

## ABSTRACT

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  A SENSORY MUSING PARK

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This thesis studies the relationship of architecture and the senses. The first part of the document explores sensory characteristics and how they work. It defines their importance in allowing humans to navigate complex environments. The second part of the thesis looks directly at environmental stimuli. It seeks to qualify and associate physical variables with particular sensory responses. The goal of the research is to create a set of standards by which architecture can design "for the senses". The design project will put to test the principles organized from research through a series of architectural installations that harness both natural and man-made stimuli. The methodology with which stimuli are engaged will highlight time, place, and the awareness of *being*. Each installation is part of a greater constellation that can be sequenced in a variety of ways, experienced uniquely each time, and even added to by visitors and artists.

# ARCHITECTURE AND THE SENSES: A SENSORY MUSING PARK

By

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## Preface

This thesis is about the senses, but more specifically, it's about architecture's role in filtering and forming our sensory perception. In order to fully understand this, we need to understand how the senses work. Our sensory organs are mediators between what happens in our brains, and what happens in the world around us. They gather information, through the form of particles and frequencies, and send it to the brain for processing. However, the human psyche is not an objective entity. Every individual's psychological and cognitive processes distort the information contained therein, which suggests the near impossibility of predicting the experiential product of a particular situation. Though architects aren't charged with addressing the psychological condition of humans, we are responsible for shaping and dressing the built environment, and should, therefore, be cognizant and sympathetic to the psychophysiological reactions that occur as products of our environments.

## Foreword

Architecture is important because of the people who interact with it. Without a human component, buildings would be massive, hollow sculptures. I believe buildings are supposed to live and breathe, and transform to accommodate human life. My research is inspired by a desire to realign architecture with its role of hosting and enhancing human experience.

## Acknowledgements

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## 00 - Introduction

People often remember a place by descriptions such as the smell of wet leaves, the gurgling of a nearby stream, the gentle rush of a cool breeze against the skin, the swelling sensation after a steep climb; or the smell of salty air, the warm sunlight streaking through white puffy clouds, the clash of waves against nearby rocks, the grains of sand expanding and contracting beneath the feet as water rushes up and recedes back; or the smell of gasoline, the hot sun beating against the brick, the feeling of warm air as it rises off the pavement, the whirring-buzzing-rumbling of nearby engines.

These motifs depict different sensory experiences that occur as a result of a particular environment. It is these sensory qualities and how we perceive them that link us to a particular place at a particular time. They allow us to connect physiologically with the present and metaphysically with moments in the past. In Proust's *Remembrance of Things Past*, he describes the moment, when biting into a cookie, that a rush of childhood memories overtake him.<sup>1</sup> The senses act as mediators between us and our environments; they tell us about natural phenomena, warn us of danger, and provide us pleasure. Diane Ackerman poetically tells us that the paradox of humanity is the brain's dependency on the senses, "the brain doesn't directly perceive anything. It is silent, dark, tastes nothing, hears nothing. All it receives are electrical impulses" (308).<sup>2</sup> Ackerman uncovers the critical importance of our sensory abilities. If the brain is useless without information gathered by our senses, why aren't our environments

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<sup>1</sup>Proust, Marcel. *Remembrance of Things Past*. New York: Random House, 1934.

<sup>2</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

tailored to heighten and illuminate sensory experiences?

However, most of our environments today confound sensory experiences through an overuse of technology, a universalized approach to place-making, and inundation by a social culture that values immediate gratification. Most of us step into an insulated machine each day that transports us to someplace else. We get out and enter a structure that has become the universal symbol for 'office'. When we finally have direct contact with our immediate environment, it involves screens talking, images being hurled, and smells thrust toward us-all beckoning our attention. Our senses are overwhelmed and abused, improperly exercised to gather meaningful information from the world around us. It is the world around us that has become the problem. Zumthor says, "'The most important thing then is that Good Architecture should take hold of a person, experience him and let him live'... The architecture shouldn't 'pull one over on him', it shouldn't try to make more of itself, through added decoration, than it already is through spatial and aesthetic power"(72).<sup>3</sup> Heidegger confirms that man lives in a world of things, and his ability to dwell among those things is contingent upon sensing and experiencing the things around him. How then, can architecture reinforce man's ability to connect with the world around him?

This thesis will analyze the senses, environmental stimuli, and case studies in cultural, social, psychological, and phenomenological terms. It will qualify the relationships between environmental stimuli and sensory perception, while proposing a methodology for enhancing sensory experience. I will organize a set of principles by which architecture can elicit positive sensory

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<sup>3</sup> Zumthor, Peter. *Thinking Architecture*. Basel: Birkhäuser, 2010.

reactions and provide a ground for meaningful interaction with the environment. These principles will be applied to a series of architectural interventions, located in the Parco della Rimembranza, in Rome. The goal of the design project is to bring awareness to one's *being* within an environment. The interventions will serve as examples of how to choreograph sensory-rich spaces. Yet they are only a framework and a foundation that can be embellished and modified by future artists, students, and practitioners. The project will be organized as a series of interconnected installations that engage both indoor and outdoor environments. The exploration itself will focus on deconstructing and then reconstructing experiences. The ability to unravel complexity in this way offers knowledge, awareness, appreciation, and a deeper connection to the causal origin of our existence. The architecture is not about itself, but rather, seeks to invoke a conscientious understanding of one's connection to the surrounding environment, while strengthening one's opportunity of what it means to *dwell* in a particular place at a particular time.



## 01 - The Senses

Understanding the senses is the first step in sensory design. Sensory reactions decode an experience at a particular time in a particular space. They link us physiologically to the present and connect us through memory to the past. John Zeisel tells us, "If you understand how people's brains and minds...have developed over time to respond to physical environments, then environments designed to support these capabilities as well as tasks, activities, and user needs, will contribute to people's quality of life, creativity, and survival" (143).<sup>4</sup> The senses are mediators between people and the environment, the information we receive and how our brains process it; they tell us about natural phenomena, warn us of danger, and provide us pleasure.

### 01.01 - Evolutionary Development

In the realm of architecture, objective disciplines, like engineering, have historically been given authority over influencing design. Aesthetic theories, on the other hand, have been treated as esoteric, unpredictable, and perhaps decadent because of the lack of precise experimental substantiation. However, as Bloomer and Moore point out in *Body, Memory, and Architecture*, the psychologists of the early 20th century opportunized aesthetic objectivity by studying sensory perception through experimentation. By using experimentation, psychology was given credibility on the level of engineering and other fact-based sciences. The Gestalt psychologists were able to prove, scientifically, that irrational

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<sup>4</sup> Zeisel, John. *Inquiry by Design*. New York: W.W. Norton & Company Inc, 2006.

forces transform the perception of an object, and furthermore, that consistent patterns of recognition can be found in humans during the process of perception (31). Similarly, the five senses as described by Aristotle, broke new ground in the early 1900's. J.J. Gibson, an environmental psychologist, redefined the senses as perceptual systems, gathering information from the surrounding environment without direct intervention from the intellect (33).<sup>5</sup> The historical evolution of sensory studies has endeavored to present perceptual, emotional, and corporeal attributes as objective qualities, applicable to design advocacy.

#### **01.01.01 - Touch**

Touch can be broken up into subcategories: these include thermal, kinesthetic, and tactile perception. Touch has historically been used as a defense against the natural environment: thermal perception warns us of temperature changes that might endanger our livelihood, kinesthetic perception negotiates between the geographic environment and our bodies, while tactile perception can identify potentially harmful qualities revealed subtly through touch.

*So What: Touch is a diverse sense that can be understood in three different ways. Each of the three 'touch perceptions' deal with direct contact between us and the environment and, perhaps, offer the most intimate form of experiencing an environment.*

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<sup>5</sup> Bloomer, Kent C. and Moore, Charles W. *Body, Memory, and Architecture*. New Haven, CN: Yale University Press, 1977.

### 01.01.02 - Smell

Based on evolutionary history, smell was one of the earliest forms of communication.<sup>6</sup>

*So What: Smell is a primitive safety mechanism and a very subtle, and often overlooked, way of exchanging information.*

### 01.01.03 - Hear

From the womb, babies are introduced to sound, the cadence of a mother's heartbeat.<sup>7</sup>

*So What: Sound is intertwined with our breathing and heartbeat. Our bodies learn from an early age different responses to sound.*

### 01.01.04 - See

Sight was the last and arguably most specialized sense to develop. Evolutionary biology reveals that predators as having binocular vision, with eyes located in the front of their heads, while prey have peripheral vision, with eyes located on the sides of their heads.

*So What: Sight has a monopoly over the other senses. A hierarchy has been established among different species based on visual capabilities.*

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<sup>6</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

<sup>7</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

## 01.02 - How the Senses Work

Learning how each sense works sets the scientific (fact-based) parameters for eliciting sensory responses.

### 01.02.01 - Touch

Touch and emotion are closely linked. Changes in emotional states often incur changes in blood pressure, an experience hosted by the thermal perception of touch. When a male bird feels intimidated in the presence of another bird, a series of endocrine and nervous reactions take place that raise his body temperature. This results in the bird fluffing his feathers to cool off. Similarly, blushing in persons is the result of an emotional state that effects changes in the blood supply to certain parts of the body.<sup>8</sup> The kinesthetic and tactile roles of *touch* are conducted through exteroceptors and proprioceptors, located at the surface of and within our skin. These cells send nerve impulses to the brain, which then sorts out meanings for our movements and feelings. *So What: Emotion, a cognitive process, is translated into a bodily experience via thermal perception. Conversely, touch perception can take bodily experiences - like tactile feeling, movement, and temperature perception - and turn it into a cognitive process.*

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<sup>8</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

### 01.02.02 - Smell

The process of smell is driven by gravity. Volatile odor molecules bouncing around in the air are inhaled through the nose.

Molecules float to the back of the nasal cavity where mucus traps them; receptor cells contained within the mucus fire millions of impulses to the brain's olfactory center. The cerebral cortex then sends impulses to the limbic system - an area that may trigger feelings and emotions. Each day we breathe roughly 23,000 times, moving about 440 cubic feet of air.<sup>9</sup>

*So What: The sense of smell accompanies a process fundamental to our survival, breathing. The mere quantity of olfactory information being received each day should cause greater consideration of the quality of smells within our environments.*

### 01.02.03 - Hear

Sound is created by the rush and withdrawal of air molecules beginning with the movement of an object. Molecules cause the eardrum to vibrate. These vibrations move the hammer, anvil, and stirrup, which press fluid into the inner ear. Fluid brushes against tiny hairs, activating nerve cells that send impulses to the brain.<sup>10</sup>

The range of frequencies for audible sound lies between 50-1500 cycles/second. At 0 degrees C, sound travels at 1100 feet/second.

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<sup>9</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

<sup>10</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

Therefore, sounds are dampened in cooler environments, because of the slower speed of airborne molecules. The speed of sound is increased by four times in water than in air.

*So What: Sound quality is dependent on the speed of molecules as they float through air or water. This elevates the importance of temperature and material transfer when developing auditory qualities for a space.*

#### **01.02.04 - See**

The eye is superior to the ear with regard to information reception and speed. Seventy percent of the body's sense receptors are located around the eyes, including eighteen times as many neurons in the optic nerve as the cochlear nerve.<sup>11</sup> Light travels 186,000 miles/second through air. When light enters the eye, the iris, a muscle that expands and contracts the pupil, moderates quantity. The retina, located at the back of the eyeball, contains about 125 million rods and 7 million cones. Rods record information in black and white and construe dimness, whereas cones examine color and assist the lens in focusing. Neurons within the retina pass this information to the brain through electrochemical reactions. The visual cortex receives and processes information in about 1/10 second.

*So What: The speed and accuracy of visual information leads to*

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<sup>11</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

*favoring of visual sense. However, the fovea, located within the retina and packed with highly sensitive cones individually linked to the brain, is useless in low or no light situations.<sup>12</sup> It is typically in poorly lit environments that people call upon the other senses to supplement information about their surroundings.*

### **01.03 - Sensory Perception Types**

The senses inform us through many different means. The type and method of gathering sensory information affects the cognitive processing of information.

#### **01.03.01 - Touch**

The haptic sense is the sense of touch. It includes the entire body, not just the skin. As stated in 01.01.01, environmental information can be received through thermal, kinesthetic, and tactile perception. Kinesthetic perception is the transfer of information through movement. Proprioceptors tell the brain what is happening while muscles work. Thermal and tactile perception are the result of exteroceptors sending impulses to the brain. Exteroceptors are nerves located within the skin that convey heat, cold, texture, contact, and pain.<sup>13</sup>

*So What: Touch is relative to movement, temperature, and tactile qualities. This broadens the implications of how a space can be*

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<sup>12</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

<sup>13</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

*designed to engage our sense of touch. Touch is an immediate receptor, unlike any other sense, requiring direct contact to convey information.*

### **01.03.02 - Smell**

Information can be received and released through various smells. Smells emitted through fear, emotion, and sex are indicators of private, sometimes internalized situations. Deer release chemicals through their hoofs when frightened. The scent of chemicals discharged on the ground is gathered by other deer and signals danger nearby. Similarly, the crushed skins of a minnow provides a smell that causes members of the same species to flee. Edward C. Hall reveals the Arab custom of smelling a girl before betrothal to check for smells of anger or discontent. Sexual smells allow moths to locate their mates from two to three miles away.

*So What: Smells seem intimately linked to survival, whether through warning, reproduction, gathering food, or self defense.*

*They can offer a subtle, yet crucial means for analyzing an environment*

### **01.03.03 - Hear**

Sound can be experienced through music, or vibrations, and the act of speaking. Listening to music causes vibrations through the bones and singing causes vibrations through the vocal chords. It



internalizes the vibrations whereby making the body soundproof to outside sounds. The act of speaking begins in the larynx, which, because of its low position in the throat, distinguishes humans from animals; it restricts people from eating and breathing at the same time, whereas animals are able to do so. Modes of speaking, dialects and accents, can be traced through changes in social factors and geography, as adaptations to new challenges. *So What: The types of auditory senses reveal the interwoven nature of multiple senses acting on a single experience. They expose overlapping characteristics of sensory functions.*

#### **01.03.04 - See**

Vision can be experienced literally or imaginatively. Our literal world is comprised of what we call the "visual field", which consists of constantly shifting light patterns recorded by the retina. These recorded light patterns make up the scenes and environments that we interact with in our waking lives. However, we also dwell among an internalized, imagined world. Our visual thoughts are comprised of images, some of which may be borrowed from past experiences, others that may be generated by a chemistry of stimuli. Imagined sight can be triggered by any of the senses, but takes experiential form through vision.<sup>14</sup> Diane Ackerman characterizes sight as 'conductor' of the senses, "When we see an

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<sup>14</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

object, the whole peninsula of our senses wakes up to appraise the new sight...together they all see the same sight - a grassy hillside - and each does a slightly different take on it, all of which adds up to what we see." (282).<sup>15</sup>

*So What: Sight is so dominant that it overtakes even our imagined, or dreamed, world. However, it is also stimulated, even corrected, by the other senses, confirming that the sensory systems act in concert as a whole to construct the most vivid and accurate understanding of an environment.*

#### **01.04 - Sensory Benefits**

Discovering positive impacts of sensory experiences helps extract salient features of beneficial environments, which can serve to inform future design goals.

##### **01.04.01 - Touch**

Understanding a space kinesthetically can increase the user's possibilities for moving in and using the space. Thermal perception and movement of air currents can serve as space locators for blind people.<sup>16</sup>

*So What: Recognizing and understanding movement within a space can expand design opportunities. Furthermore, engaging natural qualities like sun and wind can connect people to a specific*

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<sup>15</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

<sup>16</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

*place at a specific time.*

#### **01.04.02 - Smell**

Smells have been known to connect people to memories. In a test conducted by a perfume manufacturer, children who learned words in association with a particular smell had better word recognition. Smells also have obvious survival benefits; the smell of gas or smoke can betray the presence of danger, smells can signal different emotional states and serve as self defense mechanisms in the case of a skunk.

*So What: The brain's link between smell and memory is much stronger than the link between smell and sound. Therefore, smells are much more powerful at conjuring the past than a particular sound ever could. Additionally, smells provide crucial information about an environment; it is a survival tool that should be utilized.*

#### **01.04.03 - Hear**

Chemist James Olds notes that the pleasure center of the brain is a complex mix of chemicals and electricity that can be triggered in many different ways. Hearing can provide emotional stimulation through mediums like music; he calls it a 'pleasure from the thrill of shooting the rapids of our body's river of rewards'. Hearing, like the other senses, is a faculty that can be strengthened or weakened through use or disuse. Selective hearing allows us to focus on a

conversation in a loud, chaotic environment. The ear has an opportunity to hear things twice: the outer ear will reflect fractions of sound, while some dives straight into the inner ear. There is a special set of delays depending on the angle of incoming sound. The brain reads the delay and then locates the sound. Selective hearing is typically more developed in non-seeing people.<sup>17</sup>

*So What: Hearing can be functional and enjoyable. However, it must be exercised in order to produce positive results. Perhaps environments should consider minimizing sensory stimuli, a simulation of a blind person's environment for example, to highlight and extract focused sensory responses.*

#### **01.04.04 - See**

Sight has some very obvious benefits. A seeing person's perceptual radius can extend for miles unobstructed, but a blind person's perceptual realm is limited to a radius between 20'-100'. Vision can gather and convey immediate information; it can punish, encourage, establish dominance, and convey interest or distaste simply through the size of the pupils.<sup>18</sup>

*So What: Vision is information packed; it can gather and disseminate a wide range of information within one gaze. Perhaps this might cause us to consider the environments that under-stimulate sight as a way of simplifying a message and clarifying an*

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<sup>17</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

<sup>18</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

*experience.*

## **01.05 - Issues Confronting Sensory Perception**

Identifying negative impacts of sensory experiences can inform designers about problems within an environment that stem from our initial contact.

### **01.05.01 - Touch**

The body has become alienated from the environment through technological processes like cars, elevator, and indoor mechanical systems. Touch is a lesser dominant sense. When people kiss they close their eyes so as to concentrate in the touch and block out the distractions of sight.<sup>19</sup>

*So What: Channeling experiences, by limiting the number of distractions and regulating elements that separate us from the environment, might serve to heighten those experiences.*

### **01.05.02 - Smell**

Smell becomes less noticeable and can even go undetected after prolonged periods of exposure. Violets naturally contain iodine, which short---circuits the sense of smell, causing us to lose the sensation after a short period. However, most perfumes also contain iodine. Edward Hall calls Americans underdeveloped in the olfactory sense, through the overuse of deodorants and perfumes. He says this leads to undifferentiated spaces lacking in richness

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<sup>19</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

and obscuring memories.<sup>20</sup>

*So What: This issue deals with the problem of overstimulation. It faults the over exposure of induced smells for obscuring experiences and confusing environments.*

### **01.05.03 - Hear**

Sounds can confuse and irritate as well as stimulate and please.

Exposing children to chronic noise increases aggression and lowers concentration, according to a study of Manhattan school children located in classrooms near above ground rail lines.

*So What: The issue of technology disrupting tactile experiences also affects hearing. Many of our environments are bombarded by constant noise on many different levels. This can be disorienting and overwhelming, causing our senses to recoil.*

### **01.05.04 - See**

Ackerman tells us, "Because the eyes love novelty and can get used to almost any scene, even one of horror, much of life can drift into the vague background of our attention".<sup>21</sup> We engage in visual activity constantly, from the moment we wake up until we go to sleep. Juhani Pallasmaa calls visual imagery 'endless commodity manufactured to postpone boredom'. It allows us to live in a fabricated dream world and we allow ourselves to be consumed by

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<sup>20</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

<sup>21</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

it so as to avoid confrontation of our existential realities.<sup>22</sup>

*So What: An environment that is able to moderate and suspend visual interest has the ability to command its occupant's attention.*

*Edward Hall says, "Man learns what he sees and what he learns influences what he sees".<sup>23</sup> His observations suggest that sight can dominate to ill effect, limiting what and how we learn. And yet, we are able to voluntarily control sight. It is the one sense we can actively shut off, though we are often coaxed into hallucinatory or dream-like vision while we sleep.*

## **01.06 - Phenomenology of Sensory Experience**

The senses also link us to metaphysical experiences through memory and emotion.

### **01.06.01 - Touch**

Touch is perhaps the most personally experienced sense because of the mutual exchange between *us* and *it* - touch and be touched.

Texture is a quality that is appreciated almost entirely by touch, and the memory of tactile experience is what enables an even deeper appreciation of things we can feel with our bodies.

*So What: Touch is particularly important for connecting us to time and place. We refer to 'tangible' things as 'real' things, things we can physically confirm. The validation of an environment is*

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<sup>22</sup> Pallasmaa, Juhani. *The Eyes of the Skin*. West Sussex, England: John Wiley & Sons Ltd, 2005.

<sup>23</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

*particularly important in linking us with our existence and connecting us to the "here and now".*

#### **01.06.02 - Smell**

Smell is also a key means of linking the past to the present. The experiences we go through in relation to particular olfactory qualities creates positive and negative perceptions of those smells that we carry with us through time.

*So What: It is difficult to separate smell from the individual perceptions people have about it. Therefore, it is hard to manipulate the olfactory qualities of a space to produce contrived effects. Therefore, the goal is not to induce controlled reactions in people, but rather to make them aware that they are in the act of smell - and they can formulate their own responses to the qualities of that particular smell.*

#### **01.06.03 - Hear**

The heart creates an internal sound that measures our lives and loves through the rate of its beating. It tells the story of our existence. The act of hearing bridges air to water. It takes sound waves, physical molecules traveling through air, and turns them into fluid waves, which are carried by ear fluids and then electrical impulses.

*So What: In the same way that sound may record the quality of an*



*experience, the beating of our heart, it can also affect the quality of an experience. It is important to recognize that most of the senses are two - way systems.*

#### **01.06.04 - See**

Visual experience carries multiple layers of intricate and profound meaning. Captain Robert Scott sailing to Antarctica wrote, "the eastern sky was massed with swaying auroral light...fold on fold the arches and curtains of vibrating luminosity rose and spread across the sky, to slowly fade and yet again spring to glowing life...It is impossible to witness such a beautiful phenomenon without a sense of awe, and yet this sentiment is not inspired by its brilliancy but rather by its delicacy in light and colour, its transparency, and above all by its tremulous evanescence of form" (247).<sup>24</sup>

*So What: Visual poetry is an experience that moves. It recalls and applauds the phenomenon of life. This happens uniquely and vibrantly through sight.*

#### **01.07 - Architectural Applications**

Gathering information on the senses can be applied specifically to the architectonic qualities of a space, thereby providing a framework for future applications to follow.

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<sup>24</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

### **01.07.01 - Touch**

The tactile design of a space should take into consideration texture manipulation, furniture type and location, and materiality and scale.

#### **01.07.01.a - Texture**

The textures within a room beckon occupants to become aware of their material surroundings, and in some instances actively touch surfaces. Frank Lloyd Wright used contrasting textures, particularly along walls, to enhance the very qualities of differing materials.

*So What: Hierarchy of intensity or simple alternation of contrasting items juxtaposes opposites to bring out particularities.*

#### **01.07.01.b - Furniture**

The orientation and relationship of furniture in a room affect the kinesthetic experience of occupants. As noted by Hansel Bauman, architect of *DeafSpace* projects at Gallaudet University, circular seating arrangements orient people's bodies toward one another and allow visual contact to be made.

*So What: It is often to co-acting of two senses that heightens an experience. When touch and sight are dually acting, the connection is doubly affecting.*

### **01.07.01.c - Reverberation Rates**

The size of a space and the reverberation rates affected by materials changes person's reactions within the space.

Several school studies have shown that people read more slowly in larger rooms with higher reverberation rates.<sup>25</sup>

*So What: A space, monumentally large, in comparison to the human scale, is not conducive to intimate activities.*

*Higher reverberation rates can be distracting and/or agitating.*

### **01.07.02 - Smell**

The olfactory design of a space should take into consideration the type of materials able to conduct smell, as well as take advantage of naturally occurring, iodine-free smells.

#### **01.07.02.a - Water**

Smells travel four times faster in water than in air.<sup>26</sup>

*So What: The designer should consider where and how to carry certain smells throughout a space through the use of water.*

#### **01.07.02.b - Materials**

Only substances volatile enough to spray microscopic substances into the air can be smelled. Materials such as stone, glass, steel and ivory don't evaporate at room

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<sup>25</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

<sup>26</sup> Kuttruff, Heinrich. *Room Acoustics*. New York: Elsevier Science Publishers, 1991.

temperature and therefore don't emit smells.<sup>27</sup>

*So What: Selection of materials is key to olfactory qualities of a space, especially with regard to the changing of seasons.*

### **01.07.03 - Hear**

Sounds have a spatial quality. During the act of hearing, they are located in space, therefore giving them both a geographic and spatial quality. Square rooms sound different than circular rooms; rooms with multiple openings sound different than rooms that are completely enclosed.

*So What: The room's shape, walls, floor, ceiling and the shape of objects within the room all cause different reverberation patterns in our ears.*

### **01.07.04 - See**

Our peripheral vision greatly affects our perception of a space.

Close-walled tunnels or tree-lined streets exaggerate a sense of movement by repetitively activating the periphery.

*So What: The use of liners and side-line objects should consider the effects on mobility, compression, and stasis.*

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<sup>27</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

## **02 - Sensory Stimuli**

The senses can be activated by many different environmental stimuli. Understanding the uses and effects of those triggers, how they impact sensory perception, and the various responses produced by them will help inform the design parameters of future applications. Under-stimulation within an environment may cause restlessness, excessive emotional reaction, low levels of concentration, and irritation. Over-stimulation can cause changes in heart rate, pace of breathing, blood pressure, muscle tension, and psychiatric stress. Whereas constant stimulation can be unfavorable, variation of sensory intensities arouses, causing an experiential awakening. Diane Ackerman's perspective on stimulating the senses recognizes a need for variation, " When there is no risk, the emotional terrain is flat and unyielding, and, despite all its dimensions, valleys, pinnacles, and detours, life will seem to have none of its magnificent geography, only a length".<sup>28</sup>

### **02.01 - Meaning of Stimuli**

Analyzing the architectonic application of environmental stimuli and the social-cultural-historical reference provides a tangible framework for sensory design.

#### **02.01.01 - Shape**

Shape can comprise the space container, or the space

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<sup>28</sup> Ackerman, Diane. *A Natural History of the Senses*. New York: Random House, Inc. 1990.

itself.

*So What: Shapes often hold symbolic meaning, derived from a ritualistic use. The use perhaps became traditionalized because of the psychological and emotional responses to certain shapes, as well as their reflection in nature and biology.*

### **02.01.01.a - Rings**

Encircling is used to emphasize. It symbolizes infinity and represents the nature of the cosmos. All planets are surrounded by rings of differing colors.<sup>29</sup>



Figure: 02.01.01a

### **02.01.01.b - Tunnel, Cave & Tube**

Caves and tunnels are historically associated with tombs and temples. These shapes represent negative space. They are excavated spaces, concealed within the earth or some other solid mass. They have an aura of mystery and a hidden expression.



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<sup>29</sup> Martienssen, Heather. *The Shapes of Structure*. London: Oxford University Press, 1976.

Figure: 02.01.01b

### **02.01.01.c - Post and Pit**

Post is always used as a vertical marker along a horizontal termination. The pit though a vertical extension in the opposite direction is usually demarcated by a post. Both shapes give way to ascent and descent. The post may symbolize majesty, honor, and the act of rising while the pit signifies burial, imprisonment, and the act of sinking.

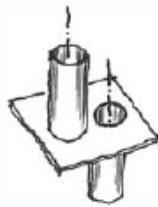


Figure 02.01.01.c

### **02.01.01.d - Box and Cage**

The box provides full enclosure while the cage confines without visually enclosing.



Figure 02.01.01.d

### **02.01.01.e - Tent and Canopy**

The tent is enclosed and self-supporting. It is held in tension, whereas the canopy is suspended and

supported by some other means.



Figure 02.01.01.e

#### **02.01.01.f - Shell**

Shells are used for sports arenas and theatres. It is a hollow container; adaptable to the organism that occupies. It can be a hollow container with gently sloping sides.

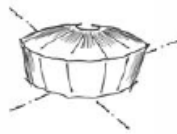


Figure 02.01.01.f

#### **02.01.02 - Color**

Since the time of the Egyptians, healers have been utilizing colors for their remedial benefits. Psychics would identify an aura that might hold some telling information about a person's internal well - being. The aura is a cluster of electromagnetic energy that can be seen through the color of its light waves. Color healing can be achieved through food intake, exposure to the sun, color visualization, and



color meditation.<sup>30</sup> Edwin Babbitt's groundbreaking book *The Principles of Light and Color*, in 1878, was one of the first to record the uses and benefits of color therapy:

*So What: The relationship of color and emotion acts both inwardly and outwardly. Biological reactions occur within our bodies while receiving certain colors, while the internal psychological and emotional state of our beings can be expressed outwardly through auras (the electromagnetic spectrum).*

#### **02.01.02.a - Red**

Red shares properties with the sun, rousing the blood and nerves. When combined with yellow, red can be a cerebral stimulant.

#### **02.01.02.b - Orange**

Orange and yellow are said to stimulate the nerves.

#### **02.01.02.c - Yellow**

Yellow can be a laxative.

#### **02.01.02.d - Blue and Violet**

Blue and Violet are known for soothing effects. They were often used for calming inflammation and nervous irritability.

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<sup>30</sup> Mahnke, Frank. *Color, Environment, and Human Response*. New York: Wiley, 1996.

### 02.01.03 – Light

From the perspectives of lighting designers, it can be used to convey an aura, define distance, and manipulate the spatial relationship between objects and their surroundings. Light that leaves objects ambiguous creates a phenomenological experience, but the moment something is clearly defined it enters the realm of visual language and loses its mysticism. The direction of light and angle of rays can be understood by the angle and distance of shadows.<sup>31</sup> The placement, intensity, and color of light on objects affect the perception of spatial distances. Smooth surfaces reflect light evenly, causing it to shine, whereas rough surfaces scatter light waves in many different directions so that they don't return directly to our eyes.<sup>32</sup>

*So What: Sometimes ambiguity creates a richer environment because of the personalized opportunity it allows our imagination.*



Figure 02.01.03.a



Figure 02.01.03.b

<sup>31</sup> Van der Pol, Jasmine and Laganier, Vincent. *Light and Emotions*. Birkhauser: Basel, 2011.

<sup>32</sup> Canter, David. *The Psychology of Place*. New York: St. Martin's Press, 1977.

#### 02.01.04 - Acoustics

Acoustics are contingent on shape and volume of room, the number and arrangement of objects within the room, and the material of walls, ceiling, floor, and furniture.<sup>33</sup>

*So What: Rounder spaces amplify sound, because they provide the right distance and continuity of surface to bounce vibrations off of.*

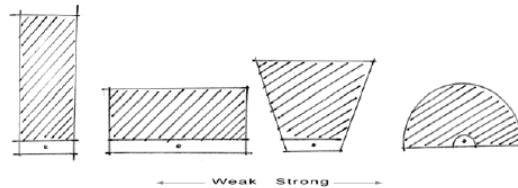


Figure 02.01.04

#### 02.01.05 - Material

Historically, textiles such as silk and wool were most valuable. Additionally, marble and ivory were besought because of their rarity and difficulty in extraction.

*So What: Texture has traditionally been associated with social positioning. Today, it may be used to draw parallels with a specific region or culture.*

#### 02.02 - How Stimuli Work

The effect of stimuli on our sensory perception is difficult to qualify.

Environmental psychologists have been working at stratifying this

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<sup>33</sup> Kuttruff, Heinrich. *Room Acoustics*. New York: Elsevier Science Publishers, 1991.

information, which can often be comprised of multiple variables, all co-acting and influencing each other. This multiplicity makes it difficult to directly link cause and effect.

#### **02.02.01 - Shape**

Shapes can be perceived as symbols or space. Gestalt perception is the brain's habit to visually complete an entity and form the essence of its shape. The space of a shape can affect the experience of occupants, producing a range of emotional reactions. The figure, formation, and scale of wall, floor, and ceiling in a building generate its shape.

*So What: Shape is somewhat abstract, as is space. Shape allows the formation of space, which causes people to respond to their environments in a number of different ways.*

#### **02.02.02 - Color**

Color is made up of white and colored light. White light ranges in shades of cool to warm, whereas colored light ranges in saturation.<sup>34</sup> The effects of color are dependent on hue, value, intensity, and length of endurance. When the eyes receive color information, a nerve impulse passes through the ARAS (Ascending Reticular Activation System) before it makes its way to the central nervous system. The ARAS acts as a clearing station

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<sup>34</sup> Mahnke, Frank. *Color, Environment, and Human Response*. New York: Wiley, 1996.

for stimulation, dividing arousal into two categories: phasic, meaning immediate, and tonic, meaning gradual. A neural pathway in the brain carries light and color stimulation to the hypothalamic midbrain region, which then transfers information to the pineal and pituitary glands, causing them to produce and release hormones.

*So What: The eyes have a dedicated center within the brain to sort out information received before sending it to the nervous system to be announced throughout the rest of the body. It is so precise as to organize arousal into categories of intensity.*

### **02.02.03 - Light**

Light consists of a spectrum of colors. It can be perceived at wavelength frequencies of about 380 nanometers, or 380 millionths of a meter. The color violet is about 380 nanometers in length whereas red is 780.<sup>35</sup> The brightness of light refers to two subjective perceptions: intensity and quantity.<sup>36</sup>

*So What: The colors that create more intense reactions also have the longer wavelengths.*

### **02.02.04 - Acoustics**

Sounds are changes in pressure caused by a vibrating entity.

Loudness is additive, meaning that the sum of two noise sources

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<sup>35</sup> Mahnke, Frank. *Color, Environment, and Human Response*. New York: Wiley, 1996.

<sup>36</sup> Rapoport, Amos. *The Meaning in the Built Environment*. Beverly Hills, CA: Sage Publications, 1982.

will be an addition of their loudness.<sup>37</sup>

*So What: Our environments might become audibly complex because of variety of materials, placement of objects, and over inclusion of objects. Simplifying a space can lead to auditory clarity.*

#### **02.02.05 - Material**

There exists a critical proximity with materials. They can react with one another and through combined radiance give rise to something unique. Depending on the type and weight of a material, the critical proximity can be lengthened or shortened to enhance the 'atmosphere'.<sup>38</sup>

*So What: As stated under 02.02.04 - Acoustics, simplifying and clarifying the type and quantity of different materials can lead to a more harmonious environment.*

#### **02.03 - Positive and Negative Effects of Stimuli**

Understanding the impacts of different stimuli helps qualify the nature of various environmental characteristics. A balanced environment is necessary to secure unity in the midst of variety. While variety is necessary to arouse interest, unity is essential to create favorable impressions and satisfy moods and desires. However, variety, when

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<sup>37</sup> Brebner, John. *Environmental Psychology in Building Design*. London: Applied Science, 1982.

<sup>38</sup> Zumthor, Peter. *Atmospheres*. Basel: Birkhäuser, 2006.

overdone, is confusing and irritating; and unity, when unequalized by variety, is bland and monotonous.<sup>39</sup>

### 02.03.01 - Shape

The various shapes, as outlined in 02.01, induce different emotional sensations. The *cage* might seem lightweight and free as compared with the *box*. The *post* might seem airy and liberating whereas the *pit* might seem closed and imprisoning. The size of a shape relative to the human body also plays an importance role in experiencing space. Kent Bloomer and Charles Moore question why people aren't *moved* by the experience of a shopping mall or office tower. They explain that, "we can neither measure ourselves against it nor imagine a bodily participation. Our body response is reduced to little more than a craned head, wide eyes, and perhaps an open jaw..." (61).<sup>40</sup>

*So What: The platonic nature and scale of shape have the power to affect different emotional responses in people.*

### 02.03.02 - Color

Small patterns and pale, cool colors create the perception of larger rooms. This works in tandem with light causing an enlarged appearance of volumes under high illumination.

*So What: Colors and patterns are perceived by our eyes in*

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<sup>39</sup> Mahnke, Frank. *Color, Environment, and Human Response*. New York: Wiley, 1996.

<sup>40</sup> Bloomer, Kent C. and Moore, Charles W. *Body, Memory, and Architecture*. New Haven, Connecticut: Yale University Press, 1977.

*different ways. Rather than manipulating these features, it seems advisable to avoid overstimulation through the different implementations.*

#### **02.03.02.a - Red**

An arousing color that causes pulse to quicken. It makes the ceiling heavy and intrusive; walls aggressive and advancing; and floor that creates alertness.

#### **02.03.02.b - Orange**

Makes the ceiling stimulating; walls warm and luminous; and floor activating and oriented for motion.

#### **02.03.02.c - Yellow**

Yellow has a marked vibrancy and, depending on its intensity, can cause a nervous twitching. It makes the ceiling light; walls warm and exciting - sometimes irritating; and floor elevating or diverting.<sup>41</sup>

#### **02.03.02.d - Green**

Green can range from agreeable to compelling, depending on its intensity. On a ceiling application it can create a sense of protection; on the walls coolness, calmness, and security; and on the floor, a natural, soft, and relaxing reaction.

#### **02.03.02.e - Blue**

Blue is a typically pleasant, restful, and good for

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<sup>41</sup> Mahnke, Frank. *Color, Environment, and Human Response*. New York: Wiley, 1996.



concentration. It makes the ceiling celestial and cool; walls distant, light, and space deepening when dark; and floor inspiring and showing effortless movement.

#### **02.03.02.f - Violet**

Can be psychologically disconcerting and subduing.

#### **02.03.02.g - White**

Makes the ceiling empty, reduces shadows, and diffuse light; walls sterile and lacking energy and floor touch inhibiting

#### **02.03.02.h - Black**

Makes ceiling hollow, walls ominous, and floor abstract.

### **02.03.03 - Light**

When light enters the eye, it activates the energy portion of the visual pathway, sending signals to the hypothalamic region of the brain, which subsequently releases hormones. Additionally, light can greatly affect the perception of health in someone's face and skin. We don't always see light, but we see faces and surfaces that look healthier and more vibrant under the correct mixture of direct and diffuse light, and of course, sunlight.<sup>42</sup> Sunlight, in particular, can be used both naturally and artificially, to treat psoriasis, schizophrenia, and certain cancers - not to mention the benefits of Vitamin D for growth. The lack of light, particularly in northern

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<sup>42</sup> Van der Pol, Jasmine and Laganier, Vincent. *Light and Emotions*. Birkhauser: Basel, 2011.

regions, affects mood, hormones, and circadian rhythms.

Statistically, the winter months increase the rate of suicide, alcoholism, and insanity in northern regions.

*So What: Light, in its natural form, has salutary affects on our bodies and minds.*

#### **02.03.04 - Acoustics**

Noise affects on performance depend on variables such as intensity, predictability, and the noise's significance.<sup>43</sup>

*So What: It seems advisable to keep these stimuli to a minimum.*

#### **02.03.05 - Material**

Materials can capture and release thermal energy. They affect the temperature of a space. Peter Zumthor, talking about the wooden beams of his Swiss Pavilion for the Hanover World's Fair, says that the indoor environment stayed 'cool as a forest' when it was hot outside and warm when it was cool outside. Materials can withdraw or emit warmth to our bodies. Steel drags the thermal energy out of our bodies, but wood enhances our bodily thermal qualities.<sup>44</sup>

*So What: The living---breathing quality of the materials within a space conveys information to our bodies, inducing similar effects as occur within their very composition.*

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<sup>43</sup> Brebner, John. *Environmental Psychology in Building Design*. London: Applied Science, 1982.

<sup>44</sup> Zumthor, Peter. *Atmospheres*. Basel: Birkhäuser, 2006.

## **02.04 - Psychological Effects of Stimuli**

Once sensory information reaches the brain it goes through a series of cognitive processes that result in perception. No sensory impulse affects our brain in isolation; they act upon our psyche in concert with many other uncontrollable factors. However, there is a range of typical cognitive reactions, outlined below, that is expected within associated environments.

### **02.04.01 - Shape**

The proximity and distance of objects within and that make up a space create levels of intimacy. The size, dimension, scale, and building mass in contrast with the human figure affect our perception of an environment. Is the thing far bigger than me or are they smaller bits much smaller than me? The size and weight of an object can intimidate or subliminate, imprison or liberate.<sup>45</sup>

*So What: Shape is a massive stimulus. It encompasses the space of an experience.*

### **02.04.02 - Color**

Jungian psychology indicates an ancestral disposition to color. During experiments, babies were shown to have a predisposition to two dark spots next to each other. Marlsburg attributes it to brain convolution of the human face prototype. Both cultural and

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<sup>45</sup> Rapoport, Amos. *The Meaning in the Built Environment*. Beverly Hills, CA: Sage Publications, 1982.

personal associations follow colors closely, most of which generate from experiences, memories, and tradition. Moderate color arousal can be psychologically and physically beneficial. A study comparing the heart rate of occupants in a gray and room and a colorful room showed positive affects for the colorful room. The lack of stimulation in the gray room caused occupants to be self reflective, which incurred in increased their heart rates.

*So What: Including an appropriate level of stimulation allows persons to connect with their time and place-specific existence. However, when an environment disguises time and place, it is uncomfortable and disassociating for occupants, resulting in negative reactions.*

#### **02.04.03 - Light**

Passage of time and earth-bound coordinates are elements that can only be experienced by the particular qualities of light in those precise instances. Additional psychological effects of light can be referenced under 04.02.03.

#### **02.04.04 - Acoustics**

Unexpected noise or sudden changes in noise levels can be distracting and a cause for irritation.

#### **02.04.05 - Material**

Material stimuli can cause us have thermal reactions, typically

warm and cool. However, between warm and cool is a zero point where no temperature can be perceived. This is a physiological registration apparatus that deals with relativity. If the subject's left hand rests in a bowl of 25 degree C water and right hand in 35 degree C, after placing both hands in a bowl of 30 degree C water, the left hand will register warmth while the right, coolness.<sup>46</sup>

*So What: This topic suggests that environments of contrast produce varied physical responses. It shows that the juxtaposition of varied stimuli produces hierarchies of experience and that perception is subject to the nature of stimuli.*

## **02.05 - Phenomenology of Stimuli**

The relationship between what we feel and what we think points to the tasks of our senses and our brains. The ambiguity between reality and imagination is clarified by an intellect grounded in sensory perception. Zumthor captures the phenomenon of a sensory---based intellect when he states, "How comforting to know that the old division between intuition and intellect is still alive and well and that in the end it is our feelings which decide, for all the intellectual gymnastics. But feelings cover a wide area --- experience, imagination, how we use our senses, it is a trained sensory package, and it is the ability to sense moods; it is a certain sureness of intuition. Architecture must succeed and touch people's

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<sup>46</sup> Kuttruff, Heinrich. *Room Acoustics*. New York: Elsevier Science Publishers, 1991

sense. More than this, it must please them".<sup>47</sup>

### 02.05.01 - Shape

The shape, construct, actuality of a thing has a sensual affect on people. Peter Zumthor says, "that is what I would call the first and the greatest secret of architecture, that it collects different things in the world, different materials, and combines them to create a space like this".<sup>48</sup> Movement shapes space and movement responds to shape. It is a temporal art, like music, the experience of which is not limited to a single second but rather generates over many overlapping instances.

*So What: Shape is multifaceted element. It can stimulate through a series of instances. It is not momentary, like visual and olfactory stimulants.*

### 02.05.02 - Color

The perception of color can be influenced by other colors or form; this stimulus---perception relationship of a color is called Contrast Induction Phenomenon. Katz differentiates *color attributes* versus *color appearances*. Color attributes refer strictly to the differing wavelengths of the visible light spectrum. However color appearances suggest surface color of objects, volume color of

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<sup>47</sup> Zumthor, Peter. *Three Concepts*. Basel: Birkhauser, 1997.

<sup>48</sup> Rapoport, Amos. *The Meaning in the Built Environment*. Beverly Hills, CA: Sage Publications, 1982.

liquids, and "film" color of atmospheric elements.<sup>49</sup>

*So What: Color assignments are almost like words. It is an order designed by man to organize and make sense of the world around him. But the actuality, the meaning behind words and color associations can only be truly understood through experiencing of them.*

### **02.05.03 - Light**

Zumthor admits that daylight, not artificial light, has an almost spiritual quality to it. "When the sun comes up in the morning--- which I always find so marvelous, absolutely fantastic the way it comes back every morning - and casts its light on things. It gives me the feeling there's something beyond me, something beyond all understanding".<sup>50</sup>

*So What: The experience of light elevates man beyond the physical. The designer can plan the physical attributes of a space and perhaps anticipate the phenomenological aspects, but ultimately, it is up to the individual to make the experience his own. This reinforces the importance of the thesis addressing both the designer's process and the occupant's experiential awareness.*

### **02.05.04 - Acoustics**

Interiors can be thought of as giant instruments, collecting,

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<sup>49</sup> Hesselgren, Sven. *Man's Perception of Man-Made Environment*. Stroudsburg, PA: Dowdenm Hutchinson & Ross, Inc. 1975.

<sup>50</sup> Zumthor, Peter. *Atmospheres*. Basel: Berhauser, 2006.

resonating, and transmitting sound. The shape and materials applied to a space affect the acoustic experience. Zumthor describes the beauty of imagining a building's sound within its stillness; but he doesn't fail to recognize the difficulty of doing so in a world overtaken by noise.

*So What: Shape and acoustics are inextricably tied.*

#### **02.05.05 - Material**

Materials are endless; there are a thousand different ways to envision a material, to break it down, illuminate it.

*So What: A material can be experienced at many different scales.*

*Specific sensory qualities can be extracted from a material element.*



### **03 - Case Study Analysis**

This section deconstructs several precedents into their feature components.

#### **03.01 - Cultural Characteristics**

Cultural characteristics both acting upon a place and carried by visitors to a place influence the experiences therein. It is important to consider these factors as while designing spaces intended to extract sensory responses.

##### **03.01.01 - History**

This section looks at historical and sometimes geographic factors.

##### **03.01.01a - Therme Vals**

Therme Val rests on the site of an old hotel dating back to 1893. It was replaced by a complex in 1960, which was again renovated in 1996.

##### **03.01.01b - St. Benedict's Chapel**

Traditionally, the image of the Surselva church is important, symbolic. Typically, the church is done in the Baroque style, which stands out against the regional vernacular of dark wooden farm buildings.

##### **03.01.01c - Church of the Light**

The church implements distinctive elements from Chinese history. Walls are used vis-à-vis the outside

world to confer individuality within the space. The blind wall facing the congregation, its back toward the outside, is particularly reminiscent of the Chinese blind wall facing the street in most building types. Additionally, the spaces that comprise the church represent a series of imbricated squares, as is common in Chinese architecture.

#### **03.01.01d - Chichu Art Museum**

The program calls for a permanent display of spatial art. It houses work by Monet, Walter De Maria, and James Turrell.

#### **03.01.01e - Kalkriese Archaeological Museum Park**

Kalkriese is the location of the historic battle between the Teutons and Romans. Augustus' troops were stopped from extending their expansion into Germany.

#### **03.01.02 - Social Environment**

This section explores sociological factors upon a particular place.

#### **03.02.01a - Therme Vals**

As a resort and vacation destination, it has a somewhat contrived social environment.

### **03.02.01b - St. Benedict's Chapel**

The juxtaposition of the Baroque, a global style, against the traditional form of secular buildings represents unification between global and local. It is also an expression of a historical order: a village church proclaiming and embracing a world religion.<sup>51</sup>

### **03.02.01c - Church of the Light**

Much of Chinese architecture is a series of closed worlds, represented by strict geometry - either the square to represent earth or circle to represent heaven.

### **03.02.01d - Chichu Art Museum**

The island location requires visitors to be deliberate about visiting the museum.

### **03.02.01e - Kalkriese Archaeological Museum Park**

The site combines building and landscape to create a park-like complex. The *Questioning Pavilion*, last in the sequence, juxtaposes views of the meadow with taped news broadcasts of international conflicts to reinforce the issue of war as a current problem, not an issue relegated to the past.

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<sup>51</sup> Zumthor, Peter. *Works: Buildings and Project 1970-1997*. Baden, Switzerland: Lars Muller Publishers, 1998.

## **03.02 - Physical Characteristics**

This section looks at the physical particularities of each site.

### **03.02.01 - Location**

#### **03.02.01.a - Therme Vals**

Located on the eastern flank of the Valserrhain River Valley in the Swiss Alps. The site consists of Vals gness that was quaried 1000 m up valley, and then built back into the same slope. The entrance is embedded within the slope. A series of continuous geometric caves meander through the earth and emerge.<sup>52</sup>

#### **03.02.01.b - St. Benedict's Chapel**

Located above the hamlet of Sogn Benedeg in the region of Surselva, Switzerland. Surrounded by meadows, in the tradition of older churches, a small path leads from the village to the entrance of the church.

#### **03.02.01.c - Church of the Light**

It is a small building, northwest of Osaka, hidden by pine trees and submerged within nature.

#### **03.02.01.d - Chichu Art Museum**

Located in Naoshima, Kagawa, Japan. The island is

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<sup>52</sup>Zumthor, Peter. *Three Concepts*. Basel: Berkhauser, 1997.

comprised of the remains of a terraced saltpan. The site is 9,990 sqm and the building footprint is 2,573 sqm.

### **03.02.01.e - Kalkriese Archaeological Museum Park**

Located in Osnabruck, Germany, the 20 hectare site at the probable location of the Battle of Varus. The museum portion of the site is composed of stilt-like footing, sheathed in 10'x20' Cor-Ten panels. A 120' tall tower, juxtaposed against a long exhibition hall, greets visitors as they enter the site.<sup>53</sup>

## **03.02.02 - Light & Shadow**

### **03.02.02.a - Therme Vals**

A solid gneiss block defines each block of program. Long fissures on one edge of the ceiling plane wash the walls with top-light. This ethereal daylight is filtered down into the steamy baths.

### **03.02.02.b - St. Benedict's Chapel**

A zone of transom windows is set beneath the baldachin, overlaid by a delicate system of slats that modulate natural light. The wall behind the timber posts is abstractly painted silver-gray, representing light and shadow.

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<sup>53</sup> Zeiger, Mimi. *New Museums: Contemporary Museum Architecture Around the World*. New York: Rizzoli International Publications, Inc, 2005.

### **03.02.02.c - Church of the Light**

The smooth texture of the concrete invites light to play across the surface. Vertical slots cut into the walls and channels cut out of the ceiling allow light to wash the vertical horizontal planes.

### **03.02.02.d - Chichu Art Museum**

The building uses natural daylight to lead visitors into the depths of the museum. Lighting inside certain exhibition areas is delicately controlled and manipulated to create desired effects. Within the Walter De Maria exhibition space, a long east-west skylight allows light to slice across the room during the course of the day.

### **03.02.02.e - Kalkriese Archaeological Museum Park**

The main structure modulates light inside the display wing with alternating openings. From the outside, it appears as if steel panels have been removed at certain locations.

### **03.02.03 - Water**

The strong effect of water on the senses became apparent through the research in Part 1 and 2. While some precedents do not incorporate water, the different uses should be explored for future application.

#### **03.02.03.a - Therme Vals**

Natural spring waters, heated at 30 degrees C, feed the spa.

#### **03.02.03.b - St. Benedict's Chapel**

No use of water.

#### **03.02.03.c - Church of the Light**

No use of water. Rather, Ando's Church of the Water uses water in lieu of light to enhance the sensory experience.

#### **03.02.03.d - Chichu Art Museum**

The building creates a north-south axis, facing the sea. The location on the island makes it an object within the sea.

#### **03.02.03.e - Kalkriese Archaeological Museum Park**

No use of water.

### **03.02.04 - Ground**

#### **03.02.04.a - Therme Vals**

Therme Vals rests 1200 meters above sea level, set into the slopes of Valserrain Valley.

#### **03.02.04.b - St. Benedict's Chapel**

The wooden floorboards float freely on joists, which allow a slight spring beneath one's feet.

#### **03.02.04.c - Church of the Light**

The concrete floor seamlessly runs up and becomes the walls and ultimately the ceiling.

#### **03.02.04.d - Chichu Art Museum**

The building is completely underground, blending in with its earthen surroundings.

#### **03.02.04.e - Kalkriese Archaeological Museum Park**

Fallen steel plates irregularly placed along the ground trace a path that symbolizes the disarray and confusion of legion troops during battle. The ground material changes from grass, to sandy gravel, to indicate opponents' sides, while a deep trench lined with steel divides the site.

### **03.02.05 - Vertical Horizontal Movement**

#### **03.02.05.a - Therme Vals**

The walls of the baths are layered vertically with stacked stone forming strata from floor to wall to ceiling. The seamless transition between each surface contributes to the monolithic quality.

#### **03.02.05.b - St. Benedict's Chapel**

Entering the church creates the feeling of leaving land and climbing aboard a wooden vessel. The space of the church is centered on a point in the



middle of the church. Freestanding timbers line the edges of the floor and define the interior space. They support the roof, which is reminiscent of leaf veins or the ribs of a ship.

#### **03.02.05.c - Church of the Light**

Ando uses walls to contain space. The massive concrete walls are poured on site, acting as fixed elements containing space. On the exterior, there is a double skin involving two layers of variably thick concrete and insulation. By vibrating the concrete mixture and using a particular slump, Ando is able to render a smooth, almost textile-like concrete.

#### **03.02.05.d - Chichu Art Museum**

The entry sequence takes people through an ascent before passing through the entrance tunnel. The entrance tunnel gradually descends below grade, with only the sky visible overhead. Rooms are a series of horizontal and vertical descents differentiated by the quality and quantity of light flowing through the spaces.

#### **03.02.05.e - Kalkriese Archaeological Museum Park**

Vertical iron poles dot the edge of the site, marking the wooded border of the Tueton rampart. On the

inside of the display gallery, aluminum paneled walls provide a cool, sterile vertical surface, breaking up the horizontal in a regularized grid.

### **03.03 - Sensory-Stimuli Relationship**

#### **03.03.01 - Touch & Kinesthetics**

##### **03.03.01.a - Therme Vals**

The Vals employ smooth materials, the touch of skin against warm stone, the puddles of mist thinly spread along the stone surfaces.

##### **03.03.01.b - St. Benedict's Chapel**

The spring of wooden boards can be felt beneath one's feet. The forward thrusting of the east-west orientation propels one's body toward the helm of the space.

##### **03.03.01.c - Church of the Light**

The "S" movement that one takes approaching the entry slight disorients the participant and heightens an expectation of arrival. Inside the church, materials are chosen for their very tactile quality. Wooden benches, emitting a sense of warmth are juxtaposed against the cool, hard concrete shell.

##### **03.03.01.d - Chichu Art Museum**

The feel of sunlight and touch of smooth, concrete

walls follows the visitor through the entire sequence of spaces.

#### **03.03.01.e - Kalkriese Archaeological Museum Park**

The aluminum paneled interior and concrete floor create a cool, sterile indoor environment. The rusted Cor-Ten walls of the archaeological portion undulate and move people through the site in an almost earth-like corridor.

#### **03.03.02 - Smell**

##### **03.03.02.a - Therme Vals**

Mountain air clinging to the misty air particles.

##### **03.03.02.b - St. Benedict's Chapel**

Surrounded by meadows, the soft woody smells of the building structure and nearby pines fill the air. Breezes carry the scent of grass and wildflowers through the clear mountain air.

##### **03.03.02.c - Church of the Light**

In general, the deprivation, the emptiness that the church boasts, begets an appreciation of the slightest sensory stimuli. I image the smell of pines is absorbed as one sits within the modest, yet confident interior of Church of the Light.

#### **03.03.02.d - Chichu Art Museum**

Open-air courtyards house cattails, grass, or rocks  
imbuing a mellow aroma through the different rooms.

#### **03.03.02.e - Kalkriese Archaeological Museum Park**

The rural surrounding likely provides smells of grass,  
pines, and local flowers.

### **03.03.03 - Hear**

#### **03.03.03.a - Therme Vals**

The sounds of water pattering against stone.  
Zumthor is concerned with drawing out the sound  
and glow from materials.

#### **03.03.03.b - St. Benedict's Chapel**

One might hear the sounds of the meadow, humming  
of insects, the rustle of activity in the town below.  
Inside the chapel, one is insulated from the outside;  
inside its womb, the gentle creaking of the floor  
boards remind worshippers of their connection to this  
moment in time and place.

#### **03.03.03.c - Church of the Light**

The sound of the wind might be heard rustling  
through the pines outside and gliding through the  
narrow channels of concrete.

#### **03.03.03.d - Chichu Art Museum**

Being submerged beneath the earth might dampen sounds and quiet reverberations off the concrete walls.

#### **03.03.03.e - Kalkriese Archaeological Museum Park**

The *Hearing Pavilion* is equipped with an "ear", a gramophone-shaped device that captures real-time sounds from the natural environment. The pavilion also plays recordings, resembling the clang and cry of horsemen in battle.

#### **03.03.04 - See**

##### **03.03.04.a - Therme Vals**

The splendid views of the Valserrain Valley are withheld from visitors until they move from the entry through the changing rooms. The sequence of spaces builds sequentially. The perspective is always controlled, ensuring or denying the view concert with the spaces' function or implied meaning. The concept of darkness and light are explored. Water is employed to reflect light and diffuse it through the steam-filled rooms.

##### **03.03.04.b - St. Benedict's Chapel**

The play of light and shadow along the walls skids

and scatters in between freestanding beams.

Outside, the meadow earth slopes downward, toward the back of the church, cupping views out over the town and exposing what would be the hull of the church, as if waiting to set sail over the wavering hills.

#### **03.03.04.c - Church of the Light**

Plain, concrete walls simplify the space. Attention is focused on the cross of light puncturing the wall behind the pulpit.

#### **03.03.04.d - Chichu Art Museum**

Sight is mostly illuminated by daylight. Views are restricted to one or so features. The entrance tunnel introduces this method by allowing views only to the sky. In other spaces, long slits in the wall allow visual access to a courtyard that is open to the sky.

#### **03.03.04.e - Kalkriese Archaeological Museum Park**

The *Seeing Pavilion* has an "eyeball", a large camera obscura, that protrudes through the roof and which frames and distorts the battlefield.<sup>54</sup>

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<sup>54</sup> Zeiger, Mimi. *New Museums: Contemporary Museum Architecture Around the World*. New York: Rizzoli International Publications, Inc, 2005.

## **03.04 - Psychological Factors**

### **03.04.01 - Perception**

#### **03.04.01.a - Therme Vals**

There is an intended change in perception from the front edge of the building, showered in daylight, to the back of the site, which is surrounded by narrow caves. Yet the front is sequentially experienced last.

#### **03.04.01.b - St. Benedict's Chapel**

The form of the building, though not expressive of a Baroque tradition, continues to carry a tradition of sacredness. Its distinguished shape juxtaposes it against the rectangular farm buildings.

#### **03.04.01.c - Church of the Light**

The temporal dimension of sunlight creates awareness of the things around us, manipulated by the disposition of walls and openings. Ando relates our understanding of being alive to the sensitivity of nature, "Thus we are sensitized to nature, to shadows and the wind, to the sounds around us, to what it means to be fully alive, to where we are (23).<sup>55</sup>

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<sup>55</sup> Molinari, Luca. *Ando Museums*. Milan, Italy: Skira editor S.p.A., 2009

#### **03.04.01.d - Chichu Art Museum**

The entrance tunnel is intentionally set 6 degrees off the vertical, so that the sensation of descending into the earth is perceptible by ground, wall, and sky.

#### **03.04.01.e - Kalkriese Archaeological Museum Park**

The series of pavilions is sequentially organized to prepare people for an important question: how can we learn from history and end the war that exists in our society today?

### **03.04.02 - Environment**

#### **03.04.02.a - Therme Vals**

Unnamed places for Intimacy are placed within the bath sequence. These intimate environments created by hollowed out area between doorways. Ambiguity allows for personalization of spaces

#### **03.04.02.b - St. Benedict's Chapel**

The form of the church is "feminine" rather than "masculine", in the tradition of a right angle nave-apse space. The softer, biomorphic leaf shape avoids conjuring the tradition atmosphere of the didactic church and sets forth a space for worship uninhibited by the history of old forms.



#### **03.04.02.c - Church of the Light**

Ando's work eliminates anything extraneous which might divert one's attention from the essential quality of the space. He uses simple geometry, cubes, cylinders, bar concrete walls, solid-void, light-darkness.

#### **03.04.02.d - Chichu Art Museum**

The museum is completely embedded within the earth causing people to rely on daylight to guide them. Ando 'defamiliarizes' occupants in this way to heighten place-specific awareness.

#### **03.04.02.e - Kalkriese Archaeological Museum Park**

Each pavilion favors different modalities of transferring information, yet it is done less through sensory excitation, and more through the use of machines that represent sensory organs.

### **03.04.03 - Gestalt**

#### **03.04.03.a - Therme Vals**

The Gestalt is never fully appreciated, as is the intent. Rather, it consists of a series of spaces that ultimately ejects one onto the mountain, where the gestalt of the Alps *landscape* can be truly appreciated.

#### **03.04.03.b - St. Benedict's Chapel**

The shape of the church is a lemniscate, an algebraic curve that gradually shortens in proportion.

In this way, its form carries the image of the nave and apse; the cross is embedded within its form.

#### **03.04.03.c - Church of the Light**

The iconic image of the cross bursting through the concrete wall further enhances the connection between the inside and outside. The cross is a void that embraces God within its emptiness.

#### **03.04.03.d - Chichu Art Museum**

The sequence of spaces is sequential, allowing Ando to regulate the immersion of the visitor from the earthly realm to an underground architectural world.

#### **03.04.03.e - Kalkriese Archaeological Museum Park**

The overall site is anchored by the main building, fronted by a viewing tower and extended by a long exhibition hall. The sensory pavilions dot the landscape and are connected by a steel corridor running across the middle of the site below grade.

## 03.05 - Phenomenological Factors

### 03.05.01 - Phenomenology

#### 03.05.01.a - Therme Vals

The concept of *hollowing out* helped define strategies for carving out slots that would allow light into the cavernous spaces. Zumthor wanted to create feeling out of materials. "Materials can assume a poetic quality within the context of an environment: to do so, they must correspond to the form and senses in the architectural object".<sup>56</sup>

*So What: Zumthor uses the words 'mountain, stone, water, building in-with stone, building into-out of the mountain to guide his design process. The goal is to give those words an architectural interpretation, 'to translate into architecture their meaning and sensuousness', by which the building is given form.*

#### 03.05.01.b - St. Benedict's Chapel

St. Benedict is built in the material tradition of Surselven farmhouses. The wood will darken on the south side, becoming black, and develop a silvery gray on the north. In this way it carries the essence of time and place through its appearance.

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<sup>56</sup> Zumthor, Peter. *Works: Buildings and Project 1970-1997*. Baden, Switzerland: Lars Muller Publishers, 1998.

### **03.05.01.c - Church of the Light**

Zen philosophy tells us that nothing-ness, the absolute and formless void represents God. The void allows 'being', it allow 'nothing to become 'something'.

### **03.05.01.d - Chichu Art Museum**

The journey commences above ground, assimilating to the visitor's disposition, but then slowly taking him on a gradual immersion into a sensory-specific experience.

### **03.05.01.e - Kalkriese Archaeological Museum Park**

The series of buildings begins with the traditional lobby space, orienting the visitor to the site. As one progresses through the site, each pavilion engages a story, using the senses as 'topics' to *tell* the occupant something. The last pavilion reverses the occupant-environment relationship by compelling the occupant to self-reflect, question, and hopefully, start doing the *telling*.

## **03.06 - Conclusion**

### **03.06.01 - Architectural Conclusions & Analysis**

#### **03.06.01.a - Therme Vals**

Manfred Sak describes Zumthor's architecture as a matter of philosophy, structure, and organization of qualities, be they haptic or visual. "He wishes his buildings to be developed from a set task, from their purpose, designed for the place in which they stand and into whose surroundings they emerge, gradually becoming one with that place and built from materials which are most closely associated with the task".<sup>57</sup>

#### **03.06.01.b - St. Benedict's Chapel**

St. Benedict addresses critical regionalism through abstraction and reinterpretation of the Alps vernacular. It reconciles the struggle of carrying on past traditions while also creating new ones. The materiality of the space recalls the local craft of Surselven people and the form maintains a distinguished shape from local buildings. However, shedding historical, formal aesthetics has liberated the spirit of worship. It is a space that offers simplicity, self-reflection, and quiet communion.

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<sup>57</sup> Zumthor, Peter. *Three Concepts*. Basel: Birkhäuser, 1997.

### **03.06.01.c - Church of the Light**

Ando makes several important points about the nature of our architectural environments. "It is only when we ourselves experience the richness of emptiness directly in spaces...that the psychological reality implicit in the assertion is fully registered" (8).<sup>58</sup> Ando conveys through the medium of architecture that humans cannot live in chaos, that architecture has a responsibility to create an ordered world and provide affirmation for the human existence.

### **03.06.01.d - Chichu Art Museum**

Ando's museum might represent a gradual approach to sensory deprivation as a means of heightening an experience. This method meets people at their sensory level and slowly immerses them into his world, where they become gradually affected by the minimalistic stimulation around them.

### **03.06.01.e - Kalkriese Archaeological Museum Park**

The museum doesn't exactly engage the senses, but rather, uses sensory modes to drive the concepts for different pavilions. Each pavilion is experienced in isolation, physically distanced from the others. The

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<sup>58</sup> Molinari, Luca. *Ando Museums*. Milan, Italy: Skira editor S.p.A., 2009.

path between them is not specifically prescribed.

Though they are architecturally distinct, they form a psychological sequence that results in a prescribed conclusion.

## **04 - Design Analysis**

The approach to this project involves a constant interplay of physical and conceptual. I will organize the research from "Part 01 Senses" and "Part 02 Stimuli" to organize experiential principles. Additionally, I will extract the lessons learned from "Part 03 Case Study Analysis". Through a series of combinations, the derivatives of these three parts, shown in italics, can be used to inform design. These principles will be applied to the site as a method for selecting a program and organizing a parti.

### **04.01 - Qualifying the Senses**

Prior to designing the building program, the research conducted in parts 01 and 02 requires further reconciliation. The charts below explore senses in more specific context. By refining the sensory analysis, I am able to formulate a comprehensive lens through which design parameters will ultimately be marked against.

#### 04.01.01 - Sense Principles: *Hear*

<b>Evolutionary Development</b>	<b>Development of Hear</b> <i>Biological</i> Sound is intertwined with our breathing and heartbeat. Our bodies learn from an early age different responses to sound.
<b>Types</b>	<b>Types of Hear</b> <i>Vibrations</i> The types of auditory senses - speaking, music, vibrations - reveal the interwoven nature of multiple senses acting on a single experience. They expose overlapping characteristics of sensory functions.
<b>How it Works</b>	<b>How Hear Works</b> <i>Molecular Movement</i> Sound quality is dependent on the speed of molecules as they float through air or water, as well as frequency, intensity, and directionality. This elevates the importance of temperature and material transfer when developing auditory qualities for a space.
<b>Benefits</b>	<b>Benefits of Hear</b> <i>Pleasure</i> Hearing can be functional and enjoyable. However, it must be exercised in order to produce positive results. Perhaps environments should consider minimizing sensory stimuli, a simulation of a blind person's environment for example, to highlight and extract richer and more focused auditory informative.
<b>Issues</b>	<b>Issues Confronting Hear</b> <i>Overstimulation</i> The issue of technology disrupting tactile experiences also affects hearing. Many of our environments are bombarded by constant noise on many different levels. This can be disorienting and overwhelming, causing our senses to recoil.
<b>Phenomenology</b>	<b>Phenomenology of Hear</b> <i>Transformation</i> Sound reflects the process of transforming physical molecules to fluid waves to electrical impulses. Sound records the quality of an experience, through the quickening and slowing of our beating heart, but it can also affect the quality of an experience. It is important to recognize that most of the senses are two-way systems.
<b>Architectural Applications</b>	<b>Architectural Recommendations for Hear</b> <i>Shape</i> The room's shape, walls, floor, ceiling and the shape of objects within the room all cause different reverberation patterns in our ears.

Table 04.01.01



## 04.01.02 - Sense Principles: *Touch*

<b>Evolutionary Development</b>	<b>Development of Touch</b> <i>3 Types</i> Diverse sense that can be understood in three different ways: kinesthetics, thermal, and tactile perceptions. Each of the three 'touch perceptions' deal with direct contact between ourselves and the environment and, perhaps, offer the most intimate form of experiencing an environment.
<b>Types</b>	<b>Types of Touch</b> <i>Immediate Receptor</i> Touch is relative to movement, temperature, and tactile qualities. Touch is an immediate receptor, unlike any other sense, requiring direct contact to convey information. <sup>59</sup>
<b>How it Works</b>	<b>How Touch Works</b> <i>Muscular, Pulmonary &amp; Nervous</i> Proprioceptors and exteriorceptors, located within and on the surface of the skin, record muscular, thermal, and tactile information and transfer it through nerve impulses to the brain.
<b>Benefits</b>	<b>Benefits of Touch</b> <i>Time &amp; Place</i> Recognizing and understanding movement within a space can expand design opportunities. Furthermore, engaging natural qualities like sun and wind can connect people to a specific place at a specific time.
<b>Issues</b>	<b>Issues Confronting Touch</b> <i>Understimulation</i> Channeling experiences, by limiting the number of distractions and regulating elements that separate us from the environment, might serve to heighten those experiences.
<b>Phenomenology</b>	<b>Phenomenology of Touch</b> <i>Cognitive to Corporeal</i> Touch is particularly important for connecting us to time and place. We refer to 'tangible' things as 'real' things, things we can physically confirm. The validation of an environment is particularly important in linking us with our existence and connecting us to the "here and now". Emotion, a cognitive process, is translated into a bodily experience via thermal perception. Conversely, touch perception can take bodily experiences - like tactile feeling, movement, and temperature perception - and turn it into a cognitive process.
<b>Architectural Applications</b>	<b>Architectural Recommendations for Touch</b> <i>Juxtaposition</i> Hierarchy of intensity or simple alternation of contrasting items juxtaposes opposites to bring out particularities.

<sup>59</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

### 04.01.03 - Sense Principles: See

<b>Evolutionary Development</b>	<b>Development of See</b> <i>Dominating</i> Sight, though the last sense to develop, is the most specialized and has a monopoly over the other senses. A hierarchy has been established among different species based on visual capabilities.
<b>Types</b>	<b>Types of See</b> <i>Dream</i> Sight is so dominant that it overtakes even our imagined, or dreamed, world. However, it is also stimulated, even corrected, by the other senses, confirming that the sensory systems act in concert as a whole to construct the most vivid and accurate understanding of an environment.
<b>How it Works</b>	<b>How See Works</b> <i>Light</i> The speed and accuracy of visual information leads to favoring of visual sense. However, the fovea, located within the retina and packed with highly sensitive cones individually linked to the brain, is useless in low or no light situations. <sup>1</sup> It is typically in poorly lit environments that people call upon the other senses to supplement information about their surroundings.
<b>Benefits</b>	<b>Benefits of See</b> <i>Give &amp; Receive Information</i> Vision is information packed; it can gather and disseminate a wide range of information within one gaze. Perhaps this might cause us to consider the environments that under-stimulate sight as a way of simplifying a message and clarifying an experience.
<b>Issues</b>	<b>Issues Confronting See</b> <i>Self Reacting</i> An environment that is able to moderate and suspend visual interest has the ability to command its occupant's attention. Edward Hall says, "Man learns what he sees and what he learns influences what he sees". <sup>60</sup> His observations suggest that sight can dominate to ill effect, limiting what and how we learn. And yet, we are able to voluntarily control sight. It is the one sense we can actively shut off, though we are often coaxed into hallucinatory or dream-like vision while we sleep.

<sup>60</sup> Hall, Edward C. *The Hidden Dimension*. New York: Doubleday, 1966.

<b>Phenomenology</b>	<b>Phenomenology of See</b> <i>Conductive</i> Visual poetry is an experience that moves. It recalls and applauds the phenomenon of life. Sight is able to awaken the other senses and even simulate perception.
<b>Architectural Applications</b>	<b>Architectural Recommendations for See</b> <i>Repetition &amp; Scale</i> The use of liners and side-line objects should consider the effects on mobility, compression, and stasis.

Figure 04.01.03

#### 04.01.04 - Sense Principles: *Smell*

<b>Evolutionary Development</b>	<b>Development of Smell</b> <i>Primitive</i> Smell is a primitive safety mechanism, one of the earliest senses to form, and a very subtle, and often overlooked, way of exchanging information.
<b>Types</b>	<b>Types of Smell</b> <i>Give &amp; Receive Information</i> Smells seem intimately linked to survival, whether through warning, reproduction, gathering food, or self defense. They can offer a subtle, yet crucial means for analyzing an environment
<b>How it Works</b>	<b>How Smell Works</b> <i>Breathing</i> The sense of smell accompanies a process fundamental to our survival, breathing. The mere quantity of olfactory information being received each day should cause greater consideration of the quality of smells within our environments.
<b>Benefits</b>	<b>Benefits of Smell</b> <i>Memory</i> The brain's link between smell and memory is much stronger than the link between smell and sound. Therefore, smells are much more powerful at conjuring the past than a particular sound ever could. Additionally, smells provide crucial information about an environment; it is a survival tool that should be utilized.
<b>Issues</b>	<b>Issues Confronting Smell</b> <i>Overstimulation</i> This issue deals with the problem of overstimulation. It faults the over exposure of induced smells for obscuring experiences and confusing environments.
<b>Phenomenology</b>	<b>Phenomenology of Smell</b> <i>Personalized Reactions</i> It is difficult to separate smell from the individual perceptions people have about it. Therefore, it is hard to manipulate the olfactory qualities of a space to produce contrived effects. Therefore, the goal is not to induce controlled reactions in people, but rather to make them aware that they are in the act of

	smell - and they can formulate their own responses to the qualities of that particular smell.
<b>Architectural Applications</b>	<b>Architectural Recommendations for Smell</b> <i>Water</i> The designer should consider where and how to carry certain smells throughout a space through the use of water. Selection of materials is key to olfactory qualities of a space, especially with regard to the changing of seasons.

Figure 04.01.04

#### 04.01.05 - Sense Principles: *Taste*

<b>Evolutionary Development</b>	<b>Development of Taste</b> <i>Survival Mechanism</i> Developed to detect the nutrients contained within various foods, and alert to poisonous substances
<b>Types</b>	<b>Types of Taste</b> <i>5 Types</i> Different chemicals perceptible on tongue: salty, sweet, sour, bitter, savory. Our other senses contribute greatly to the experience of taste
<b>How it Works</b>	<b>How Taste Works</b> <i>Solubility</i> Papillae on our tongue are small bumps containing fluid. Chemicals from food are dissolved in the fluid and transmit nerve impulses to the brain
<b>Benefits</b>	<b>Benefits of Taste</b> <i>Evolution</i> Because so many of our taste associations are psychological, taste preferences can evolve. We often defer to professionals to hone our taste preferences: chefs, sommelier. The broadening of our palettes invites various flavors, cultural preferences, and the sublimity of experience
<b>Issues</b>	<b>Issues Confronting Taste</b> <i>Limitations</i> Our tongue is limited to perceiving 5 different flavors. Without our sense of smell, we would lack the rich experience of taste. Considering this, taste can be seen as a uniter, inviting all of the senses to contribute to an experience
<b>Phenomenology</b>	<b>Phenomenology of Taste</b> <i>Imagination</i> Our sense of taste can be triggered, perhaps most powerfully, by the imagination. Looking at food, talking about food, hearing someone else eating food, and especially smelling food is almost powerful as actually eating food

<b>Architectural Applications</b>	<b>Architectural Recommendations for Taste</b> <i>Gathering</i> Throughout time, people have celebrated our sense of taste by gathering around a meal. The Romans staged elaborate, and sometimes theatrical, meals. Today we crave new exciting environments in which to take a meal.
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Figure 04.01.05

## 04.02 - Qualifying Stimuli

The charts below explore stimuli in descriptive terms. By ascribing a particular property to each lens, stimuli are enabled to take on new meaning.

### 04.02.01 - Stimulus Principles: Shape

<b>Meaning of Stimuli</b>	<b>Meaning of Shape</b> <i>Symbolic</i> Shapes often hold symbolic meaning, derived from a ritualistic use. The use perhaps became traditionalized because of the psychological and emotional responses to certain shapes, as well as their reflection in nature and biology
<b>How it Works</b>	<b>How Shape Works</b> <i>Space</i> Shape is somewhat abstract, as is space. Shape allows the formation of space, which causes people to respond to their environments in a number of different ways.
<b>Pros &amp; Cons</b>	<b>Pros &amp; Cons of Shape</b> <i>Platonic Form</i> The platonic nature and scale of shape have the power to affect different emotional responses in people.
<b>Psychological Effects</b>	<b>Psychology of Shape</b> <i>Large Scale</i> Shape is a massive stimulus. It encompasses the space of an experience.
<b>Phenomenology of Shape</b>	<b>Phenomenology of Shape</b> <i>Multi-momentary</i> Shape is multifaceted element. It can stimulate through a series of instances. It is not momentary, like visual and olfactory stimulants.

Figure 04.02.01

### 04.02.02 - Stimulus Principles: Color

<b>Meaning of Stimuli</b>	<b>Meaning of Color</b> <i>Emotion</i> The relationship of color and emotion acts both inwardly and outwardly. Biological reactions occur within our bodies while receiving certain colors, while the internal psychological and emotional state of our beings can be expressed outwardly through auras (the electromagnetic spectrum).
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<b>How it Works</b>	<b>How Color Works</b> <i>Filter Station</i> The eyes have a dedicated center within the brain to sort out information received before sending it to the nervous system to be announced throughout the rest of the body. It is so precise as to organize arousal into categories of intensity.
<b>Pros &amp; Cons</b>	<b>Pros &amp; Cons of Color</b> <i>Moderate Manipulation</i> Colors and patterns are perceived by our eyes in different ways. Rather than manipulating these features, it seems advisable to avoid overstimulation through the different implementations.
<b>Psychological Effects</b>	<b>Psychology of Color</b> <i>Time &amp; Place</i> Including an appropriate level of stimulation allows persons to connect with their time and place-specific existence. However, when an environment disguises time and place, it is uncomfortable and disassociating for occupants, resulting in negative reactions.
<b>Phenomenology of Shape</b>	<b>Phenomenology of Color</b> <i>Associations</i> Color assignments are almost like words. It is an order designed by man to organize and make sense of the world around him. But the actuality, the meaning behind words and color associations can only be truly understood through experiencing of them.

Figure 04.02.02

### 04.02.03 - Stimulus Principles: *Light*

<b>Meaning of Stimuli</b>	<b>Meaning of Light</b> <i>Ambiguity</i> Sometimes ambiguity creates a richer environment because of the personalized opportunity it allows our imagination.
<b>How it Works</b>	<b>How Light Works</b> <i>Wavelengths</i> The electromagnetic light that create more intense reactions also have the longer wavelengths.
<b>Pros &amp; Cons</b>	<b>Pros &amp; Cons of Light</b> <i>Health</i> Light, in its natural form, has salutary affects on our bodies and minds.
<b>Psychological Effects</b>	<b>Psychology of Light</b> <i>Time &amp; Place</i> Passage of time and earth-bound coordinates are elements that can only be experienced by the particular qualities of light in those precise instances.

<b>Phenomenology of Shape</b>	<b>Phenomenology of Light</b> <i>Overstimulation</i> The experience of light elevates man beyond the physical. The designer can plan the physical attributes of a space and perhaps anticipate the phenomenological aspects, but ultimately, it is up to the individual to make the experience his own. This reinforces the importance of the thesis addressing both the designer's process and the occupant's experiential awareness.
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Figure 04.02.03

#### 04.02.04 - Stimulus Principles: *Acoustics*

<b>Meaning of Stimuli</b>	<b>Meaning of Acoustics</b> <i>Shape</i> Rounder spaces amplify sound, because they provide the right distance and continuity of surface to bounce vibrations off of.
<b>How it Works</b>	<b>How Acoustics Work</b> <i>Clarification</i> Our environments might become audibly complex because of variety of materials, placement of objects, and over inclusion of objects. Simplifying a space can lead to auditory clarity.
<b>Pros &amp; Cons</b>	<b>Pros &amp; Cons of Acoustics</b> <i>Predictability</i> Acoustics deal with frequency, intensity, and directionality of sounds. It seems advisable to keep volatile and unpredictable auditory stimuli to a minimum.
<b>Psychological Effects</b>	<b>Psychology of Acoustics</b> <i>Predictability</i> Acoustics that are uncontrolled, unanticipated, or volatile will produce disturbing reactions in occupants.
<b>Phenomenology of Shape</b>	<b>Phenomenology of Acoustics</b> <i>Shape</i> Shape and acoustics are inextricably tied.

Figure 04.02.04

#### 04.02.05 - Stimulus Principles: *Material*

<b>Meaning of Stimuli</b>	<b>Meaning of Material</b> <i>Associations</i> Texture has traditionally been associated with social positioning. Today, it may be used to draw parallels with a specific region or culture.
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<b>How it Works</b>	<b>How Material Works</b> <i>Simplification</i> As stated under 02.02.04 - Acoustics, simplifying and clarifying the type and quantity of different materials can lead to a more harmonious environment.
<b>Pros &amp; Cons</b>	<b>Pros &amp; Cons of Material</b> <i>Chemical Makeup</i> The living-breathing quality of the materials within a space conveys information to our bodies, inducing similar effects as occur within their very composition.
<b>Psychological Effects</b>	<b>Psychology of Material</b> <i>Contrast</i> This topic suggests that environments of contrast produce varied physical responses. It shows that the juxtaposition of varied stimuli produces hierarchies of experience and that perception is subject to the nature of stimuli.
<b>Phenomenology of Shape</b>	<b>Phenomenology of Material</b> <i>Scale</i> A material can be experienced at many different scales. Specific sensory qualities can be extracted from a material element.

Figure 04.02.05

### 04.03 - Sense-Stimuli Combinations

In this section, senses and stimuli are examined in unison. The exercise forms a grid of almost mathematical combinations by which direct relationships of environment and response can be studied. This exploration reveals the limitless possibilities that can be achieved through the cross-pollination of environmental factors and human occupation.

#### 04.03.01 - Sense-Stimuli: *Hear*

<b>Shape</b>	<b>Shape - Hear Relationship</b> <i>Reverberations</i> The shapes of spaces create different reverberations patterns. The time between molecules vibrating against the container and reentering our ears allows a human to locate himself within the space.
<b>Color</b>	<b>Color - Hear Relationship</b>
<b>Light</b>	<b>Light - Hear Relationship</b> <i>Temperature</i> Natural light from the sun varies in temperature based on the angle of incidence and sky visibility. Sound waves travel slower in cooler temperatures. At 0 degrees C, sound travels at 1100 ft/sec, whereas at 30 degrees C, sound travels at 1150 ft/sec.
<b>Acoustics</b>	<b>Acoustic - Hear Relationship</b> <i>Synthesis</i> Acoustics combine elements of shape, volume, and materiality to enhance sound. Pressure (decibels), frequency (herz), and directionality determine loudness (sone). Human vocal chord frequency ranges from 50-350 Hz (23. <i>Room Acoustics</i> )
<b>Material</b>	<b>Material - Hear Relationship</b> <i>Density</i> Greater thickness and fiber complexity result in greater sound absorption. Similarly, materials offering a cavity, channel, or layer for sound to enter will diffuse the intensity of sound. <sup>61</sup>

Figure 04.03.01

<sup>61</sup> Kuttruff, Heinrich. *Room Acoustics*. New York: Elsevier Science Publishers, 1991.

### 04.03.02 - Sense-Stimuli: *Touch*

<b>Shape</b>	<b>Shape - Touch Relationship</b> <i>Kinesthetics</i> Round spaces are inward focusing St. Benedict's Chapel, Sumvigt creates a forward thrusting inertia through the oblong shape of its structure
<b>Color</b>	<b>Color - Touch Relationship</b> <i>Thermal</i> Color, through the form of light waves send nerve impulses to the hypothalamic region of the brain. In short, color temperatures are as follows: Red - hot and arousing Orange - warm and luminous Yellow - warm and exciting Green - cool and calming Blue - cool and restful Violet - cool and subduing
<b>Light</b>	<b>Light - Touch Relationship</b> <i>Emotion</i> When light enters the eye, it activates energy pathways to the brain. Though emotions are based in our conscious, they are influenced by the corporeal. This burst of energy is often the cause of lifting a mood and soothing depression
<b>Acoustics</b>	<b>Acoustic - Touch Relationship</b> <i>Vibration</i> Sound is actually experienced through touch. The resonance of sound waves against our eardrums creates sound. The feeling of a sound, its vibrations through a medium, are amplified or dampened by the shape and materiality of space
<b>Material</b>	<b>Material - Touch Relationship</b> <i>Tactile</i> Materials conveys information to us through touch. Textural quality enriches the haptic experience by stimulating proprioceptors and exteroceptors, located within and on top of our skin

Figure 04.03.02

### 04.03.03 - Sense-Stimuli: *See*

<b>Shape</b>	<b>Shape - See Relationship</b> <i>Gestalt Perspective</i> The tendency to complete a visual shape or pattern affects the visual field of our environments. The elements that form shapes in our perspective views can expand or contract a space and affect our kinesthetic experience within a space
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<b>Color</b>	<p><b>Color - See Relationship</b>  <i>Emotion</i>  The eyes have a dedicated center for processing color information before sending it to the nervous center of the brain. The eyes organize colors into categories of arousal intensity, based on longer (stimulative) or shorter (sedative) wavelengths.  Red - rouses blood and nerves  Orange - stimulates nerves  Yellow - cerebral stimulant  Blue and Violet - calming<sup>62</sup></p>
<b>Light</b>	<p><b>Light - See Relationship</b>  <i>Information Processing</i>  The retina, located at back of eyeball and containing photosensitive rods and cones, processes light as it enters the eye.  125 mill rods construe dimness and record B&amp;W  7 mill cones examine color  The "blindspot" is an area on retina without rods/cones, where optic nerve enters the brain</p>
<b>Acoustics</b>	<p><b>Acoustic - See Relationship</b>  <i>Anticipation</i>  See what is heard, or seeing before hearing affects the perception of environmental surroundings. Seeing reinforces information carried by sound; it also provides anticipation to sounds that may decrease shock or distraction.</p>
<b>Material</b>	<p><b>Material - See Relationship</b>  <i>Scale</i>  Visual perception of materials involves Gestalt rather than haptic processes. Though the haptic experience is more intimate, involving direct, reciprocal contact, Gestalt perception offers varied information at multiple scales.</p>

Figure 04.03.03

#### 04.03.04 - Sense-Stimuli: *Smell*

<b>Shape</b>	<p><b>Shape - Smell Relationship</b>  <i>Movement</i>  The shape of a space affects the movement of particles through a medium. These particles enter our nose as smells. Though typically applied to sound, the properties of shape affect smell as well. A rounded, concentric space will cause particles to reverberate back and forth within the space, whereas long, rectilinear spaces will more quickly dispel moving particles  <i>Geometry</i>  Our brains categorize smells by their shape. Molecules have different geometric shapes and fit into neurons accordingly. James E. Moore's stereochemical theory</p>
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<sup>62</sup> Mahnke, Frank. *Color, Environment, and Human Response*. New York: Wiley, 1996.

<b>Color</b>	<p><b>Color - Smell Relationship</b>  <i>Associative</i>  Color and smell are paired by associative values. Color, the electromagnetic spectrum of light, has very little direct effect on smell. It is through learned associations, based on the chemical properties of different colored elements, that cause predictability of olfactory effects:  Red - spicy  Orange - sweet  Yellow - sweet, sour  Green - bitter  Blue/Violet - mellow</p>
<b>Light</b>	<p><b>Light - Smell Relationship</b>  <i>Electromagnetism</i>  The range in frequencies of light across the electromagnetic spectrum effect temperature values of particles. Particles under higher frequencies of light break down more quickly and are released into the air, resulting in smell</p>
<b>Acoustics</b>	<p><b>Acoustic - Smell Relationship</b></p>
<b>Material</b>	<p><b>Material - Smell Relationship</b>  <i>Chemical</i>  The chemical properties of materials break down at varying temperatures. As temperatures rise, particles break down and are released into the atmosphere. Concrete and steel have a much higher boiling point than wood or fabric, and therefore contribute fewer particulates to the olfactory experience of a space</p>

Figure 04.03.04

#### 04.04 - Case Study Qualification

This section filters the analysis done in Part 03, allowing each characteristic to take on more definitive meaning.

##### 04.04.01 - Case Study: *Therme Vals*

<b>History</b>	<b><i>Reinterpretation</i></b> Oldest hotel dates from 1893. It was replaced by a complex in 1960, which was again renovated in 1996.
<b>Social Environment</b>	<b><i>Resistance</i></b> Resists against the contrived social environment of spa, or resort.
<b>User</b>	<b><i>Destination</i></b> Destination, though part of the Alps geographical region, it is not stitched into a local community. Part of an older hotel complex, creating a new appendage that appears old through the use of time worn aesthetics.
<b>Location</b>	<b><i>Contextualism</i></b> Eastern flank of the Valserrhain River Valley in the Swiss Alp Vals gneiss that was quarried 1000 m up valley and built back into the same slope. Entrance is embedded within the slope. Series of continuous geometric caves meander through the earth and emerge. <sup>63</sup>
<b>Light &amp; Shadow</b>	<b><i>Lightness</i></b> A solid gneiss block defines each block of program Long fissures on one edge of the ceiling plane wash the walls with top-light Ethereal daylight is filtered down into the steamy baths.
<b>Water</b>	<b><i>Nature</i></b> Natural spring waters, heated at 30 degrees C, feed the spa.
<b>Ground</b>	<b><i>Elevation</i></b> 1200 meters above sea level; set into the slopes of Valserrhain Valley.
<b>Movement</b>	<b><i>Layering</i></b> Bath walls layered vertically with stacked stone forming strata from floor to wall to ceiling Seamless transition between each surface contributes to the monolithic quality.
<b>Touch &amp; Kinesthetics</b>	<b><i>Contact</i></b> Smooth materials, the touch of skin against warm stone, the puddles of mist thinly spread along the stone surfaces.

<sup>63</sup> Zumthor, Peter. *Works: Buildings and Project 1970-1997*. Baden, Switzerland: Lars Muller Publishers, 1998.

<b>Smell</b>	<b><i>Nature</i></b> Mountain air clinging to the misty air particles.
<b>Hear</b>	<b><i>Water</i></b> The sounds of water pattering against stone. Zumthor is concerned with drawing out the sound and glow from materials.
<b>See</b>	<b><i>Controlled</i></b> Sequence of spaces builds sequentially Views of Valserrain Valley are withheld from visitors until they move from the entry through the changing rooms Perspective is always controlled, ensuring or denying the view in concert with the spaces' function or implied meaning Concept of darkness and light are explored Water is employed to reflect light and diffuse it through the steam-filled rooms. <sup>64</sup>
<b>Perceptual Psychology</b>	<b><i>Surprise</i></b> There is an intended change in perception from the front edge of the building, showered in daylight, to the back of the site, which is surrounded by narrow caves. Yet the front is sequentially experienced last.
<b>Environmental Psychology</b>	<b><i>Personalization</i></b> Places for Intimacy: Intimate environments created by hollowed out area between doorways Ambiguity allows for personalization of spaces
<b>Gestalt Psychology</b>	<b><i>Withholding</i></b> The Gestalt is never fully appreciated, as is the intent. Rather, it consists of a series of spaces that ultimately eject one onto the mountain, where the gestalt of the Alps <i>landscape</i> can be truly appreciated.
<b>Phenomenology</b>	<b><i>Thinking, Building, Dwelling</i></b> Zumthor uses the words 'mountain, stone, water, building in-with stone, building into-out of the mountain to guide his design process. The goal is to give those words an architectural interpretation, 'to translate into architecture their meaning and sensuousness', by which the building is given form.
<b>Architectural Conclusions</b>	<b><i>Purpose</i></b> Manfred Sak describes Zumthor's architecture as a matter of philosophy, structure, and organization of qualities, be they haptic or visual. "He wishes his buildings to be developed from a set task, from their purpose, designed for the place in which they stand and into whose surroundings they emerge, gradually becoming one with that place and built from materials which are most closely associated with the task".

Figure 04.04.01

<sup>64</sup> Zumthor, Peter. *Thinking Architecture*. Basel: Birkhäuser, 2010.

#### 04.04.02 - Case Study: *St. Benedict's Chapel*

<b>History</b>	<b><i>Tradition</i></b> Typically, Surselva church is done in the Baroque style, which stands out against the regional vernacular of dark wooden farm buildings. <sup>65</sup>
<b>Social Environment</b>	<b><i>Juxtaposition</i></b> The juxtaposition of the Baroque, a global style, against the traditional form of secular buildings represents unification between global and local. It is also an expression of a historical order: a village church proclaiming and embracing a world religion.
<b>User</b>	<b><i>Vernacular</i></b> Zumthor's chapel, unlike the church prototype is built in the local material. The tradition of wood acts as a unifier between the new and the old. It embraces the tradition of local craft and the community's skills.
<b>Location</b>	<b><i>Approach</i></b> Located above the hamlet of Sogn Benedeg in the region of Surselva, Switzerland. Surrounded by meadows, in the tradition of older churches, a small path leads from the village to the entrance of the church.
<b>Light &amp; Shadow</b>	<b><i>Illumination</i></b> A zone of transom windows is set beneath the baldachin, overlaid by a delicate system of slats that modulate natural light. The wall behind the timber posts is abstractly painted silver-gray, representing light and shadow.
<b>Water</b>	
<b>Ground</b>	<b><i>Movement</i></b> The wooden floorboards float freely on joists, which allow a slight spring beneath one's feet.
<b>Movement</b>	<b><i>Transcendence</i></b> Entering the church creates the feeling of leaving land and climbing aboard a wooden vessel. The space of the church is centered on a point in the middle of the church. Freestanding timbers line the edges of the floor and define the interior space. They support the roof, which is reminiscent of leaf veins or the ribs of a ship.

<sup>65</sup> Zumthor, Peter. *Works: Buildings and Project 1970-1997*. Baden, Switzerland: Lars Muller Publishers, 1998.



<b>Touch &amp; Kinesthetics</b>	<p><b><i>Propulsion</i></b> The spring of wooden boards can be felt beneath one's feet. The forward thrusting of the east-west orientation propels one's body toward the helm of the space.</p>
<b>Smell</b>	<p><b><i>Clarity</i></b> Surrounded by meadows, the soft woody smells of the building structure and nearby pines fill the air. Breezes carry the scent of grass and wildflowers through the clear mountain air.</p>
<b>Hear</b>	<p><b><i>Insulation</i></b> One might hear the sounds of the meadow, humming of insects, the rustle of activity in the town below. Inside the chapel, one is insulated from the outside; inside its womb, the gentle creaking of the floor boards remind worshippers of their connection to this moment in time and place.</p>
<b>See</b>	<p><b><i>Dancing</i></b> The play of light and shadow along the walls skids and scatters in between freestanding beams. Outside, the meadow earth slopes downward, toward the back of the church, cupping views out over the town and exposing what would be the hull of the church, as if waiting to set sail over the wavering hills.</p>
<b>Perceptual Psychology</b>	<p><b><i>Juxtaposition</i></b> The form of the building, though not expressive of a Baroque tradition, continues to carry a tradition of sacredness. Its distinguished shape juxtaposes it against the rectangular farm buildings.</p>
<b>Environmental Psychology</b>	<p><b><i>Non-Historic</i></b> The form of the church is "feminine" rather than "masculine", in the tradition of a right angle nave-apse space. The softer, biomorphic leaf shape avoids conjuring the traditional atmosphere of the didactic church and sets forth a space for worship uninhibited by the history of old forms.</p>
<b>Gestalt Psychology</b>	<p><b><i>Embedded</i></b> The shape of the church is a lemniscate, an algebraic curve that gradually shortens in proportion. In this way, its form carries the image of the nave and apse; the cross is embedded within its form.</p>
<b>Phenomenology</b>	<p><b><i>Essence</i></b> St. Benedict is built in the material tradition of Surselven farmhouses. The wood will darken on the south side, becoming black, and develop a silvery gray on the north. In this way it carries the essence of time and place through its appearance.</p>

<b>Architectural Conclusions</b>	<p><b>Abstraction</b>  St. Benedict addresses critical regionalism through abstraction and reinterpretation of the Alps vernacular. It reconciles the struggle of carrying on past traditions while also creating new ones. The materiality of the space recalls the local craft of Surselven people and the form maintains a distinguished shape from local buildings. However, shedding historical, formal aesthetics has liberated the spirit of worship. It is a space that offers simplicity, self-reflection, and quiet communion.</p>
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Figure 04.04.02

### 04.04.03 - Case Study: *Church of the Light*

<b>History</b>	<p><b>Reminiscent</b>  The blind wall facing the congregation, its back toward the outside, is particularly reminiscent of the Chinese blind wall facing the street in most building types. Additionally, the spaces that comprise the church represent a series of imbricated squares, as is common in Chinese architecture.</p>
<b>Social Environment</b>	<p><b>Dichotomies</b>  Much of Chinese architecture is a series of closed worlds, represented by strict geometry - either the square to represent earth or circle to represent heaven.</p>
<b>User</b>	<p><b>Ambiguity</b>  The church is non-particular to race, age, and gender. Though, it is a Christian church; it represents a western religion while implementing eastern traditions.</p>
<b>Location</b>	<p><b>Scale</b>  It is a small building, northwest of Osaka, hidden by pine trees and submerged within nature.</p>
<b>Light &amp; Shadow</b>	<p><b>Beckoning</b>  The smooth texture of the concrete invites light to play across the surface. Vertical slots cut into the walls and channels cut out of the ceiling allow light to wash the vertical horizontal planes.</p>
<b>Water</b>	<p>No use of water. Rather, Ando's Church of the Water uses water in lieu of light to enhance the sensory experience.</p>
<b>Ground</b>	<p><b>Continuity</b>  The concrete floor seamlessly runs up and becomes the walls and ultimately the ceiling.</p>
<b>Movement</b>	<p><b>Insulation</b>  Ando uses walls to contain space. The massive concrete walls are poured on site, acting as fixed elements containing space. On the exterior, there is a double skin involving two layers of variably thick concrete and insulation. By vibrating the concrete mixture and using a particular slump, Ando is able to render a smooth, almost textile-like</p>

	concrete.
<b>Touch &amp; Kinesthetics</b>	<p><b>Disorientation</b> The "S" movement that one takes approaching the entry slight disorients the participant and heightens an expectation of arrival. Inside the church, materials are chosen for their very tactile quality. Wooden benches, emitting a sense of warmth are juxtaposed against the cool, hard concrete shell.</p>
<b>Smell</b>	<p><b>Deprivation</b> In general, the deprivation, the emptiness that the church boasts, begets an appreciation of the slighter sensory stimuli. I image the smell of pines is absorbed as one sits within the modest, yet confident interior of Church of the Light.</p>
<b>Hear</b>	<p><b>Filtering</b> The sound of the wind might be heard rustling through the pines outside and gliding through the narrow channels of concrete.</p>
<b>See</b>	<p><b>Puncturing</b> Plain, concrete walls simplify the space. Attention is focused on the cross of light puncturing the wall behind the pulpit.</p>
<b>Perceptual Psychology</b>	<p><b>Temporality</b> The temporal dimension of sunlight creates awareness of the things around us, manipulated by the disposition of walls and openings. Ando relates our understanding of being alive to the sensitivity of nature, "Thus we are sensitized to nature, to shadows and the wind, to the sounds around us, to what it means to be fully alive, to where we are (23).<sup>28</sup></p>
<b>Environmental Psychology</b>	<p><b>Simplification</b> Ando's work eliminates anything extraneous which might divert one's attention from the essential quality of the space. He uses simple geometry, cubes, cylinders, bar concrete walls, solid-void, light-darkness.</p>
<b>Gestalt Psychology</b>	<p><b>Void</b> The iconic image of the cross bursting through the concrete wall further enhances the connection between the inside and outside. The cross is a void that embraces God within its emptiness.</p>
<b>Phenomenology</b>	<p><b>Formlessness</b> Zen philosophy tells us that nothing, the absolute and formless void represents God. The void allows 'being', it allow 'nothing to become 'something'.</p>

<b>Architectural Conclusions</b>	<p><b>Emptiness</b> Ando makes several important points about the nature of our architectural environments. "It is only when we ourselves experience the richness of emptiness directly in spaces...that the psychological reality implicit in the assertion is fully registered" . Ando conveys through the medium of architecture that humans cannot live in chaos, that architecture has a responsibility to create an ordered world and provide affirmation for the human existence.</p>
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Figure 04.04.03

#### 04.04.04 - Case Study: *Chichu Art Museum*

<b>History</b>	<p><b>Display</b> Permanent display of spatial art</p>
<b>Social Environment</b>	<p><b>Isolation</b> The island location requires visitors to be deliberate about visiting the museum.</p>
<b>User</b>	<p>The museum is not particularly designed per age, race, or gender.</p>
<b>Location</b>	<p><b>Terracing</b> Located in Naoshima, Kagawa, Japan. The island is comprised of the remains of a terraced saltpan. The site is 9,990 sqm and the building footprint is 2,573 sqm.</p>
<b>Light &amp; Shadow</b>	<p><b>Guidance</b> The building uses natural daylight to lead visitors into the depths of the museum. Lighting inside certain exhibition areas is delicately controlled and manipulated to create desired effects. Within the Walter De Maria exhibition space, a long east-west skylight allows light to slice across the room during the course of the day.</p>
<b>Water</b>	<p><b>Orientation</b> The building creates a north-south axis, facing the sea. It's location on the island makes it an object within the sea.</p>
<b>Ground</b>	<p><b>Submersion</b> The building is completely underground, blending in with its earthen surroundings.</p>
<b>Movement</b>	<p><b>Ascent</b> The entry sequence takes people through an ascent before passing through the entrance tunnel. The entrance tunnel gradually descends below grade, with only the sky visible overhead. Rooms are a series of horizontal and vertical descents differentiated by the quality and quantity of light flowing through the spaces.</p>
<b>Touch &amp; Kinesthetics</b>	<p><b>Warmth</b> The feel of sunlight and touch of smooth, concrete walls follows the visitor through the entire sequence of spaces.</p>

<b>Smell</b>	<b><i>Imbue</i></b> Open-air courtyards house cattails, grass, or rocks imbuing a mellow aroma through the different rooms.
<b>Hear</b>	<b><i>Dampening</i></b> Being submerged beneath the earth might damper sounds and quiet reverberations off the concrete walls.
<b>See</b>	<b><i>Illumination</i></b> Sight is mostly illuminated by daylight. Views are restricted to one or so features. The entrance tunnel introduces this method by allowing views only to the sky. In other spaces, long slits in the wall allow visual access to a courtyard that is open to the sky.
<b>Perceptual Psychology</b>	<b><i>Angled</i></b> The entrance tunnel is intentionally set 6 degrees off the vertical, so that the sensation of descending into the earth is perceptible by ground, wall, and sky.
<b>Environmental Psychology</b>	<b><i>Embedded</i></b> The museum is completely embedded within the earth causing people to rely on daylight to guide them. Ando 'defamiliarizes' occupants in this way to heighten place-specific awareness.
<b>Gestalt Psychology</b>	<b><i>Immersion</i></b> The sequence of spaces is sequential, allowing Ando to regulate the immersion of the visitor from the earthly realm to an underground architectural world.
<b>Phenomenology</b>	<b><i>Transformation</i></b> The journey commences above ground, assimilating to the visitor's disposition, but then slowly taking him on a gradual immersion into a sensory-specific experience.
<b>Architectural Conclusions</b>	<b><i>Minimalism</i></b> Ando's museum might represent a gradual approach to sensory deprivation as a means of heightening an experience. This method meets people at their sensory level and slowly immerses them into his world, where they become gradually affected by the minimalistic stimulation around them.

Figure 04.04.04

#### 04.04.05 - Case Study: *Kalkriese Archaeological Park*

<b>History</b>	<b><i>Memory</i></b> Site of historic battle between Teutons and Romans
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<b>Social Environment</b>	<p><b>Blending</b> The site combines building and landscape to create a park-like complex. The <i>Questioning Pavilion</i>, last in the sequence, juxtaposes views of the meadow with taped news broadcasts of international conflicts to reinforce the issue of war as a current problem, not an issue relegated to the past.</p>
<b>User</b>	<p><b>Disassociation</b> Sited in a rural context, the park is not directly associated with a specific local community.</p>
<b>Location</b>	<p><b>Confrontation</b> Located in Osnabruck, Germany, the 20 hectare site at the probable location of the Battle of Varus. The museum portion of the site is composed of stilt-like footing, sheathed in 10'x20' Cor-Ten panels. A 120' tall tower, juxtaposed against a long exhibition hall, greets visitors as they enter the site.<sup>66</sup></p>
<b>Light &amp; Shadow</b>	<p><b>Modulation</b> The main structure modulates light inside the display wing with alternating openings. From the outside, it appears as if steel panels have been removed at certain locations.</p>
<b>Water</b>	
<b>Ground</b>	<p><b>Irregularity</b> Fallen steel plates irregularly placed along the ground trace a path that symbolizes the disarray and confusion of legion troops during battle. The ground material changes from grass, to sandy gravel, to indicate opponents' sides, while a deep trench lined with steel divides the site.</p>
<b>Movement</b>	<p><b>Dispersion</b> Vertical iron poles dot the edge of the site, marking the wooded border of the Tueton rampart. On the inside of the display gallery, aluminum paneled walls provide a cool, sterile vertical surface, breaking up the horizontal in a regularized grid.</p>
<b>Touch &amp; Kinesthetics</b>	<p><b>Undulation</b> The aluminum paneled interior and concrete floor create a cool, sterile indoor environment. The rusted Cor-Ten walls of the archaeological portion undulate and move people through the site in an almost earth-like corridor.</p>
<b>Smell</b>	<p><b>Locality</b> The rural surrounding likely provides smells of grass, pines, and local flowers.</p>

<sup>66</sup> Zeiger, Mimi. *New Museums: Contemporary Museum Architecture Around the World*. New York: Rizzoli International Publications, Inc, 2005.

<b>Hear</b>	<p><b><i>Vicariousness</i></b>  The <i>Hearing Pavilion</i> is equipped with an "ear", a gramophone-shaped device that captures real-time sounds from the natural environment. The pavilion also plays recordings, resembling the clang and cry of horsemen in battle.</p>
<b>See</b>	<p><b><i>Protrusion</i></b>  The <i>Seeing Pavilion</i> has an "eyeball", a large camera obscura, that protrudes through the roof and which frames and distorts the battlefield.</p>
<b>Perceptual Psychology</b>	<p><b><i>Culmination</i></b>  The series of pavilions is sequentially organized to prepare people for an important question: how can we learn from history and end the war that exists in our society today?</p>
<b>Environmental Psychology</b>	<p><b><i>Representation</i></b>  Each pavilion favors different modalities of transferring information, yet it is done less through sensory excitation, and more through the use of machines that represent sensory organs.</p>
<b>Gestalt Psychology</b>	<p><b><i>Connection</i></b>  The overall site is anchored by the main building, fronted by a viewing tower and extended by a long exhibition hall. The sensory pavilions dot the landscape and are connected by a steel corridor running across the middle of the site below grade.</p>
<b>Phenomenology</b>	<p><b><i>Orientation</i></b>  The series of buildings begins with the traditional lobby space, orienting the visitor to the site. As one progresses through the site, each pavilion engages a story, using the senses as 'topics' to <i>tell</i> the occupant something. The last pavilion reverses the occupant-environment relationship by compelling the occupant to self-reflect, question, and hopefully, start doing the <i>telling</i>.</p>
<b>Architectural Conclusions</b>	<p><b><i>Prescription</i></b>  The museum doesn't exactly engage the senses, but rather, uses sensory modes to drive the concepts for different pavilions. Each pavilion is experienced in isolation, physically distanced from the others. The path between them is not specifically prescribed. Though they are architecturally distinct, they form a psychological sequence that results in a prescribed conclusion.</p>

Figure 04.04.05

## 04.05 - Diagramming Analysis

This section explores the previous analysis through diagram. It generates a kit of parts that describes different ways to stimulate an environment.

### 04.05.01 - Study of Parts

Consider the effects of the different approaches as they apply to room types.

#### 04.05.01.01 - One Sense: No Intensity Change

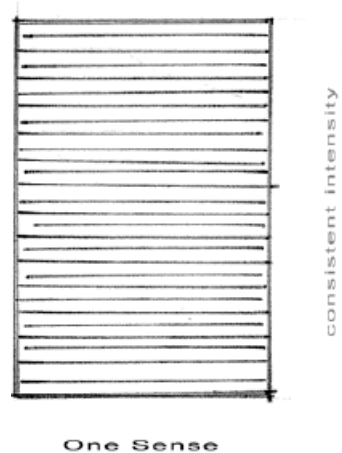


Figure 04.05.01.01



#### 04.05.01.02 - One Sense: Intensity Change

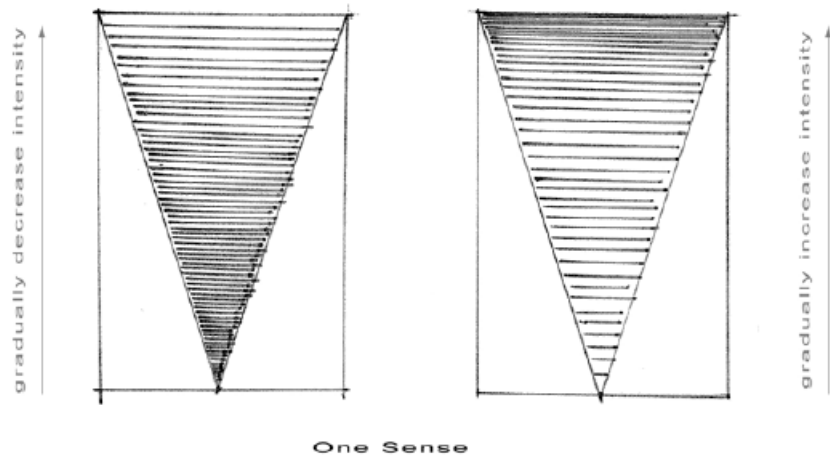


Figure 04.05.01.02

#### 04.05.01.03 - Multiple Senses: No intensity change

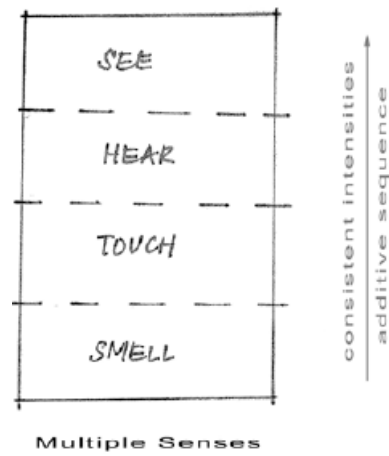


Figure 04.05.01.03

#### 04.05.01.04 - Multiple Senses: Intensity change

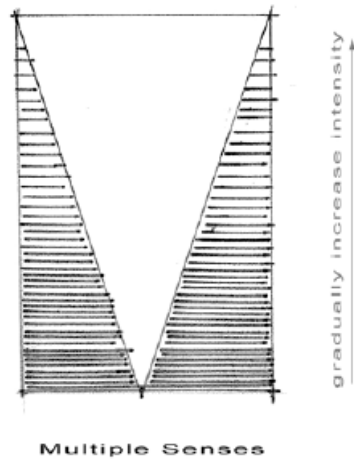


Figure 04.05.01.04

#### 04.05.02 - Study of Wholes

The design process will look at space organization in terms of sensory intensities. The diagrams below explore sensory deprivation and overstimulation as experiential qualities of the building layout and individual room sequences:

##### 04.05.02.01 - Serial: Non-Prescriptive

Allows for multiple different routes through building.

Visitors are offered a different experience each time.

It explores a random sequence with organized rooms.

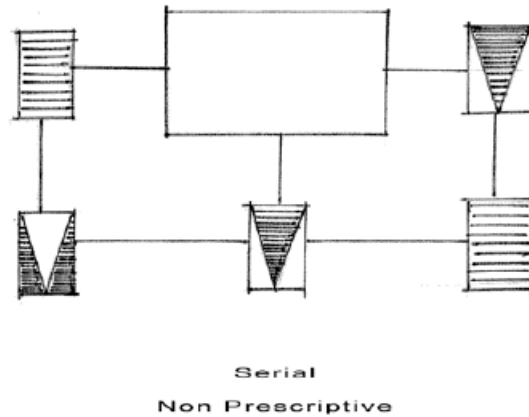


Figure 04.05.02.01

#### 04.05.02.02 - Sequential and Prescribed

Sequential spaces that don't built on each other.

Following each room is a “clearing room” that dispels residual experience before entering the next space.

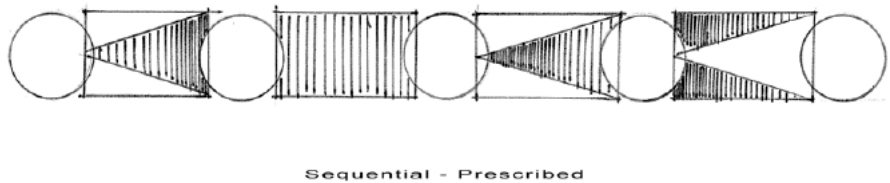


Figure 04.05.02.02

#### 04.05.02.03 - Sequential and Interrelated Additive

Begins with sensory deprivation. Sequence of rooms slowly increases amount and intensity of stimulants.

This organization creates awareness through initial deprivation, by slowly reintroduces a more symphonic sensory experience. The space features

containers rather than a path-based sequence.

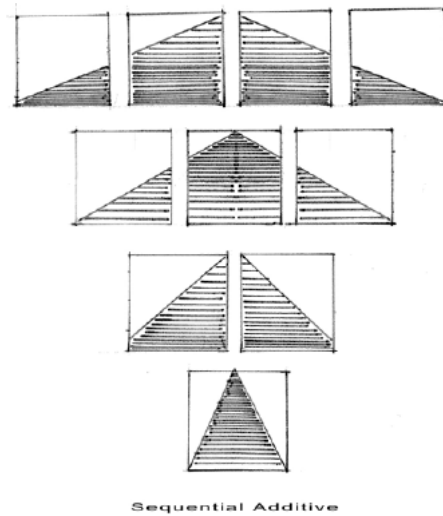


Figure 04.05.02.03

#### 04.05.02.04 - Sequential and Interrelated Subtractive

Begins with sensory over stimulation. Sequence of rooms slowly decreases amount and intensity of stimulants. This organization favors slow assimilation to sensory appreciation. The space features containers rather than a path-based sequence.

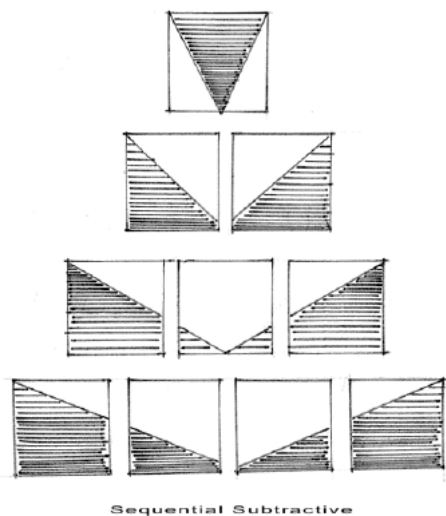


Figure 04.05.02.04

### **04.05.03 - Tangible Applications**

#### **04.05.03.01 - Primary Applications**

Pair of nail shoes unite participant directly with the environment through movement. The ability to get from point A to point B applies is a functional aspect to the person-environment interaction. However, the experience is revealed by a disruption of conventional means of movement.

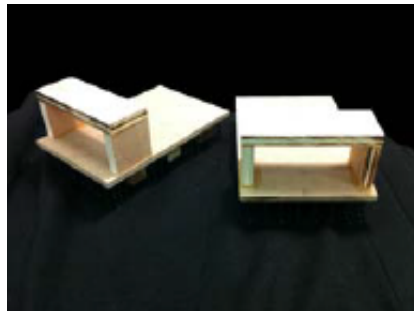


Figure 04.05.03.01a

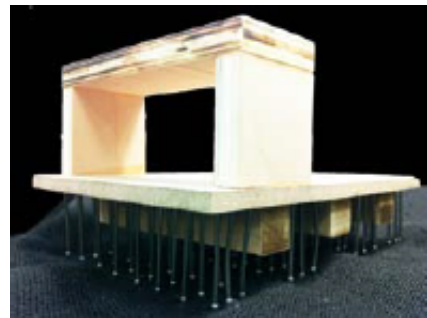


Figure 04.05.03.01b

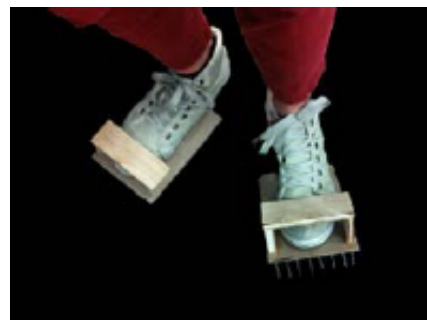


Figure 04.05.03.01c

#### **04.05.03.02 - Secondary Applications**

Sensing post unites participant through another object. We feel, smell, and listen to the object, not

the environment directly. The tactile sensation mixes puffy plastic and cool metal nails. The smells recall orange, cinnamon, and cloves. The sounds of glass clunking over the nails can be heard upon turning the object and twisting it around.



Figure 04.05.03.02a



Figure 04.05.03.02b



Figure 04.05.03.02c

The models below explore light and color with particular regard to the direction, amount, and shape of light entering the cube.

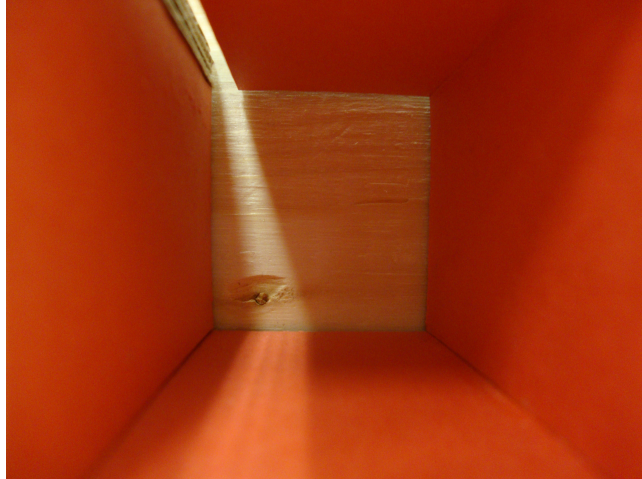


Figure 04.05.03.02d



Figure 04.05.03.02e

## 05 - Design Approach

### 05.01 - Site Selection

This site for this project is Rome, Italy. Rome is a dynamic city, where the layering of historic, aesthetic, social, and cultural components is visible within the physical strata of the city. The complex layering sets the stage for the senses to play off of: light, shadow, sounds, smells, color, texture.



Illustration 05.01a



Illustration 05.01b



## 05.01.01 - Site Characteristics

### 05.01.01.01 - Location

The site I've selected is located in Rome, Italy, at the northern edge of the city, along the belly of the Tevere River. Parco Villa Glori sits, elevated, above a long axis of entertainment venues, the likes of which are Renzo Piano's Parco della Musica, Nervi's basketball arena and Stadio Flaminio, and Zaha's Maxxi museum.



Illustration 05.01.01.01a



Illustration 05.01.01.01b

### 05.01.01.02 - Light & Shadow

The park is fully vegetated with olive and pine trees that cast rhythmic shadows against the earthen ground. Rome has a northern Mediterranean climate, with relatively mild winters and hot, dry summers. Based on sun angles and proximity to the equator, shadows will be slightly longer during winter months.

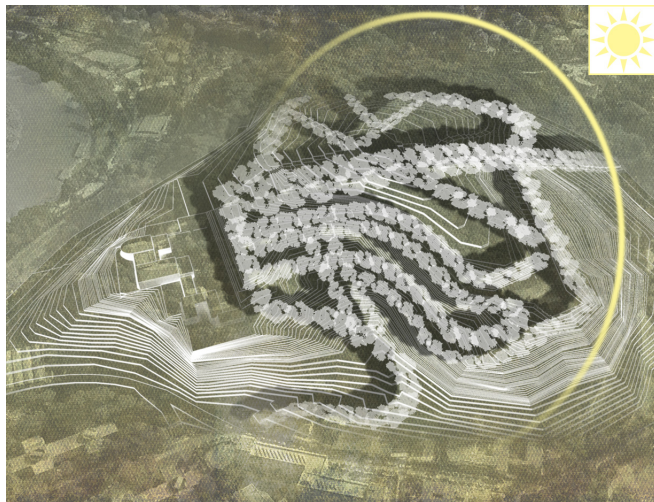


Illustration 05.01.01.02a

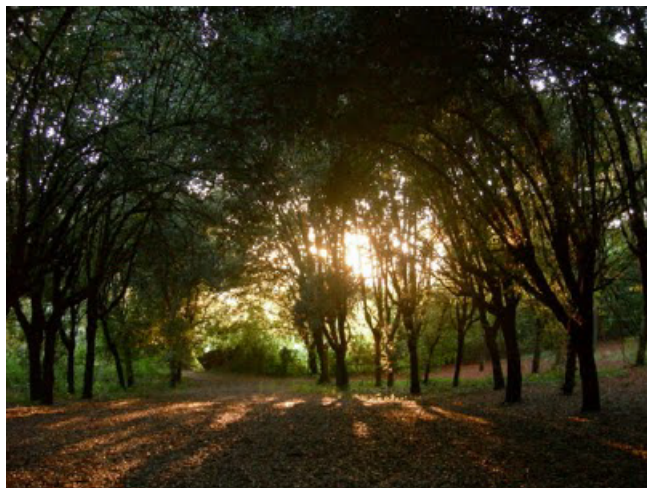


Figure 05.01.01.02b

### 05.01.01.03 - Water

The element of water is not contained directly within the site. However, the Tevere cups the hill, as it rounds the northern curve. Runoff on-site reflects the lay of the land, the depressions and elevations.



Illustration 05.01.01.03

### 05.01.01.04 - Ground

The ground surface alternates between gravel, cobblestones, and grass, offering a rich and contrasting medium of touch beneath one's feet. The pedestrian pathways within the park form orthogonal, diagonal, and organic routes within the park.



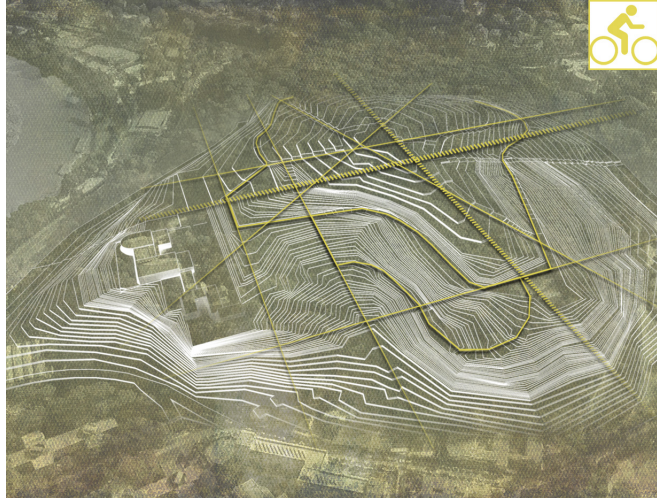


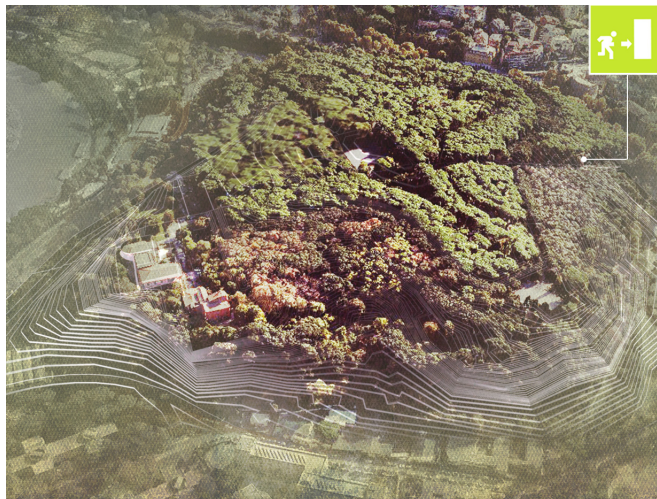
Illustration 05.01.01.04

#### **05.01.01.05 - Vertical-Horizontal Movement**

From the lowest to highest point within the park, there is 155' of elevation change. The park covers roughly 3.8 million square feet, some of which includes an existing hotel and sculpture park.

#### **05.01.01.06 - Access**

The site is accessible from central Rome aboard Tram 2 along Via Flaminia, several bus lines and roughly 1.5 miles on foot.



### 05.01.01.07 - Views

Views to and from the park will be explored further during my site visit. The elevated site situation of the park allows to be visible from the long strip of entertainment venues along Via Pietro de Cubertin.

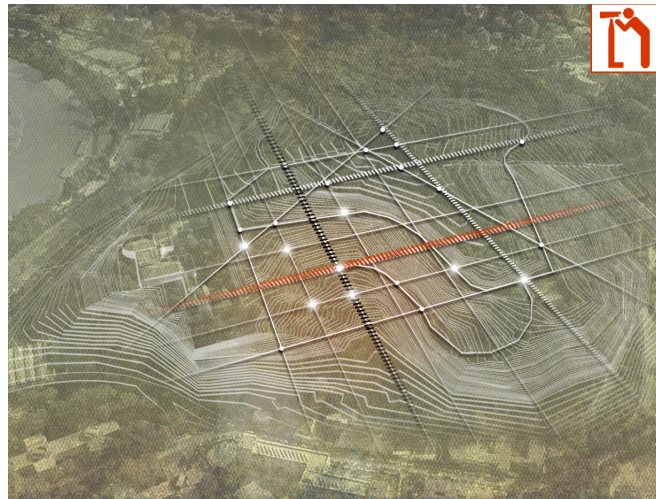


Illustration 05.01.01.07a

The existing tree alleys within the park frame views and conduct movement.



Illustration 05.01.01.07b

## 05.01.02 - Cultural Characteristics

### 05.01.02.01 - Historical

Parco Villa Glori, also called Parco della Rimembranza, commemorates a squabble in 1867 between papal and secular forces. Garibaldi led the secular unit against the pope in an effort to unite Rome against the Catholic Church. During the time, the area was being developed as the "Passeggiata Flaminia", a long stretch of Renaissance civic buildings. At the end of WWI, it became a commemorative park for fallen war heroes. The thematic dichotomy of existing destinations within the park poses an interesting perspective on life, death, past, present, memory, honor, and celebration.



Figure 05.01.02.01a

Altare ai Caduti commemorates Italian war heroes





Figure 05.01.02.01b

The Villa Glori is partially a historic home and partially a center for AIDS assistance.

#### **05.01.02.02 - Social**

Though the Parco della Rimembranza is located along a distinctive axis of entertainment venues in Rome's Parioli neighborhood, the park itself is largely residential. It's a place for people to run, kids to play, elders to walk, and the community to gather.



Figure 05.01.02.02a



Figure 05.01.02.02b



Figure 05.01.02.02c

### **05.01.02.03 - User**

The Villa Glori site is accessible by neighborhood residents, seeking outdoor leisure; music aficionados, coming from a production at the Auditorium; sports' fans, coming from Neri's arena, Stadio Flaminio, or Stadio Olimpico; or tourists, arriving by tram 2 which leaves directly from Piazza del Popolo.

### **05.01.03 - Sensory Stimuli**

#### **05.01.03.01 - Hear**

Our ear is a catchment device, funneling particles to our inner ear. Both the shape and directionality of particles strongly influence the nature and intensity of sounds. Round spaces, in particular, provide a continuous surface off of which particles can reverberate. This technique is evident in many



building typologies as a method for naturally enhancing sounds. The existing sounds within the park vary from north to south. As one moves northward, the hum of the city fades away and the rustling of trees, agitated by the northwesterly winds, fill the air.

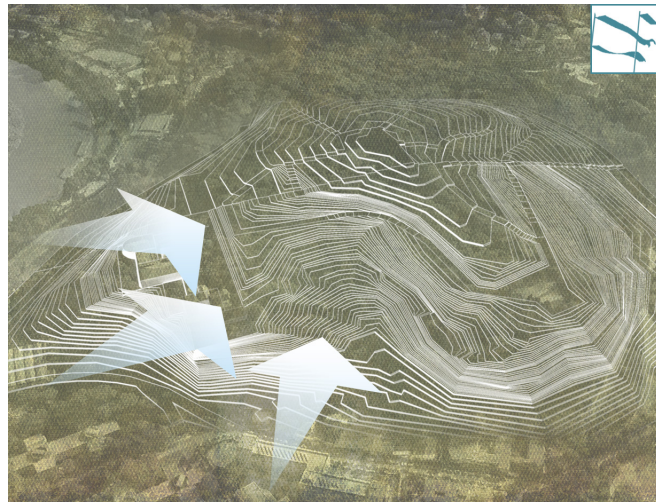


Illustration 05.01.03.01

### **05.01.03.02 - Touch**

Touch works in three ways: externally through our skin, internally through kinesthetic, and also thermally. Touch is really the one sense that you can't turn off - and yet we aren't always aware of the feel of our clothing against our skin. That is because our body has learned to desensitize itself after prolonged periods of constant stimulation. If that is true, then the opposite is also true: contrast, juxtaposition, alternations of our tactile experience

will enhance and reawakens our haptic, kinesthetic, and thermal perception. As a park, Villa Glori currently offers the kinesthetic experience of movement. The rows of trees and line of war hero busts, marking a portion of the path, enhance the rhythm of movement along that alley.

#### **05.01.03.03 - Sight**

Our sense of sight is one that we are very well adjusted to. We use it to take in so much information. But our eyes don't actually collect images. Our eyes see light, color, and motion. That information is processed at very developed filtering stations within our eyes, and sent to the brain to be constructed into an image. This information reveals that the strongest stimulants of sight are the movement of light and shadow, the contrast of color. The collages below combine several photos taken during my latest visit to Rome. They represent a synthesis of the colors and visual textures that can be found throughout the city.



Figure 05.01.03.03a

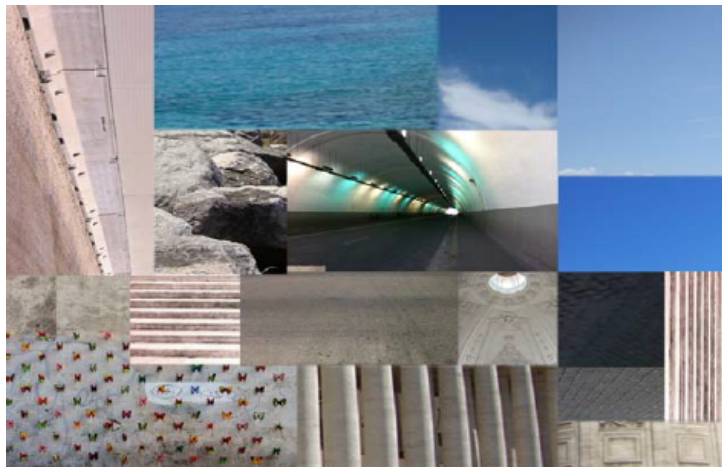


Figure 05.01.03.03b

#### 05.01.03.04 - Smell

Smell works in a similar way as hearing. Our mouth and nose are catchment devices for particles. But our sense of smell is largely dependent on the physical state of molecules: they travel faster and stronger in, for example, high temperatures and water. This becomes apparent when we heat food on the stove, you rinse herbs under water, or visit a place like the beach, where the air is saturated with particles from

the sea. Parco della Rimembranza is planted with olive and pine trees, which emit a rich, nutty smell that emanates throughout the park.

#### **05.01.03.05 - Taste**

Our sense of taste is somewhat limited. Our tongue can only perceive five chemicals: salty, sweet, savory, sour, bitter. The rest of what we experience as *taste* is a combination of other sensory experiences and our imagination. Talking about food, smelling food, hearing somebody else eating food, is almost as powerful as actual *taste*. But taste has been celebrated throughout time, not just for the gustatory experience, but also for the ritual of gathering together. The setting of a meal and the occasions around which meals take place greatly influence how we engage our sense of taste. Taste is, in that sense, limitless. It is a vector of the imagination and vehicle for congregation.

### **05.02 - Program**

#### **05.02.01 - Project Scope**

This project is intended to fulfill two objectives: the first is to enlighten the architectural design process by offering a model for consideration of sensory and experiential

architectonic aspects; the other, is to serve as a place for visitors to interact with a particular environment, a space that will heighten one's awareness of *being* within that environment, and an experience that will evoke an appreciation and intimacy with one's surroundings through architecture.

#### **05.02.02 - Design Objectives**

The project will be an experiential park that offers a non-prescribed series of spaces that elicit particular sensory responses. Based on the matrixes composed in the earlier parts of this paper, it is understood that the combination of senses and stimuli reaches an exponential value. In addition, the insertion the human being into the equation increases the innumerable, possible outcomes. That given, the park is not intended to assert a particular experience upon the visitor, but rather to stitch together specific stimuli that might render personalized meaning for each individual experiencing the park. My research this past year has deconstructed experience, place, or building into its various components, as shown in the diagram below.



Figure 05.02.02

### 05.02.03 - Parti

Though there are an infinite number of possible design explorations, I have created three architectural interventions to investigate *experience* per the components listed above. The park is structured as a scaffold that can be added to and modified in the future. It is a playground, in essence, for artists, practitioners, and students to install their own vision of a "sensory experience".

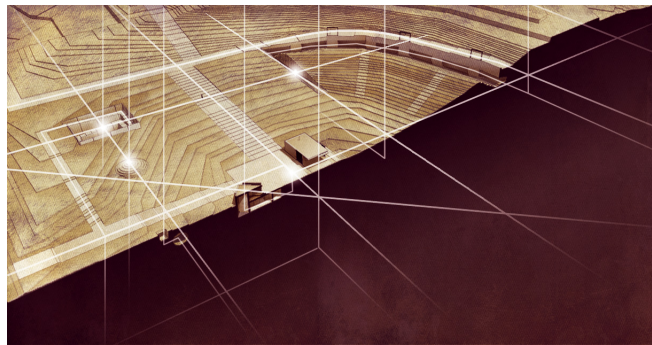


Illustration 05.02.03

### 05.02.04 - Program General

The park consists of the *centering plaza*, which will explore sight and taste in isolation; the *scent path*, which will

highlight touch and smell; and the *sound caves*, which will feature sight and sound.

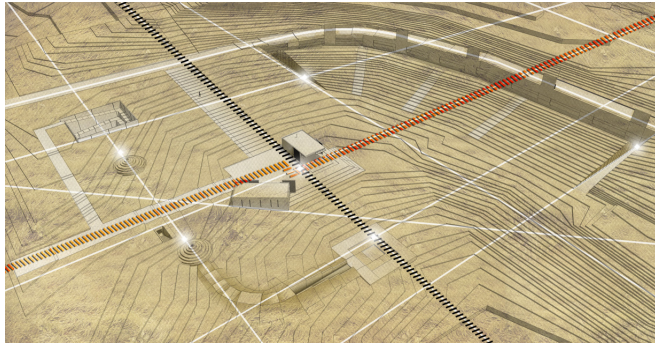


Illustration 05.02.04a

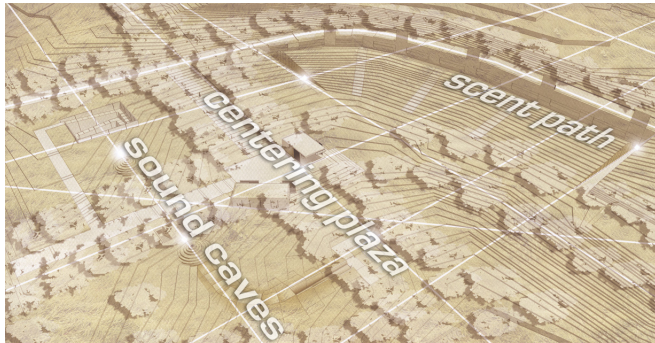


Illustration 05.02.04b

### 05.02.05 - Centering Plaza

The centering plaza focuses on *sight* and *taste*. With regard to *sight*, it is located at the epicenter of the park. The centralized location and orientation of the buildings anchor the other installations to that center-point, while conducting views outward to the other destinations and inward from those various constellations.





Illustration 05.02.05a



Illustration 05.02.05b





Illustration 05.02.05c

### 05.02.05.01 - Sight

The existing tree alleys, which frame views to and from the Centering Plaza, highlight the edge of our cone of vision. What this does is focus our visual attention inward, to the center of our eyes, where rods and cones are most densely packed and vision is strongest.



Illustration 05.02.05.01a



Illustration 05.02.05.01b

## 05.02.05.02 - Taste

With regard to taste, the Centering Plaza takes a less literal approach. While visitors can certainly have a coffee or a pizza here, taste is used to unite and synthesize experience. People can gather around a small meal or a snack. This location highlights the ritual of gathering around *taste*.



Illustration 05.02.05.02a



Illustration 05.02.05.02b

### 05.02.06 - Scent Path

The scent path deals with touch and smell. This is the place where people might walk through the rhythmic arcade to escape the midday sun, or sit along the grassy berm and watch the sun set.



Illustration 05.02.06

#### 05.02.06.01 - Touch

With regard to *touch*, it deals primarily with the kinesthetic experience of entering the path. One might climb up and over the vegetated berm,

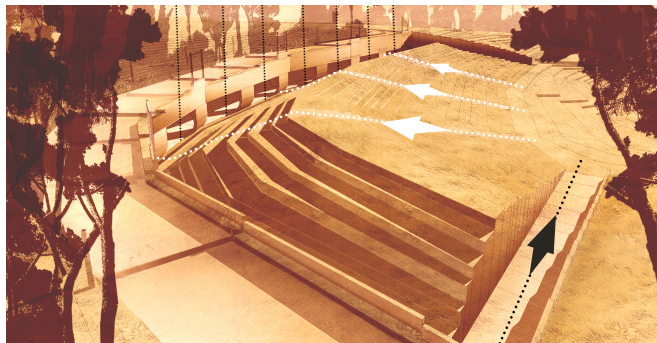


Illustration 05.02.06.01a





Illustration 05.02.06.01b

or glide in, at grade, as the walls of earth climb up around oneself.



Illustration 05.02.06.01c

## 05.02.06.02 - Smell

The experience of *smell* along the scent path harnesses existing site features: the winds coming from the northwest,



Illustration 05.02.06.02a

the drainage channel directing runoff alongside the path,



Illustration 05.02.06.02b

and the vegetated berm, which releases particles that are caught by the wind, saturated by water evaporating from the channel, and carried to the visitor walking along the path.

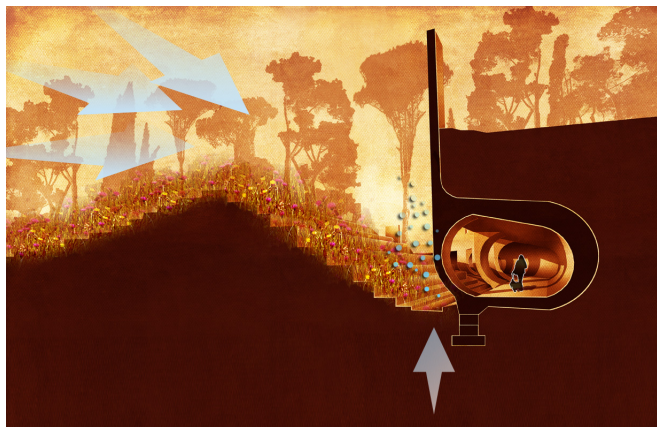


Illustration 05.02.06.02c

This video explores the synthesis of multiple stimuli, experienced throughout different times of day, the different seasons, and most importantly, through the alternation of architectonic features: the rhythmic

opening and closing of the bays.



Figure 05.02.06.02d

### 05.02.07 - Sound Caves

The sound caves take us below ground where our senses are temporarily deprived, then re-stimulated.

The alternation between sensory deprivation and stimulation continues throughout the tunnel. This installation focuses specifically on *sight* and *sound*.

#### 05.02.07.01 - Sight

In each of the red squares below, light is carefully moderated to reflect the time of day and changes in seasons.



Illustration 05.02.07.01a

The western entry burrows into the earth,

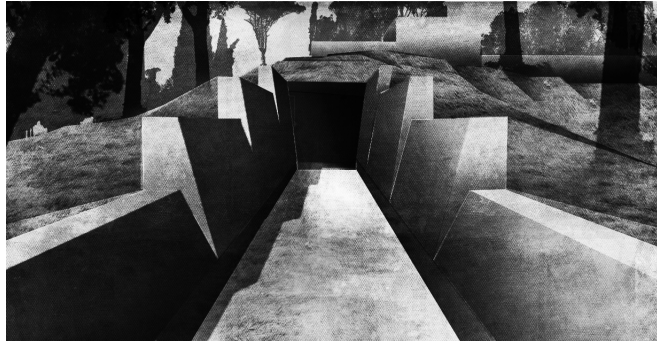


Illustration 05.02.07.01b

while the eastern entry forms a "well" dug out of the earth.

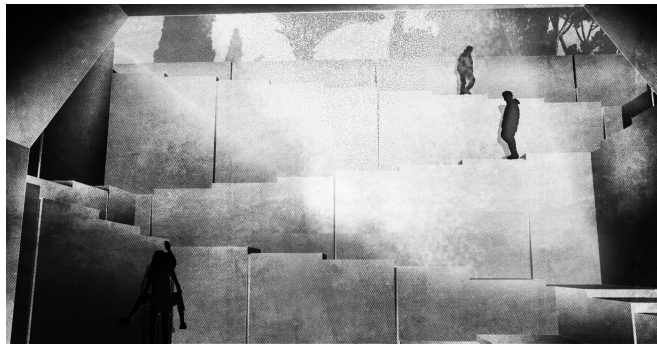


Illustration 05.02.07.01c

In between these two entry points, the experience of light in the tunnel is modified by the time of day and season.

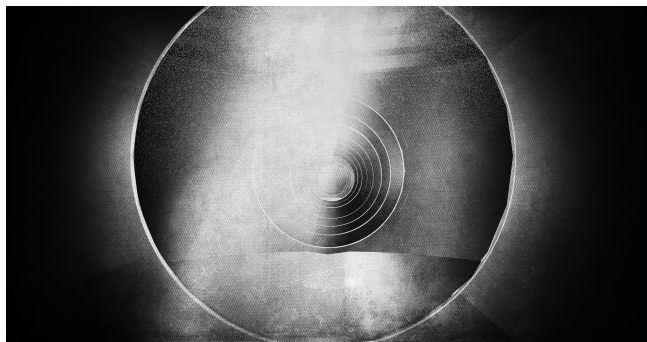


Illustration 05.02.07.01d : Cave "drum" at 9am



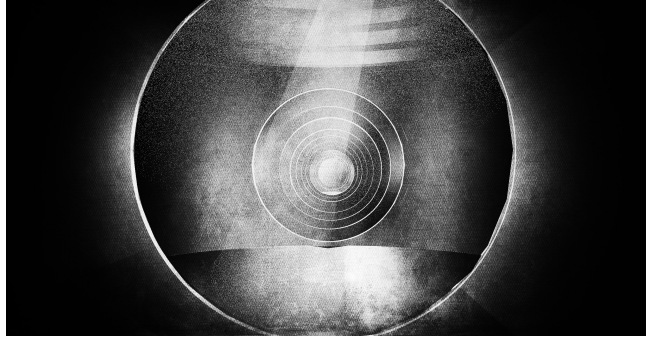


Illustration 05.02.07.01e : Cave "drum" at 12 noon

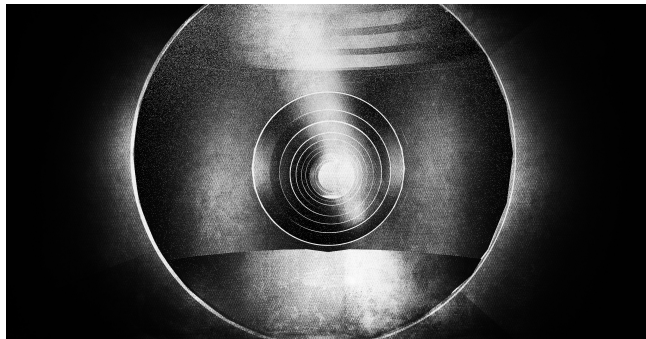


Illustration 05.02.07.01f : Cave "drum" at 3pm



Illustration 05.02.07.01g : Cave "drum" at 5pm

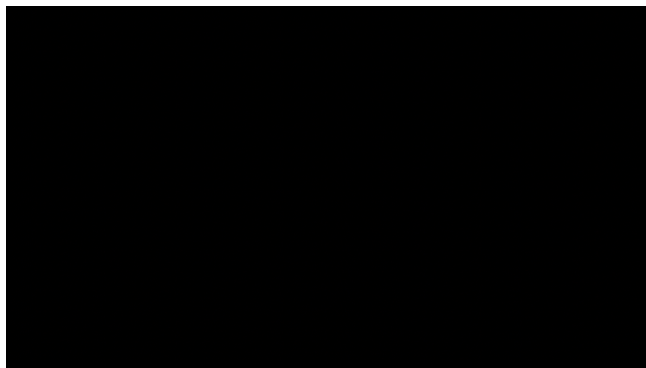


Figure 05.02.07.01h



### 05.02.07.02 - Sound

Sound changes as one moves through the caves.

Outside noises are suppressed upon entering the

caves. As the shape of the caves evolve from a

square to a circle, back into a square, the sound of

footsteps, breathing, talking, water flowing, will all

reverberate differently within those shaped spaces.



Illustration 05.02.07.02a



Illustration 05.02.07.02b

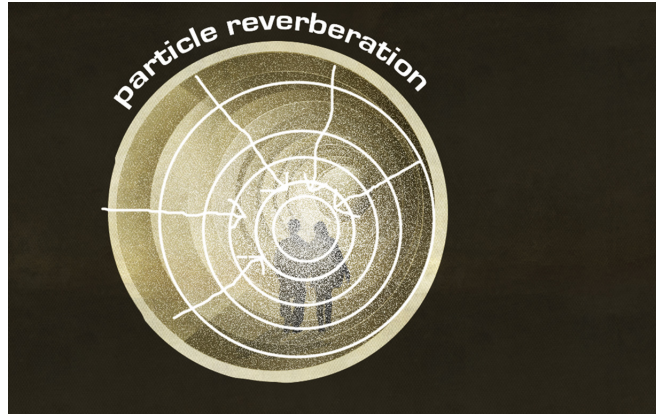


Illustration 05.02.07.02c

This video highlights the transformation of sounds as the surface of the space transforms from square to round.



Figure 05.02.07.02d

The next video explores the combination of sight, sound, and the other senses, as one moves through the caves.

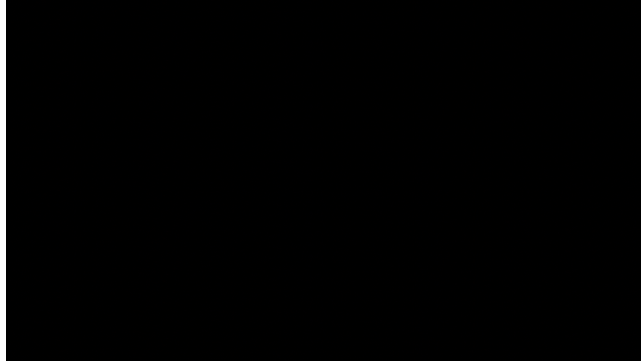


Figure 05.02.07.02e

### **05.03 - Conclusion**

This thesis is a breakdown of how we experience our lives, and more specifically, how architecture can affect our virtual experience. The question that I continually ask myself is: "why is this important? What is the value of deconstructing and then reconstructing our experiences?"

It is important because as we unravel the complexity of experience, we have the chance to peek in at the origin of an extremely complex structure: our lives and our experiences. The knowledge we gain, by seeing its foundations, makes us more aware of, more appreciative of, and more connected to the world around us. This last video is a synthesis of all the relationships discussed: our sensory perceptions, the nature of various stimuli, and the method by which those stimuli are employed. It also explores the overlap of our sensory experiences: the way seeing corroborates hearing, which aligns with how we smell, and how we touch and taste. Our lives are a symphony of experiences that we

gather, process, and which, in concert, eventually become our conscious understanding of the world. Architecture has the unique opportunity to enhance and emphasize those experiences.



Figure 05.03

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