Tolerances to Nature

An analysis of nature as we understand it and the subjective human response to biophilic design.

Alyse Cox

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Thank you for your guidance, knowledge, and encouragement. Not only in the final fifth year, but also the initial four.

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Tyler Robertson	Significant Other
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Over time, civilization has altered nature to become filtered. As nature has become filtered, people have developed their own level of tolerance to true, unfiltered nature. Biophilic design, although considered an objective human need, should therefore not only be seen as a uniform and objective principle, but should respond to subjective needs.

Thesis Statement

Everyone has their own tolerance to nature. Therefore, as designers, we must consider not only the objective qualities and benefits of biophilic design, but also the subjective needs of the user.

The connection between humans and nature is an innate, psychological bond that is a part of our DNA. Through various studies, it has been proven time and time again that being exposed to nature can result in mental and physical health benefits. Be exposed to nature in a variety of forms can reduce stress, reduce anxiety, improve mental health, lower blood pressure, and even speed by post-operative recovery. These benefits can even be achieved through simply looking at a representational image or viewing a garden through a window.

Biophilic design is the incorporation of the natural environment into the built environment. The most common way biophilic design is employed is through the implementation of nature. Though this is most common, it is not the only means available. After conducting a survey comparing activities in an outdoor setting versus an indoor setting, results showed that 46% of people preferred to do these activities in an indoor setting.
Even though many people do love and embrace nature in its original form, there are many who do not. These people like nature on their own term—filtered nature. There are many instances of filtered nature in our society: swimming pools, artificial grass, hot tubs, ice rinks, rainfall shower heads, etc.

Over time, civilization has altered nature to become filtered. As nature has become filtered, people have developed their own level of tolerance to true, unfiltered nature. Biophilic design, although considered an objective human need, should therefore not only be seen as a uniform and objective principle, but should respond to subjective needs.

Understanding Nature

Understanding Nature

Define

Biophilic design is routed in implementing and implying nature. In order to imply nature, designers should first consider what is nature? The deeper you think about nature and try to put it into terms, the more you realize how difficult it is to do so. Many common definitions include but are not limited to:

"The physical word collectively"
"Products of the Earth"
"Phenomena of the physical world"
"The physical world and everything in it that is not made by people"

These common definitions boil down to defining nature as either everything or nature as everything minus things related to mankind. The part that is difficult is determining where to draw the line when it comes to humans. We were born into this world the same as a tree, a lion, or a mosquito. However, through evolution we have developed a distinction between us and other living things. If we consider our origins, we should be categorized alongside any other living entity. Humans once lived as a part of nature and as a part of the natural food chain. The issue that comes into question is how to categorize everything that is made by mankind. The fact is that everything comes from something. Glass is made from sand, however only one is a part of nature. When breaking things down, it seems clear that, arguably, everything is a part of nature. Yet we clearly know that this is not the case. All of these definitions contradict one another. It is unclear where to draw the line where humans and society comes in. Therefore, nature cannot be defined.

Taking both the meaning of biophilia and nature into consideration, biophilic design can then be defined as: Designing to fulfill the human's innate, psychological connection to the natural world that everything was evolved from through the use of direct nature, indirect nature, and space and place conditions in the built environment.

Nature

Cannot be defined.

Growth vs. Change

In order to create a biophilic design, the route of this debate must be addressed. Although a definition of nature is unclear, it is still necessary to understand what the clear distinction is between natural and built environments. This leads to the question, what makes them different? The answer: growth versus change. When considering the basics of all things, a distinction can be made that helps to draw a line. Consider a tree for example. Everything stems from the trunk of the tree (the core). Each branch comes from another branch and so on. It is constantly adding to itself but all stems from an origin. The roots of the tree act the same as the branches: continuously branching off of one another stemming

further outward. This is growth: the process of increasing in quantity and/or quality. But what makes growth any different from change. Change is the act of altering something either positively or negatively. The different is, growth is internally induced whereas change is externally induced. For instance, lets consider a building. A building does not make itself. It requires an external influence in order for it to increase or decrease in quantity. When under construction, it is external influences that build the structure rather than the structure itself. Masonry, lumber, concrete all have to be brought to the site and added together to make a building with the effort of humans to assemble. Between the external materials and the external influence of people, the building in no way created itself. Compare this to a bean sprout. Think back to elementary school. Did you ever do the science experiment where everyone put a couple seeds in a clear sandwich bag and taped them to the window to watch them grow? The bean grew in size but nothing was added to the bag. This is an example of growth.

Growth and change can be used to categorize things between the built and natural environment. However, there is some overlap. Cities can be classified as an example of growth even though cities are made from things of change. Even though a city is man-made and made up of many buildings, cities grow because they are internally developed. If you look at a city as a whole, it grows similar to tree roots. Trees begin at a central point like a seed

Growth

Internally induced. The process of increasing in quantity and/or quality.

Fig. 1.1
Process of plant growth.

Change

Externally induced. The act of changing or altering something either positively or negatively.

Fig. 1.2
Process of change.

Detroit

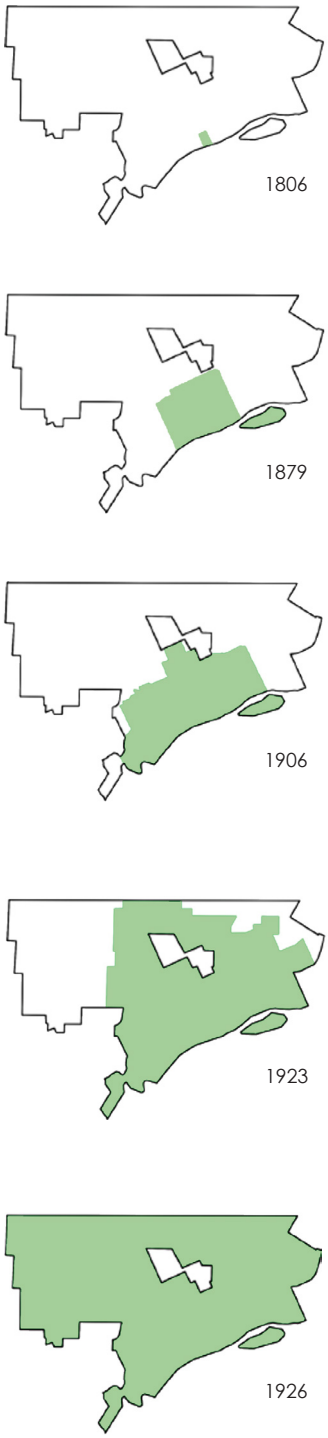


Fig. 1.3
Growth of the city of Detroit.

Tree Roots

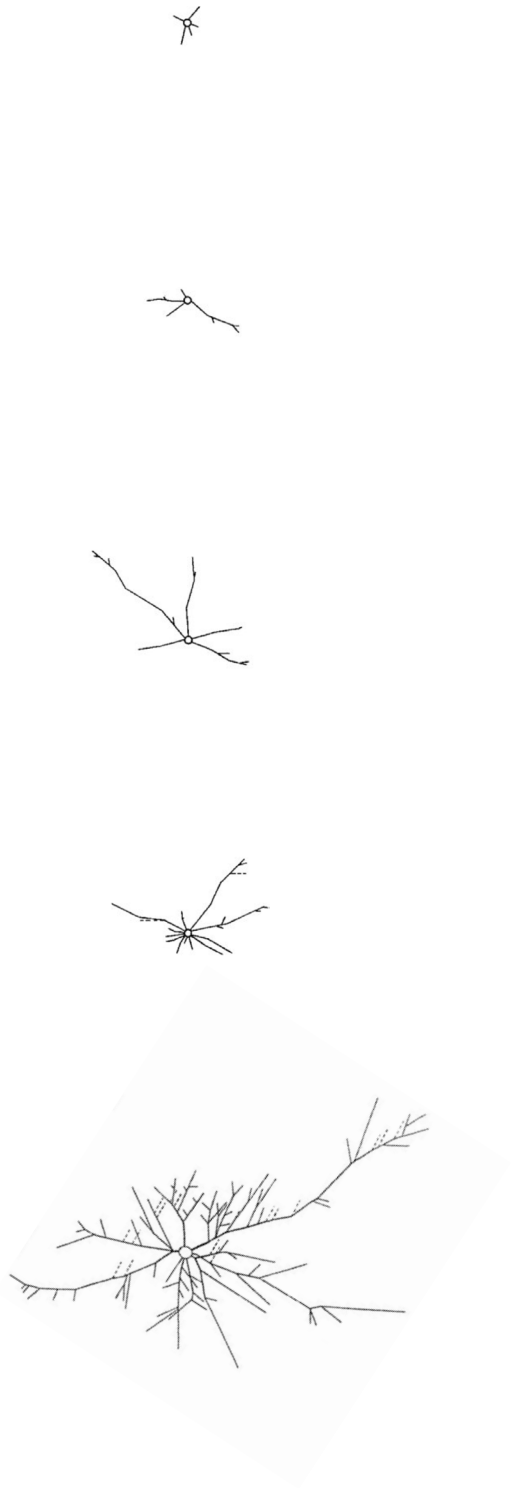


Fig. 1.4
Growth of tree roots.

and expand and radiate outward. When compared the growth of a city to tree roots, they are nearly the same. Both cities and tree roots create a branching pattern where there are larger pathways that break off to smaller ones and again to smaller ones and again. Both have a center and core like a tree has a trunk that all the roots lead to and a city has a downtown. After studying the development of several cities, it is clear that just like trees, cities tend to radiate outward. Landscape influences effect cities just the same as they would trees. For example, trees are more prosperous near water and trees will grow next to the water, but typically not within the water. Trees will also become scarcer where the land is less prosperous, just like cities. Where there are steep mountains, there will be less trees because it is difficult for trees to grow there. Everything that is living and that grows share many common qualities and attributes; cities and trees are merely an instance among many others.

Even if one were to argue that a city can decrease, it still leaves a remanence of infrastructure and buildings. This can be compared to if someone were to cut down a tree. Even if it were cut down, many of its roots would remain underground. Or if you were to cut off a branch, the tree still remains. The structures and main elements of a city remain regardless of the actual state of the city. Even though it is helpful to create distinctions between the natural and built environments, it will remain difficult to draw a clear line and this is one example of that. Even though a distinction may seem obvious, it is not until it is carefully evaluated that the true answer will become apparent. Keeping this in mind will lead to more in-depth thinking and research that will in turn help to influence future considerations. Creating and understanding these distinctions helps to understand how to emulate and mimic nature and in turn results in a more informed design. If designers intend on implying natural shapes and forms into design, an understanding of how those shapes are developed is required. Stephen Kellert, a man whom is known as an expert in biophilic design, developed six categories of biophilic design elements and attributes. The second category is natural shapes and forms. In order to understand natural shapes and forms you must consider how these forms develop/grow in order to create a successful emulation of nature.

2
NATURAL SHAPES & FORMS

Resisting straight lines and right angles.

Botanical motifs

Tree and columnar supports

Animal motifs

Shells and spirals

Egg, oval, & tubular forms

Arches, vaults, domes

Shapes resisting straight lines and right angles

Stimulation of natural features

Biomorphy

Geomorphology

Biomimicry

Understanding Biophilic Design

Understanding Biophilic Design

Define

The biophilia hypothesis is the idea that humans possess an innate tendency to seek connections with nature and other forms of life. The term biophilia was originally used by German-born American psychoanalyst Erich Fromm in The Anatomy of Human Destructiveness (1973), which described biophilia as "the passionate love of life and of all that is alive." The term was later used and coined by American biologist Edward O. Wilson in his work Biophilia (1984), which proposed that the tendency of humans to focus on and to affiliate with nature and other life-forms has, in part, a genetic basis.

Biophilia

An innate, psychological, human desire to be connected to nature.

Biophilia is the innate, psychological, human desire to be connected to nature. This connection has developed through thousands of years of evolution and has become routed into our DNA. Biophilia stems back all the way to when humans were created. People are a development of nature and a part of it. Nothing can be created nor destroyed; meaning everything comes from something and that includes us. Before modern society was established, humans were just as much a part of nature as any plant or wild animal. Humans lived off the land, learned to adapt to climate conditions, and survived based on natural selection. Even though humans have developed significantly since then, we still hold these primal urges within our DNA. It is important to understand the route at which biophilia stems from in order to have a better-informed design. Stephen Kellert takes note of this in his six biophilic design elements and attributes with his sixth category being: evolved human-nature relationships (shown to the right).

The common person may think that we as humans have outgrown our basic, primal instincts, but this is not the case. These primal instincts are still very much a part of us, even if it seems unlikely. One of these instincts is prospect and refuge. A modern example of this can be seen when people are in public. For instance, whether it is at a restaurant or church or anywhere else, people tend to always sit at the back or outer edges of the room. For example, at a lecture most people will tend to sit in the very back. At a restaurant, people prefer to sit at the tables along the edge of the wall rather than the center tables. The reason behind why people do this is simple, it is our primal instincts. People prefer to sit in locations that allow them to see and be aware of their surroundings. Also, by sitting in these locations, it provides a sense of safety. For instance, at a restaurant, if a woman were sitting at a center table, she will be more likely to hold onto her purse or keep it in her lap rather than hang it on the back of the chair. This is because people are more likely to walk behind her and she cannot see them or her purse to make sure no one touches it. This is just one example

that shows how to this day, humans still hold onto their primal urges. Overtime these have obviously settled, but still remain.
Biophilic design recognizes that our species has evolved for more than ninety nine percent of its history in adaptive response to the natural world and not to human created or artificial forces. We, as humans, have become biologically encoded to associate with natural features and processes. This need is thought to remain instrumental to people's physical and mental health.

6

EVOLVED HUMAN-NATURE RELATIONSHIPS

Designing to maintain strong reactions and connections to our deep history with nature.

Prospect and refuge

Order and complexity

Curiosity and enticement

Change and metamorphosis

Security and protection

Mastery and control

Affection and attachment

Attraction and attachment

Exploration and discovery

Information and cognition

Fear and awe

Reverence and spirituality

Benefits

The connection between humans and nature is an innate, psychological bond that is a part of our DNA. Through various studies, it has been proven time and time again that being exposed to nature can result in mental and physical health benefits. The first study done to prove the benefits of biophilic design in hospitals was conducted by Roger S. Ulrich, Ph.D., EDAC. Ulrich was a professor in the Department of Architecture and Centre for Healthcare Architecture at Chalmers University of Technology. Ulrich conducted his study on surgical patients from 1972 to 1981 in Pennsylvania. The results of this study found that patients that were able to look at greenery and nature had a reduced hospitalization time by eight percent compared to patients without a view of greenery or nature. Ulrich also found that patients with a view overlooking green area had sorter post-operation hospitalization. After the publication of Dr. Roger S. Ulrich's finding, there was a surge of many other studied done to continue to find and prove the benefits associated with biophilic design. These various other studied found that ninety five percent of patients and families exposed to direct contact with nature reported lowered stress levels, more

Conductor of Study
Roger S. Ulrich, Ph.D., EDAC
Professor, Department of Architecture and Centre for Healthcare Architecture, Chalmers University of Technology

Location
Pennsylvania

Time Frame
1972-1981

Participants
Surgical patients

Looking at greenery and nature reduces hospitalization time by...

8%

Patients with views overlooking green area had shorter post-operation hospitalization.

95%

of patients and families exposed to direct contact with nature reported lowered stress levels, more positive thoughts, and increased coping ability.

21%

drop in healthcare costs.

22%

reduction in the use of analgesics.

Fig. 2.1 Massachusetts General Hospital Lunder Building

Mental Effects

Access to nature:

- Reduces stress
- Reduces anxiety
- Reduces anger
- Increases pleasant feelings
- Promotes creative thinking
- Increases productivity

No access to nature:

- Causes depression
- Causes anxiety

Physical Effects

Access to nature:

- Reduces blood pressure
- Reduces heart rate
- Reduces muscle tension
- Reduces production of stress hormones
- Helps cope with pain
- Increases recovery time for patients

No access to nature

- Causes weight gain
- Increases difficulty paying attention
- More susceptible to illness
- Causes senses to diminish

positive thoughts, and increased coping ability. These studies also found that there was a twenty two percent reduction in the use of pain-relieving drugs and a twenty one percent drop in healthcare costs. Research into biophilic design increased drastically after Ulrich's study and even more health benefits have been discovered. It has been proven that being exposed to nature in a variety of forms can reduce stress, reduce anxiety, improve mental health, lower blood pressure, and even speed up post-operative recovery time among other things.

In addition to the more direct studies that explored the benefits to direct exposure to nature, other studies were conducted that explore the benefits of indirect exposure. These additional studies prove that a person does not have to be exposed to physical nature to still reap the benefits of biophilic design. Evidence shows that representational images of natural features such as landscapes, gardens, and waterscapes can reduce stress and improve results like pain relief. A similar study of a dental setting by Heerwagen found that on days when a large nature mural (Fig. 2.2) was displayed in the waiting room, patients showed decreased stress levels as compared to days when the mural was not present. Another experiment conducted with blood donors found that those who viewed a wall-mounted television showing a tape of nature had lower blood pressure and pulse rates than those donors who watched a tape of an urban setting or even a talk or game show. These examples illustrate that even when a direct connection to nature is not available (things like views to the outdoors, natural features like plants and water, etc.) indirect nature can still yield positive benefits for patient health and well-being.


Fig. 2.2 Landscape mural

Perception

Many studies have been done that prove a person does not have to be exposed to physical nature to still reap the benefits of biophilic design. In one study, evidence shows that representational images of natural features such as landscapes, gardens, and waterscapes can reduce stress and improve results like pain relief. This study focused on relatively common natural instances for the representational imaging. This leads to a question of why this study used those type of images. One could assume it is because of the human's response to those images. A person's response to an image is directly related to a person's life experiences. A person must have an experience to associate with an image in order for the image to evoke a connection. The more experiences a person has to associate with, the more likely they will have a positive association. However, this also can cause a mediocre connection.

The less experiences a person has to associate with, the higher the chance for a negative connection. For example, if you see something on a daily basis, such as your backyard, will create a mediocre connection than something you may only experience once in your lifetime. However, the more experiences a person has to associate with an image, the more likely they are to have a positive association, therefore, there is a middle ground to expect. For example, someone goes snorkeling once in their life and has a traumatic experience, seeing a picture of a coral reef will trigger a memory and therefore associate the image with a bad experience. However, showing something in the middle ground that is not super common but is still more relatable to people, would produce a better connection. Something that people would be more likely to come into contact with but no on the daily such as forest or mountains might be ideal.

Daily

The more experiences a person has to associate with, the more likely they will have a positive association. However, this also can cause a mediocre connection.

Once

The less experiences a person has to associate with, the higher the chance for a negative connection.

Glumac Shanghai Office

Location
Shanghai, China

Project Type
Commerical Office, Leased

Size
10,000 ft^2

Year of Completion
2014

Designers
Glumac, Gensler, Shimizu,
GIGA, Terrapin Bright Green

Awards
LEED Platinum

The Glumac Shanghai office building renovation is one of many examples of what kind of difference biophilic design can have on people. Located in Shanghai, China, this case study was a renovation done in 2014 to a commercial office building. The renovation aimed to fulfill Cramer and Browning's conceptual categories and Ryan et al.'s biophilic conditions for biophilic design. Cramer and Browning's conceptual categories include: nature in the space, natural analogues, and nature of the space (shown to the right). This project incorporated visual connections to nature, Dynamic and diffused light, connection with natural systems, and biomorphic forms and pattern. A survey was conducted after the renovation that showed positive results. One of these results was that ninety five percent of employees agreed that "the office's design features lighten my mood". This survey proves that the incorporation of biophilic design into a space can have a positive impact for the users of the space.

NATURE IN THE SPACE

Visual Connection with Nature.

Non-Visual Connection with Nature.

Non-Rhythmic Sensory Stimuli.

Access to Thermal & Airflow Variability.

Presence of Water.

Dynamic & Diffuse Light.

Connection with Natural Systems.

NATURAL ANALOGUES

Biomorphic Forms & Patterns.

Material Connection with Nature.

Complexity & Order.

NATURE OF THE SPACE

Prospect.

Refuge.

Mystery.

Risk/Peril.

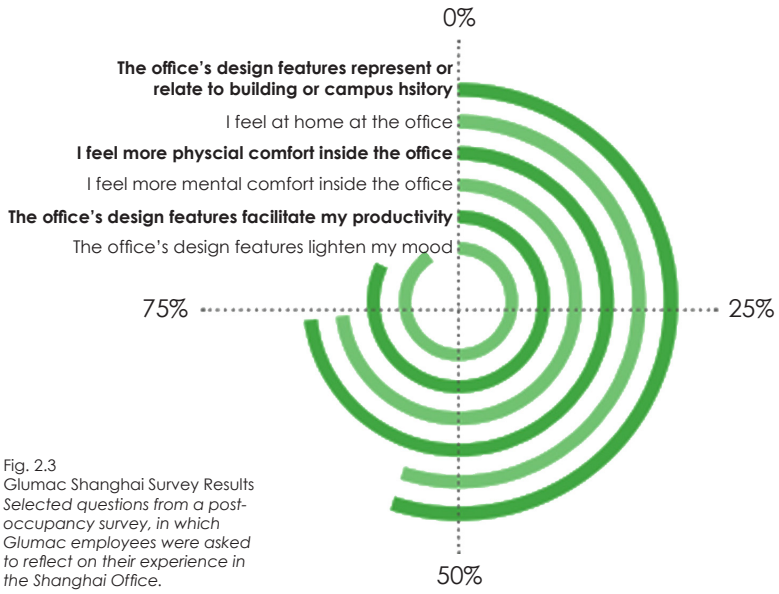


Fig. 2.3
Glumac Shanghai Survey Results
Selected questions from a post-occupancy survey, in which Glumac employees were asked to reflect on their experience in the Shanghai Office.

Fig. 2.4
Glumac Shanghai

Fig. 2.5
Glumac Shanghai

Fig. 2.6
Glumac Shanghai

Fig. 2.7
Trees Indoors.

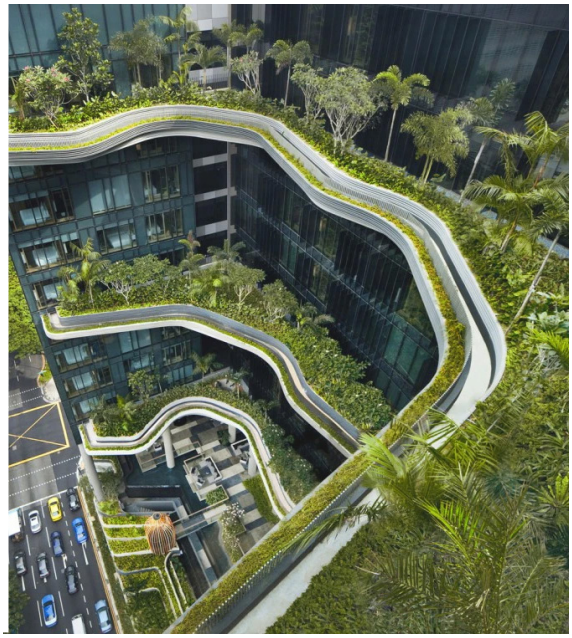


Fig. 2.8
Building covered in plants.

Fig. 2.9
Green Wall.

Typical Application

Biophilic design is the incorporation of the natural environment into the built environment. There are three main categories to biophilic design: access to nature, no access to nature, and the human's response to nature. Most commonly, biophilic design focuses on the first category: access to nature. This is typically employed through the implementation of nature into the built environment or through blurring the boundary between the indoors and the outdoors. However, this is not always the best method. For example, the Farnsworth house designed by Mies van der Rohe in 1951. The Farnsworth House is a widely recognized and studied structure constructed in the 20th century. As one of the pinnacle works of Mies van der Rohe's style and philosophy. It is a one-room weekend retreat southwest of downtown Chicago emulated a floating glass box. Every exterior wall in this home is glass. Although this may sound appealing and be a great example of blurring the boundaries between indoor and outdoor, it is not necessarily a great place to live. Dr. Edith Farnsworth, the owner of the home, ended up hating the home after staying in it. Dr. Farnsworth felt like she was on display and had no privacy. The Farnsworth house is an example of our evolved human-nature relationships and how important it is to consider the humans response when designing.

Fig. 2.10
Farnsworth House

Changing the Focus

Changing the Focus

Introduction

Biophilic design is most commonly known for the incorporation of natural elements, textures, sounds, and shapes into design. All of these methods can be narrowed down into two categories. Implementing and implying nature. Implementing nature can include, but is not limited to, the incorporation of greenery into a space. This is sometimes done through the incorporation of greenery on walls (see fig. 2.9). Implying nature can include anything from the incorporation of textures, colors, and patterns into a space to mimicking natural forms. Mimicking natural forms typically requires more drastic measures in changing the physical form of the space. This can include works of biomimicry, biomorphic design, and biornametic design.

Biomimicry: The act of learning from and then emulating biological forms, processes, and ecosystems to create more sustainable design.

Biomorphic: Describes anything resembling or suggesting the forms of living organisms.

Biornametics: Derives space and forms from patterns and ratios found in nature and applies those through design.

According to Oliver Health, there are three elements to biophilic design. The first being access to nature (implementation of nature). The second being no access to nature (implying nature). These two are well known and applied by anyone that uses

Biophilic Design

Designing to fulfill the human psychological connection to nature through the use of direct nature, indirect nature, and space and place conditions in the built environment.

1

ACCESS TO NATURE

Sunlight

Plants

Water

Views

2

NO ACCESS TO NATURE

Color

Texture

Pattern

Form

Imagery

3

HUMAN RESPONSE

How to get people to react so elements are successful.

One average, how much time per day do you spend outdoors in the summer months?

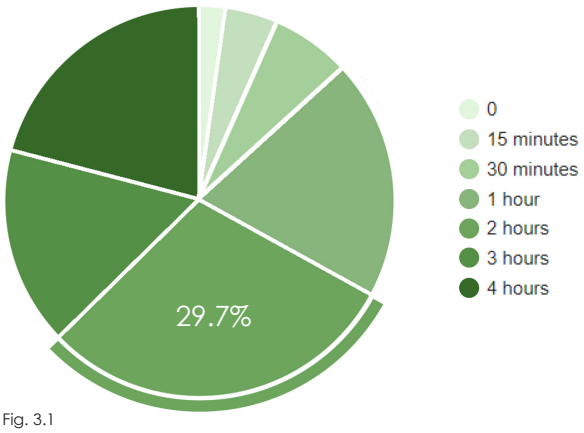


Fig. 3.1

One average, how much time per day would you like to spend outdoors during the summer months?

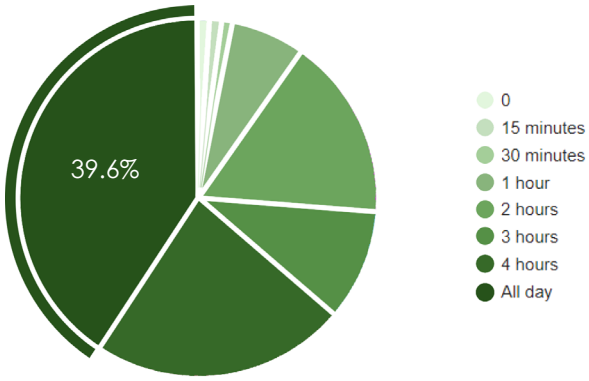


Fig. 3.2

One average, how much time per day do you spend outdoors in the winter months?

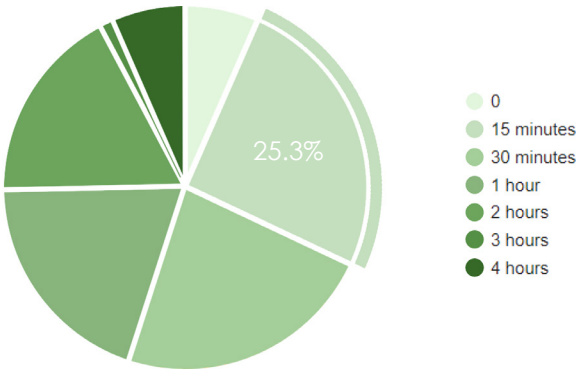


Fig. 3.3

One average, how much time per day would you like to spend outdoors during the winter months?

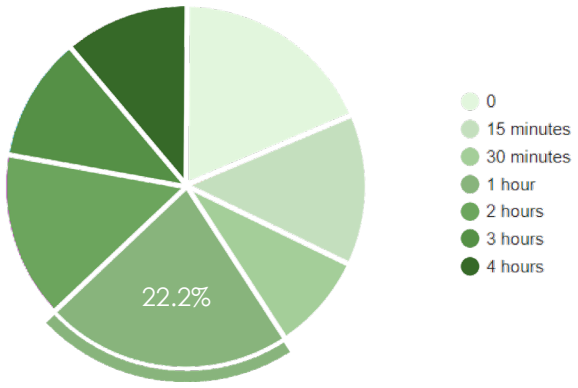


Fig. 3.4

biophilic design in their works. However, there is a third element to biophilic design that is commonly not acknowledged and therefore skipped. The third element to biophilic design is the human response. In other words, how to get people to react so elements are successful. The first two elements of biophilic design can be viewed as objective elements. However, the third element is the human response which is a subjective element to biophilic design. This thesis aims to single out and analyze this third element in order to get to the route of what makes biophilic design successful.

Survey 01

Since the human's response is a subjective quality, the first step would be to gauge if people have a desire to be in nature and if comfortability affected that. This led to the conduction of a survey. This survey was comprised of two parts. The first part of the survey was conducted asking participants how much time they currently spend outside in the winter versus the summer and how much time they would like to spend outside in the winter versus the summer. In the summer, the highest average time spent outside was two hours but increased to all day when asked how much time you would like to spend outside in the summer months. In the winter, the highest average time spent outside was fifteen minutes but increased to one hour when asked how much time you would like to spend outside in the winter months. The results were that on average, people want to spend more time outdoors than they currently do. On average, people spend ninety percent of their day indoors. In terms of designing based on the human response, it is important to understand why people spend so much of their time indoors. Is it because they are required to for work or because they simply do not want to go outside?

The second part of this survey evaluated what the typical perception of nature is for a typical person. The part focused on comparing an action done in nature compared to its counterpart that society has developed as an alternative. This was done in order to see if comfortability outweighed the need for a connection to nature. For each question, the participant was asked "which do you prefer?" along with two images side by side. The results showed that forty six percent chose society's counterpart. Although this was nearly a tie, the fact that nearly half chose comfortability over biophilia speak volumes to the influence society has on our lives. These results show that some people do accept nature for how it is, but almost just as many do not accept nature in its natural form. In conclusion, people like nature, but only on their terms. This results in a form of nature this thesis terms as filtered nature.

Average of all results:

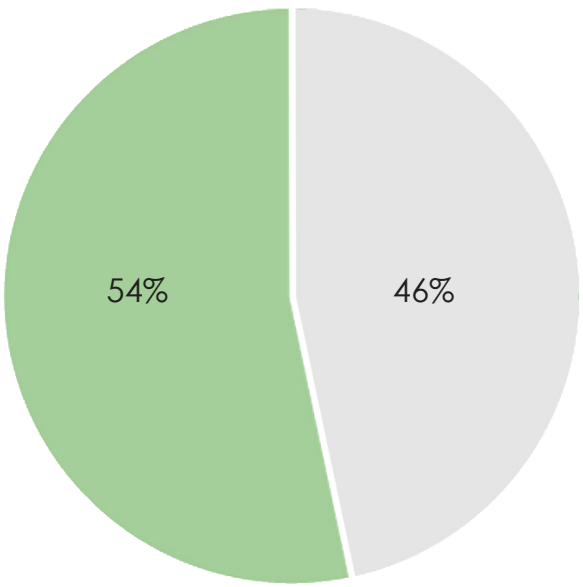


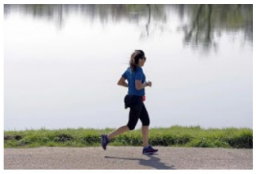
Fig. 3.5

Which do you prefer? *

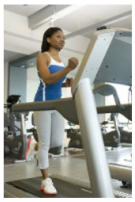
Walking bare foot on grass

Walking bare foot on clean hardwood floors

Which do you prefer? *



Running outside



Running on a treadmill

Which do you prefer? *

Laying on a hammock outside

Laying on a couch inside

Which do you prefer? *

Swimming in a lake

Swimming in a pool

Which do you prefer? *

Sitting on a park bench outside

Sitting on a couch inside

Which do you prefer? *

Sitting at a bonfire

Sitting in front of a fireplace

Which do you prefer? *

Eating at picnic table outside

Eating inside at a table

Which do you prefer? *

Windows open for breeze

Fan blowing

Fig. 3.6 Survey 01 Questions

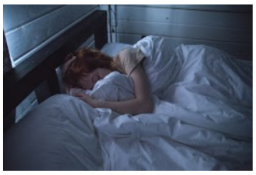
Which do you prefer? *

Driving with the windows down

Driving with the AC on

Which do you prefer? *

Sleeping outside



Sleeping inside

Which do you prefer? *

Ice skating on a lake outside

Ice skating at an ice rink

Which do you prefer? *

Rock climbing outdoors

Rock climbing indoors

Filtered Nature

Over time, civilization has altered nature to become filtered. Without realizing it, people have developed a tolerance to nature and have distanced themselves. Nowadays, people want clean, crispy lines and everything to be orderly. This takes away everything that is natural though. People are unaware that we have conformed to society and have altered our perceptions of what nature really is. Nature is not a potted plant inside your home or a manicured lawn. We must realize the obvious truth: we have become disconnected from the true, unfiltered nature. Fig. 3.?? on the following page is an eidetic image that represents how much of the world is left unfiltered and untouched. The data on exactly how much of the world is untouched is inconclusive. Depending on the source and the terminology used to define "untouched" varies between sources creating a multitude of answers. However, based on the majority of sources, it is approximately fourteen percent. The shape of the image is used to represent Earth and show this percentage. This eidetic image features various imagery illustrating various natural setting that can be categorized as either filtered or unfiltered. Through the use of hierarchy, this image shows how true, unfiltered nature should be seen as more prominent and therefore should be valued higher than what civilization has corrupted us into thinking is nature. This is also emphasized through the use of color: making the filtered nature greyed out and the unfiltered nature in color. Not only is this done to show that unfiltered is superior in terms of fulfilling our need to connect to nature, but it speaks to how we have been blind sighted and living in a dull world without even noticing.

Fig. 3.7
Eidetic Image

Fig. 3.8
Hot Spring

Hot Springs = Hot Tub

Fig. 3.9
Hot Tub

Fig. 3.10
Grass

Grass = Artificial Grass

Fig. 3.11
Artificial Grass

Fig. 3.12
Rain

Rain = Rainfall Showerhead

Fig. 3.13
Showerhead

Fig. 3.14
Snow

Snow = Artificial Snow Room

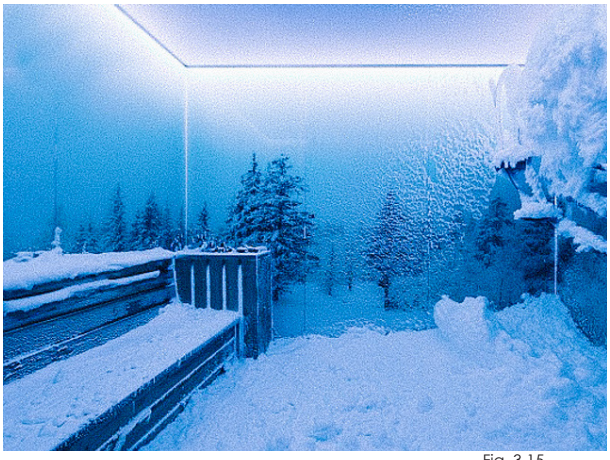


Fig. 3.15
Artificial Snow

Fig. 3.16
Lake

Lake = Swimming Pool

Fig. 3.17
Swimming Pool

Fig. 3.18
Frozen Lake

Frozen Lake = Indoor Ice Rink

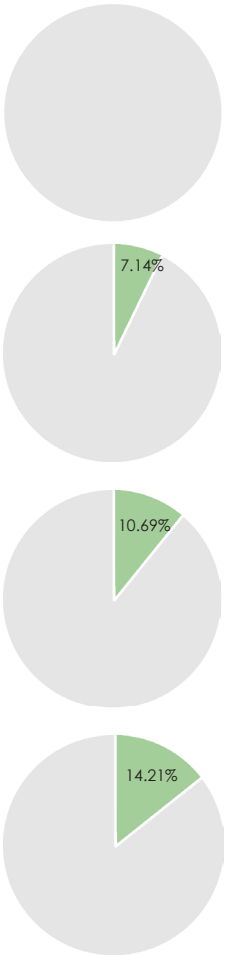
Fig. 3.19
Ice Rink

Las Vegas: The Fakest Place on Earth

Fig. 3.20
Las Vegas Map

Las Vegas is a prime example of how people chose filtered nature over unfiltered nature. Las Vegas is a major tourist destination. The city is located in the middle of a desert and within driving distance to several national parks, however this is not why people come to the city. Of the 42 million visitors in 2019, the majority of them stayed on the strip. A location considered to be the fakest place on Earth. It is ironic considering there are several amazing national parks within driving distance including the Grand Canyon (one of the seven natural wonders of the world). Of the 42 million visitors Las Vegas saw in 2019, only 7.14% visited the Red Rock Canyon that is just a twenty-minute drive away. 10.69% of the visitors traveled to Zion National Park and 14.21% visited the Grand Canyon. It is astonishing that only about a tenth of the people that visit Las Vegas actually travel beyond the city.

Las Vegas is known to be an epicenter for all things replicated and faked whether it be culture, history, or nature. When enter Las Vegas via airport, the first instance of nature a visitor will come across is a palm tree. However, this is not a refreshing view like when visiting Florida. These palm trees are made of metal. The deception does not end here. Once out of the airport and to the strip, several of the casino incorporate some time of faked nature. Inside Caesars Palace some visitors may succumb to the illusion that they are outside after a few too many since the ceiling is curved and painted as a sky. At the venetian visitors may just get the sense they are in Venice if it were not for the crystal-clear water and faint smell of chlorine in the air. The botanical gardens at the Bellagio should not foul anyone though since the butterflies are larger than a human head. And in the evening, you can find a volcano erupt by may find yourself feeling cooler rather than hot since the magma is just lights reflecting on water.



Las Vegas:
42 million visitors in 2019

1 **Red Rock Canyon:**
3 million visitors in 2019
20 min drive

2 **Zion National Park:**
4.5 million visitors in 2019
2 hr 30 min drive

3 **Grand Canyon:**
6 million visitors in 2019
4 hr 5min

Fig. 3.21

Fig. 3.22
Sky at Caesars Palace

Fig. 3.23
Canals at The Venetian

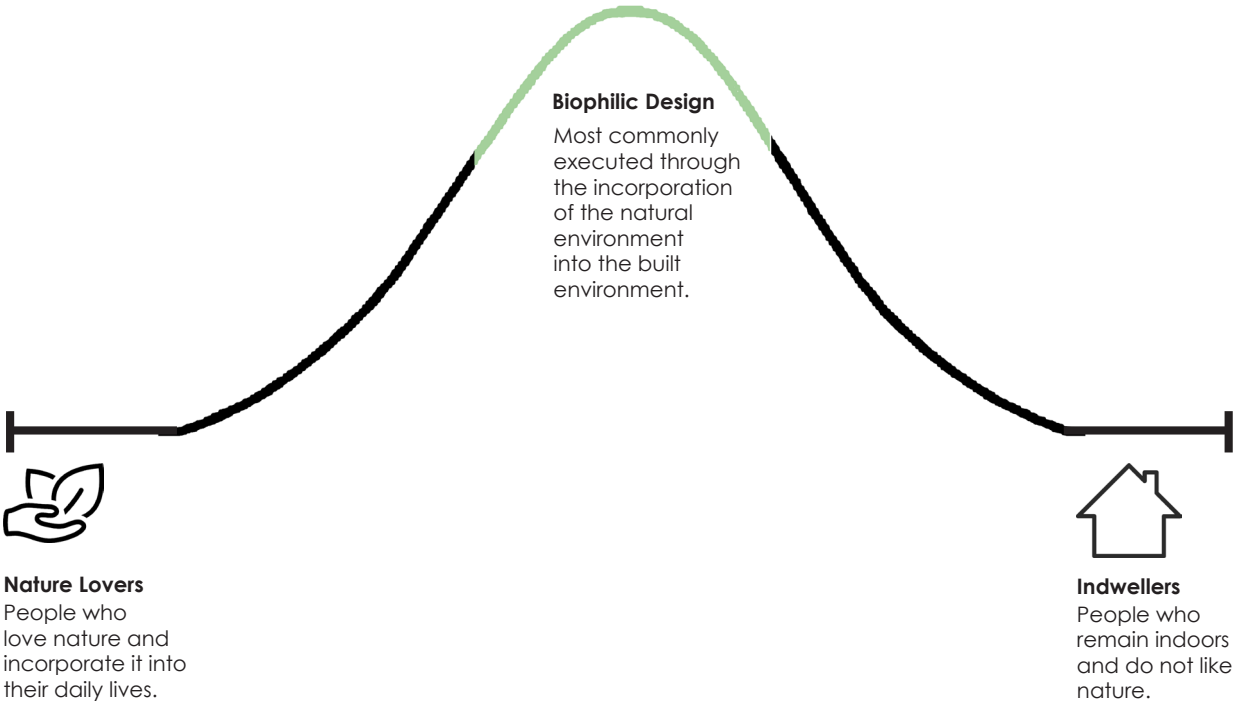
Fig. 3.24
Volcano at The Mirage

Fig. 3.25
Botanical Garden at Bellagio

Fig. 3.26
Palm Trees at Las Vegas Airport

Varying Tolerances

People like nature on their own terms and the modernization of society has resulted in a form of nature defined as filtered nature. As civilization has developed, the majority of the population has pushed nature away and conformed. However, this is not the case for everyone. As stated, people want nature on their terms. Each individuals' terms however are up to them to determine. This range in tolerance resembles a bell curve. The majority lies somewhere in the center, while the minorities fall to the ends. In this instance, the bell curve ranges from nature lovers to indwellers. Nature lovers and people who love nature and incorporate it into their daily lives. On the opposite end of the spectrum lies indwellers. These are people who remain indoors and do not like nature. The third element of biophilic design according to Oliver Health is the human response. However, this is subjective as stated before. Therefore, there is a wide variety of human responses which is why it is important to take this element into consideration and understand whom you are designing for.



Based on the survey, it has been determined that there is a limit to how much nature people are willing to subject themselves to. However, this limit is subjective to each individual person. Most of the time, this is less about if people like nature or not and more geared toward how conducive it is to their lifestyle and comfortability level. The most common way biophilic design is employed is through the implementation of nature. Though this is most common, this may not be the most conducive means of design for all users. Even though many people do love and embrace nature in its original form, there are many who do not or simply do not have the time to care for plants. A survey shows that sixty nine percent of people do not own any living plants. When asked why not the responses were:

"I'm terrible at keeping them alive."

"They die."

"Because I don't have time to take care of them."

"I would forget to water them."

These responses prove that most people do not have the lifestyle to accommodate the implementation of plants into their homes.

There are two ends to the spectrum. There are people that will jump into a mud puddle and people who refuse to walk on grass. Some people have become disconnected

Do you own any living plants?

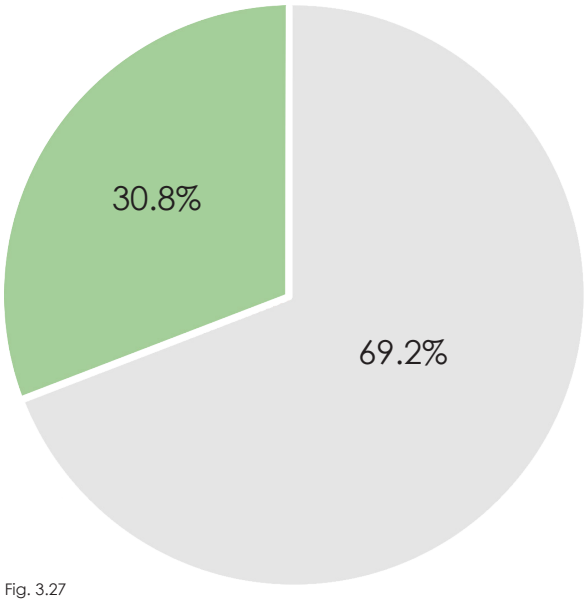


Fig. 3.27

from nature and have developed a need and desire for cleanliness and everything to be filtered and conditioned to their liking. Society has created instances of nature for these people so that they can have nature on their terms. For instance, some people find lakes to be dirty and would rather swim in a pool full of toxic chemicals so they stay clean. And some would rather soak in their personal hot tub than go to a hot spring in order to control the temperature. And other would prefer to sit in front of a gas fireplace than a wooden one due to the embers. This may be great for some, but there will always be the people who love to jump into mud puddles.

People want nature on their terms: Weather

To the left are scenarios based around the topic of weather. These people range on the scale from nature lovers to indwellers. These scenarios illustrate the different responses people have based upon their tolerance to nature. These responses are based upon real individuals from the metro Detroit area of Michigan. Interviews and observations were made to determine how these individuals would react in the various scenarios. Of course, these are examples from three scenarios. Therefore, it is not accurate to say all nature lovers or indwellers would agree to these responses.

Hot:

Donna opens her windows to allow a breeze and puts on lighter clothes.

Cold:

Donna wears extra layers to keep warm and frequently uses her oven to cook meals and leaves the oven door open to utilize the heat to save energy.

Rain:

Donna loves to go outside and run in the rain, she finds it refreshing.

Snow:

Donna doesn't bother shoveling. She just puts on some snow boots and heads out.

Nature Lovers
People who love nature and incorporate it into their daily lives.

Hot:
Steven wears lighter clothes and sets his air conditioning to 75 degrees.

Cold:
Steven keeps his heat set to 70 degrees in the winter and uses a thicker comforter at night.

Rain:
Steven wears a rain coat and carries an umbrella when it rains to stay dry.

Snow:
Steven goes out after a snow storm and shovels his driveway and brushes off his car.

Hot:
Jackie has her air conditioning set at 70 degrees and sleeps under a thick comforter at night.

Cold:
Jackie keeps her thermostat at 72 degrees in the winter and turns up the temperature rather than get a sweater.

Rain:
Jackie refuses to walk outside in the rain. If she needs to go somewhere, she will make sure to park under a covered structure so she doesn't have to get wet.

Snow:
Jackie hires a company to plow and shovel her driveway and parks her car in the garage so that it doesn't get snow on it.

Indwellers
People who remain indoors and do not like nature.

People want nature on their terms: Property Maintenance

To the left are scenarios based around the topic of property maintenance. These people range on the scale from nature lovers to indwellers. These scenarios illustrate the different responses people have based upon their tolerance to nature. These responses are based upon real individuals from the metro Detroit area of Michigan. Interviews and observations were made to determine how these individuals would react in the various scenarios. Of course, these are examples from three scenarios. Therefore, it is not accurate to say all nature lovers or indwellers would agree to these responses.

Lawn:

Donna does not worry about cutting her lawn nor if there are weeds mixed in with the grass nor bare patches of grass.

Garden:

Donna allows he garden to grow freely and naturally. She does not pull weeds since they are just another plant.

Potted Plants:

Donna does not put plants in pots because it restricts their growth. Instead she has a sun room with flower beds on every wall filled with plants to grow freely.

Leaves:

Donna collects her leaves to use as mulch for her flower beds. The rest of the leaves she adds to her flower beds to use as insulation.

Nature Lovers
People who love nature and incorporate it into their daily lives.

Lawn:
Steven owns a lawn mower and cuts his lawn as needed. He waters his grass as needed and makes sure to lay down grass seed to fill in any areas missing grass.

Garden:
Steven has typically flower beds with several plants all properly spaced based on the planting directions provided at the time of purchase. He regularly pulls weeds as they pop up and gets new mulch every year in the spring.

Potted Plants:
Steven has several hanging baskets with flowers on his porch that he makes sure to water daily and some potted plants inside his home.

Leaves:
Steven racks his leaves and bags as needed so that the clean up never becomes overwhelming.

Lawn:
Jackie hires a lawn service to deal with her lawn. She wants it cut once a week and has her sprinklers set to turn on every day.

Garden:
Jackie hires a gardener to maintain her garden.

Potted Plants:
Jackie does not have any plants in or outside of her home.

Leaves:
Jackie has her lawn service come once a week to pick up all the leaves as they fall.

Indwellers
People who remain indoors and do not like nature.

Go for a walk in nature:

A study was conducted that interviewed and observed individuals to determine where on the spectrum from nature lover to indweller they fell. After determining three individuals that would fell one under nature lovers, another with the majority in the center, and third someone who would be considered an indweller they were prompted with a task. These individuals were asked to go for a walk in nature. The context of what they considered nature was eft open for interpretation. The far left individual that was consider a nature lover chose to walk off path in a wooded forest. The middle individual that would be considered the majority chose to walk on a path without straying from it in a wooded area. Lastly, the indweller chose to walk in a residential area in which the individual resides that was next to a lake. All three individuals chose different types of location that has varying degrees of filtered nature.

Fig. 3.28
Person walking off path in the woods.

Nature Lovers
People who love nature and incorporate it into their daily lives.

Fig. 3.29
Person walking on
path in the woods.

Fig. 3.30
Person walking in
residental area by lake.

Indwellers
People who remain indoors and do not like nature.

In Terms of Design

In Terms of Design

Survey 02

A second survey was conducted to better understand what connects us to nature. This survey was tailored to understanding the differences between the two methodologies to biophilic design: the implementation of nature and implying nature. This survey aims to prove that implying nature can be as successful as the implementation of nature through the basis of perception. This would provide an alternative form of design for those who preferred filtered nature. The survey was conducted by first showing only the image at the top and asking participants "how well does this space make you feel connected to nature" and rank the image on a scale of one to ten (one being the space makes you feel completely disconnected from nature and ten being the space makes you feel completely connected to nature). After answering all images individually, the images that were examples of implied nature were then pair with an image of what the space on the left was attempting to emulate and then asked again to rank the image on a scale of one to ten (one being the space does not emulate the image at all and ten being the space completely emulates the image).

Fig. 4.1

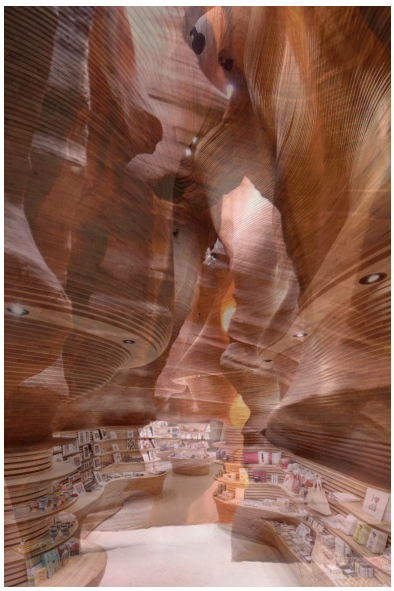


Fig. 4.2

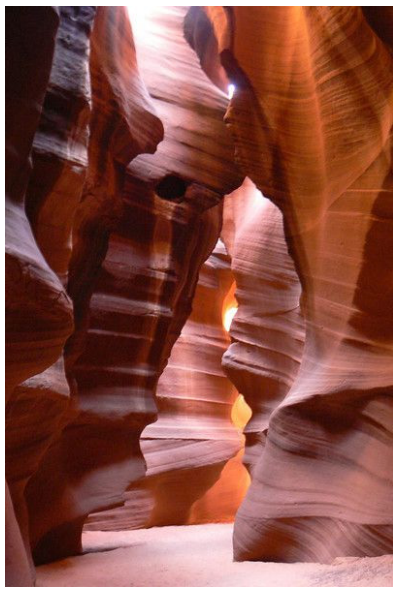


Fig. 4.3

How well does this space make you feel connected to nature?

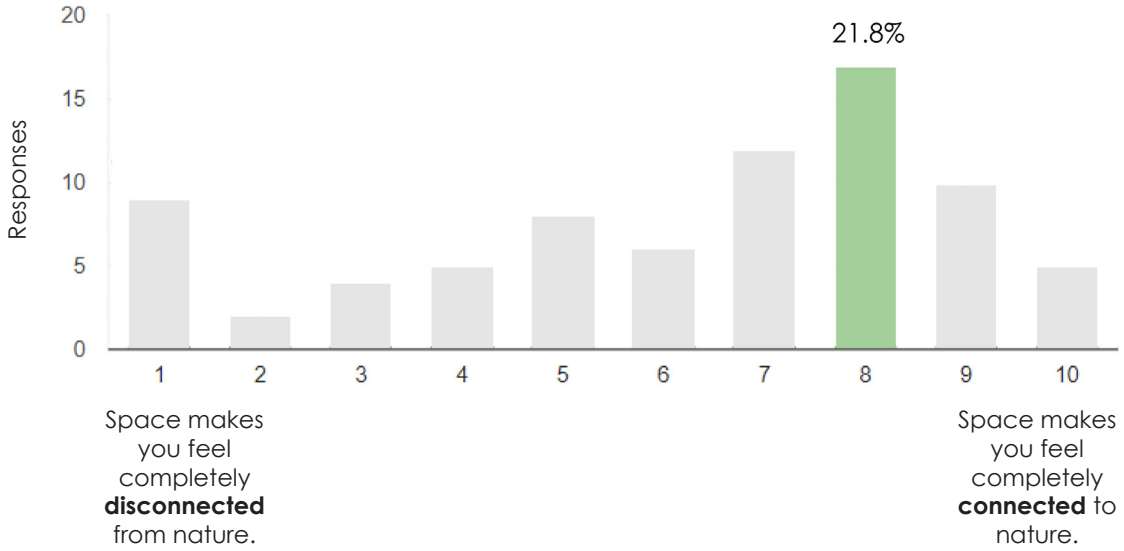


Fig. 4.4

How well does the space on the left emulate the image on the right?

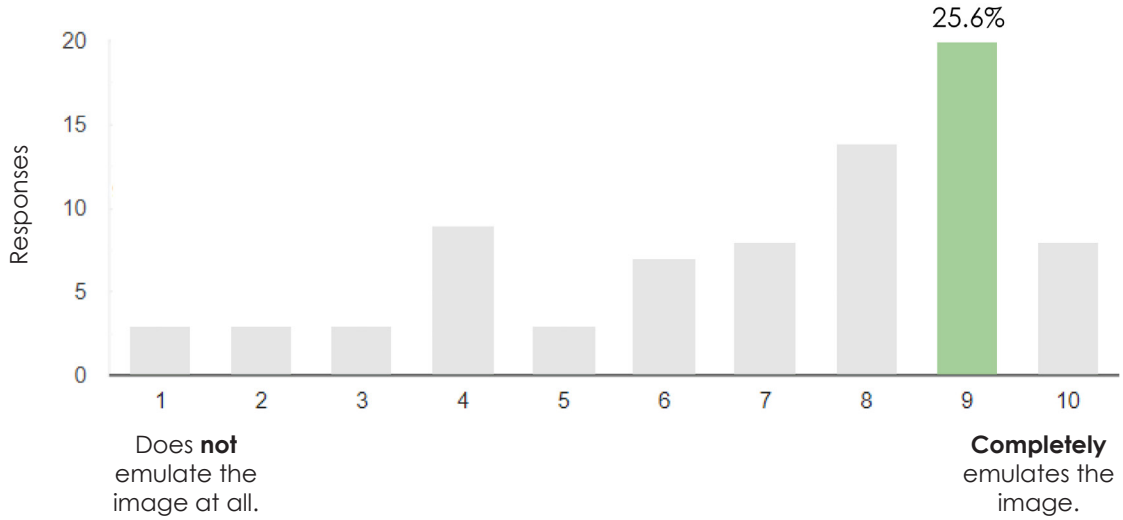


Fig. 4.5

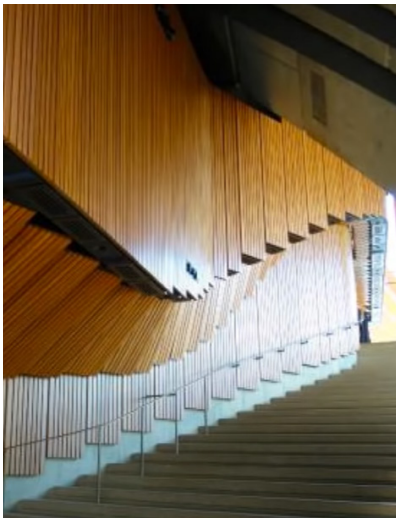


Fig. 4.6

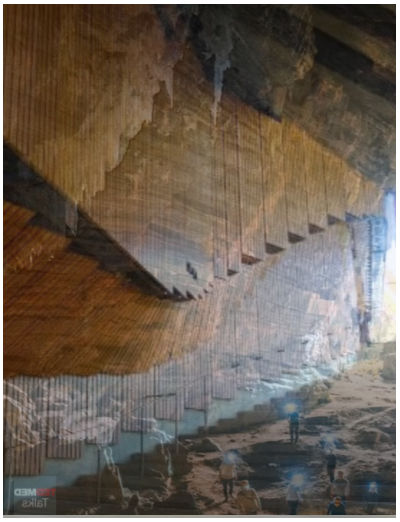


Fig. 4.7

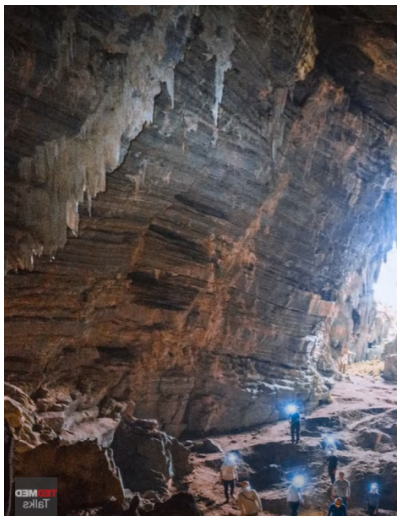


Fig. 4.8

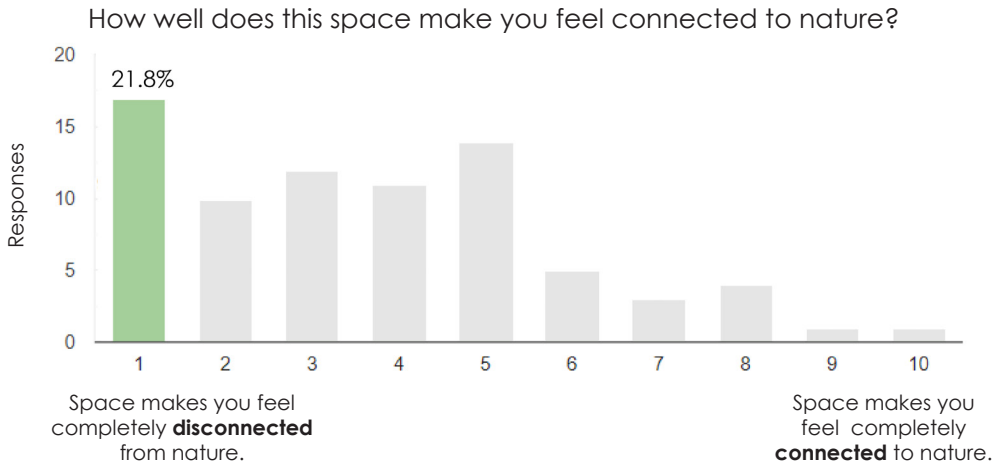


Fig. 4.9

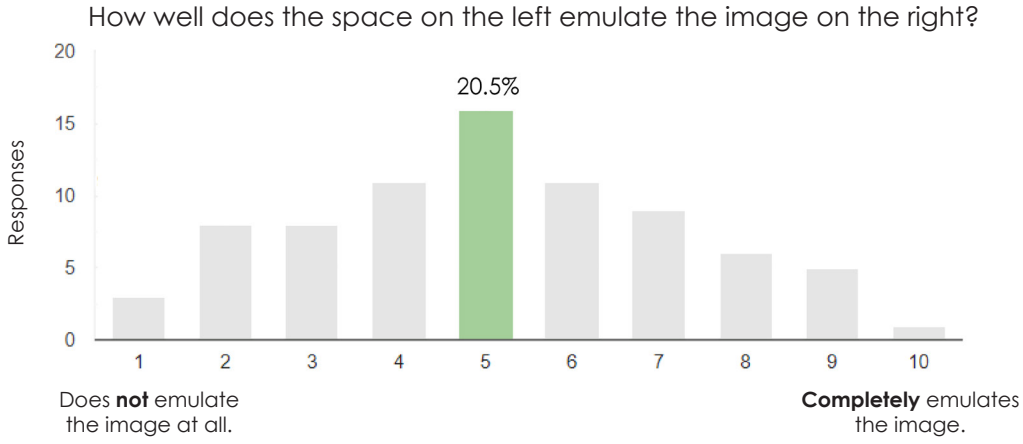


Fig. 4.10

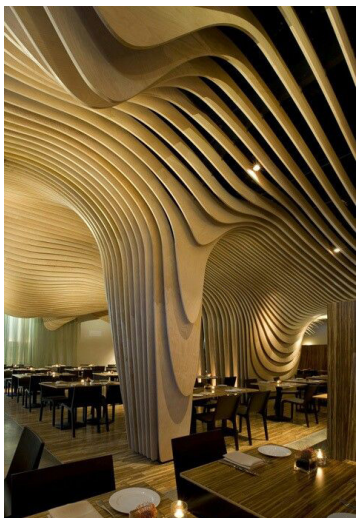


Fig. 4.11

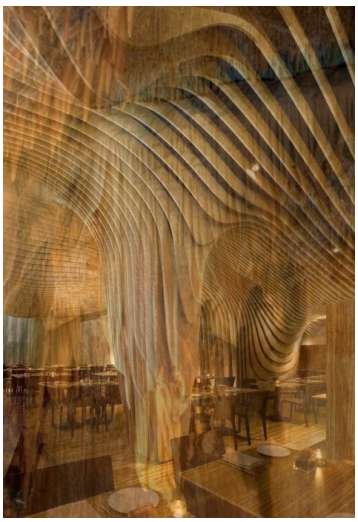


Fig. 4.12

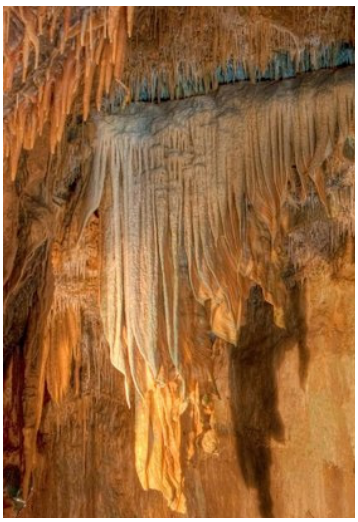


Fig. 4.13

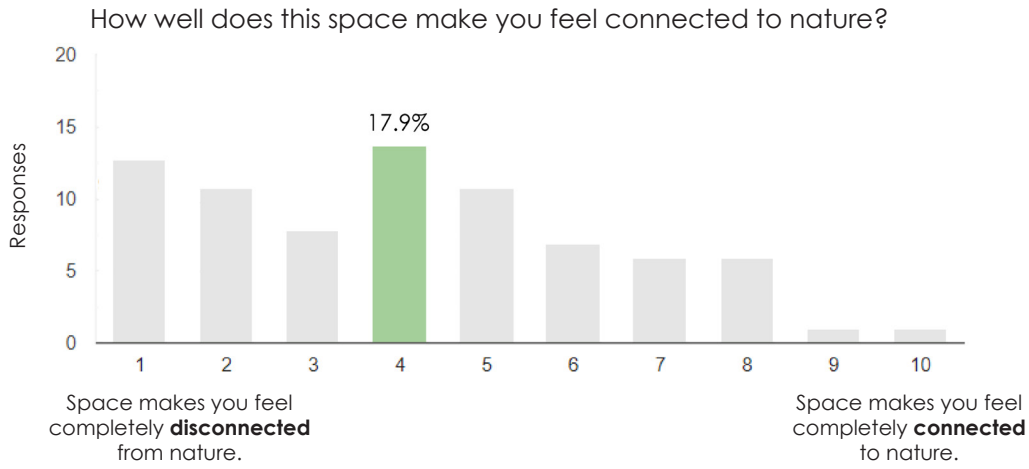


Fig. 4.14

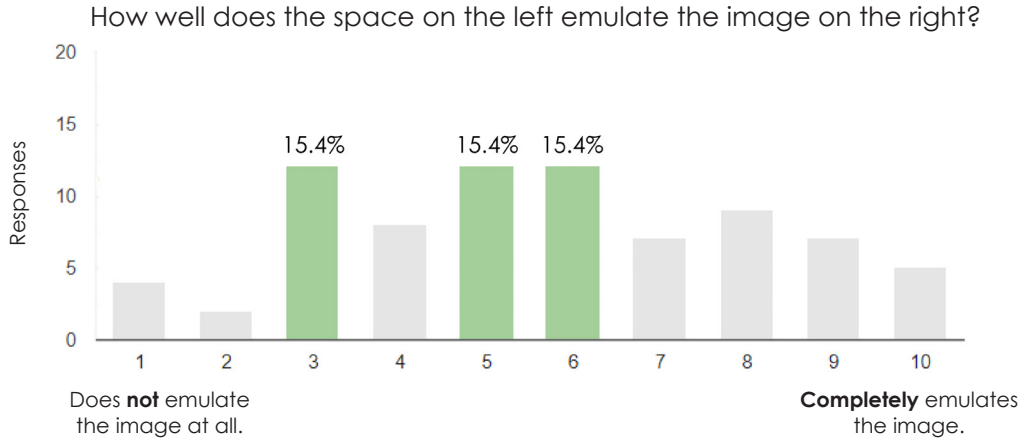


Fig. 4.15

Fig. 4.16

Fig. 4.17

Fig. 4.18

How well does this space make you feel connected to nature?

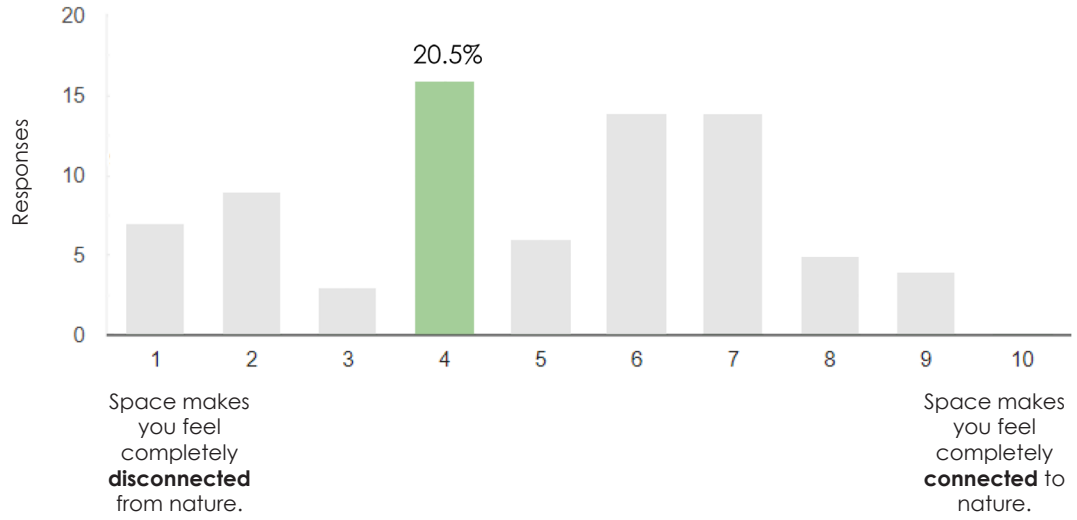


Fig. 4.19

How well does the space on the left emulate the image on the right?

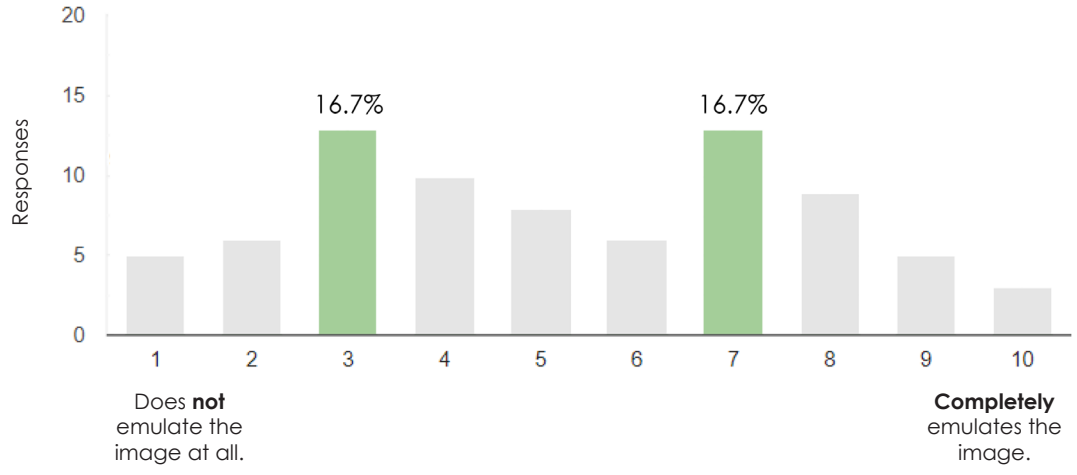
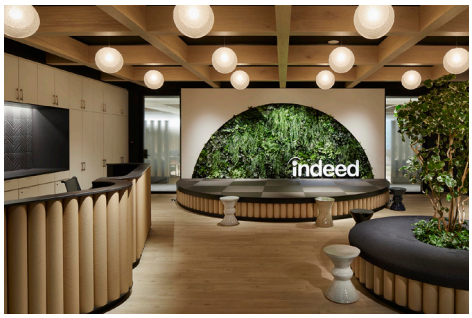


Fig. 4.20

All the images increased when paired and all averaged at or above a four on the scale. The survey consisted of images that were examples of implied nature and of implemented nature. Some of the images showed access to the outside whereas others did not. Images that had access to windows typically scored higher. All the images shown below are examples of implemented nature and use similar applications of biophilic design: greenery, natural colors, natural textures, and natural materials. However, when comparing images of implied nature and implemented nature that both did not have access to nature the images that were examples of implied nature score equal to or higher than the implemented nature images. This in turn means that implying nature is just as, if not more, successful as implementing nature when there is no access to nature.



1 2 3 4 5 6 7 8 9 10

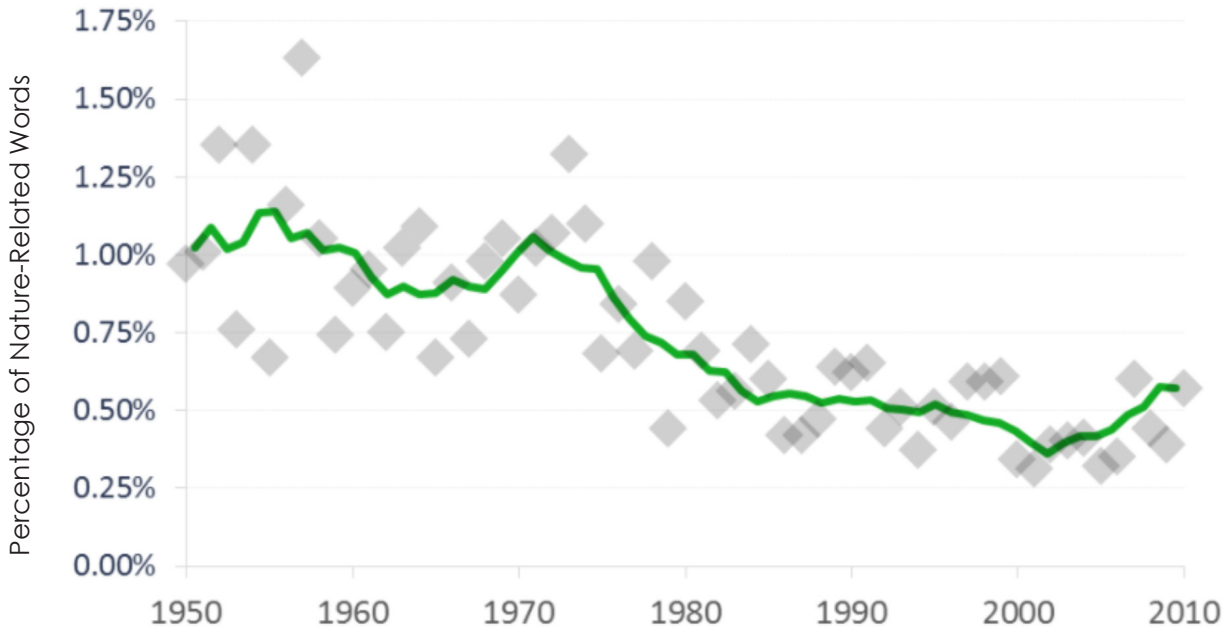
Space makes you feel completely **disconnected** from nature.

Space makes you feel completely **connected** to nature.

Reflection

External Influences

Results:



List of 186 nature-related words belonging to 4 categories
General words
Names of flowers
Names of trees
Names of birds

Time Frame
1901-2000

Areas of Pop Culture
English fiction books (1901-2000)
Top 100 songs (1950-2011)
Movies (1930-2014)

This thesis argues that people have become distanced from nature due to development of civilization and in turn resulted in the development of a form of nature called filtered nature. However, there was a study done that expresses a potential solution to this issue. Many people argue that it was the development of technology that resulted in our distancing from nature. This study agrees with that statement but offers a potential solution. If technology is caused the divide, perhaps we can use technology to bridge the gap.

This study gathered a list of 186 nature-related words belonging to four categories: general words, names of flowers, names of trees, and names of birds. The study then searched these words in various areas of pop culture: English fiction books, top 100 songs, and movies within the time span of 1950-2000. The results were then charted (see fig. 5.1). These results showed that there was a decrease in the percentage of nature-related world in pop culture. This follows other studies that showed the same decreases of people spending time outdoors. In turn, the study came to a conclusion. Cultural products such as songs and films not only reflect the prevailing culture—they also shape it. Modern artists have the opportunity to send the message that nature is worth paying attention to and to help awaken curiosity, appreciation, and respect for nature.

The results of this study can lead to argue that perhaps designers should not be condoning filtered nature and accepting an individuals subjective perception of nature. Rather, designers and societal influencers should use their positions to promote true, unfiltered nature to attempt to alter individuals perceptions.

Extensions of Research

This thesis limits its focus to understanding the importance of the human perspective in terms of biophilic design. The fact is that as designers, it is also our job to be psychologists. In order to be a good designer, we must understand our clients and how they view the world in order to create a design that will go beyond their expectations. This thesis is never ending with limitless avenues of research due to the nature of subjectivity. This thesis is only one part of many. Each part can be anything that influences the human's response. Some examples include how a person was raised. The time during this developmental stage shapes a person's perspective of the world and in turn will affect their response to architecture and what their "tastes" are. A more direct avenue would be to take a look at how geography plays a role in a human's response. Someone who was raised in a rainforest, a desert, or in a mountain range will all have a vastly different opinion on how a home should be built for example. Another book could be dedicated to understanding the development of technology and why and how that create such a distance between humans and nature. But that book could then lead into understanding how industrialization altered the structure of the work force and in turn lead to most households having both parents working, making parenting much harder and in turn resulting in the increased allowance of technology during play time. The avenues are limitless, and all connect to one another. This thesis book is only one of many parts and merely the foundation on which to build upon.

Geographical

How location plays a factor in how nature is filtered and a person's subjective opinion of nature.

Industrialization

How the development of technology has pushed us away from the outdoors and in front of screens.

Cultural

How is nature treated differently between various cultures.

Generational

As mental health has grown in importance to the newer generations, how has this influences our relationship to nature.

Childhood Influence

Does a person's upbringing influence their relationship to nature.

Social Media

How does the media influence an individual's perception of nature.

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2.10 Farnsworth House. Flicker, and Dan Howarth. "Photography Courtesy of Flickr User David Wilson." Jeff Bridges and Maggie Gyllenhaal to Star in Movie about Mies Van Der Rohe's Farnsworth House, Dezeen, 8 Feb. 2017, www.dezeen.com/2017/02/08/mies-van-der-rohe-farnsworth-house-hollywood-movie-jeff-bridges-maggie-gyllenhaal-residential-architecture-usa/.

Understanding Filtered Nature

3.1 Pie Chart. Alyse Cox.

3.2 Pie Chart. Alyse Cox.

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3.6 Survey 01 Questions. Alyse Cox.

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3.11 Artifical Grass. Selby, James. "Closeup of American Football on Field with Yard Lines." Online Classes Keep Football Players out of Academic Fray, Myarklamiss.com, 23 Dec. 2019, www.myarklamiss.com/football/online-classes-keep-football-players-out-of-academic-fray/.

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3.13 Rainfall Showerhead.

3.14 Snow. Okrent, Arika. 8 Beautiful Snow Scenes from Literature, Mental Floss, 19 Feb. 2015, www.mentalfloss.com/article/32114/8-beautiful-snow-scenes-literature.

3.15 Artifical Snow. www.pexels.com.

3.16 Lake. www.pexels.com.

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3.18 Frozen Lake. www.pexels.com.

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2.28 Person walking off path in the woods. Image taken by Alyse Cox.

3.29 Person walking on path in the woods. Image taken by Alyse Cox.

3.30 Person walking in residental area by lake. Image taken by Alyse Cox.

In Terms of Design

4.1 Bookstore. "National Museum of Qatar Gift Shops." Architizer, 2020, architizer.com/idea/2711158/.

4.2 Collage. Alyse Cox.

4.3 Canyon. Ballos, Gregory Ballos. "The Torch Flame of Antelope Canyon." Fine Art America, 2020, fineartamerica.com/featured/the-torch-flame-of-antelope-canyon-page-arizona-gregory-ballos.html.

4.4 Chart. Alyse Cox.

4.5 Chart. Alyse Cox.

4.6 Staircase. Sturgeon, Amanda. Using biophilic design to heal body, mind, and soul, TED-

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4.7 Collage. Alyse Cox

4.8 Cave. Sturgeon, Amanda. Using biophilic design to heal body, mind, and soul, TEDMED, 6 Feb. 2019. Youtube, www.youtube.com/watch?v=uAmbZCtNC9U.

4.9 Chart. Alyse Cox.

4.10 Chart. Alyse Cox.

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4.14 Chart. Alyse Cox.

4.15 Chart. Alyse Cox.

4.16 Office. Betsky, Aaron. Architecture in Limbo. [on-line]. Accessed 12 December 2003; available from http://archilab.org/public/2000/catalog/betskyen.htm; internet.

4.17 Collage. Alyse Cox.

4.18 Tree. Brand, Stewert. How Buildings Learn. New York: Penguin Group, 1994

4.19 Chart. Alyse Cox.

4.20 Chart. Alyse Cox.

Extensions of Research

5.1 Chart. Alyse Cox.

Appendixes

Appendix A

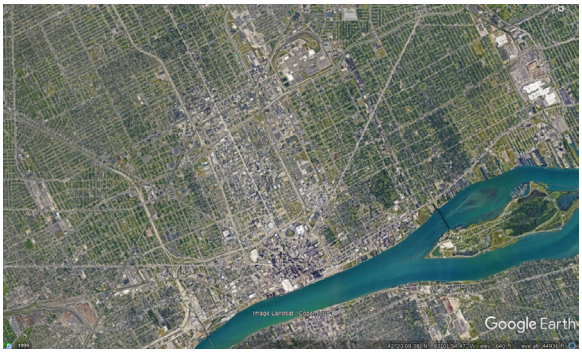
A. City Growth

Description:

Maps of six cities showing a satellite view of the city in both 1984 and 2020. These images aim to show how the city grew and in what direction. These cities have a variety of natural features near or surrounding them that effects the growth pattern. For example, the Pacific ocean tot the west of Los Angeles and the mountain range tot he east restricts the growth of the city.

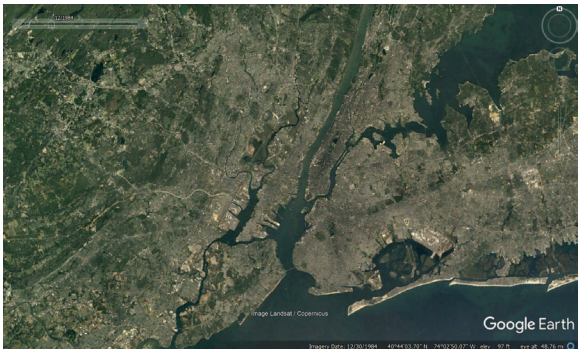
Detroit

1984

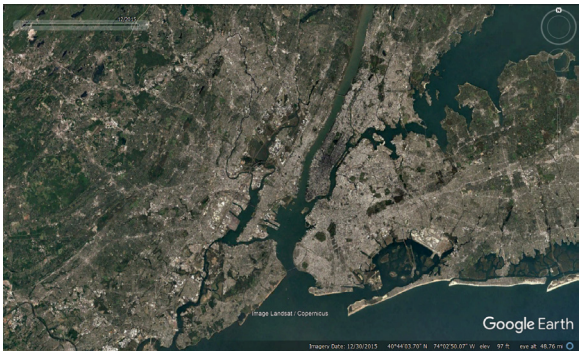


Current

New York



1984



Current

Beijing

1984

Current

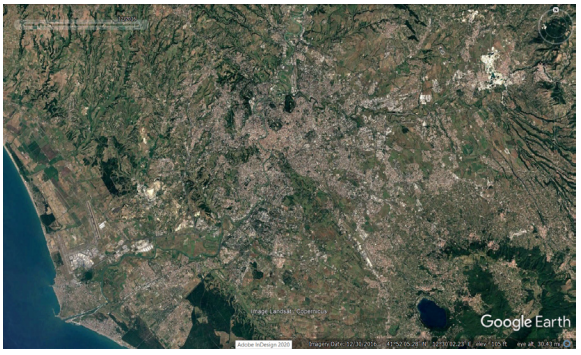
Los Angeles

1984

Current

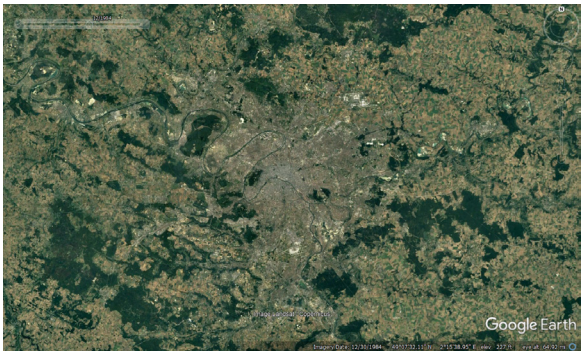
Rome

1984



Current

Paris



1984

Current

Appendix B

B. Table of the benefits of biophilic design.

Description:

This table shows the benefits of biophilic design on the left with references on the right. These references are various articles and studies done that prove these benefits.

Health / Well-Being Benefits	References
Reduced stress	Berto 2014; Fan et al. 2011; Nielsen and Hansen 2007; Stigsdotter et al. 2010; van den Berg and Custers 2011; van den Berg et al. 2010; Ward Thompson et al. 2016
Better sleep	Astell-Burt et al. 2013; Grigsby-Toussaint et al. 2015; Morita et al. 2011
Improved mental health / Reduced depression	Astell-Burt et al. 2014c; Beyer et al. 2014; Cohen-Cline et al. 2015; Gascon et al. 2015; Kim et al. 2009; Maas et al. 2009b; McEachan et al. 2016; Nutsford et al. 2013; Sturm and Cohen 2014; Taylor et al. 2015; White et al. 2013
Reduced anxiety	Beyer et al. 2014; Bratman et al. 2015a; Maas et al. 2009b; Nutsford et al. 2013; Song et al. 2013; Song et al. 2015
Greater happiness / well-being	Ambrey 2016; Fleming et al. 2016; Larson et al. 2016; MacKerron and Mourato 2013; Van Herzele and de Vries 2012; White et al. 2013
Reduced aggression	Bogar and Beyer 2016; Branas et al. 2011; Kuo and Sullivan 2001a, b; Troy et al. 2012; Younan et al. 2016
Reduced ADHD symptoms	Amoly et al. 2014; Faber Taylor et al. 2001; Faber Taylor and Kuo 2009; Faber Taylor and Kuo 2011; Kuo and Faber Taylor 2004; Markevych et al. 2014b; van den Berg and van den Berg 2011
Lower blood pressure	Duncan et al. 2014; Markevych et al. 2014a; Shanahan et al. 2016
Improved post-operative recovery	Park and Mattson 2008; Park and Mattson 2009; Ulrich 1984
Improved pain control	Acutely (Diette et al. 2003; Lechtzin et al. 2010) and chronically (Han et al. 2016)
Reduced obesity	Bell et al. 2008; Cleland et al. 2008; P. Dadvand et al. 2014a; Lachowycz and Jones 2011; Sanders et al. 2015; Stark et al. 2014
Reduced diabetes	Astell-Burt et al. 2014a; Bodicoat et al. 2014; Brown et al. 2016; Thiering et al. 2016
Improved immune function	Li et al. 2006; Li et al. 2008a; Li et al. 2008b; Li et al. 2010; Li and Kawada 2011
Improved general health: Adults Cancer survivors Children	Brown et al. 2016; de Vries et al. 2003; Kardan et al. 2015; Maas et al. 2006; Maas et al. 2009b; Stigsdotter et al. 2010; Wheeler et al. 2015 Ray and Jakubec 2014 Kim et al. 2016

Appendix C

C. Stephen Kellert's Biophilic Design Elements & Attributes

1 ENVIRONMENTAL FEATURES

Using well-recognized natural world characteristics.

- Color
- Water
- Air
- Natural Ventilation
- Plants
- Animals
- Natural materials
- Views and vistas
- Facade greening
- Geology and landscape
- Habitats and ecosystems
- Fire

2 NATURAL SHAPES & FORMS

Resisting straight lines and right angles.

- Botanical motifs
- Tree and columnar supports
- Animal motifs
- Shells and spirals
- Egg, oval, & tubular forms
- Arches, vaults, domes
- Shapes resisting straight lines and right angles
- Stimulation of natural features
- Biomorphy
- Geomorphology
- Biomimicry

3 NATURAL PATTERNS & PROCESSES

Varying the sensory experiences with transitions and complimentary contrasts.

- Sensory variability
- Information richness
- Age, change, and the patina of time
- Growth and efflorescence
- Central focal point
- Patterned wholes
- Bounded spaces
- Linked series and chains
- Integration of parts to wholes
- Complementary contrasts
- Dynamic balance and tension
- Fractals
- Hierarchically organized ratios and scales

4
LIGHT & SPACE

Use light and space to evoke desired human reaction.

- Natural light
- Filtered and diffused light
- Light and shadow
- Reflected light
- Light pools
- Warm light
- Light as shape and form
- Spaciousness
- Spatial variability
- Space as shape and form
- Spatial harmony
- Inside-outside spaces

5
PLACE-BASED RELATIONSHIPS

Designing with cultural, spiritual, ecological, or historical relationships in mind.

- Geographic connection to place
- Historic connection to place
- Cultural connection to place
- Indigenous materials
- Landscape orientation
- Landscape features that define building form
- Landscape ecology
- Integration of culture and ecology
- Spirit of place
- Avoiding placelessness

6
EVOLVED HUMAN-NATURE RELATIONSHIPS

Designing to maintain strong reactions and connections to our deep history with nature.

- Prospect and refuge
- Order and complexity
- Curiosity and enticement
- Change and metamorphosis
- Security and protection
- Mastery and control
- Affection and attachment
- Attraction and attachment
- Exploration and discovery
- Information and cognition
- Fear and awe
- Reverence and spirituality

Appendix D

D. Survey 01

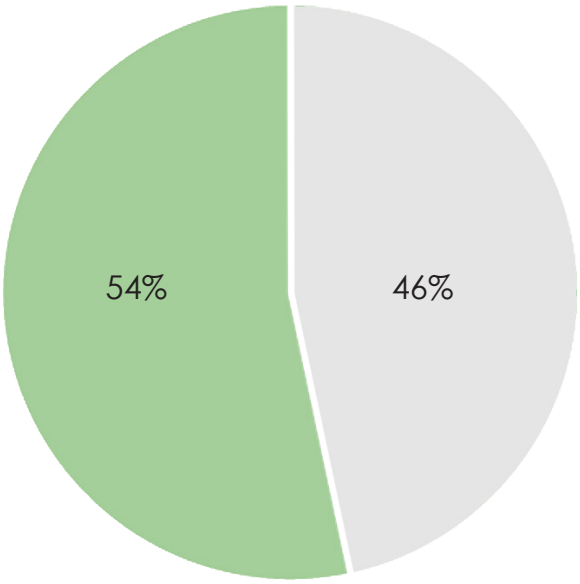
Title: Understanding our Relationship with Nature

Description: The goal of this survey is to understand how much civilization has altered our relationship with nature. All participants will remain anonymous. Responses and data collected in this survey will be shared publicly. Thank you for your participation in this survey!

Instructions: Please answer all questions as which do you PREFER, not which are you most likely to do.

Number of Participants: 91

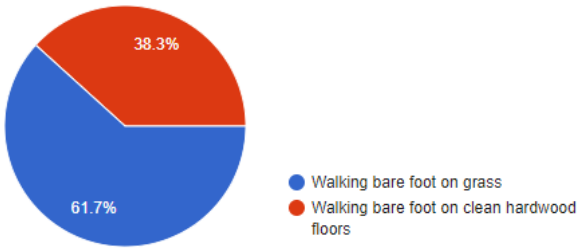
Average of all results:



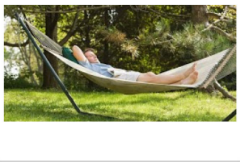
Which do you prefer? *

Walking bare foot on grass

Walking bare foot on clean hardwood floors

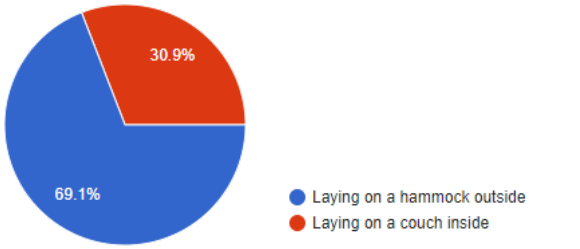


Which do you prefer? *

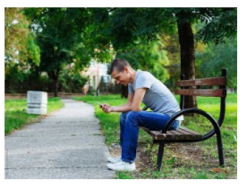


Laying on a hammock outside

Laying on a couch inside

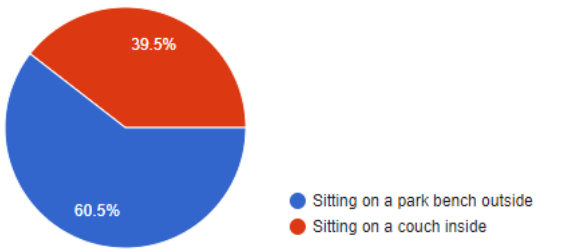


Which do you prefer? *



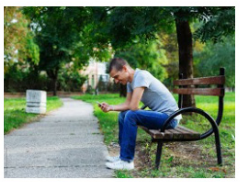
Sitting on a park bench outside

Sitting on a couch inside

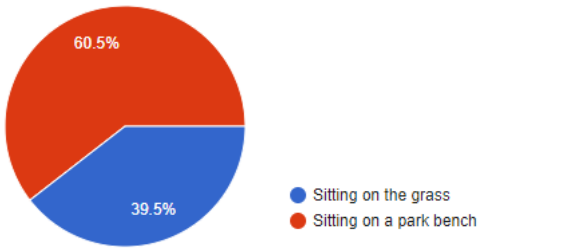


Which do you prefer? *

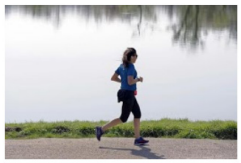
Sitting on the grass



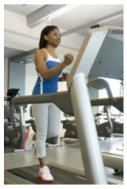
Sitting on a park bench



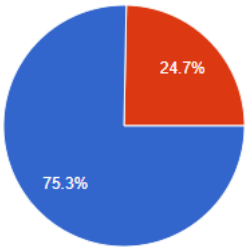
Which do you prefer? *



Running outside

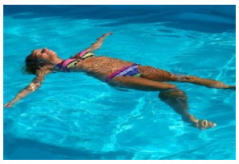


Running on a treadmill

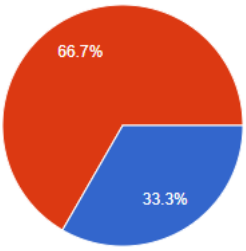


Which do you prefer? *

Swimming in a lake



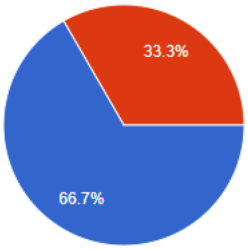
Swimming in a pool



Which do you prefer? *

Sitting at a bonfire

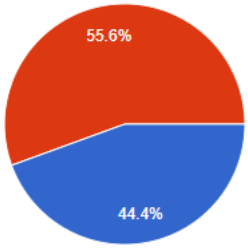
Sitting in front of a fireplace



Which do you prefer? *

Eating at picnic table outside

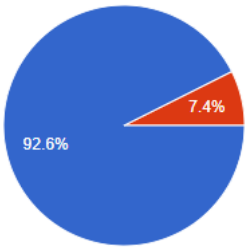
Eating inside at a table



Which do you prefer? *

Windows open for breeze

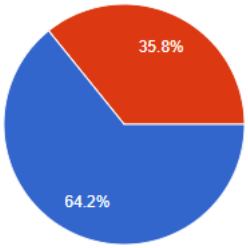
Fan blowing



Which do you prefer? *

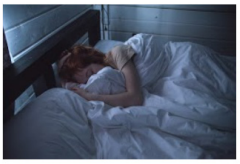
Driving with the windows down

Driving with the AC on

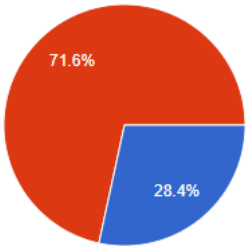


Which do you prefer? *

Sleeping outside



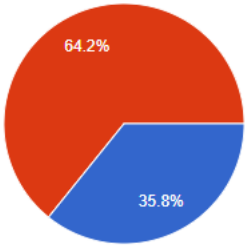
Sleeping inside



Which do you prefer? *

Roller skating outside

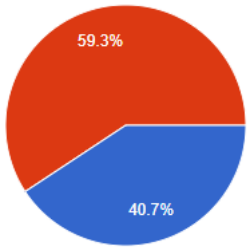
Roller skating at a roller rink



Which do you prefer? *

Ice skating on a lake outside

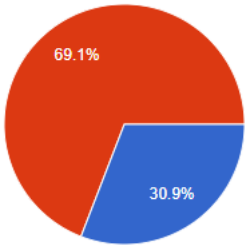
Ice skating at an ice rink



Which do you prefer? *

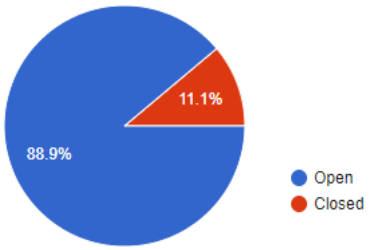
Rock climbing outdoors

Rock climbing indoors



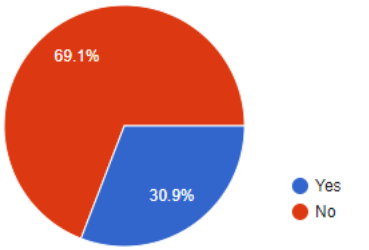
Do you prefer to keep your curtains open or closed during the day?

- ◯ Open
- ◯ Closed



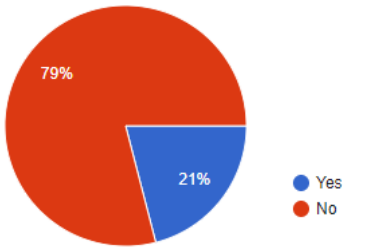
Do you own any living indoor plants? If no, why? *

Your answer



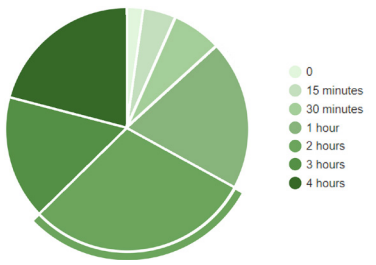
Do you own any artificial indoor plants? *

- ◯ Yes
- ◯ No



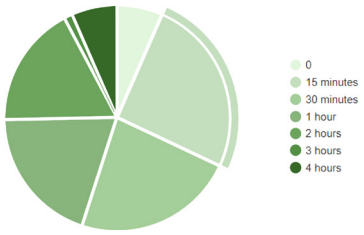
On average, how much time per day do you spend outdoors in the summer months? (do not include hours at a job) *

- ◯ 0
- ◯ 15 minutes
- ◯ 30 minutes
- ◯ 1 hour
- ◯ 2 hours
- ◯ 3 hours
- ◯ 4 hours



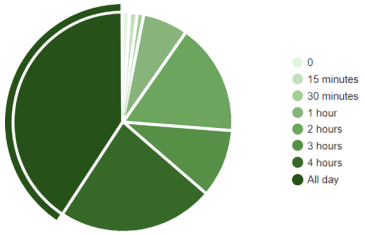
On average, how much time per day do you spend outdoors in the winter months? (do not include hours at a job) *

- ◯ 0
- ◯ 15 minutes
- ◯ 30 minutes
- ◯ 1 hour
- ◯ 2 hours
- ◯ 3 hours
- ◯ 4 hours



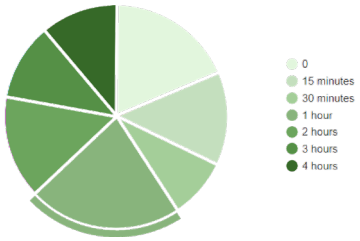
How much time per day would you like to spend outdoors during summer months? *

- ◯ 0
- ◯ 15 minutes
- ◯ 30 minutes
- ◯ 1 hour
- ◯ 2 hours
- ◯ 3 hours
- ◯ 4 hours
- ◯ All day



How much time per day would you like to spend outdoors during winter months? *

- ◯ 0
- ◯ 15 minutes
- ◯ 30 minutes
- ◯ 1 hour
- ◯ 2 hours
- ◯ 3 hours
- ◯ 4 hours



Appendix E

E. Survey 02

Title: Understanding our Relationship with Nature

Description: The purpose of this survey is to gain an understanding of what elements of design do we associate with nature and what aspects of biophilic design (implying nature compared to implementing nature) make us feel more connected to nature than others.

All participants will remain anonymous. Responses and data collected in this survey will be shared publicly. Thank you for your participation!

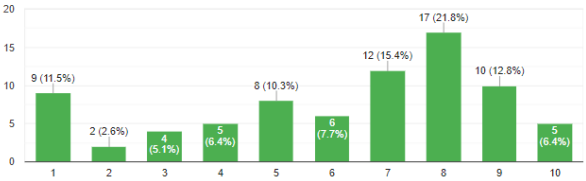
Instructions: Please rate each image based on how much you feel the space does or does not make you feel connected to nature.

Number of Participants: 78

1 2 3 4 5 6 7 8 9 10

Space makes you feel completely disconnected from nature.

Space makes you feel connected to nature.



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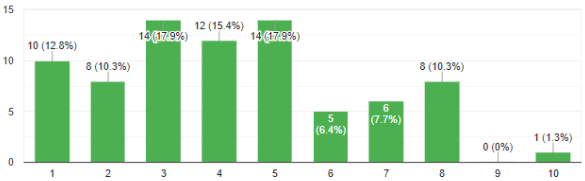

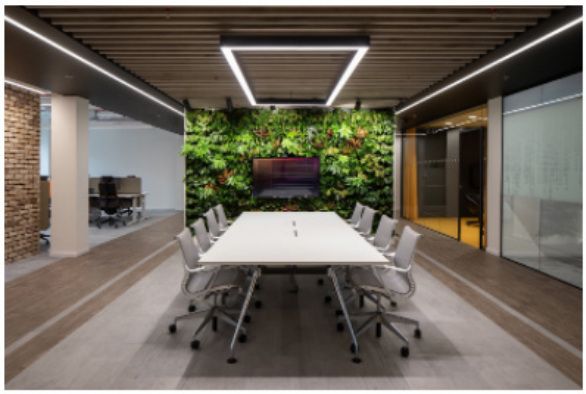

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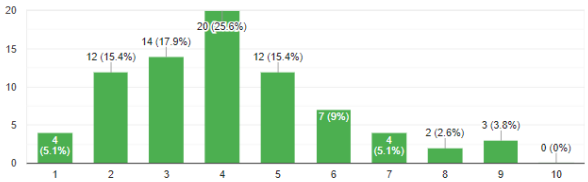

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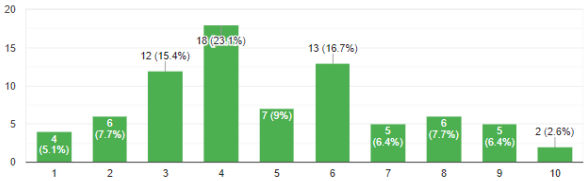

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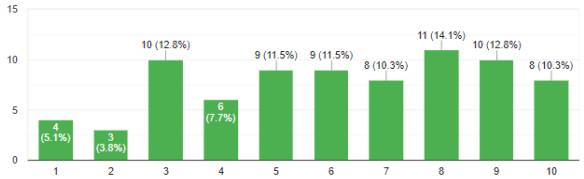

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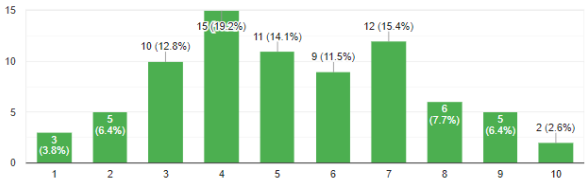

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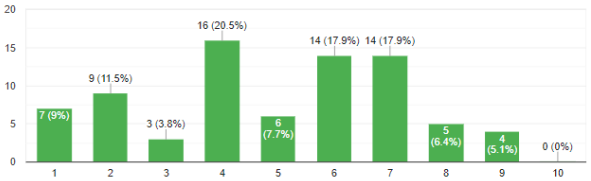

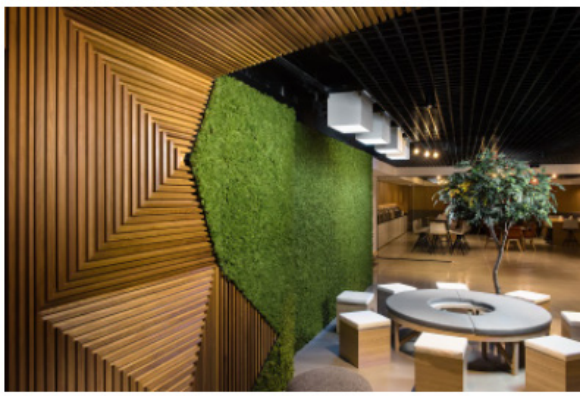

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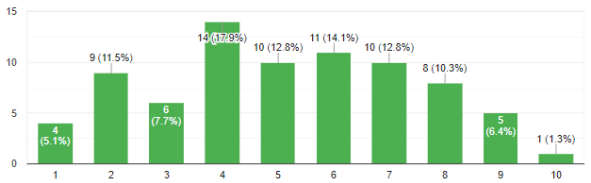

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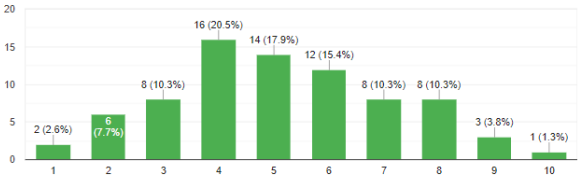

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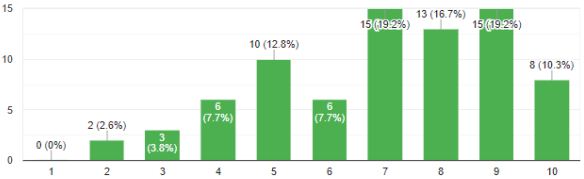

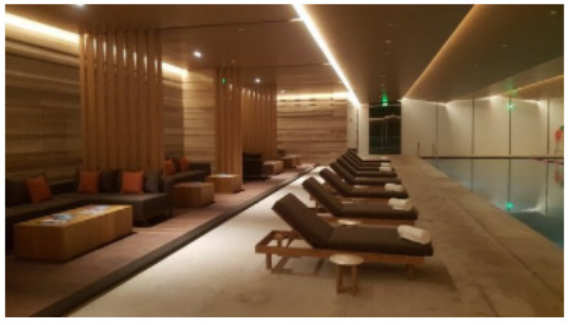

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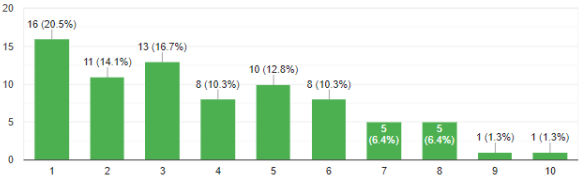

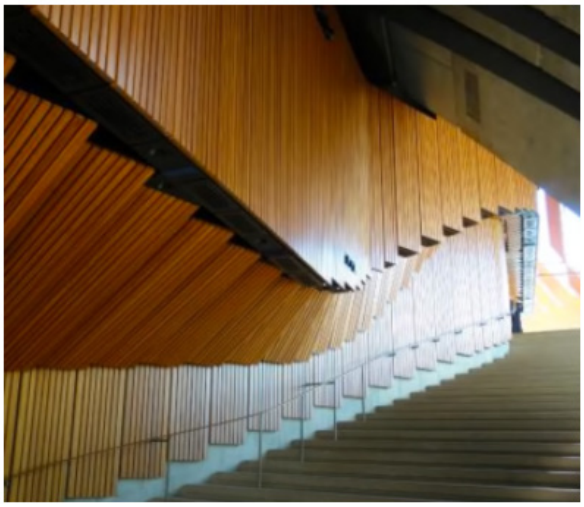

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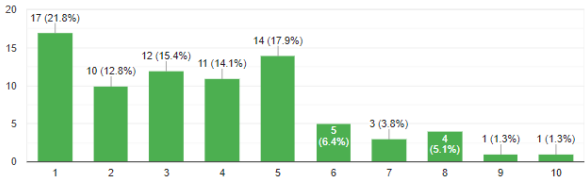

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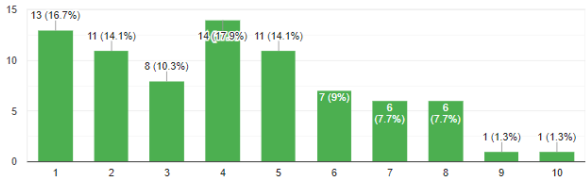

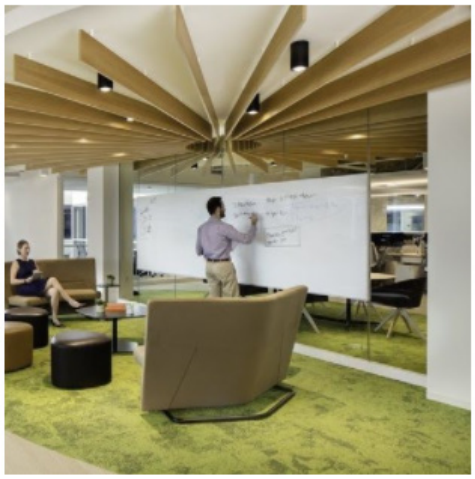

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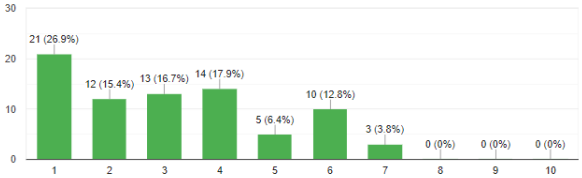

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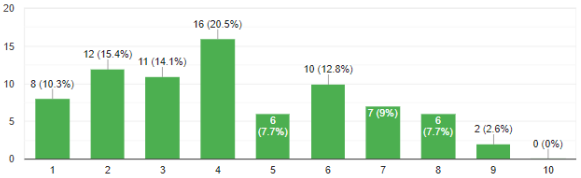

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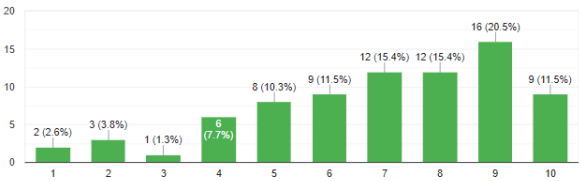

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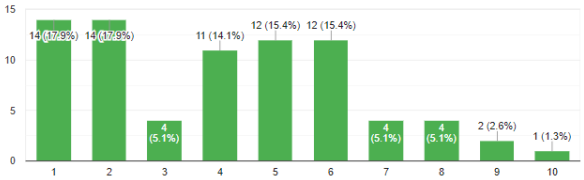

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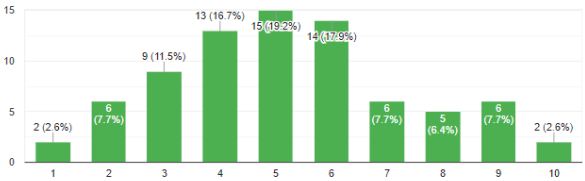

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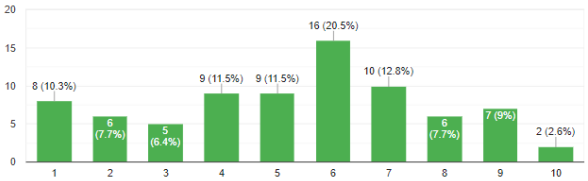

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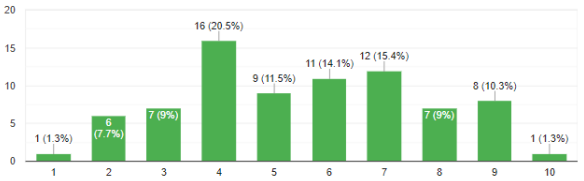

How well does the space on the left emulate the image on the right? *

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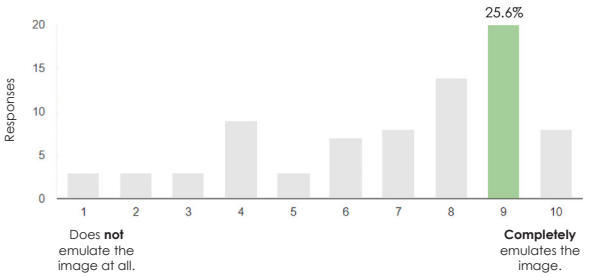
Does not emulate the image at all. ○○○○○○○○○○ Completely emulates the image.

How well does the space on the left emulate the image on the right?



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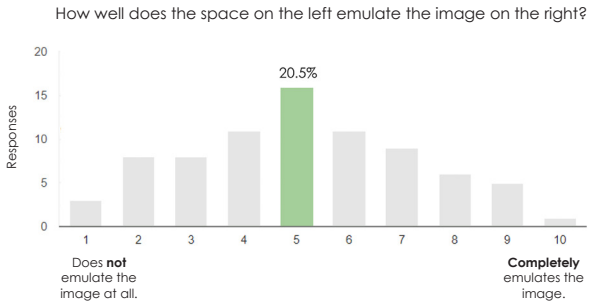

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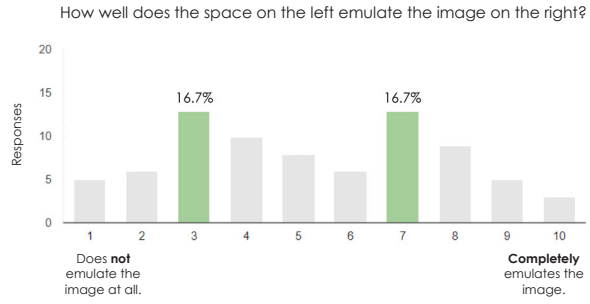

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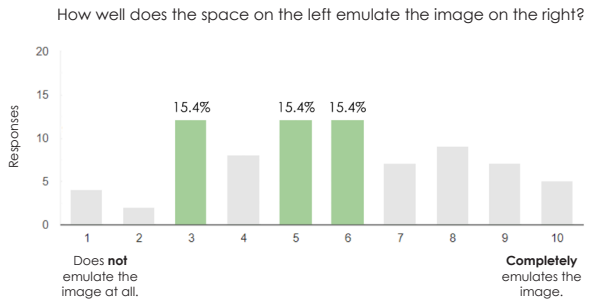


Appendix F

F. Video 01

Narrative:

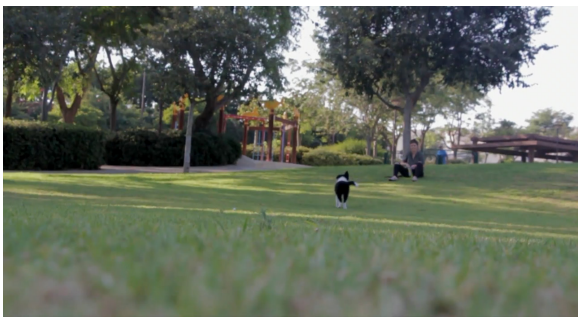
What is nature? What does it look like? Straight lines side by side. Grass all the same length; don't miss a blade. Pull all the weeds, no one wants that. But is that even nature? Should it be "natural"? Through the years we have drifted from reality and formed our own "nature". We have filtered nature to our liking. It must be clean; it must be orderly. Is that in any way natural though? What even is nature anymore?

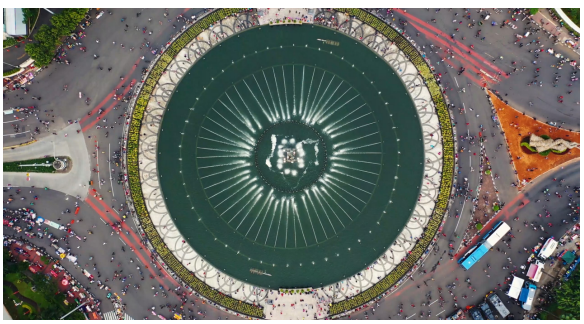
Video Link:

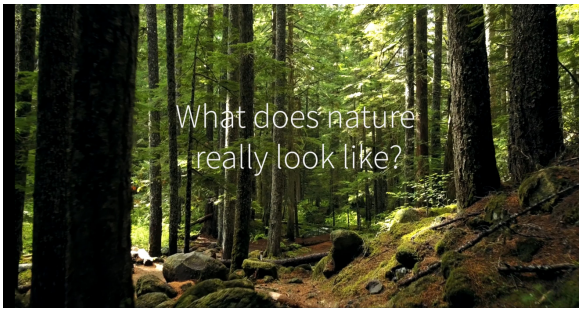
https://youtu.be/YVJJP3nLaoA

References:

pexels.com
bensound.com
freesound.org






What does nature
really look like?

Appendix G

G. Video 02

Video Link:

https://youtu.be/13QMMhuc0Ls

References:

pexels.com
bensound.com

We made roads...

We have distanced ourselves from nature.

...that cut through the landscape...

We once lived within natural formations...

...in order to find our way.

But instead, we lost all sense of direction.

We have come out of our holes...

We have become trapped...

...to only trap ourselves back inside them.

...in a world we created.