The Impacts of Restorative Architecture: Returning to Our Roots

Kaitlin Margaret Whitaker

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IMPACTS OF RESTORATIVE DESIGN: RETURNING TO OUR ROOTS
by
Kaitlin M. Whitaker

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Architecture
Major: Architecture

The University of Memphis
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I would also like to thank my family and friends for the positive influence they have had on my life and education. To my parents, Richard and Peggy, thank you for nurturing my passion for architecture from such a young age, and guiding me through my education. And to my brother, Richard Ryan, you have always set the bar so high; thanks for being such strong competition throughout our educational years. A special thanks to the Armstrong family; you have provided me with such strong and dependable encouragement.

Finally, I would like to thank Jacob Armstrong. I would not be where I am today without your constant love and support.
I have always felt the effect of nature and the impact of restorative environments, but until recently I did not know what it was like to be deprived of them.

I grew up in a small town. It was a rural area not overtaken by concrete and unresponsive structure. There were several places in the town that were left pristine, untouched by humans. A ravine wrapped around the quaint neighborhood I lived in. The quiet streets were shaded by the towering trees of the ravine. There I felt a connection with the environment.

The town and its surroundings were transformed by the seasons. In the summer, the ravine came to life: the trees blossomed, and the animals who lived within it were active; in the winter, it was still and peaceful.

During my undergraduate studies I attended a school that was surrounded by natural beauty. This is when I first started to notice the impact of nature’s restorative qualities. Architecture school created some very stressful and long weeks, but on the weekends, I would take a break. I would venture into the nearby state parks and conservation areas to explore the pristine nature of southern Illinois. Taking time away from school and being immersed in nature allowed me to become mentally and physically restored. I saw the effects on some of my fellow classmates that did not take time away and were unable to become restored. I noticed that they seemed to take longer on their projects, even though they did not take time away. Their productivity diminished, and they lost the ability to focus. They were becoming stressed and overwhelmed. I did not feel as stressed as my classmates, because I was able to take time to visit nature and experience the restorative environment.

For my graduate studies, I moved to Memphis, Tennessee, a more urban environment than I was accustomed to. In some neighborhoods, I quickly realized that nature had been removed from the urban fabric of the city, while in others, nature has been woven into the area’s development.
Architecture must reunite with its roots; it must become a bridge that reconnects humans to their surroundings. Architecture must remember where its users came from and how they are programmed to experience space. Introducing nature into the built environment will allow humans to naturally connect with their surroundings. This thesis idea is investigated through the design of a Co-work campus located in the Edge District of Memphis, Tennessee. It is crucial for an urban community to have access to the benefits of a restorative environment. Using biophilic design strategies, this thesis creates an immersive environment that softens the barrier between the built and natural landscapes. Additionally, principles from Kaplan’s Attention Restoration Theory are utilized throughout the design to allow the complexity and evolution of the natural world back into architecture, creating an optimal working environment. Finally, a Wabi-Sabi design aesthetic is used to find beauty in the cycles of nature.
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Architecture is our link to the world. It immerses us, engulfs us. Yet we live bound between the walls of our buildings, trapped on the inside, longing for the outside. Architecture is a broken link, keeping us on one side, with the world we belong to on the other.

Architecture has drifted away; it has forgotten who we are; disconnected us from ourselves; it has lost its connection.

Architecture must act as a connector between our built environment and our natural environment; it must allow communication between ourselves and others; it must become the bridge reconnecting us to our origins.

It must serve as a gateway to our inner self.

Architecture must return to its roots within nature, it must remember its true purpose; it must respond to the basic instinct of its user.

We have emerged from nature; we are designed to live immersed within it. We share a sacred connection that can never be broken.

Architecture must reconnect with nature to reunite with us. Architecture must become the bridge.
Attention Restoration Theory

This theory finds that attention can be replenished through restorative environments. There are four characteristics of restorative environments:

1. Fascination—Ability of an environment to generate awe in people. The water feature generates awe and effortlessly grabs the attention of those who pass by.
2. Being Away—A feeling that can be objective or subjective, as a person can be far away from a location or let his or her mind wander from everyday life and worries. Site vegetation allows people to mentally and physically escape from their surrounding stresses.
3. Extension—Refers to the connection between each element found in an environment; the feeling of being able to travel through the environment in order to look for information it provides the observer. The circulation through the site allows workers and the community to become immersed in the restorative environments provided through natural elements on the site. The curves and changes in topography allow people to wander through and discover new information as they journey through the site.
4. Compatibility—Characteristics found in an environment that meet the preferences and goals of its users. The refuge pods provide the users a place to retreat and reflect in order to become mentally restored.

INTRODUCTION

Nature, humanity, and architecture once existed as one. Over time, however, architecture disconnected from these origins. As architecture continues to disregard what it means to be human this disconnect grows larger. Humans have pre-existing behaviors and attitudes toward their environment, many of which are responses to human instincts. Insects are rooted in nature as a result of living within nature for the majority of human existence. Insects determine how to perceive the surroundings to better fit human needs. Humans instinctively play a large role in determining reactions to certain stimuli, which is apparent in human attitudes and behaviors. Positive attitude and behavior responses toward stimuli create environmental characteristics that are preferred and valued by humans. Humans desire to connect with their surroundings; they desire environments that are dynamic, evolving, and interact with the senses. When architecture is aligned with the characteristics that are valued by humans, it requires the power to form a connection, and can be positively used to influence its users.

The thesis connects to human biological and physiological needs by aligning the built environment with the values of nature. Kaplan’s Attention Restoration Theory uses stimuli found in nature to alter the mental state and achieve cognitive restoration in the users (figure 1). Research for this thesis also includes biophilic design, which is utilized throughout to form an environment innate to human perception and comfort (figure 2). Biophilic design also aids in Attention Restoration Theory to bring nature and the restorative benefits associated with it into the built environment. Finally, the thesis uses the Japanese aesthetic of Wabi-Sabi to support a restorative environment by creating a serene and simple aesthetic through harmony with nature (figure 3).

The thesis uses a Co-work campus to explore these theories. The Co-work space introduces a new ideal to office life. It implements restorative characteristics through an integration with nature to produce the optimal working environment. In order to achieve the optimal working environment, the design merges the interior and exterior spaces and breaks down the barriers inviting the outside and the community in. The project site is located in the Edge District of Memphis, Tennessee. The Edge District is currently being revalued, while preserving its diversity and rich culture. The site is located at the intersection of two predominate districts within the city: the medical district and downtown Memphis, two high stress, and high density neighborhoods. This strengthens the need for a restorative and natural design. The design allows nature to reclaim the site, which creates a natural oasis within the urban setting.
**Biophilic Design**

Biophilic strategies and design principles are used in the design of the site and the buildings to create a harmonious relationship between the built and natural environments. There are three design approaches for biophilic design:

1. **Nature in Space**—direct and physical ephemeral presence of nature in a space. This includes plant life, water, animals, as well as breezes, sounds, scents, and other natural elements.
   - Natural ventilation
   - Presence of water
   - Natural Analogues—Organic, non-living and indirect evocation of nature. Objects, materials, colors, shapes, sequences, and patterns found in nature.
   - Soft edges
   - Nature-based material selection

2. **Nature of Space**—Spatial configurations in nature. This includes our innate and learned desire to be able to see beyond our immediate surroundings, our fascination with the slightly dangerous or unknown, obscured views, and revelatory moments.
   - Mystery approach with transformation of ground plane
   - Vantage points in double-height spaces
   - Kudzu’s perceived risk

**Wabi-Sabi**

Wabi—Positive aspects of living along in nature: a quiet, rustic simplicity.

Sabi—Beauty in age, in a weathered character focusing instead on the serenity that can come with time.

**Characteristics**

- Wabi—Sabi
- Modernism
- One of a kind
- Organic
- Geometric
- Softened shapes and edges
- Linear projections
- Natural materials
- Man-made materials
- Expansion of sensory information
- Reduction of sensory information
- Warm
- Cool and bright
- Celebrates impurities
- Celebrates purity
- Evolving and devolving
- Timeless

1. **Incomplete**—The facade design represents the incomplete with the voids in the slats.
2. **Imperfection**—Kudzu's highlights the beauty and character in the flaws found in aging buildings.
3. **Impermanent**—The presence of nature is ever changing, it is always evolving or devolving. The ravine highlights the seasons of nature as the views of the Co-work office are exposed to the changes of the exterior elements.
DESIGN SOLUTION

Site Analysis
The site and program harmoniously serve to soften the boundaries between the built and natural environments. The thesis project is located in the Edge District in Memphis, between the Medical District and Downtown (figure 5). The site works towards improving the city’s connectivity by creating bike paths and circulation paths near and through the site (figure 4). Currently, the site is a barren parking lot, but the thesis design works towards restoring the site, creating a natural oasis in the city (figures 6-7). Both the site and the program are designed to maximize the restorative features for the user and the environment. There are four main programmatic components that make up the Co-work campus: the Co-work Office, the Cafe, the Children’s Play Space, and the Interstitial Exterior Elements. The program is arranged on the site based on the user’s exposure to the four restorative environments: being away, extent, compatibility, and fascination.¹

The diverse program creates a community-driven lifestyle that aligns with the need for flexibility and diversity for workers and modern families. Promoting diversity on the site creates stronger interactions and engagement between users that promotes creativity and productivity.²

The programmatic spaces are in independent buildings. This allows for the fourth component, the exterior elements, to interact with the built forms, weaving the interior with the exterior. This also allows for circulation on the site to become a restorative experience.³ The circulation and layout between the buildings are rooted in how humans intuitively move through space. Humans are programmed to want to discover new information to better understand their surroundings. The users will be exposed to a tranquil environment that is rich in stimuli and reinforces their perception as they move through space to uncover new information about their surroundings.⁴

2. Salingaros, “Biophilia and Healing Environments.”
4. Terrapin Bright Green, “14 Patterns of Biophilic Design.”
1. The vibrant interaction to the east of the site highlights the unique artistic vibe of the neighborhood.
2. The bike share, established a couple years ago, aids in creating a more accessible urban core to the city. The bike path goes past the site, and the thesis proposes to continue the path to link downtown to Midtown.
3. The view of the streetscape, which aligns with the developmental goals of the city by including a bike path, parking lane, and sidewalk.
4. Kudzu’s, on the northwest side of the site, is colliding with the ravine, illustrating the relationship between the natural and built environments.
5. Currently the site is an underutilized parking lot, which slopes back to a ravine with a lush tree line.
6. An existing building runs along the eastern side of the site.
7. The western edge of the site is a steeply sloping ravine, where nature has begun to expand into the current parking lot.
8. The existing connection to Union Avenue, located on the south corner of the site.
Site and Program

The site is composed of three built components that are woven together by a fourth main component, the exterior elements (figures 8-11).

1. The existing ravine along the western edge of the site will remain intact.
2. The Co-work Office is placed along the ravine. This building has the greatest need for restorative environments and, therefore, has the maximum exposure to the existing nature on the site.
3. The Cafe space is placed along Monroe Avenue to extend the restorative elements of the site to the public. The cafe will act as a gateway into the site promoting the public to interact with campus members.
4. The Children's Play Space is angled inward for security and to bring a sense of community onto the site. It also helps to define the courtyard.
5. The parking is submerged underground pushing the landscape up to generate the building forms and allow for more natural elements on the site.
6. The roofs of the buildings are transformed into green roofs, reclaiming the footprint of the structure. The roof plane of the buildings are then modified to slope down to grade. This allows the users to easily occupy the roof planes and extends the site’s natural elements and restorative qualities back to the users.
7. The building shapes are sculpted by the site and the greenery in between is defined by the building shape.
8. The circulation running through the site achieves connection between Monroe Avenue to the north, and Union Avenue to the south, and impacts the people circulating through the restorative environments.

References:
- Wineman and Barnes, "Workplace Settings.
- Augustin, Frankel, and Coleman, Place Advantage.
- Robinett, "Our Role and Relationship with Nature.
- Kaplan, "The Restorative Benefits of Nature."
1. Co-work Tiered Work Area
2. Cafe Mezzanine
3. Elevator in Children's Play Space
4. Kudzu's

Figure 10   Ground Level Plan

Figure 11   Mezzanine Level Plan
The thesis transforms the ground plane to create a design that is restorative to the site and to the users. The ground gradually slopes up, forming a hill with the building nestled within; the buildings appear as part of the earth, blending with the natural landscape (figures 12-13). The slope provides people access to move onto the roof planes of the buildings. The journey up the hill onto the roof creates a sense of anticipation, as people ascend the hill their view is cut short, they cannot see what lies beyond, and this creates mystery. "Mystery is the promise of many information achieved through partially obscured views or other sensory devices that entice the individual to travel deeper into the environment." People will continue to discover more information as they climb higher onto the roof level. As people approach the top of the sloped landscape, their perspective changes. They are now able to view the site from above, without obstructions. As people move onto the roof they become removed from their current surroundings; this allows their minds to wander and provides the users an opportunity for effortless attention. Research from Terrapin Bright Green shows that seeing a large overview of a space has visual preference among humans, based on spatial habitat responses. This concept is known as prospect. The views and interaction with the landscape created by allowing access onto the building fulfills the innate desire to learn and explore beyond one’s immediate surroundings. It captures attention through fascination and engagement and leaves its users feeling inspired.

Precedent Study: Occupiable Roof Plane

An existing project, Olympic Sculpture Park, served as inspiration for these design elements. The Sculpture Park, located in Seattle, Washington and designed by Weiss/Manfredi Architects, peeled up the earth to allow the building to nestle underneath it (figures 14-15).

15. Terrapin Bright Green, “14 Patterns of Biophilic Design.”
16. Ibid., 4.3.3.
17. Ibid.18. Ibid.
20. Ibid., “Olympic Sculpture Park.”

9.     Terrapin Bright Green, “14 Patterns of Biophilic Design.”
10.    Ibid., 4.3.3.

Occupiable Roofs
Parking

Transformation of the ground plane creates a submerged parking level (figures 16-17). Employees arriving in vehicles begin their work day greeted with a restorative experience as they enter the site. Restorative benefits have a stronger and longer lasting impact when encountered in the morning, before the stress of work. Submerging the parking allows workers a moment of contemplation, removed from outside stresses (figures 18-20). This moment of contemplation becomes an important part of preparing for the day. As the car enters the garage, the light becomes much more dramatic as day lighting is limited. The sunlight will shine down through a large puncture penetrating throughout the ground plane, adding drama and intrigue as it captures people’s attention. In addition to the large light well puncturing the ground plane, smaller beams of light will penetrate deeper into the garage through reflections off of the water feature. The light serves as wayfinding for those parking in the garage, following the light leads users to the main circulation that takes them to the main level. As they approach the stairs, users hear and then see the waterfall that cascades along the wall of the parking level (figure 21). The presence of water greatly adds to the restorative qualities of the garage enhancing mood and reducing stress. The effects created by the lighting and waterfall effortlessly capture the users’ attention and provides them with a tranquil, restorative experience as they begin their work day.

In addition to providing a restorative experience for the users, the submerged parking allows the site to be restored because it provides more area for natural elements (figure 16). This allows the site to be used in a way that benefits the environment by returning the site to a more natural state.

An Introduction to Narrative Experience

A short narrative will be used to help capture the impacts the design has on the users as they experience the Co-work campus. The narrative is focused on a Co-work member and her family.

Journey from Parking

As the car enters the garage, mother and daughter are instantly relieved to be leaving the hustle and bustle of the busy streets behind. They are fascinated as they travel down into the earth to the parking level. The soothing sound of running water greets them as they exit the car. The daughter remembers this place, and quickly follows the glimmering reflection from the water that lights the way to the center of the site. The child love running her fingers through the cool falling water. They don’t linger long; the child quickly ascends the stairs, as she is excited to go play at the children’s play space while her mother works.

15 Sharpe and Danze, “Design Psychology in Action.”
16 Terrapin Bright Green, “14 Patterns of Biophilic Design.”
17 Ibid.
19 Robinett, “Our Role and Relationship with Nature.”

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A short narrative will be used to help capture the impacts the design has on the users as they experience the Co-work campus. The narrative is focused on a Co-work member and her family.

Journey from Parking

As the car enters the garage, mother and daughter are instantly relieved to be leaving the hustle and bustle of the busy streets behind. They are fascinated as they travel down into the earth to the parking level. The soothing sound of running water greets them as they exit the car. The daughter remembers this place, and quickly follows the glimmering reflection from the water that lights the way to the center of the site. The child love running her fingers through the cool falling water. They don’t linger long; the child quickly ascends the stairs, as she is excited to go play at the children’s play space while her mother works.

15 Sharpe and Danze, “Design Psychology in Action.”
16 Terrapin Bright Green, “14 Patterns of Biophilic Design.”
17 Ibid.
19 Robinett, “Our Role and Relationship with Nature.”
1918

Presence of restored vegetation on site

Continuation of bike path on Monroe Avenue

Sense of refuge in children’s lookout

Submerging vehicular entrance from Union Avenue

Prospect of surrounding overlooking site and Union Avenue

Diffused lighting on parking level

Journey to roof plane with anticipation through secured risk and mystery

Figure 18 Site Section

Prospects of surrounding overlooking site and Union Avenue

Submerging vehicular entrance from Union Avenue

Sense of refuge in children’s lookout

Presence of restored vegetation on site

Continuation of bike path on Monroe Avenue
Parking level

- Presence of water utilized to reflect diffused light into the garage level
- Discovery of surrounding understanding through level variation
- Preserved native vegetation
- Restored vegetation on the site

Main level

- Preserved ravine vegetation
- Discovery of surrounding understanding through level variation
- Restorative fascination created by waterfall

Figure 19: Section through Parking

Figure 20: Section through Parking Circulation

Figure 21: Waterfall Perspective
Co-work Concept

The Co-work Office design is based on principles of Active Based Workplace (ABW). ABW provides workers with the ability to control their working environment by providing flexibility. The design uses the ABW design principles to establish a range of workplace environments suited for a variety of tasks. This design strategy helps to achieve better alignment between environment and task, for improved worker productivity and satisfaction. In addition to a variety of work stations, the work place also provides a transformative approach that allows the user to customize their own work station to meet their specific needs. The Co-work space has large open spaces that allow for socialization and the exchange of ideas (figure 26). The collaboration space is open and utilizes a larger volume and scale than the adjacent areas in the Co-work building. The collaboration space also benefits from prospect, or large views overlooking vistas both exterior and interior. The design of the collaboration area signals to the users that it is appropriate to talk and connect to others in the Co-work community.

To optimize the Co-work space, the user also needs areas of refuge. Areas removed from the whole allow users space for contemplation. Refuge is also needed to give users a space to reflect and benefit from mental restoration. Individual and small group pods are also located throughout the Co-work space. The configuration of the Co-work space allows users to optimize their performance and well-being by having control over their environment.

Beginning of the Work Day

After the mother drops her child off at the Children's Play Space, she returns across the courtyard and enters in the employee entrance of the Co-work Office (figure 22).

20. Wineman and Barnes, “Workplace Settings.”
21. Terrapin Bright Green, “14 Patterns of Biophilic Design.”
22. Ibid.
Co-work Office Form

The Co-work Office (figure 26) rethinks the traditional office layout. It promotes movement and collaboration through a flexible design. The flexible design is inspired by the context of the building. The building’s form is manipulated by the landscape, as the sides are pushed and pulled to curve around the existing ravine and trees (figure 23). The building’s form is also shaped by the community and the inward-focused courtyard. Voids in the building are located to allow connections with nature toward the west and the interaction with the campus to the east.

Co-work Program

The Co-work Office caters to design professionals. Designers have a higher need for restorative spaces than other professions because creativity is easily diminished by high stress situations. The Co-work space also provides designers access to equipment and technology to help them be successful in their careers. The tiered work space doubles as a space for design representatives to hold lectures. The most important benefit the members will receive in the Co-work office is community: members are able to share ideas and information with one another as they work on their projects.

Precedent Study: Co-work Office Design

The program of the co-work space is inspired by the Google Campus. The Google Campus provides opportunities to their employees that are not traditionally found in a standard office design. This includes a variety of exterior programmatic elements such as walking and biking paths (figure 24). The interior of the Google Campus provides its employees with flexible designs that encourage collaboration (figure 25).

23. Wineman and Barnes, “Workplace Settings.”
Operable Facade

The facade is primarily glazing to provide a visual connection to the surroundings. Wooden slats of varying lengths are placed along the exterior (figure 29). The slats are operable and can flip outward to a horizontal position (figures 28-30) allowing the users to be in control of their own spaces, and to create the environment that has the conditions which best suit their needs. Moving the facade slats changes the perception of the space. When the panels are down, running parallel with the facade, the sense of community comes from within (figure 33). The connection to the outside is discovered by movement through the buildings. When the users move through the space they come across different clearings in the slats, which highlights specific views to nature. When the panels are open the building disappears into the natural landscapes. The building acts as a pavilion by being visually exposed to nature and the community. This space will provide effortless attention, a restorative benefit found in nature through the visual continuity through the glazing while maintaining a sense of refuge needed for a functional working environment.

Precedent Study: Experience through Movement

A similar concept was created in MMX studio’s design of the Eco Pavilion where they used undulating ropes to create a journey (figure 27). In the Eco Pavilion, the rope framed views are discovered through movement.

Working Connected to the Ravine

A breeze greets her as she enters into the open work area. It’s a perfect morning to peel back the facade. She collaborates with her office members as they discuss the details of tonight’s event. They work effortlessly as they enjoy the sounds of rustling leaves coming from the ravine (figure 20).

27. Smith and Suresh, “Environment Relationships to Health.”
28. Terrapin Bright Green, “14 Patterns of Biophilic Design.”
29. Ibid.
31. Terrapin Bright Green, “14 Patterns of Biophilic Design.”
32. Smith and Suresh, “Environment Relationships to Health.”
33. Rosenberg, “Eco Pavilion.”
Retreating to the Refuge Pods
Once they complete the final details, she retreats to the refuge pods to work independently. She works comfortably in her private pod as she basks in the warm sunlight (figure 31).

Needing a Restorative Moment
As lunch time draws near, she walks over to join some friends in the break area. On her way she crosses over the water feature that continues through the buildings. She pauses as she views the water flowing through the other side of the building, relaxing for a moment prior to her noon meal (figure 32).
Experience the Building Transform
Following lunch, she plans to meet a friend and fellow member of the Co-work Office in the lounge to discuss their future projects. On her way to the lounge she passes back through the open work space. This time it feels much different. The facade has been shifted as the sun shifts towards the west in the day. The slats now provide some shade and dramatic shadows that cascade into the co-work space. The afternoon light floods the room, pouring in from in between the wooden slats (figure 33).

Breaking into the Landscape
The lounge benefits from the same warm sunlight as the open work space that is punched out into the landscape. When working becomes arduous she can look up and view the natural landscape. She feels a personal connection with nature as if she was working in a tree house (figures 34 and 35).

Seeking New Vantage Points
Near the end of her workday she heads into the adjacent space. She sits down to finish up the day’s work in this double-height, tiered workspace. The double-height space allows for a gentle breeze to pass through the building using natural ventilation, which she enjoys during the heat of the day. She is excited by the new perspective and understanding she gains about her surroundings as she approaches the higher levels. Prior to leaving, she climbs to the top of the stairs and onto the roof terrace (figures 36-37).
Viewing the City from Above
She enjoys going up on the roof to view the city from this vantage point. But today she is looking specifically for her daughter. She loves spotting her playing across the courtyard at the Children’s Play Space. She is excited to hear about her day and realizes that it’s almost time. Soon it will be time for her husband to pick up their daughter, and they will all be meeting at Kudzu’s before the event tonight (figure 38).

Ending the Work Day
After descending the stairs on her way out, she passes by the collaboration table. The table is centered in a recessed area along the western facade. Similar to the lounge space, the collaboration table sits perched above the sloping terrain, visually exposed to the natural view. She drops by the reception desk to check for any messages or packages. Then she walks across the covered walk to Kudzu’s, where she waits for her family to arrive (figure 39).
The Children’s Play Space is designed around the concept of exploration and discovery. The design is programmed to preserve the children’s innate and natural way of learning. Young children learn through direct connection with their surroundings, and the spaces they inhabit should be designed to support these interactions. The Children’s Play Space is comprised of two main components, the interior and the exterior (figure 43). It is vital for a child’s development to have exposure to natural processes that allow for sensory variety. This is accomplished in the Children’s Play Space through the large exterior ramp, which is closely integrated with the interior levels.

According to Maxwell, four main principles should be present in the design of the interior and exterior components of the Children’s Play Space: complexity, exploration, restoration, and personalization. Complexity is represented in the undulating levels and topography (figures 41 and 44), along with the unique shapes of the interior space. This challenges users both mentally and physically, promoting exploration within this space: users must move through the space to gain understanding of their surroundings. The different levels offer different views from each platform on the interior surface (figure 46), while the exterior ramp offers a journey of exploration as the child races up towards the top (figure 45). Restoration qualities are needed to preserve the child’s learning ability; they are provided in this space by allowing the child to move freely throughout and find refuge on varying levels of the play space. This allows the child personalization. A child wants to have a sense of independence, without compromising safety. The varying levels of the interior play surface allow the child to seek new and exciting vantage points that are personalized to their scale, and less comfortable for adults.

All four of these principles are illustrated through the varying levels of the play space and allow children a natural approach to learning. The Children’s Place Space also allows the opportunity for creativity and free play. The design creates activity spaces that promote movement and energy, that are not limiting and restrictive to the children.

Precedent Study: Designing for a Child’s Perspective

Inspiration from contrasting scales came from the Family Box in Beijing, China. Constructed in 2011, and designed by Crossboundaries Studio, the Family Box creates zones geared towards smaller scales, which are comforting to children. Surrounding the child zones are adult visual access zones, which are scaled to adults. The adult zones provide viewers to the children’s zones for safety (figure 42). Approaching from the North

Her husband takes his bike from the Medical District, where he works. As he approaches the site he attempts to spot his daughter playing through the glazing, which slopes down following the landscape (figure 41). Once he arrives, he parks his bike and heads into the Children’s Play Space.
Viewing through the Slats

Outside of the Children’s Play Space he sees his daughter playing inside through the slats on the glazing. She loves climbing and exploring on the undulating play surface with her friends (Figure 45).

Discovery through Play

As he enters the Children’s Play Space he is greeted by the children’s laughter as they climb and play on the different levels. The levels correspond to the topography of the building’s exterior, giving the children an enhanced understanding of the topography (Figure 49).
Located on the northwest corner of the site is Kudzu’s, an abandoned building from the 1900s. Kudzu’s is part of the history of the Edge District and should be preserved to align with the goals of the community. There is beauty in aging; as in the Wabi-Sabi aesthetic, this idea is used to highlight the purity and simplicity as Kudzu’s reunites with nature. Kudzu’s celebrates the imperfection and impermanence of the structure by highlighting the power of the return of nature. Nature breaks the physical boundaries of the building and protrudes into the space—natural vegetation is allowed to grow freely within the open-air structure (figure 51). The beauty of the aging process evident in nature also becomes valued in the built environment.

Observing the Waterfall
The father and daughter stroll across the courtyard to Kudzu’s. Walking through the courtyard the child hears the rushing water and is reminded of the waterfall. She views the water from the lookout above and remembers how she enjoyed running her hands through the water this morning (figure 47).

Navigating through the Courtyard
They meander along the path through the site (figure 48). As they near Kudzu’s, the child spots her mother and races over to greet her.

Merging into the Ravine
As her parents watch from Kudzu’s, the child enjoys running with other kids along the terraced landscape that is adjacent to the site. The water feature slices through almost the entire site (figure 49). It originates on the north end of the site near Kudzu’s, and extends through the building and down to the south end of the site. The water breaks the confines of the concrete trough and pours over the edge, cascading down to the submerged parking level.

Site Circulation
The exterior spaces are crafted to weave the buildings, site, and people together. Separating the program into three buildings creates an opportunity for restorative experiences as users and visitors circulate through the site. The site circulation is more than a way to get from place to place; it is an extension of the restorative elements offered in nature. As people are moving through the space they are being actively engaged by their surroundings through sounds, sights, textures, and other people, encouraging them to be more aware of their environment. Through this sensory engagement people are encouraged to step away from their technologies and experience the stimuli in their surroundings.

In the center of the site, people rediscover the water feature they experienced on the parking level. From ground level, people are now able to comprehend the scope of the water feature (figures 47-48). The presence of water provides restorative and healing properties that calm and relax people as they encounter it. As people move around the site, they discover that the water feature slices through almost the entire site (figure 49). It originates on the north end of the site near Kudzu’s, and extends through the building and down to the south end of the site. The water breaks the confines of the concrete trough and pours over the edge, cascading down to the submerged parking level.

Precedent Study: Nature and Building Connection
The water feature on the site is similar to those seen in Luis Barragan’s designs (figure 50). The architecture contrasts the water feature: the architecture encasing the water is rigid and constant; it is man-made to be timeless and stable, which highlights the water’s nature of varying fluidly.

Kudzu’s
Located on the northwest corner of the site is Kudzu’s, an abandoned building from the 1900s. Kudzu’s is part of the history of the Edge District and should be preserved to align with the goals of the community. There is beauty in aging: as in the Wabi-Sabi aesthetic, this idea is used to highlight the purity and simplicity as Kudzu’s reunites with nature. Kudzu’s becomes an open-air pavilion for the community to use to observe this process. Parts of the eroding brick facade are peeled away to allow for views to the ravine (figure 50). Beauty comes in the incompleteness of the bricks work through removing portions of the facade. The incomplete facade also draws people into the space by creating a sense of controlled risk that excites the human mind. Kudzu’s celebrates the imperfection and impermanence of the structure by highlighting the power of the return of nature. Nature breaks the physical boundaries of the building and protrudes into the space—natural vegetation is allowed to grow freely within the open-air structure (figure 51). The beauty of the aging process evident in nature also becomes valued in the built environment.

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Cafe
The cafe building on Monroe Avenue runs along the north side of the site. The cafe space is used as a meeting place, where the public community interacts with the Co-work campus (figure 55). The cafe helps to achieve the goals of the Edge District by creating a street front that encourages people to slow down and linger in the neighborhood. This also helps the Edge District build a stronger link to the Medical District from downtown Memphis. People moving down Monroe Avenue are encouraged to slow down as they pass by the cafe space. Pedestrians will naturally slow as the building interaction with the street captures their attention. This is done through two spatial attributes that impact mental cognition: appearance of structure and perception of space. The appearance of the structure along the street front is predominantly glass, allowing people to view the interior from the street and catch a glimpse of the exhibit gallery within (figures 53-54).

The interaction with the building encourages people to come into the cafe space. The cafe is a place of collisions between the public and the Co-work members. Collisions are unplanned encounters and they result in the exchange of ideas from people with diverse skills and knowledge backgrounds to create rich interactions. To promote these collisions, the interior of the cafe provides several group-seating options that help the public mingle with the members of the Co-work campus (figure 57). The mezzanine level (figures 56 and 58) offers a better perception of the space, allowing them to interact with the environment while providing them with seating options to interact with each other. The main access off Monroe Avenue builds a stronger bond with the public through engagement and connectivity that aligns with the Co-work lifestyle, and roots the campus in the Edge District.

Traveling Down Monroe
As the sun begins to set, the family walks over to the cafe. They stroll out onto Monroe Avenue and walk down the activated streetscape. They love seeing the community coming to gather at the Co-work campus. Soon the exhibit gallery will be opening and the community will be able to see the projects the members of the Co-work Office have produced (figure 59).

47. Waddell, “Development Booms in the Edge District.”
49. Waddell, “Development Booms in the Edge District.”
Bridging the Community and Campus

The family grabs a drink and heads up to the mezzanine level. They view the city through the north windows and the campus through the southern windows. They have a greater understanding of their surroundings from the mezzanine level that overlooks the campus. As they walk through the space, following along with the horizontal slats, they uncover another side of the mezzanine level (figure 57).

Celebrating the Co-work Office

The east side of the mezzanine level is exposed to the gallery below. From above they peer down and see the community working in the co-work campus. She is grateful to be a part of this co-work community (figure 58).

Figure 55  View of Cafe
Figure 56  View of Exhibit Gallery at Mezzanine Level

Figure 57  Plan of Cafe
Figure 58  Section Through Cafe

Nature slicing through building to provide access onto roof plane

Interior/Exterior continuity

Scale variation in double-height gallery
CONCLUSION

Through the process of this thesis I have become aware of the importance in user driven designs. Designing for the human experience is crucial in architecture because the design of our spaces determine how people will function both mentally and physically. The impacts of architecture are also felt on a larger scale. The site and the community are also directly influenced by the built environment. Our built environment but be built in harmony with the users, site, and community to create a restorative design.

With the users, site, and community in mind, the facade of the building was closely examined to determine the proper material choices for the facade. The facade of the building was designed to allow the natural evolution of the materials to form a connection with the existing nature and aging bricks on the site. Over time the building will transform as it is exposed to the elements. The facade will show the journey of its life, just as the people who encounter it.

A material analysis was conducted to choose the proper materials for the facade (Figure 58). Multiple materials show age and weathering in a graceful and unique manner, however, wood was determined to be the best choice for the facade-sites because of its direct connection to other natural elements on the site. The rough grain of the wood is evident on the facade and allows users to easily connect it to the natural landscapes that are present on the site. Material selection is just one detailed example of user driven design strategies that have been employed throughout this thesis.

ANOTATED BIBLIOGRAPHY

Augustin, Sally, Neil Frankel, and Cindy Coleman. Place Advantage: Applied Psychology for Interior Architecture. Hoboken: John Wiley & Sons, 2009. This source is a combination of scholarly research proven through design experiments. The research is conducted by Sally Augustin, PhD, and supported by research from Neil Frankel and Cindy Coleman. Augustin received her PhD from Claremont University. She is the principal at Design with Science and continues writing and research based on the science behind design. The books explains the behaviors produced by environmental stimuli, and the origins behind the behaviors. Instincts are responsible for feelings and attitudes toward environments. Attitudes are transposed into behaviors, a physical reaction to the stimuli within a certain space. This source provides its own experiments and the results of stimuli in the built environment and how they are impacted by innate human perception of space. Results from the research are applied in different design situations, including a focus on work place design, illustrating the impact stimuli have over users. The reading suggests design strategies that produce desirable human work environments, and how stimuli can be altered to produce varying outcomes of behavior.

Results from the experimental data collected in this source are used in the thesis to create a productive work environment designed for human nature. The source defines a work environment that will impact human behavior for the ideal response in the space. The thesis will purposefully design spaces that will impact human behavior for the ideal response in the space.

Downtown Memphis Commission. "The Edge." Accessed November 30, 2018. https://www.downtownmemphis.com/neighborhoods/the-edge/. The Downtown Memphis Commission is an independent development agency that aims to bring more people, jobs, and businesses to the downtown area. Their vision for an ideal central core is that it is walkable, clean, safe, and full of mix-used buildings that reflect the vibrant culture of Memphis. This source examines the different neighborhoods within the central core, examples, focusing on nine districts which include, the Downtown, the Edge District, and the Medical District. The history, characteristics, demographics, and sub-cultures of the individual neighborhoods are analyzed. This source covers growth on a city level, but is lacking in growth and development that is ongoing within each district. As a whole, the city is advocating for a more livable community by incorporating wellness standards and improving accessibility.

The Edge District is a diverse area with a long history. This area is known for its utilitarian aesthetic, reflective of its hard working history. The Edge District is also famous for its arts and music culture, with murals painted by local artists, galleries, and Sun Studio located within the district. The history and the culture of the Edge District are key factors in the site selection for the thesis design.

Fazzare, Elizabeth. "Tour This Modernist Masterpiece for the First Time." Architectural Digest. February 09, 2018. Accessed March 07, 2019. https://www.architecturaldigest.com/story/luis-barragan-cuadra-sn-cristobal-mexican-modernist-first-exhibition. The article discusses architect, Luis Barragan, and his approach to merging architecture with the landscape. The article was written by journalist Elizabeth Fazzare. She studied at New York University, and has degrees in journalism and urban design. In this article, she writes on the organization Barragan followed in his designs: that nature should be left to nature, and architecture will fit around it. In his designs, Barragan used contrast to harmonize...
Stephen and Rachel Kaplan developed Attention Restoration Theory (ART) in the 1980s. They are professors at the University of Michigan specializing in environmental psychology. The theory indicates the significance that nature has on attention and the ability to combat mental fatigue to improve productivity.

This theory is used to understand which environments people work best in. Attention Restoration Theory impacts those exposed to the environments the author discusses, not only restoring attention and the ability to focus, but improving mood, cognitive function, and reducing stress. The theory defines four environments that create restored attention: Fascination, Feeling of Being Away, Extension, and Compatibility. The authors also discuss different forms of attention: Directed Attention, Directed Attention Fatigue, Effortless Attention, and Restored Attention. A traditional work environment typically requires a large amount of Directed Attention, and results in Directed Attention Fatigue. This helps the workers’ ability to perform tasks, focus, and think critically. This creates the need for Effortless Attention, and restorative environments to achieve restored attention.

Attention Restoration Theory plays a vital role in the foundation of this thesis through understanding what aspects of a design rejuvenate and replenish the users’ mental state. The space needs to be engaging; people need to have a sense of “being away,” where people are able to let their minds wander. This article illustrates ways to create restorative environments that encourage people to step away from technology, the environment must be engaging; it must interact and grab the attention of the users. It is imperative to understand the importance of environmental engagement when applying restoration qualities into the design of the thesis.

This thesis focuses on restorative spaces to improve work environments to enhance moral and productivity. The design uses principles from this article to create engagement. On the site: engagement from person to person through connectivity, and engagement with the site through movement. The thesis pairs findings from this research with the types of restorative environments of Kaplan’s research to create spaces that will replenish the human mind and body.


Architecture firm, Heatherwick Studio, collaborated with Bjarke Ingles Group to design the Google Headquarters in Mountain View, California. They wanted to create a design that breaks the boundaries of a typical office environment by encouraging workers to work together in a creative environment. The design understands that desks and cubicles are not always the most productive way to work. The designers find evidence that when workers are unhappy with their surroundings, their work suffers. The project was designed to create a space that workers enjoyed being in. Google wanted the building to have community outreach as part of the program. The project includes a walking path, cafe space, and large transformative spaces to achieve the needs of the workers and serve the community. The thesis design reimagines many of these design strategies to create healthy and happy working environments. The thesis also encourages interaction with the community through site design and programmatic elements.

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are unique to a child’s scale and allow specialized views and experiences that children discover as they move through the space.

The information from this source is utilized in the design of the Children’s Play Space. This source highlights the importance of the large exterior portion of the child’s space, and also helps to influence the interior design.

Port, Robert. “Recognizing Human Instincts: Dynamical Systems Hypothesis in Cognitive Science.” April 10, 2000. Accessed September 23, 2018. https://www.cs.indiana.edu. In this article, Port explores how human instincts are still evident in today’s behavior. Robert F. Port is a professor in cognitive sciences at Indiana University. Port has written several articles on innate behavior common across humanity. This paper also discusses specific human behaviors such as creating and communicating and are explored. The behaviors are discussed in present times, and then linked to primitive times. This research is consistent in human behavior regardless of time or culture. This suggests that human instincts, originating from a time when humans lived emerged within nature, are still present in modern society.

This text provides information for the basis of determining the natural human environment. The author views instincts as being unbreakable, unchangeable, and constant across humanity. The thesis uses this article to support biophilic design as a key element in creating spaces for humans to excel. The thesis uses this article to determine what is important in creating a comfortable human environment. The article states that connectivity, engagement, and adaptability are important in human surroundings. The thesis uses site location and circulation to achieve connectivity and engagement. The building facades, and open co-work plan, allow the users to manipulate their space to best fit their needs and fulfill their desire to manipulate and adapt their environment.

Moore, Robin C., and Clare Cooper Marcus. “Healthy Planet, Healthy Children: Designing Nature into the Daily Spaces of Childhood.” In Biophilic Design; edited by Stephen R. Kellert, 153-203. Hoboken, New Jersey: John Wiley and Sons, 2008. The chapter explains the importance of including nature in the design of children’s surroundings. The section was written by Robin Moore and Clare Cooper Marcus, both professors at the University of California in the Department of Landscape Architecture. Moore’s research specializes in the impacts of children’s behavior in designed environments, and Marcus’ research specializes in interactions in parks and outdoor spaces. Both emphasize the importance of a holistic approach towards design through the integration of the natural and the built environments. The information from this text explains how children play and why nature must be included in their surroundings. The readings state that children are born as biophilic beings. They have instincts that express curiosity and the need to explore. Children also need to experience the natural processes of evolving through sensory impacts because physical interactions and environmental stimuli are their priority mode of learning. Nature in environments for children is important for fulfilling and exploring, and understanding nature also provides children with experience play. Experience play engages children through movement and energy and allows them to play freely and creatively. Finally, children’s spaces that are rooted in nature allow children the opportunity of “child views.” Child views are designed by creating spaces that

The Children’s Play Space uses the four characteristics listed above in the design. The Children’s Play Space is centered around exploration and discovery to promote developmental growth and positive interactions and experiences. Minner, Kelly. “Olympic Sculpture Park / Weiss Manfredi.” ArchDaily. January 06, 2011. Accessed March 07, 2019. https://www.archdaily.com/101836/olympic-sculpture-park-weissmanfredi. Kelly Minner is a writer for ArchDaily, an architectural designer, and LEED AP certified. According to this article, the Olympic Sculpture Park is a new vision for urban parks. The Park, completed in 2007, is located in the center of urban Seattle, Washington, and was designed by Weiss/Manfredi Architects. The design folds up the earth to create ramps onto and over a building and road. The concept of pushing up the dirt and building the structures within it is seen in this thesis design through the transformation of the roof planes and the façade.

Moore, Robin C., and Clare Cooper Marcus. “Healthy Planet, Healthy Children: Designing Nature into the Daily Spaces of Childhood.” In Biophilic Design; edited by Stephen R. Kellert, 153-203. Hoboken, New Jersey: John Wiley and Sons, 2008. This chapter investigated the impact physical surroundings have on the development, learning, social, and emotional states of childhood. This research is conducted by Dr. Maxwell, a professor in Child Development at Cornell University. Since 1993, she has taught courses on design and environmental psychology. Prior to her teaching career, she was a city planner with a focus on over-crowding and environmental stressors. Throughout her extensive education and career, Dr. Maxwell has identified environmental characteristics beneficial to early learning.

Research within this chapter is specific to preschool and elementary aged children, and how they experience their physical surroundings. The design of physical settings is especially important to children because they learn through direct interactions with their environment; learning occurs through play activities and interactions with others and their surroundings. Because of this, spaces children encounter frequently should be designed to support and encourage their environmental characteristics needed for development and growth, as well as exploration, expansion, recreation, and personalization. Complexity and exploration are also characteristics found in biophilic design and align with how humans desire to experience their surroundings. This text mentions how Kaplan’s Attention Restoration Theory is applicable to the design of children’s environments as children have the need for restorative environments to help combat fatigue and ensure development learning is not compromised.

The Children’s Play Space uses the four characteristics listed above in the design. The Children’s Play Space is centered around exploration and discovery to promote developmental growth and positive interactions and experiences. The Children’s Play Space uses the four characteristics listed above in the design. The Children’s Play Space is centered around exploration and discovery to promote developmental growth and positive interactions and experiences. The concept of pulling up the dirt and building the structures within it is seen in this thesis design through the transformation of the roof planes and the façade.
Danze believes that human condition and well-being can be improved by manipulation of space, light, material, and form. A space can become restorative with the integration of elements that can create a healing atmosphere. Healing environments effectively reduce stress and anxiety for the users and can result in higher productivity. This article lays out effective strategies for the built environment that can connect users to nature to create healing properties that are aligned with human biology. Concepts from this source are used to determine characteristics of restorative and calming environments found throughout the thesis design, with special focus near and within the co-work building. The article also describes how people naturally want to move from place to place, and the mental effects connection routes can have. This influenced the design decision to separate the three buildings and create interaction space.


This article, written by Stephen Sharpe from the American Institute of Architects (AIA), is based off an interview he conducted with Elizabeth Danze. Stephen Sharpe is a licensed architect located in Austin, Texas. In recent years he has collaborated with the AIA to write several articles published on their website. Danze is a practicing architect with many notable and award-winning designs. She is also a professor of architecture at the University of Texas. She focuses her research on the psychological impact of design. She conducted case studies on her theories and wrote the book Space and Psyche in 2013, to study what, how, and why people mentally are affected by architecture. Based on her research, she finds that through experience users can be mentally enhanced and replenished.

This article discusses the role the physical environment has on mental states. The author, Dr. Dianne Smith, is a professor at Queensland University of Technology in Australia, and integrated health. Together they have published numerous works connecting the mind and body through the environment. Smith finds that the physical world is not separated or distinct from mental and emotional responses. When mind and body connection are in unison, the user experiences improved health and well-being. The author shows that the connections between mind and body are strengthened through experience. Significant experience occurs through interaction with physical surroundings. Three spatial attributes that effect mental cognition are function (the task), form (the appearance), and space (the whole occupiable and perceived area). These attributes allow the user to interact with their surroundings, where the environment is able to immediately impact their mental state.

This article is used to understand the importance in the placing of restorative elements. The site selection and elements of the garage are modeled off the findings from this source to allow the restorative elements on the site to affect the user before arriving to, and after leaving, the site.


The article is a document of compiled research performed by Terrapin Bright Green. Terrapin Bright Green is a distinguished design and research firm specializing in sustainable and healthy design. They focus on environmental issues and the impact they have on humans. The article explains 14 design strategies of biophilic design that can be implemented into the built environment. The research collected by Terrapin Bright Green supports the importance of biophilic design, and the impacts it can have on the user’s experience.

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In the thesis, the concept of an interconnected self through mind and body is used to form restorative environments. The thesis design follows to Kaplan’s findings on the immediate response to calming stimuli, which will affect our emotional beings. The thesis will make the calming areas of the design interactive spaces by overlapping the function and form, allowing the users the ability to transform the environment. The thesis design will use the concept of space when designing viewing and vantage points, allowing the users to uncover information as they travel throughout the buildings and site.
The research within this source found that incorporating nature in the built environment is crucial in reconciling human well-being with environmental stewardship. According to this article, biophilic design accounts for the biological make-up of humans and creates designs that promote health and well-being for the user on both a physical and mental level. The research states that incorporating nature into design is essential for human well-being, as it can increase productivity, improve mood, and reduce stress.

The thesis uses nature as a guiding principle for the design, utilizing natural patterns and processes to create a harmonious and sustainable environment. This approach is consistent with the principles of environmental psychology and human well-being, as discussed in the literature. The thesis design includes elements such as natural light, green spaces, and natural materials to create a space that is both functional and visually appealing. These elements work together to create a sense of place that is both aesthetically pleasing and conducive to human interaction and productivity.
The Co-work space utilizes ABW design strategies. The work place focuses on how the worker will use the space and is designed to fulfill the worker's needs and desires from the environment to optimally achieve their tasks.
Appendix 1: Presentation Boards

Figures 60-72 are the final presentation materials.

Unless otherwise noted, figures are by author.
1. Reception
2. Storage
3. Lounge
4. Tiered Work Space
5. Print Lab
6. Studio
7. Outdoor Access
8. Cafe Mezzanine
9. Occupied Roof
10. Covered Plaza
11. Atrium
12. Children's Play Space
13. Existing Kudzu Facade
14. Discovery Outdoor
15. Restorative Waterfall
16. Central Courtyard
17. North Elevator
18. West Elevator
19. Central Courtyard
20. Opened Glazing
The Impacts of Restorative Architecture
Reuniting Users with Their Natural Environment

Figure 70: Research Summary Board

Figure 69: Presentation

Figure 68: Presentation Model

Figure 67: Presentation
Appendix 2: Process Piece

Figure 73 is an image of the final process piece. The process piece explores the merging and contrast of the built and natural environments. Wabi-Sabi is represented in the driftwood pieces. The aging and erosion evident in the driftwood are in contrast with the stained wood base that has been altered by human touch. The concrete binds the two together. The concrete represents both Wabi-Sabi and Modernism through materiality: concrete is a man-made material, but the roughness reveals the purity in the material.