Intricate Webs of Nature

From the microscopic to the cosmic

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Abstract

The thesis paper explores an interdisciplinary and research based practice as a means to interpret the intricacies of webbed patterns in the universe. It examines the existence of patterns at a microscopic and macroscopic level in order to reinterpret them in a contemporary art context. The practice draws on theories from philosophers, mycologists, ecologists, and physicists such as Michel Foucault, Suzanne Simard, Lisa Randall, Bernie Krause and Carl Sagan. Through an investigation of their ideas, the paper highlights the presence of these patterns in nature and as an artistic influence. The structure of webbed patterns in fungi, the human body, land, roots, the cosmos, and animal architecture are a continuation of the artistic investment in biological patterns, large and small. The thesis artworks discussed here will emphasize how a research based practice is intertwined with material, form and process through a series of installations. This interdisciplinary and process based research practice builds an awareness of the pervasive patterns in the universe.

Table of Contents

List of Figures

Acknowledgments

I would like to acknowledge the immense support from my advisor and mentor Dr. Randy Cutler throughout my education at Emily Carr. Thank you for encouraging me to explore multiple directions and interests as my research evolved over the program. I learned things that I would have never come across in this lifetime and I cannot thank you enough for being that source of knowledge. I extend my gratitude to all the faculty members who have also provided a rigorous and invaluable learning experience that has resulted in the growth of my artistic practice. I was fortunate to be part of a cohort who were present for one another during every install and de-install as a team and would like to thank you all.

This journey would not have been successful without the care and attention provided by my parents overseas. Their timely video calls and long messages of wondering why I didn't call often, I promise you, the research was exciting. Thank you for your understanding. I was also blessed to have gained new parents who filled the gap of feeling distant from my own family. It was a blessing and a surprise to have met my fiancé during my time here in Vancouver, British Columbia. His enthusiasm, encouragement, love and persistent nature was uplifting and cheered me on as I researched the strange and unknown mysteries of the universe. Thank you Jeffrey for bringing joy to my life. Your flexibility and patience to drive me around, bring home-cooked meals to university, watch movies to help unwind, sharing stories before I fell asleep and listening to my frustration of being lost as an artist through this experience, will always be wonderful memories.

Thank you all for being there and assisting my performance as an artist and a researcher.

The Presence of Patterns

Fascinated with the repetition of webbed patterns in nature from the microscopic to the cosmic, I understand my art practice as an opportunity to heighten the perception of these invisible networks. As a research based artist inspired by scientific concepts, I am invested in the complexity of information that emerges from the questions that guide my thinking and making process. Specifically, this thesis project considers whether these webbed patterns might suggest the complex behavior of gravity and perhaps point to an interconnected relationship between living organisms. As part of my process, I generate an archive of drawings and sounds that examine the formation and behavior of webbed patterns before the production of installations.

Raised in Qatar with family roots in India and Portugal, I previously created sand carpets which explored patterns and motifs drawn from my cultural background. Even though I was born in the Middle East, there was never the possibility to become Qatari and have a permanent residency there, until recent amendments to the law. I am an expatriate in Qatar and a Non-Resident Indian, which makes it difficult to clarify where I find sanctuary, a place to call home. And yet, Qatar is the only home I have known. The smell of salt from the Persian Gulf envelopes the air as it mixes with Arabic perfume and oils of resin-saturated agarwood when I visit my favorite place in the city. Al Bandar is a place close to the water and to my heart. The sound of waves gently brushing rocks in the absences of traffic and wind hugging my body as I sip on chai made for peaceful memories that I long for every day. The life that I was naturally accustomed to was reevaluated as soon as I came to the hustle and bustle of Vancouver, British Columbia, to study in the MFA program at Emily Carr University of Art and Design. This sense of displacement is informed by the recognition that I am part of a community that distinguishes itself as settlers on unceded Musqueam, Skxwú7mesh and Tsleil-Waututh territory. I find

comfort acknowledging that I share a relationship with my environment along with many other life forms that are also displaced during journeys of migration. In this way, experiences during my passage as an artist guide the research and creative practice.

The evolution of my practice entails challenging material choices. I learned to become resourceful through the process of creating sand carpets in different locations as I used available local sand and motifs to symbolically and physically connect to the community and land. The ephemerality of the artwork caused by viewer participation walking over the installations merged structured patterns into blurred images, reflecting my experiences formed by different cultures. It was a reminder that nothing lasts forever and that I should embrace the temporary. Now, I see Qatar, India, and Vancouver as a part of my life, reinforcing the idea of home existing somewhere and nowhere simultaneously. I see myself growing increasingly comfortable with mobility by adapting to any space or context and finding inspiration with places that are not my own. These experiences of mobility encouraged a peculiar material practice as I look for resources that possess characteristics of temporality, fragility, recyclability, and the everyday, in order to construct a sense of home. They made me look at my environment to find familiarity as a motivation behind my inquiry about the repletion of webbed patterns and my relationship with the universe.

Connecting with my Environment

Once in Vancouver, I refocused my research from floral motifs to botany since carpets were historically a representation[1] of symmetrical Persian gardens. As a result, I was introduced to the many guest species inhabiting gardens and other environments. I prefer classifying these species as guests, rather than invasive because they have intentions to adapt rather than consciously destroy. Invasive has a negative connotation as it describes a "tendency to spread prolifically and undesirably or harmfully" ("Invasive.") and I see these species demonstrating their ability to create change, one that can affect several systems over time. Like mushrooms, some species can be seen as destructive and others easily adaptive or an attractive food source. Interacting and learning from fungi has helped to utilize or neutralize relationships through scientific applications, allowing me to empathize with guest species before making any conclusions. This confluence of interests with botany and other species encouraged an exploration of the relationships between plants and fungi that connect all of nature through physical and chemical synergies. I am engrossed in the repeated appearances of pattern in organisms and their connection beyond a visible form present in different systems of nature. Through an iterative and experimental process in the MFA program, I have been investigating the potential meaning of interconnectedness embedded in webbed patterns often manifested in neurons, trees, fungi, webs, human anatomy, the earth, and the stars. As my practice has unfolded, I have become informed by mycology, cosmology, and biomimicry in animal architecture that demonstrate the ubiquity of these patterns. These are the four distinct

[1] I learned that carpets originated in Persia and their technical construction of knots and patterns defined their style which were gradually transformed for European tastes. Originally, the structure of rugs imitated the symmetry present in a Persian garden where walls as a borders for protection, reflected the several borders in rugs (Saoud).

installations that respond to these research based inquiries: “The Shadows of Webs” (fig. 1), “Forming Patterns” (fig. 2), “Follow me” (fig. 3) alongside “uncertainty ±” (fig. 4), and “Hidden in Plain Site” (fig. 5). My practice does not seek conclusions nor solutions; instead, I am intrigued by these permeating and often invisible patterns in nature and the cosmos. This essay will take you on a journey of experimentations and processes developed during my practice as I make sense of the connections in the universe through patterns.

Figure 1: Detail of *The Shadows of Webs*, 2018.

Figure 2: Documentation of *Forming Patterns*, 2018.

Figure 3: Documentation of *Follow me*, 2018.

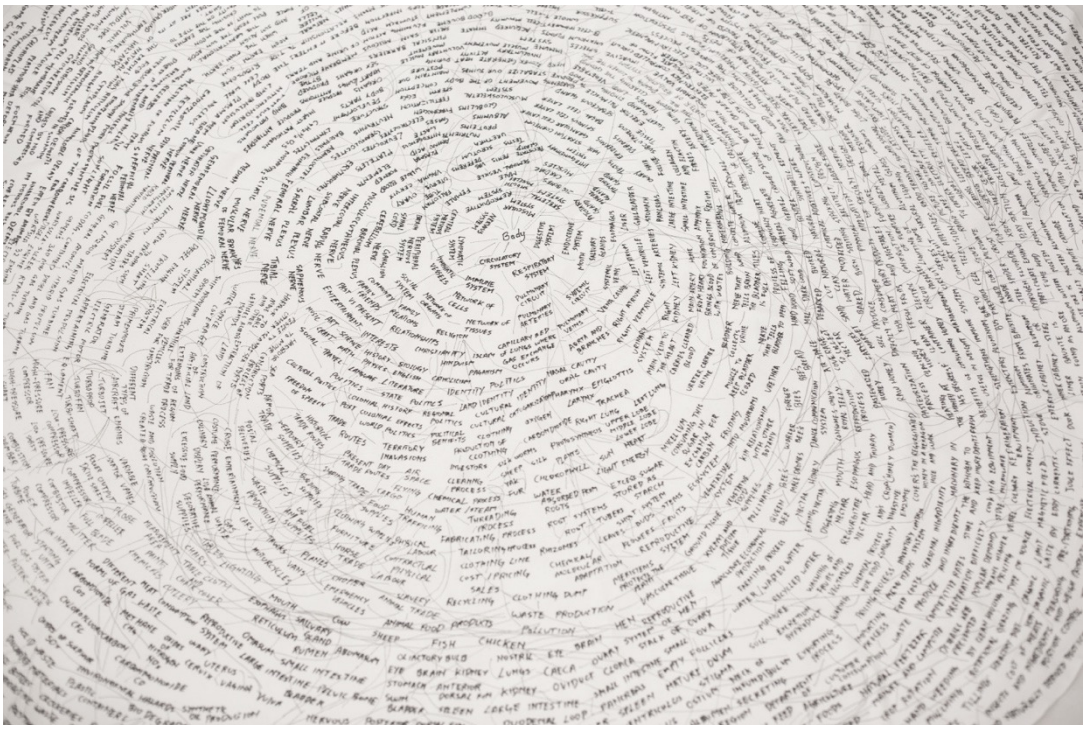

Figure 4: Detail of *Uncertainty* ±, 2018.

Figure 5: Installation of *Hidden in Plain Site*, 2019.

Experimenting, Observing, Responding

Observing patterns as I walk around the city, looking up at the sky or down at the earth, getting close to small insects, picking up broken branches and leaves, in addition to all the mundane activity at home are examples of the methods I use to understand and navigate my environment. To archive my encounters, I generate scans, drawings and sounds. These artifacts tell me stories about their relationship to the webbed pattern as part of the natural world and the universe. According to Colin Ware, director of the data visualization research lab at the University of New Hampshire, humans have the extraordinary ability to detect meaningful patterns in order to make sense of the world (Ware 22). In that light, I am trying to understand what meaning lies within the repetition of webs using audio, visual and physical understanding of the environment as a living and breathing entity. I also take inspiration from fellow artists navigating similar subject matter and materials in order to understand the larger context of my work within historical and contemporary art discourse.

Some of these artists include; French-American artist Marcel Duchamp, who used twine to guide a viewer in a retrospective exhibition of *The First Papers of Surrealism* in New York titled "Mile of String, 1942". The piece obliged visitors to contort themselves in order to view the exhibit with new perspectives and generating unique experiences. And German-born American sculpture Eva Hesse worked with string among other materials to create installations that were informed by surrealism, minimalism and conceptualism. She experimented with new processes and materials to push the boundaries of art, at a time when men dominated the art world. Hesse dipped string into liquid latex to create flexible variations of installations such as "No title, 1969-70". According to the artist, the irregularly hung sculpture allowed gravity to determine the aesthetics of the work (Hesse). While Duchamp and Hesse had different

conceptual intentions when working with string, their experiments required viewers to engage with the material in new inspiring ways in the gallery context. Japanese installation artist Chiharu Shiota uses complex networks of yarn interlaced around and between objects. "The Key in The Hand, 2015" presented in the Japan pavilion during the 56th Venice Art Biennale, is an immersive labyrinth of red yarn with keys attached to the ends that hovered over two large boats. Shiota continues to use string as an extension of an object's body in relation to the architecture of the gallery. Her use of strings to create conceptually living connections also function as visual guides for visitors. Similarly, I work with string to connect microscopic and macroscopic worlds through pattern in order to narrate a conceptual relationship between all living organisms and the universe. The construction of my string installations intervene in spaces and find relationships of form to the natural world. My practice also pursues a different aspect of engagement with the work, one that is more distant and not easily noticeable. Receiving an education in museum and gallery practices in Qatar prior to this program provided an understanding of viewers' expectations. My work attempts to find meaning in the context of particular locations and leads to a different body of work in each gallery context.

As part of my research, it was important to understand mycelium, the vegetative part of fungi, one of nature's organisms that grows multiple layers of webbed patterns. Electronic research and prototyping did not satisfy my need to see these organisms first hand. Therefore, in my studio I grew mycelium in controlled temperatures and lighting to study their movement and development of overlapping live threads, also known as hyphae. For the experiment, I sliced small pieces from the stem of a king oyster mushroom and placed it in between thin moist layers of corrugated cardboard and waited patiently for the fungus to consume the cardboard (fig. 6). Their ability to expand and grow intelligent fibers (fig. 7) created a desire to search for similar

imagery beyond the mycelium structure such as human anatomy, other species, animal architecture, and cosmological discoveries. A desire to experiment, observe and learn from what unfolds are key research based processes behind the physical and metaphorical making. The four installations borrowed these characteristics of layering and intricate patterning of connections in response to their form and repetition from the microscopic to the cosmic.

Figure 6: Day six of growing mycelium, Emily Carr studio

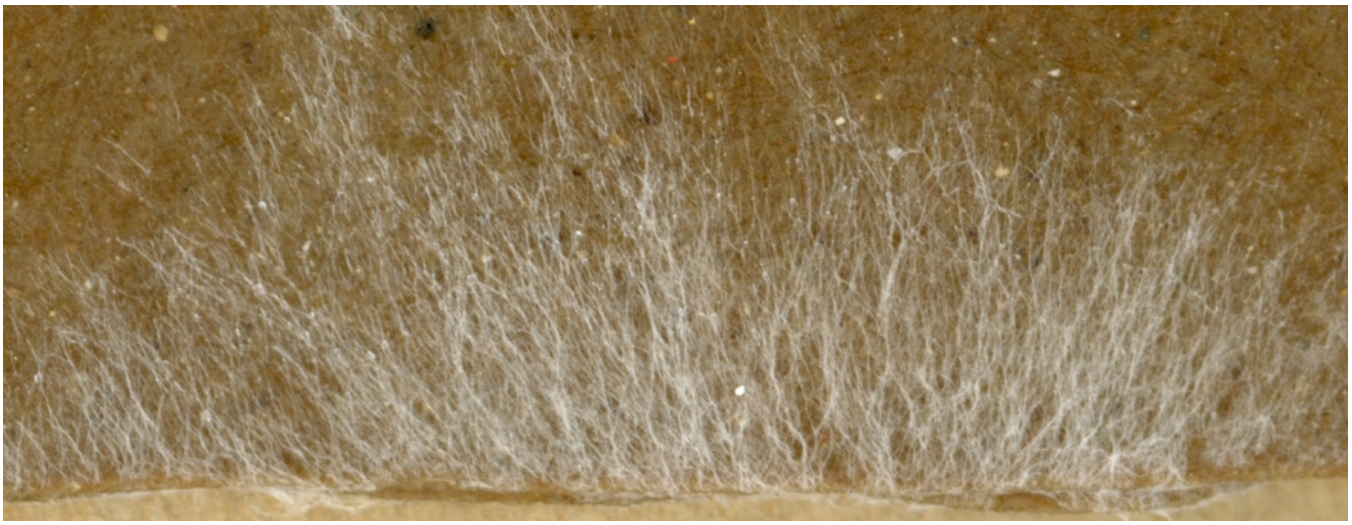

Figure 7: 900 dpi Scanned observation of mycelium, Emily Carr studio

The Shadows of Webs

The Shadows of Webs (fig. 9) is an ephemeral installation composed of cotton string and paper, installed in the Emily Carr University graduate gallery. The work responded to the behavior of mycelium, a communication network with the ability to become a bridge that builds an interspecies relationship. I referenced this concept through a brief study of mycology, a branch of biology dealing with fungi. My interest in mycology began when I discovered that plants, in forests or gardens, are connected through mycelium. Forest ecologist Dr. Suzanne Simard discovered that multiple species of trees are in contact[2] with each other, even though they are competitors for survival. Tall trees use mycelium to transfer nutrient's and sugar's to smaller plants who lack contact from the sun. Fungi appear to be in favor of conciliation and equitable distribution of information and resources (Simard, 2016). I am particularly interested in the co-evolutionary relationship between mycelium and botanical species. Now, while walking I think about the vibration of my feet against the grass that signals a tree nearby. This knowledge that there are mycelium networks underground connecting nature produces a different relationship of my body with the earth, one which is invisible. This feeling of awe with nature drives my intention to translate this concealed connection through my installation.

I am reminded of the artwork by Roxy Paine, who created a stainless metal structure of networks titled *Containment 1*, 2009 (fig. 8). The large form taking up space both negative and positive, responded to the unease between nature and industry, chaos and control, by creating large roots using stainless steel. The artist manipulated the steel structure to move organically through the gallery while addressing the ceiling, floor, and architecture of the space. The

[2] Her research has also opened other categories of distinguishing ways of communication between botany, which is not visible or clear since we are not appropriately equipped to understand nature on that level for now. However, my practice embraces those invisible communication tools and relationships between plants metaphorically.

branching rhizomatic form of the sculpture generated a weightless characteristic in contrast to the material properties. To realize a similar sense of scale I employed cotton strings in the creation of *The Shadows of Webs* (fig. 9) because of the material's historical relation to India and nature.

Figure 8: Roxy Paine, *Containment 1*, Stainless Steel, 2009 (Art Institute Chicago). Used by permission of the institute.

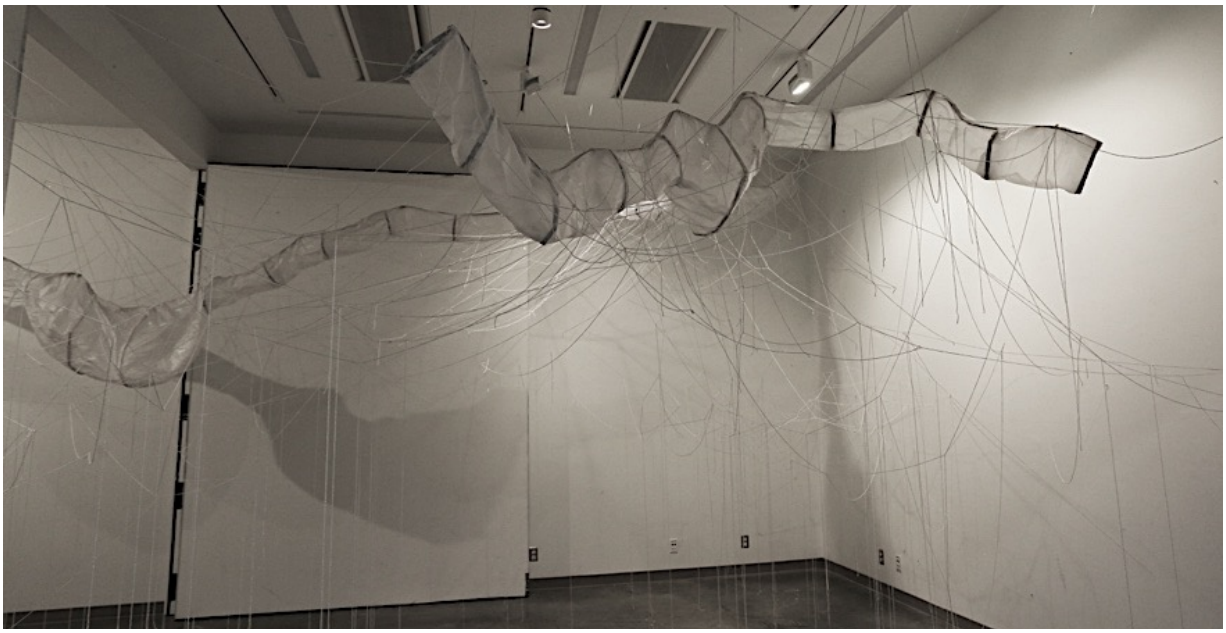

Figure 9: Documentation of *The Shadows of Webs*, 2018.

Learning that Haryana, India was the first region to spin cotton connected me with my material through a deeper ancestral knowledge and sparked my enthusiasm to investigate the limitations of cotton string. This research made me reminisce the excitement for histories embedded within material in relation to my cultural background. The readily available material made the installation occupy a larger space. Whereas the tube structure, made from translucent paper, obscured internal features of entangled strings when hit by lighting. It was strategy to discuss the hidden networks and forms of communication like a pneumatic tube[3], connecting pathways, internal organs and nerves. The direction of the tube was my personal reaction to the architecture of the gallery and like Roxy Pain, I wanted to manipulate the viewer's movement. I intended for the string's to overpower the space and transform the gallery into a chrysalis or a cocoon where viewers are entrapped and made aware of their surroundings. Through this piece I was able to share my attentiveness to what lies above me, below me, beside me and maybe inside me.

In retrospect, *The Shadows of Webs* (fig. 9) could have incorporated more layers of string and additional lighting to emphasize the shadows. There was a hint of dedication and endurance to work with a material that needed patience, especially when dealing with the entangled properties. I gathered research from the critique and discussions of the work through the use of focused questions, and learned that the installation was interpreted as alien or represented a chaotic system. The experience of my peers encouraged me to expand my observations of webbed patterns at the macroscopic level, which is why I looked upward to the stars.

[3] "Pneumatic technology uses power of compressed air blowing hard on one end of a pipe and fires a capsule at high speed through suction from the other end inside the tube. Elon Musk has proposed using a scaled-up version to transport people at speeds of 1100 km/h (700 mph), also known as hyperloop" (Woodford, 2018). The tubes demonstrate an underground physical network that reminded me of the mycelial networks.

Forming Patterns

Forming Patterns (fig. 10) is an audio visual installation focusing on the exploration of patterns from a microscopic to a cosmic perspective. In relation to my inquiry of patterns, I then became curious to understand the role of gravity in regards to the many webbed patterns of nature. The ability for these structures to grow as fractals[4] is a strange mystery I intend to explore. In astronomy, the cosmos is the entire physical universe as a unified whole. The word originated from Greek *kosmos*, meaning "order" "harmony", and "the world" ("Cosmos"). It points to the intricate ways the universe is held together. According to astronomer Carl Sagan, "The nitrogen in our DNA, the calcium in our teeth, the iron in our blood, the carbon in our apple pies were made in the interiors of collapsing stars. We are made of starstuff" (Sagan 141). I was aware that we are physically connected to our environment because we are made of similar elements in the universe. This connection is more than the webbed patterns; it is a relationship that I navigate through my practice. To better understand this unusual performance of relationships through gravity, I tried to connect this concept to theoretical physicist Lisa Randall's explanation of dark matter. "Five percent of the cosmos is a combination of stars, neutrinos, hydrogen and helium, while the remaining 95% is dark matter which has yet to be understood. Dark matter has gravitational interactions and clumps together, it moves through us" (Randall 2018). To know that there is so much dark matter[5] surrounding the universe is fascinating and complicating to bring back to my practice, which is why I will be considering this concept in future work after the completion of my thesis. However, I believe, these

[4] where each part has similar features as the whole. ("Fractal.")
[5] My understanding of dark matter further developed through participation in the *Leaning out of Windows* project organized by Emil Carr University faculty Randy Cutler and Ingrid Koenig.

gravitational forces might be able to explain why these patterns repeat on a microscopic and macroscopic level. I aim to understand dark matter which apparently holds all the systems together and moves through us constantly. "The patterns of Nature are everywhere the same. An interstellar message, intended to be understood by an emerging civilization" (Sagan 180). There is a connection we living organisms share with each other and perhaps the repeated webbed pattern is an important element. Moving through these ideas and mapping out the various patterns in nature helped generate an archive of drawings to make sense of how forms repeat as fractals at different scales of magnitude.

Forming Patterns (fig. 10) presented a series of animated drawings. This installation included twenty-seven drawings of nature's pattern using three projectors along with geophonic and anthrophonic soundscapes in the gallery. Geophony - geo in Greek, meaning earth-related, and phon, meaning sound, relates to non-biological audio sourced from marine or terrestrial elements. ("Geophony."). In contrast, Anthrophony, anthro in Greek, meaning human, and phon, meaning sound, refers to all sound produced by humans, coherent, such as music, theatre, and language, or incoherent and chaotic such as random signals generated primarily by electromechanical means. ("Anthrophony."). The sound element was triggered from learning about geophony, biophony[6] and anthrophony by soundscape ecologist Bernie Krause. He believes that there is the potential for a fuller understanding of the natural environment from what we hear and that these types of sounds produce the signature voices of the ecosystem. Sounds are capable of presenting information that widen the spatial perspective by enveloping a viewer. The addition of celestial white noise recordings to the darkened graduate gallery setting

[6] Biophony, bio in Greek, meaning life, and phon, meaning sound, refers to the collective sound that vocalizing animals create in an environment. ("biophony.")

with the animated drawings, was a strategy I used to magnify the space. The work included nine frames on each screen with multiple animations unfolding at different speeds and modes of repetition.

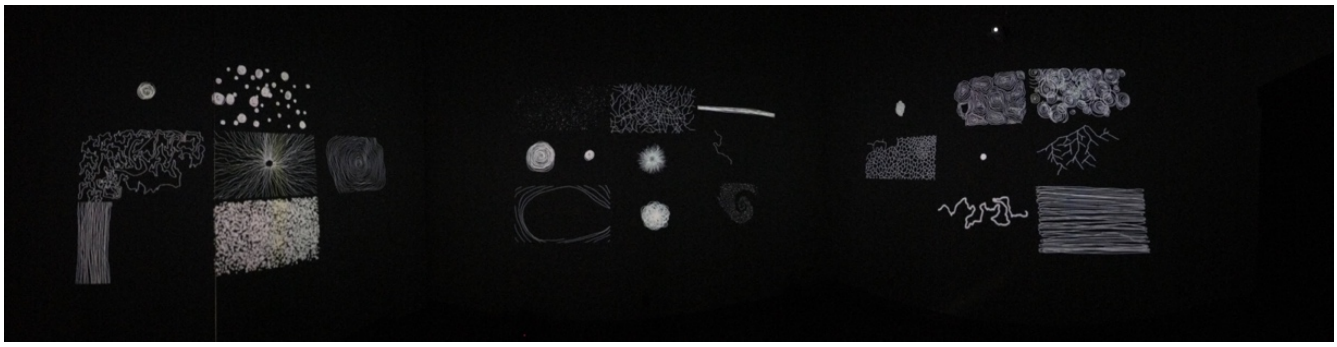

Figure 10: Documentation of *Forming Patterns* Installation, 2018.

Forming Patterns was a process; a process of my understanding that started from my cognitive memory to my hands, to my tablet, and through software editing. As I drew, I got closer to the patterns because I was aware of their formation and I was in control of their design. I was also in control of their arrangement and how they might get interpreted as well as their relationship to time. I wanted my viewer to become curious and spend time with the different patterns the way I did while creating those drawings. I believe there could be more consideration invested in the collection of sounds as it played an important role in establishing the speed of experiencing the installation. I will continue generating an archive of sounds that better connect all the concepts. *Forming Patterns* suggested the possibility of gravity in the structure of these webbed patterns and I want to push that concept past their visual aesthetics. The process of creating multiple iterations is a technique I see myself carrying forward in the planning stages of my research based practice.

Follow Me and Uncertainty ±

Follow Me (fig. 12) is a linear and lengthy installation made from cotton string, combined with *Uncertainty* ± (fig. 13), an ink on canvas mind map. The work takes inspiration from French philosopher Michel Foucault's quote, "we are at a moment, I believe, when our experience of the world is less that of a long life developing through time than that of a network that connects points and intersects with its own skein" (22). The term "skein", indicates a complicated and tangled situation. I decided to consider my embodied relationship with this tangle of webbed patterns by implicating my own anatomy, where the patterns are also present. I am fascinated with the patterns visibility and invisibility, that repeat within the internal and external structures of our bodies, particularly the brain, skin, veins, nervous system and the bronchial tree. When I look at my skin closely, I am made aware of the Blanschko's lines[7] with their creases and crevasses, similar to the sun cracked mud found in deserts after it rains. The structure of the iris is similar to that of mycelium, as it includes multiple layers of thin connective tissues and smooth muscle fibers. My practice has allowed me to recognize how these similar patterns exist within us and in the environment we live in.

My interest with large-scale spatial installations expanded after learning about Tomás Saraceno *14 Billions (Working Title*) 2010 (fig. 11). The artist scanned a black

Figure 11: Tomás Saraceno, *14 Billions (working title)*, 2010. Photo Credit: Andrea Rossetti. Used by permission of the artist and team.

[7] "The lines of Blaschko represent a nonrandom developmental pattern of the skin fundamentally differing from the system of dermatomes. Many nevoid skin lesions display an arrangement following these lines" (Happle).

widow's spider web and reconstructed the structure almost 16 times larger than the original size. He used nylon rope and 23,000 individual tied knots spanning over 400 cubic meters. The work focused on the conversation between the spider web and the cosmic web in the universe. According to the documentation of the work, it encouraged a particular viewer interaction as it filled the gallery space. Previously, I had never considered the impact of context upon an installation such as a white cube gallery setting or even an art school. These locations are directed to a certain demographic of individuals, mainly art students, and as a result this work purposefully experiments with space, materials, height and dispersal. *Follow Me* attempted to contradict an ideal gallery setting by applying characteristics of separation and inaccessibility seen with spider webs and habitats in peculiar places. *Follow Me* (fig. 12) and *uncertainty* ± (fig. 13), involved two different approaches towards understanding the body's relationship to pattern as well as an artworks relationship to space and context.

Figure 12: Documentation of *Follow Me*, 2018.

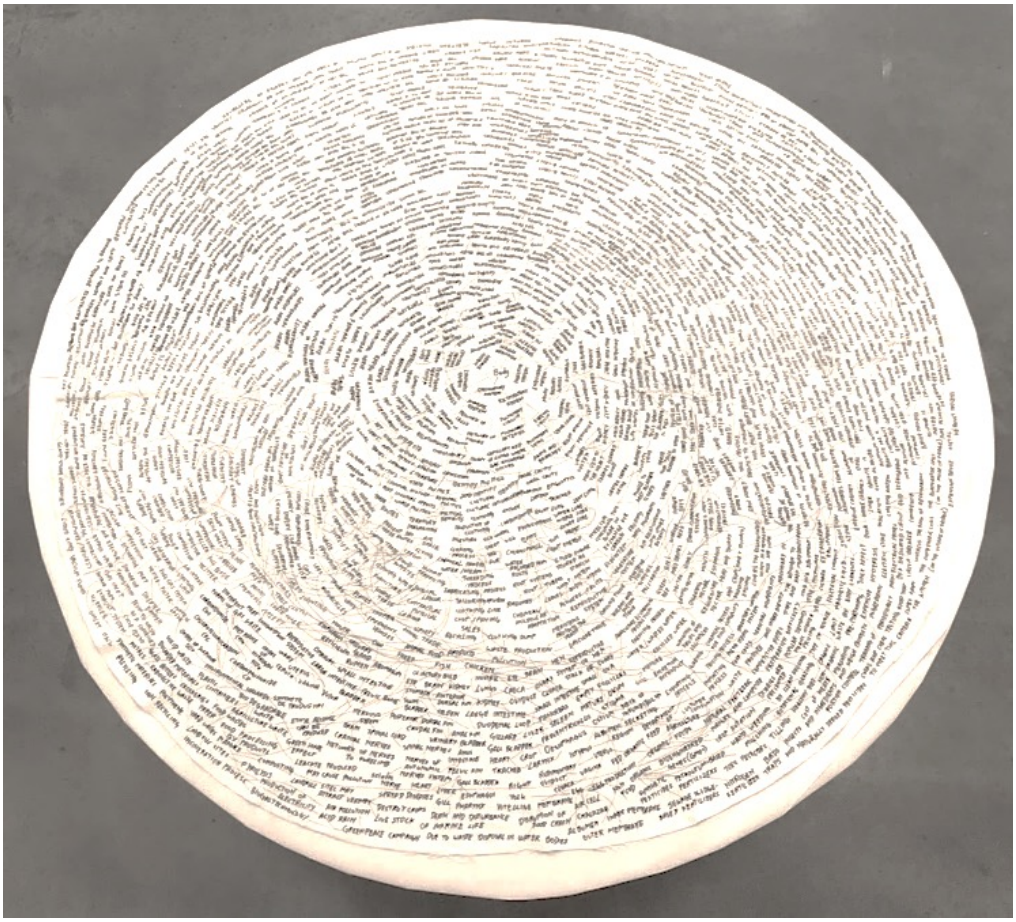

Figure 13: Documentation of *Uncertainty* ±, 2018.

Follow Me reused cotton string from *The Shadows of Webs* and addressed the viewer's encounter with the material. The piece consisted of multiple strings tapered together to form a single line, placed six feet above the ground in a hallway situated near the fire exit. *Follow Me* was a response to how I think about the multiple nodes of research coming together, the nervous system in my body triggering the activity in my brain, and the multitude of living organisms connected as a single entity like the universe. Whereas, *Uncertainty* ± (fig. 13), a framed circular mind map, noted down relationships of natural and mechanical systems that stem from the body to the outer world. I had a desire to implement my research into a straight forward

manner because I am invested in the abundance of literature I have encountered as much as my art making practice and see them moving me in similar ways. The use of text was understood as a productive strategy for articulating the weight and complexity of these borrowed scientific theories in a contained and accessible approach. The work made it easy for a viewer to follow my train of thought as I conduct my research and demonstrated a robust understanding of my material. These connections and relationships automatically revealed this webbed structure of information. As a result of the complex information, I was compelled to show two responses to the webbed patterns that bring together concepts of interconnectedness and interdependent systems in relation to a human body.

Hidden in Plain Site

Hidden in Plain Site (fig. 15) was a series of site-specific installations, made from cotton string and accompanied by geophony and anthrophony soundscapes. The work was physically dependent on the placement in relation to the architecture of the space, inspired from the patterned habitats of the weaver bird, spider and silkworm. My curiosity to learn how other species use the webbed pattern as components to the structural integrity of their habitats led me to embody their behavior as a creator of similar webbed archetypes. Animals have been building intricate structures long before humans. The weaver bird, spider, and silkworm use their own production of silk, saliva, and found materials to create suitable living conditions. The weaver bird, found in India, build their nests hanging over water and are known for their elaborately woven architecture. Their ability to forage material's to construct nests reinforced my decision to work with cotton string since it is readily available. Equally inspiring are spiders in their production of different web patterns that are strong due to their ability to generate customizable silk that serve different purposes. Research suggests that some spiders rebuild their snares every day by eating their older webs and recycling the silk (Harris). As I embarked on the production of installations for the MFA Thesis Exhibition, the reuse of cotton strings was an important strategy to recycle materials into new forms. *Hidden in Plain Site* (fig. 15) explored constructed habitats in unconventional sites in an art gallery that are informed by the behaviors of habitats in the natural environment.

I drew on Abbas Akhavans' work, *Fatigues* 2014 (fig. 14), as an inspiration to create large scale installations through smaller interventions scattered throughout the gallery. Akhavan's *Fatigues* consists of taxidermied animals mounted in unconventional dead postures as a monument to perpetual death, making them "doubly dead". The discrete nature of their

placement at the La Biennale de Montréal 2014 was designed to "trigger an encounter with animals, which we experience daily in their state of absence and disappearance" (Akhavan). Similarly, I am interested in how small installations can be experienced through a peripheral gaze as the viewer walks toward the larger works. These multiple intervention's

Figure 14: Abbas Akhavan, *Fatigues*, 2014, taxidermy animals, dimensions variable. Installation view, L'avenir, La Biennale de Montréal 2014, Musée d'art contemporain de Montréal, Montreal, Canada, 2014. Photo: Paul Litherland. Courtesy of Catriona Jeffries. Used by permission of the artist.

reference the ability of certain living organisms in the natural environment to consume spaces, whether human, animal, or botanical. These entities respond to the architecture of the Michael O'Brian Exhibition Commons Gallery at Emily Carr University. I specifically took up unconventional spaces such as the ceiling, pillars and corners in an art school, as a means to challenge historically constructed art installation methods. I wanted to challenge the norms of an

exhibition display, much like the artists Akhavan and Shiota. This process generated an experimental viewing opportunity for the string sculptures which I intend to explore after the program. I envisioned the building's array of different corners and heights as potential habitats for fictitious creatures large and small as a reminder of nature's complex collection of organisms and habitats. I manipulated cotton strings into a variety of nests that referenced an ecology of cohabitation between creatures in the gallery. The composed geophonic and anthrophonic audio component within the nests created their own strange environments reflecting the over stimulating sounds in our everyday.

I reused the string from the previous installations and explored its properties and propensities. For example, I allowed gravity to dictate the structure of the many habitats as they occupy space over the duration of the exhibition. I am persistently invested in the labor intensive processes involved in working with the constantly knotted and tangled nature of string. I understand this work as a reflection of my own displaced experience coupled with ongoing investigations of patterns in the universe. It emphasizes my relationship to land, to people, to home, to other life forms, to sound, and to an experience, in order to find my place in the natural environment.

Figure 15: *Hidden in Plain Site*, 2019.

Figure 16: 8/14 Installation of Hidden in Plain Site, 2019.

Relationship Through Pattern

The ephemeral installations in this thesis responded to the existence of webbed patterns in the universe that connects all living organisms. By engaging in an array of invisible phenomena and diverse research, I am inspired to continue manifesting an ongoing series of installations that generate similar sensory encounters and questions about the repetition of patterns. My practice is interested in nature's interconnected intelligence and adaptive systems because all organisms are connected through similar molecular compositions, visible or concealed patterns of networks and interlacing systems. This journey is in dialogue with artists Roxy Paine, Tomás Saraceno, Chiharu Shiota, Neri Oxman and others, interested in the fusion of science and art through the lens of a more than human world. This collaboration of disciplines looks for a space where neither nature nor man dominate the environment. I intend to find ways to metaphorically position my practice in a time where anthropocentrism and biocentrism can collide in one space. I feel a sense of urgency to find creative ways to comprehend the complexities of existing patterns in a generative perspective, allowing the work to inhabit different sites. As nature's various organisms take up space under specific conditions, their choices are seen as levels of negotiations instead of interruptive decisions. Similarly, my site-specific installation is a compromise between being present in a gallery and behaving like nature. *Follow Me* and *Hidden in Plain Site* challenged the conventions of display in a gallery space because I wanted the material to have a performative element as it intervened in the architecture of the art building. However, as this paper is not looking for definitive conclusions or solutions I learned that there could be other sources of interpretations that could inform the complexity of the work.

In light of the thesis defense, my practice will benefit from identifying new materials that better connect with the research. Additionally, there are possibilities of site-specificity through the lens of feminist theories of occupying space and addressing a more politically nuanced engagement with work. These new profound concepts cannot be framed in a single work or even a singular scientific discipline. Instead I have explored an interdisciplinary research based approach to capture the layers and permutations. I am departing this program knowing that my practice carries imaginative connections to a cohabitant ecosystem and invasive organisms within the context of an art gallery and will continue pursuing that research. I am headed in the direction of collaboration with scientists and artists who are open to the experience of emergence through the sharing of new knowledge. I anticipate that these future encounters will allow me to think beyond my singular body and into a collective engagement with human and non-human collaborators. Through the research and process based methodologies, my practice examines ways in which science supports and informs a creative process that merges patterns and relationships through installations. I will continue this line of inquiry knowing that I am connected to all living organisms.

Works Cited

Adams, Damian. "When Does Invasive Species Removal Lead to Ecological Recovery? Implications for Management Success." *Springer International Publishing*, Aug. 2017, www.researchgate.net/publication/319469149_When_does_invasive_species_removal_lead_to_ecological_recovery_Implications_for_management_success.

Akhavan, Abbas. *Fatigues*. abbasakhavan.com/?page_id=930.

"Baya Weaver." *Beauty of Birds*, www.beautyofbirds.com/bayaweavers.html.

Burkhardt, Richard. *Patterns of Behavior: Konrad Lorenz, Niko Tinbergen, and the Founding of Ethology*. University of Chicago Press, 2005.

C. Patten, Bernard. *Systems Ecology and Environmentalism: Getting the Science Right. Part II: The Janus Enigma Hypothesis*. Vol. 335, 2016, doi:10.1016/j.ecolmodel.2015.10.020.

Capra, Fritjof. *The Web of Life: A New Scientific Understanding of Living Systems*. Anchor Books, 1997.

"Cosmos." *Encyclopaedia Britannica*, www.britannica.com/science/Cosmos-astronomy.

Foucault, Michel, and Jay Miskowiec. "Of Other Spaces." The Johns Hopkins University Press, vol. 16, no. 1, Spring 1986, pp. 22–27.

"Fractal." *Cambridge Dictionary*, dictionary.cambridge.org/dictionary/english/fractal.

Hagan, Martin. *Neural Network Design 2nd Edtion*. Mark Hudson Beale, 2014, hagan.okstate.edu/NNDesign.pdf.

Happle, Rudolf. *Human Genetics: Lyonization and the Lines of Blaschko*. Vol. 70, 1985, link.springer.com/article/10.1007/BF00273442.

Harris, Steve. *14 Incredible Spider Facts*. www.discoverwildlife.com/animal-facts/insects-invertebrates/facts-about-spiders/.

Hesse, Eva. “No Title 1969-70.” *Whitney Museum of American Art Collection*, 1970.

“Invasive.” *Cambridge Dictionary*, dictionary.cambridge.org/dictionary/english/invasive.

“Invasive Fish Species Could Threaten B.C. Salmon.” *CTV News*, 26 Aug. 2012, www.ctvnews.ca/canada/invasive-fish-species-could-threaten-b-c-salmon-1.930505.

Jimmytst. *Nature and Us Exploring Physical and Human Geography and Understanding the Interrelationship between Nature and Us: Interconnectedness of Trees and Rivers – Network Patterns*. Apr. 2013, natureandus.wordpress.com/tag/veins/.

Kurin, Richard. *The Silk Road: Connecting People and Cultures*. 1976, festival.si.edu/2002/the-silk-road/the-silk-road-connecting-peoples-and-cultures/smithsonian.

Morrissey, David. *Leaning Out of Window: Meeting*. 5 Dec. 2018.

“Network.” *Cambridge Dictionary*, dictionary.cambridge.org/dictionary/english/network.

Paine, Roxy. *Containment 1*. 2009. *Eli and Edythe Broad Art Museum*, msutoday.msu.edu/news/2012/eli-and-edythe-broad-donate-works-to-broad-art-museum-at-msu/.

Pollan, Michael. The Botany of Desire: A Plant’s-Eye View of the World. Random House Publishing Group, 2001.

Randall, Lisa. *Lisa Randall: Atoms Only Make Up 5% of Our Universe. The Rest Is Dark Matter and Energy*. Wired UK, 2018, www.youtube.com/watch?v=47__sGHfaBE.

Sagan, Carl. *Cosmos*. Random House.

Saraceno, Tomás. *Hybrid Webs*. 2013.

Saoud, Rabah. *The Muslim Carpet*. muslimheritage.com/article/muslim-carpet.

Simard, Suzanne. *How Trees Talk to Each Other*. 2016, www.ted.com/talks/suzanne_simard_how_trees_talk_to_each_other.

Simard, Suzanne. “Net Transfer of Carbon between Ectomycorrhizal Tree Species in the Field.” *Nature*, vol. 388, 1997, pp. 579–82.

“Skein.” *Cambridge Dictionary*, dictionary.cambridge.org/dictionary/english/skein.

Stamets, Paul. *Mycelium Running: How Mushrooms Can Help Save the World*. Ten Speed Press Berkeley, 2005.

Tyson, Neil. *Cosmos: A Spacetime Odyssey*. 2014.

Ware, Colin. *Information Visualization : Perception for Design*. San Francisco : Morgan Kaufman, 2000.

Wohlleben, Peter, and Jane Billinghurst. *The Hidden Life of Trees: What They Feel, How They Communicate—Discoveries from A Secret World*. Greystone Books, 2016.

Woodford, Chris. *Pneumatic Tube Transport*. Nov. 2018, www.explainthatstuff.com/pneumatic-tube-transport.html.