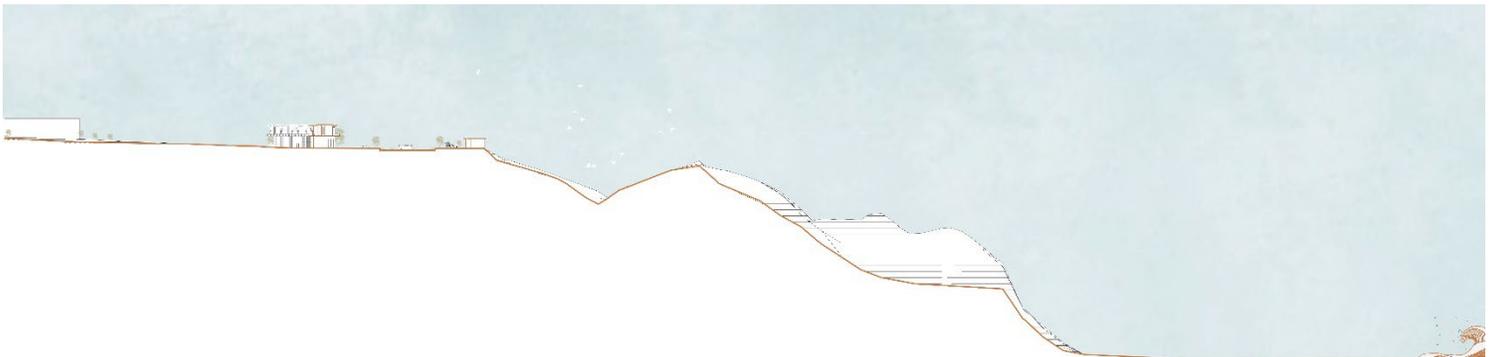


Illustration 5: Site Section (Source Author)



Figure 8: Google Maps, *La Jolla*, 2022

The chosen site has beautiful views to the ocean that allows for occupants to feel closer to nature as well as access to local trails. The surrounding facilities would help strive the goal to create therapeutic spaces. By offering this typology it can improve mental health, mood, perception and advancements in neuroarchitecture.



Figure 9: Google Maps, *La Jolla*, 2022

To broaden the view when looking at mental health, in California it is important to note that “1 in 6 adults experience mental health illness” (Holt 2018). This project can become one of many resources available for California residents with mental health concerns. For instance, “Medi-Cal pays for a significant portion of mental health treatment in California. The number of adults receiving specialty mental health services through Medi-Cal has increased by nearly 50% from 2012 to 2015, coinciding with expansion of Medi-Cal eligibility.” (Holt 2018) In partnership Medi-Cal can help be the driver for a Mental Health related housing typology that does not have a clinical approach.

Subsection 1 Program Analysis

The site location will help define the surrounding context and the sensorial design considerations for the program. When designing therapeutic spaces there must be a

multisensory experience involved that fuses perception, memory and imagination. Therefor a program that allows a user to interact with all of their senses is ideal for a spa retreat. Users are assigned a 4 day schedule of activities that best suit their physical and mental needs. Once the program tabulation had been mapped out on the site it was important to investigate the program through form techniques.

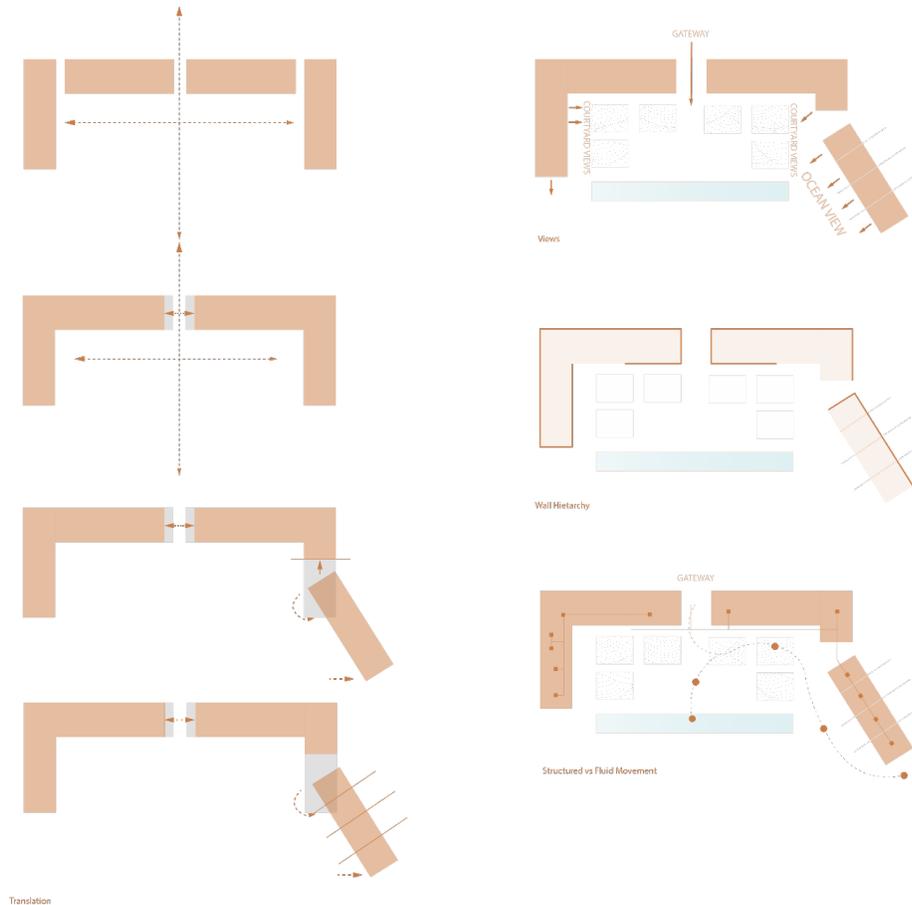


Illustration 6: Form Translation (Source Author)

Creating a hierarchy of spaces based off their program helped configure the floor plan.



Illustration 7: Ground Floor Plan (Source Author)

The ground floor plan includes:

1. Reception
2. Break Room
3. Employee Office
4. Employee Bathroom
5. Utility/ Mech Room
6. Storage
7. Employee Conference Room
8. Employee Overnight Room
9. Employee Conference Room
10. Guest Lounge
11. Restroom

12. Therapy Gathering Room
13. Mechanical
14. Yoga/Sound Bath
15. Dining/ Kitchen
16. Pantry
17. Kitchen Storage
18. Restroom
19. Outdoor Dining Patio
20. Storage
21. Mood Room
22. Mens Locker Room
23. Women's Locker Room
24. Spa Pool
25. 60 Degree Sauna
24. 95 Degree Sauna
26. 110 Degree Infrared Sauna
27. 130 Degree Infrared Sauna
28. Red Clay Sauna
29. Restroom
30. Mechanical
31. Sensory Deprivation Tank
32. Sensory Deprivation Tank
33. Spa Lounge
34. Outdoor Pool Locker Room
35. Restroom
36. Changing Room
37. Changing Room
38. Outdoor Pool
39. Garden
40. Meditation Garden
41. Fire Pit



Illustration 8: Second Floor Plan (Source Author)

The second floor plan includes:

- 42. Guest Balcony
- 43. Lounge
- 44. Retreat Units

The plan is preceded by gardens that are filled with native flowers and trees to provide pleasant aroma as well as a source of shading to the users. Along the greenery on the site are seating nooks to encourage socialization. As seen on the plan, therapeutic spaces are located on the ground plan. The functions are placed

strategically so activities such as yoga and therapy can have direct access to the outdoors to create a blur between indoor and outdoor space. While the activities such as the saunas, spa pool, mood room, and red clay saunas have glimpses of the outdoors but intentionally direct the healing inward to the building.

Section 2: Tactics

The processes that our brain use to determine our safety and health comes from our surroundings. The modern architecture designs available today helps to secure this deep sense of safety. By creating this safety the site is broken into three stages: Profane, Sacred, and Nature.

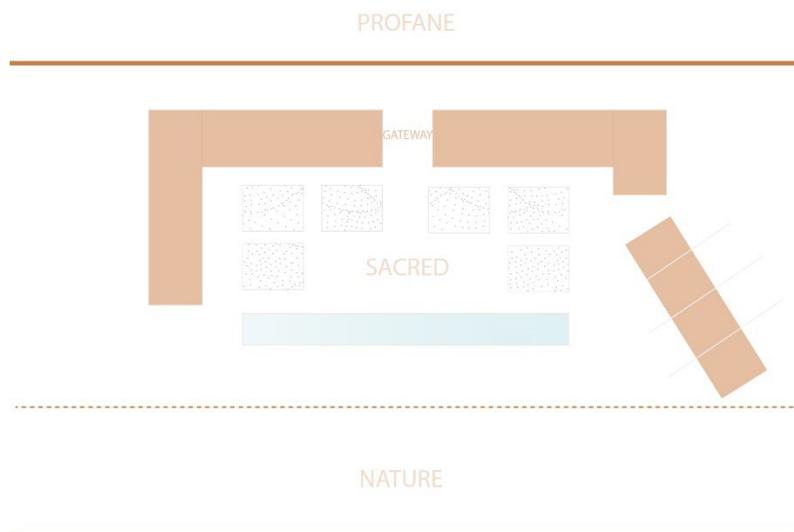


Illustration 9: Concept Diagram (Source Author)

The profane entails the noisy urban area of the surrounding site. Once through the gateway the users enters the sacred space. Here is where the therapeutic spaces commence allowing courtyards to be filled with gardens and peaceful environments. Users are encourage to socialize, explore, and heal as they occupy this space. Lastly

end of the site approaches onto the nature. Here is where the ocean's horizon and natural terrain take over. When we optimize the utility of our surrounding spaces to work for us, we can begin to harness the internal drive of our processing. Being reintroduced to natural elements allows for our nervous systems to relax. Various forms of these elements can be added rather seamlessly into the design of buildings. In many ways, these simple features can be significantly beneficial. With a section cut through the site it becomes easier to visualize the substantial height of the topography

Design Development

Furthering the design, the use of materials, textures, shadows, and light are crucial to determining the effects space can have on its users. Manipulating how light penetrates the building will influence the user's brain and behavior through visual perception. Lighting can play a key role in the surrounding environment because it affects the user's emotional aspect. These lighting strategies were implemented throughout the building design.

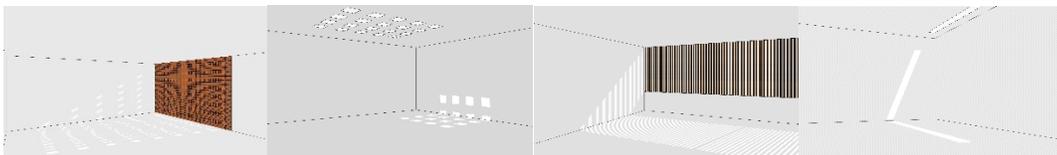


Illustration 10: Implemented Lighting Designs (Source Author)

As a matter of fact the relation between spatial features and the users experience of space can be interpreted by a diverse approach of fields. For example, William

Churchill says “We shape our buildings; thereafter they shape us” in his speech to the House of Lords meeting on October 28, 1943. Ultimately, we are creating environments we trust.



Illustration 11: Detailed Section (Source Author)

User Engagement

At this retreat, every guest receives a personalized schedule tailored to their individual needs and desires. This ensures a satisfying and fulfilling experience. Throughout their four day stay guests will attend group therapy activities as well as individual therapeutic relief activities. One user introduced to the project is Susanne, she’s a Professor that wishes to prioritize self care and relieve some of the built up stress that her career has caused her body to undergo over the years. A few of her concern areas are stress, physical

and mental exhaustion. She is asked which concerns are most important for her journey during her stay. Based on these points her personalized schedule and how she might move throughout the site is shown below. This will help keep guest focused and engaged in their daily activities.



Illustration 12: Personalized Schedule (Source Author)

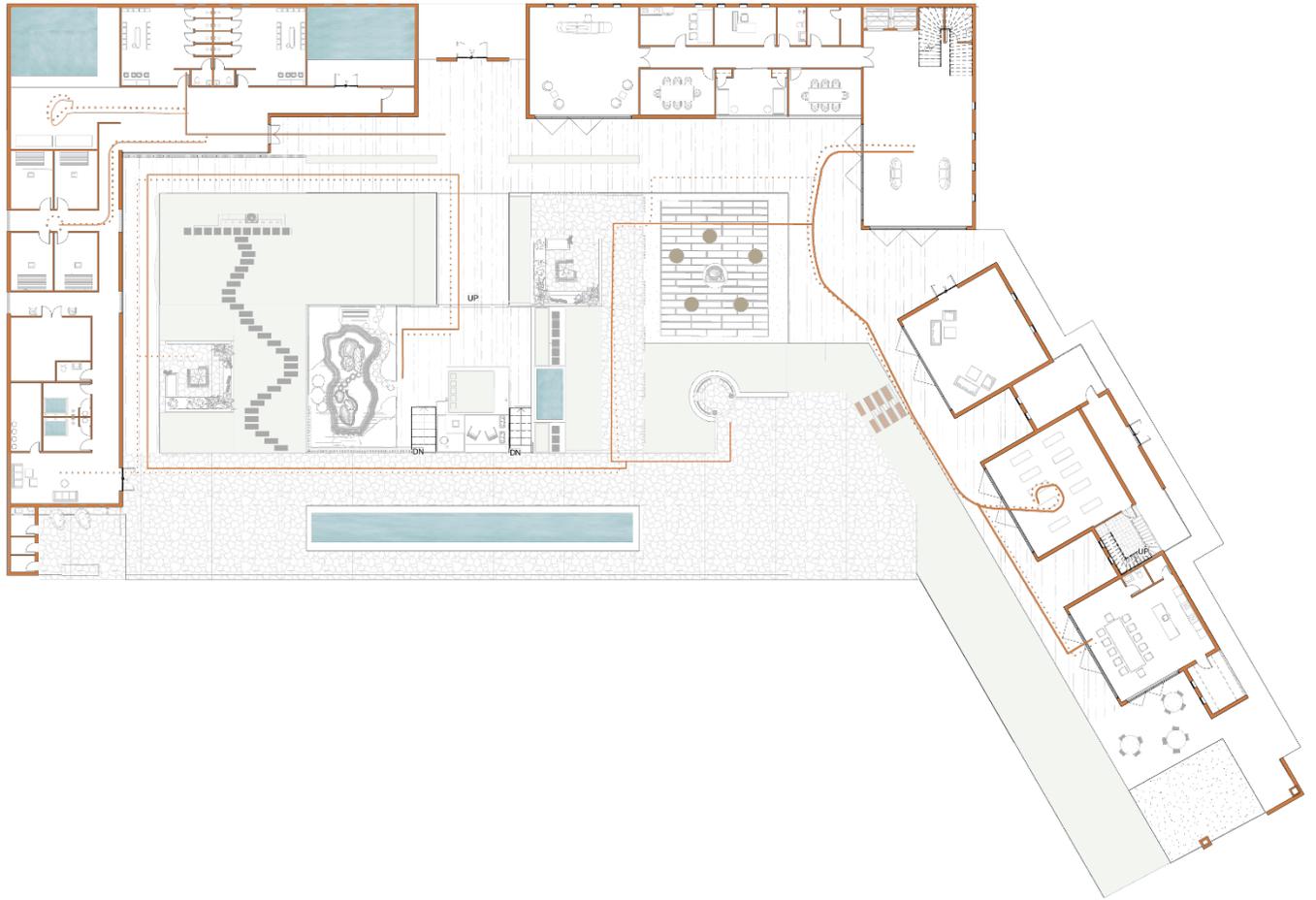


Illustration 13: Movement Diagram(Source Author)

Chapter 6: Therapeutic Spaces

The architecture and program focus on experiential journey within the building with a composition of warm therapeutic spaces as well as complex spaces that push the user's internal perceptions. Neuroarchitecture principles have led to the creation of several therapeutic spaces with significant implications.

Spa Pool

This room features a mineral Users can expect to enter this space and immerse themselves into the jetted pool to help energize their body. As they soak they can inhale the eucalyptus infused steam. Some of the benefits include: increased circulation, reduction of inflammation, improved mood, reduced stress, improved sleep quality. The transcending tranquility of this spa pool, washed with the light from the penetrated ceiling emphasizes the sound of the water. A user can feel relief and enjoyment as they enter the warm body of water.



Illustration 14: Therapeutic Spa Pool (Source Author)

Mood Room

This room features a hydrotherapy plunge pool. Users can expect to enter this space and sit in the pool while experiencing elements of rain to promote relaxation as the rain washes their stress away. Some of the benefits include: improved endurance, cardiovascular benefits, and reduction in soreness. This dark wet atmosphere creates a multisensory experience as the subconscious fuses perception, memory and imagination. This design is meant to push one out of their comfort zone.



Illustration 15: Therapeutic Mood Room (Source Author)

Sauna

This room features a soothing steam bath that relaxes muscles, cleanses skin and helps to remove toxins. Inhalation of eucalyptus enhances relaxation. Some of the benefits include: recovery for sore muscles, increased metabolism and weight loss, promotes skin health, anti-aging benefits and reduced stress. The spatial layout and use of natural materials such as wood in this space promote a relaxed and comfortable emotional experience while increasing a greater Neuro-cognitive coherence to the space.



Illustration 16: Therapeutic Sauna (Source Author)

Red Clay Sauna

This room features a ball pit of warm red clay shaped as small balls. In this space a user can experience a massage and muscle relaxation as they sink into the red clay balls. Some of the benefits include: improved complexion, soothes irritated skin, and detoxifies the body. The scent of the red clay and texture of the clay balls when a user is sunken into the pits creates a complex space.



Illustration 17: Therapeutic Red Clay Sauna (Source Author)

Sensory Deprivation Tank

This room features a float therapy tank. In this space a user comes in alone and enters the tank. Due to the buoyant Epsom salt and water solution your muscles can fully feel relaxed as your body floats. Some of the benefits include: ease of mental anxiety, decreased stress, reduce in chronic pain and muscle tension. Due to the dissociation of sound and light in this space. The design technique provides a user to experience with the sense of touch and internal perception.



Illustration 18: Therapeutic Sensory Deprivation Tank (Source Author)

Outdoor Courtyard & Pool

This space contains an outdoor swimming pool that is connected by large gardens and patios. Here users can experience the infinite landscape as the pool views overlook the Pacific Ocean and La Jolla's beautiful intricate topography. Some of the benefits include: easy access to nature, fresh air, relaxation, floral aromas, and scenic views of the Pacific Ocean. Overall, this space creates a multisensory environment.



Illustration 19: Therapeutic Outdoor Courtyard & Pool (Source Author)

Chapter 7: Conclusion

In conclusion, this project helps introduce a relatively new field “Neuroarchitecture” that impacts the built environment and human perception and behavior. Throughout this project the design strategies help set a precedent for future designers. Using the given principles neuroarchitecture can be integrated into any building. This project gives great potential on how to revolutionize the way we approach design. By understanding the brain and the various responses a user has to architectural elements, such as light, color, spatial layout, and materials. With this we can create spaces that help improve positive emotional and cognitive experiences. Ultimately connecting mind and body through the use of architecture.

Appendices

If needed.

Glossary

If needed.

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