Learning to See the Unknown

Drawing Out the Strange

Hayley Carruthers

Learning to See the Unknown: Drawing out the Strange

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Abstract

Learning to See the Unknown: Drawing Out the Strange is a thesis project that takes a speculative approach to reflecting on subjective experiences of mental imagery, perception, and other neural phenomena. Entangled with ways of understanding from scientific knowledge practices within neuroscience the work engages with histories of scientific renderings that visualize the invisible.

Examinations of neuroculture reveal ongoing interconnections between art and neuroscience. Scientific imaging processes of the brain render visible invisible phenomena, such as thought and consciousness. Artistic interplay with this type of imaging exposes ambivalent possibilities in what it means to see and think, challenging the scientific understanding of mind and perception. In my studio practice I begin to develop a methodology that 'excavates' my subjective neural experiences and interconnects the experience with emerging theories of neuroscience phenomena. Starting with my own experience of the strangeness of neural phenomena and utilizing a process of making that corresponds with the performance of material, I create a series of drawings that resist making the strange familiar. How can I visualize the unknown but maintain a strangeness, an ambiguity, that resists the apprehension of knowability?

This thesis examines several works *Untitled Light Space, Untitled Darkness,* and *Untitled Mental Specimen Space* and engages with works from other artists and theories surrounding light, perception, neuroscience and the relationship of objectivity and subjectivity in art and science. The thesis includes interludes of poetic writing that reflect on and attempt to convey the odd neural sensations I experienced as a child which are driving forces for some of the work.

Thank you to my super supervisor Ingrid Koenig for your cosmical knowledge, keeping me grounded, and provoking new questions.

Thank you to my friends and amazing cohort who I love dearly.
This work would not have been able to come together without your kindness, generosity, jokes, and after studio drinks.

And lastly thank you to my parents, brother, and sister-in-law for continuing to send me many photos of the family cats.

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Acknowledgement

I am a fourth generation, white, able-bodied, cis-gendered female of western European descent living in Canada. I was born and raised in Calgary, known as Moh'kinsstis, the traditional Treaty 7 territory of the Blackfoot confederacy (comprising the Siksika, Piikani, and Kainai First Nations), the Tsuut'ina First Nation, the Îyâxe Nakoda (including the Chiniki, Bearspaw, and Wesley First Nations), and the Métis Nation (Region 3). This thesis, and the research and artworks described in this thesis were written and created on the unceded, traditional and ancestral land of the Coast Salish Peoples, which includes the territories of the Musqueam, Squamish, and Tsleil-Waututh Nations. It is on this land that I currently reside as an uninvited guest.

Moving as a treaty person onto unceded land has made me re-examine the privilege of my body and the space it takes up. Every morning I am reminded of my settlerhood. I try to re-evaluate and be aware of how I move through the land and how I move through my mind. The land acknowledgment is a reminder that I do not get to feel comfortable here. It is a reminder to resist making familiar the feeling of my comfort and the injustice and oppression of others. It is a reminder to carry care with me and remember that everything is not as it seems.

Introduction

This thesis project takes a speculative approach to reflecting on subjective experiences of mental imagery, perception, and other neural phenomena. Entangled with ways of understanding from scientific knowledge practices within neuroscience, the work engages with histories of scientific renderings that visualize invisible neural phenomena to challenge understandings of the mind and perception. My studio practice proposes how artistic interplay could alter how one thinks and sees where one can become conscious of the unknown as a field of generative inquiry. Through an artistic process how can I visualize the unknown while maintaining a strangeness, an ambiguity, that resists the apprehension of knowability?

My studio practice proposes a methodology of not knowing and remaining open to strangeness by using a process of drawing. Drawing is a medium of transmutation; bringing to fruition a 'real' element through drawing creates a possibility for change and transcendence. It creates a space for wonder and possible subversion of the desire to make the strange familiar. In Rachel Jones' writing *On the Value of Not Knowing: Wonder, Beginning Again and Letting Be,* she quotes Luce Irigaray stating that when we make the strange familiar "we avoid the problem of meeting with the stranger, with the other. We avoid letting ourselves be moved, questioned, modified, enriched by the other as such." Part of the artistic work is remaining open to strangeness. Learning to see the strange restores the everyday as a place of marvel and wonderment (Jones 1).

One of the challenges encountered in this work has been how to resist making the strange familiar while revealing the entangled knowledges of art and science. Artistic work can embrace ambivalence and resist classification when reflecting on the strange. For instance, the Surrealists were invested in making the familiar strange; my practice instead begins with examining the strange, but not to make it familiar. I visualize the subjective experience of neural phenomena by corresponding with material in the studio. Subjectivity and imagination cannot be captured in the purely scientific. Drawing is a generative and transformative method that contrasts with science's process of classification.

Contemporary observations of neuroculture suggest that neuroscientific influences on art are part of a larger cultural phenomenon. Neuroculture, as identified by artist and theorist Susanne Anker and writer Giovanni Frazzetto, acknowledges how neuroscience knowledge intersects with our daily lives, social practices, and intellectual discourses. Anker and Frazzetto point out artistic interplay with neuroscientific images that render visible invisible phenomena (such as thought and consciousness). Intersecting with neuroscience, artistic narratives can function in the realm of ambiguity and sometimes irony to offer insight about individuality that scientific processes have no way of integrating (819). Artistic engagement with neuroscience has spanned centuries; noted by the

illustrations of neuroscientist Santiago Roman y Cajal, biologist and pathologist Camillo Golgi, and biologist and zoologist Ernst Haeckel[1]; influencing the Surrealists, such as Max Ernst and his collages with scientific images[2]; and influencing contemporary artists, such as Elizabeth Jameson and Susan Aldworth who engage with neuroscience imaging and modern technologies to create work that explores consciousness and the sense of self[3].

In current scientific discourse, the relationship between neuroscience and other disciplines is more complex than that of neuroscience just having influence or impact.[4] Neuroscience has replaced the old model of the brain as a 'single centralized source of control' to one that has emphasized 'plasticity' –the quality by which our brains develop and change throughout the course of our lives. In her book *What should we do with our brain?,* neuroscience philosopher Catherine Malabou develops another meaning for plasticity arguing for a 'destructive plasticity', such that plasticity allows our brains to adapt to existing circumstances and also opens a margin of freedom to intervene and change those circumstances (Malabou).

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[1] Santigo Ramón y Cajal's (1852-1934) colourful and intricate drawings sought to reveal internal structures of the brain. Cajal supported the neuron doctrine, the idea that the nervous system is made of discrete individual cells (Daston and Galison 115). Camillo Golgi (1843-1926) developed the 'black reaction', a method of staining to make visible the nerve cells of the brain. Golgi had a holistic view of the brain, arguing that neurons could not be isolated from one another because "the finest branches of their axons intermingled, giving rise to an inextricable network or net" (Daston and Galison 115). Ernst Haeckel (1834-1919) dedicated himself to the study of unicellular organisms (protozoans) and catalogued over 100 detailed illustrations of different species (Eibl-Eibesfeldt 19).

[2] In addition to utilizing scientific images, surrealists also idealized and took imagery from indigenous nations believing that indigenous cultures retained "a potency lost by Western art". Surrealists collected stolen indigenous art from North America. For instance, André Breton had acquired a Kwakwaka'wakw headdress that was confiscated from the community after a 1921 raid by the Canadian government on a local potlatch. It was not until 2003 when Breton's daughter, Aube Elléouët-Breton, travelled to Alert Bay BC on the traditional Kwakwaka'wakw territory to return the headdress (Lederman 2011).

[3] Elizabeth Jameson uses medical technology, transforming brain scans as a way of taking ownership of her Multiple Sclerosis (Jameson 2020). Susan Aldworth experimented with etching techniques to develop a method of chemical processes that are analogous to those in the brain that might be responsible for personality (Aldworth).

[4] In his article "Brainhood, anthropological figure of modernity", psychologist and science historian, Fernando Vidal explains "brainhood" calling to attention the "quality or condition of being a brain"(5). Vidal explores the historical development of brainhood and argues that the notion of self as brain is not based on neuroscientific knowledge but rather impelled neuroscientific investigation. He suggests that the "cerebral subject is the anthropological figure inherent to modernity (at least insofar as modernity gives supreme value to the individual as autonomous agent of choice and initiative)" (5).

These ideas have informed my studio practice and my attempts to visualize the processes of seeing how one thinks. They influence the approach I take to making; I reflect on how the material and studio process enact or echo scientific processes for visualizing neural phenomena. They also impact the ways in which I consider that role of my mind as I think through drawing, my body, and material to navigate my underlying neural reality.

Personal Knowledge

My mom is a nurse. She worked in labour and delivery for a long time before becoming a recovery nurse at a plastic surgery clinic. Because of her I was able to get a job at the same clinic at the age of 13. I did most of the cleaning and organizing jobs that no one had the time or desire to do. I cleaned fat out of liposuction infiltrators, ran the bloody laundry, sterilized surgery instruments, brought tea and cookies to recovering patients, sat for ten minutes holding a half-lucid patient's hand while she told me of her intense craving for chicken. I assisted in a few hair transplants, craning my neck to tediously slice separate strands of hair out of cut sections of scalp. I worked there for 7 years while I went from middle school to high school to university.

My dad spent his childhood in and out of surgery. He was born with one ear. I remember seeing his scars as a child and him telling me that they took skin from other parts of his body to build him an ear. He was a stay-at-home dad or a bring-your-kid-on-site dad. He started an independent hardwood flooring company when my older brother was born. A lot of my younger days were spent with my brother sitting in strangers' homes watching my dad knock in floorboards on his hands and knees.

I grew up considering the body; the pain and transformation it could endure and the physical labour it can take up. I wanted to be in touch with what was inside the body and the mind, to watch the processes of life and know how they functioned. When I considered going to university I applied for Psychology, then reapplied to study Biology. I then changed majors after my first year to Fine Art. A once crisp white lab coat I took from work to use in bio labs is now covered in ink splotches and paint splatters. I have a scalpel in my pencil case because the blade is the best for sharpening pencils. I keep a box of the surgical gloves I wore at the clinic. They now protect my hands from ink instead of blood and grease.

Several visions stick out from my childhood.

The dark wall of my bedroom would float into the distance, making room for something else to fall before my eyes.

There is one vision of string and another of lumps. Only they were not really string and not really lumps. They were some other strange form that terrified me. The visions existed in a space that was not really a space where I, as an observer, felt both insignificant and infinite.

I can think back to the visions like a vivid memory. When I try to re-vision the lumps one my arms fester. My gums become heavy and expand in my mouth. I feel on the cusp of a panic attack. Bright silver pangs in my elbows, the back of my neck, the base of my skull.

My brain shudders and says No. No-no-no-no-no no.

Mind Stuff

I use this term ‘mind stuff’ to describe an assortment of mental phenomena that will be outlined in this chapter such as the hypnagogic and the hypnopompic, Alice in Wonderland Syndrome, and synesthesia (ie. all these components are bits of mind *stuff* and stuff of my mind). But also to reflect on the meaning of the term by mathematician and philosopher William Kingdon Clifford. In his 1878 article “On the Nature of Things-in-Themselves”, he coins the term Mind-stuff(n) as the single substance that constitutes reality –the elements of which consciousness is derived. Clifford suggests that since consciousness exists in humans and humans evolved from matter; then matter must also possess consciousness. Mind stuff can be correlated with Panpsychism, the doctrine that everything material has an element of consciousness (Chalmers 246). In her book *For the Love of Matter*, ecological philosopher Freya Mathews describes how Panpsychism challenges the dualistic point of view that mind and matter are distinct substances –mind as sheer interiority and matter as sheer externality (26).

As a child, I experienced vivid mental sensations of strange, amoeba-like, cellular forms that induced a synesthetic or empathic response in my body[5]. The forms had different colours and shapes, situated in what appeared to be an internal indistinguible space. They would appear together or alone, in brief flashes or long periods of time. They arose during the between states of waking I later came to know as the hypnagogic and the hypnopompic. ‘Hypnagogic’ experiences, coming from the Greek word *agogos* (leading in) refers to hallucinatory events occurring between wakefulness and falling asleep. ‘Hypnopompic’ experiences, coming from the Greek *hypnos* (sleep) and *pompe* (sending away) refers to a phenomena of hallucinatory events occurring on the way out of sleep (Warren, 2007). I remember some of these visions distinctly; several of which have followed me into adulthood. On occasion I’ll have experiences of new visions with similar forms and vividness yet I wonder about their authenticity. Sometimes it is as if my mind decided to make them for me because I wanted it to.

[5] I pick up emotions and tingles from certain objects and textures –which may be a form of synesthesia– but I think of it as empathic responses. When referring to these ‘vivid mental sensations’ (or visions), I use the terms synesthetic and empathic to describe corresponding physical and emotional sensations that occur in response. Most commonly I experience shivers and silver tingles on the back of my neck and tips of my elbows. Some visions made me sad and anxious, as if I was experiencing emotions that were not my own. Some visions opened up new synesthetic connections that I don’t typically experience, such as momentarily hearing colour.

I lie in bed. The room is dark. I am still becoming used to my own awareness of how my eyes can adjust to the fainter light. It is an odd sensation, to really pay attention to my eyes for the first time. There are strange things to see in the dark. Not monsters that hide in closets and under beds, but strange pictures that lay over the shadows, a layer between me and the physical world that I can no longer see.

Then my brain starts to glitch again. It grows too large for my skull. My gums push on my teeth. Parts of my body feel like they are expanding. Time is growing, and moving faster and faster. Too fast. Collapsing. The bed jilts sharply. The headboard moves to the left, the feet to the right. Over and over. I try to speak to my brother in bed across from me. The bed keeps shaking. My brain mimics its motion, infinitely expanding against my skull. Eventually it stops. My head is back to being still. I can speak now. I tell my brother an alligator was shaking my bed.

Yes. It must have been an alligator.

Childhood was a strange time. As my brain was developing I experienced what I fondly call ‘brain glitches’, but can otherwise be explained as Alice in Wonderland Syndrome (AIWS). Most common at night and in young children, AIWS describes a set of symptoms with alteration of body image. “An alteration of visual perception is found in the way that the sizes of body parts or sizes of external objects are perceived incorrectly” (Weissenstein, Luchter, and Bittmann, 303). Parts of the body and external objects can be perceived as growing, shrinking in size, or farther away. Sense of time can also be warped. When a bout of AIWS occured, it was like I was temporarily living within the lens of a microscope. My body expanded but would become small as time and space grew and shrunk around me. It was like I was travelling at great speed, the faster I went the more compressed I felt. In those moments my experience of reality became strange, I existed temporarily in a space that was not real.

I have colour grapheme-synesthesia[6]. Letters, numbers, punctuation marks and some symbols have an inherent code of colour. The colours have remained the same since I can remember and they each have their own specificity. 5 is red but not just any red, a happy red closer to turning orange than purple. A is yellow but not just any yellow, a sharp warm yellow, calming but altering. It is as if I see double. The colour associations take place within an alternative field of view. A black and white page of text is also a symphony of colour. It is not just what I see, but what I hear and think that also has colour. If I hear a new word and cannot visualize how it is spelt it sounds like mushy naked letters and looks like a ‘*plop*’. The colours I experience would be different from the colours a fellow synesthete would experience. Writer Vladimir Nabokov and his editor and wife Véra Nabokov were both colour-grapheme synesthetes, however they saw different colours. Nabokov discovered that their son also saw letters in colour. “We asked him to list his colours and we discovered that in one case, one letter which he sees as purple, or perhaps mauve, is pink to me and blue to my wife. [...] So the combination of pink and blue makes lilacs in his case. Which is as if his genes were painting in aquarelle” (Nabokov 1962).

The mind can be a strange place. I always wanted to know what was going on with my head. If I could understand that I could understand my relationship with reality. But what I ended up looking for –in a world that wants to categorize and taxonomize– was a way to remain open to the strangeness of how the world can be perceived.

[6] As illustrated [as close to actuality that I can] in the title of this section.

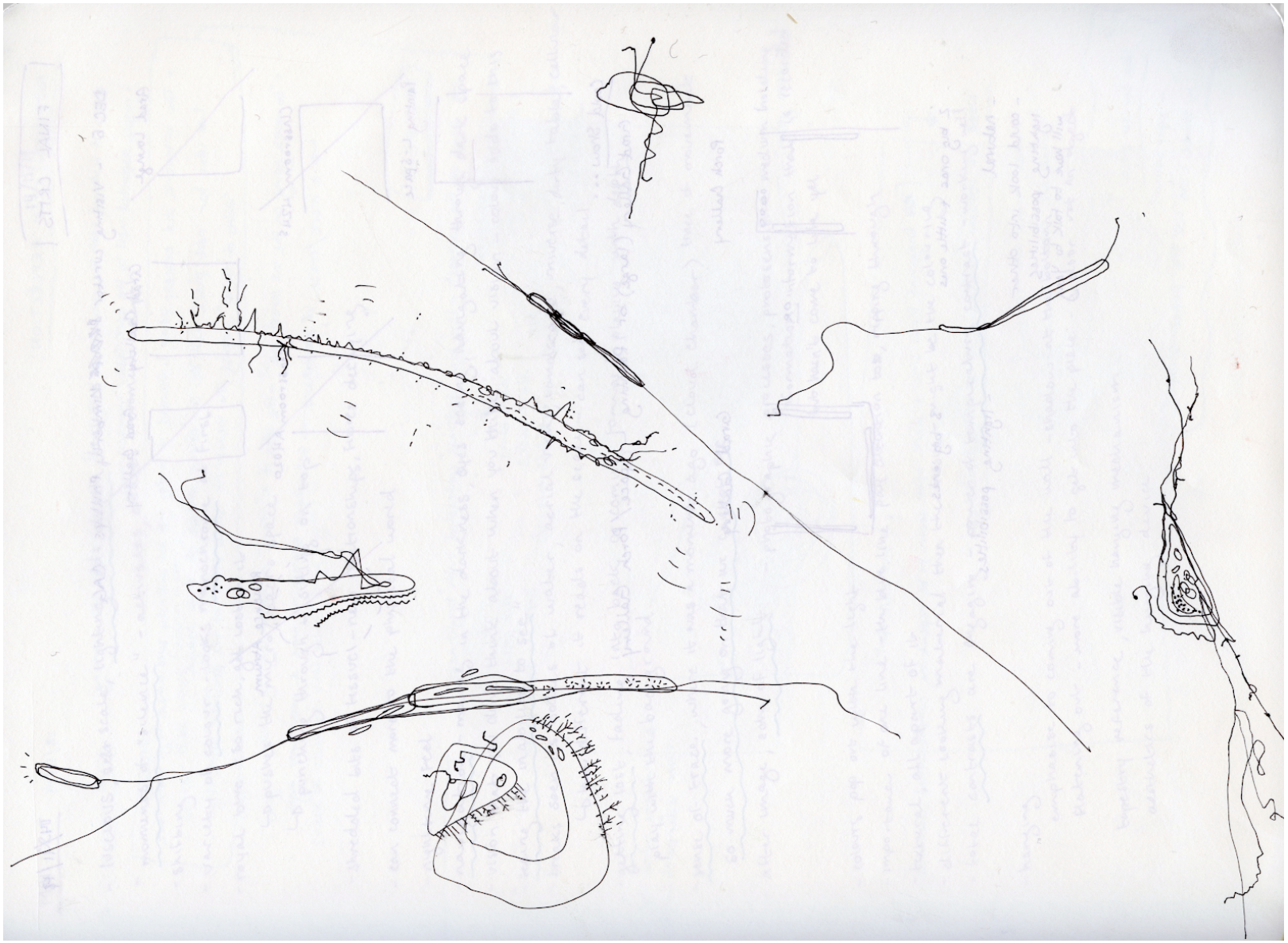

Figure 1. Hayley Carruthers. Scan of sketchbook doodles. 2019

Drawing out the Strange

Compelled by the wonder and strangeness in my experience of being, my work explores mental imagery, perception and other mental phenomena. Utilizing ways of understanding from neuroscience and visual languages of scientific imagery (such as microscopy), I draw upon my own internal space to pull out images from memory and give them a material presence while not wanting them to become familiar –to let them exist in their strangeness.

I can transmute these experiences through my body, exploring my 'personal knowledge'[7] through the relationship between my mind, hand, and material. As phenomenological anthropologist Timothy Ingold suggests, "personal knowledge is not buried deep down in the psyche rather than raised up at the forefront of consciousness" (111). My personal knowledge of internal experiences is not submerged. It is in the forefront of my everyday experience. Yet it is hidden, not focused on or articulated the same way other knowledge exists. It requires a different method of 'fetching'. The practice of making and the correspondence with material allows me to tap into this knowledge.

I use drawing as a substitute microscope; a process to perceive the intangible internal moments of my reality. Reflecting on my experienced mental images I began by drawing in quick succession representations of the strange forms. Starting as line drawings with charcoal on paper (fig. 1) I then moved to alcohol inks on silkspan tissue paper as it allowed for a formative and organic representation (fig. 3). The fluid reaction of the alcohol ink with the tissue allowed me to find ways of coaxing the ink while simultaneously letting the ink direct itself. This distribution of ink by the fibres of the paper created a space for the controlled and uncontrolled relationship between how I intended to direct the drawing and how the drawing wanted to enact itself –a metaphor, perhaps, for the tension between the control in recreating a mental image and the fickleness of the image to take hold.

I was searching through a bucket of vast space. As I pulled out forms new ones approached –free to flow from the depths of my mind into a gesture on paper. The original mental imagery still belonged in my mind and what came out was an approximation of my experience. In this process of externalizing the forms started to become something 'other'. Some repeated and mutated. Drawing after drawing, the forms revealed themselves into new specimens. Influenced by Santiago Ramon y Cajal's drawings from the

[7] When referring to 'personal knowledge' in this thesis I am alluding to my own internal subjective sensations such as memories of mental imagery and visions, and other neural phenomena.

microscope, I laid the forms out on the tissue paper as if they were slices of life on a slide. I ended up with a series of small drawings that catalogued the forms. The drawings fluctuate between spaces of real and unreal, internal and external, strange and familiar. They created an opportunity to be in the realm of not knowing.

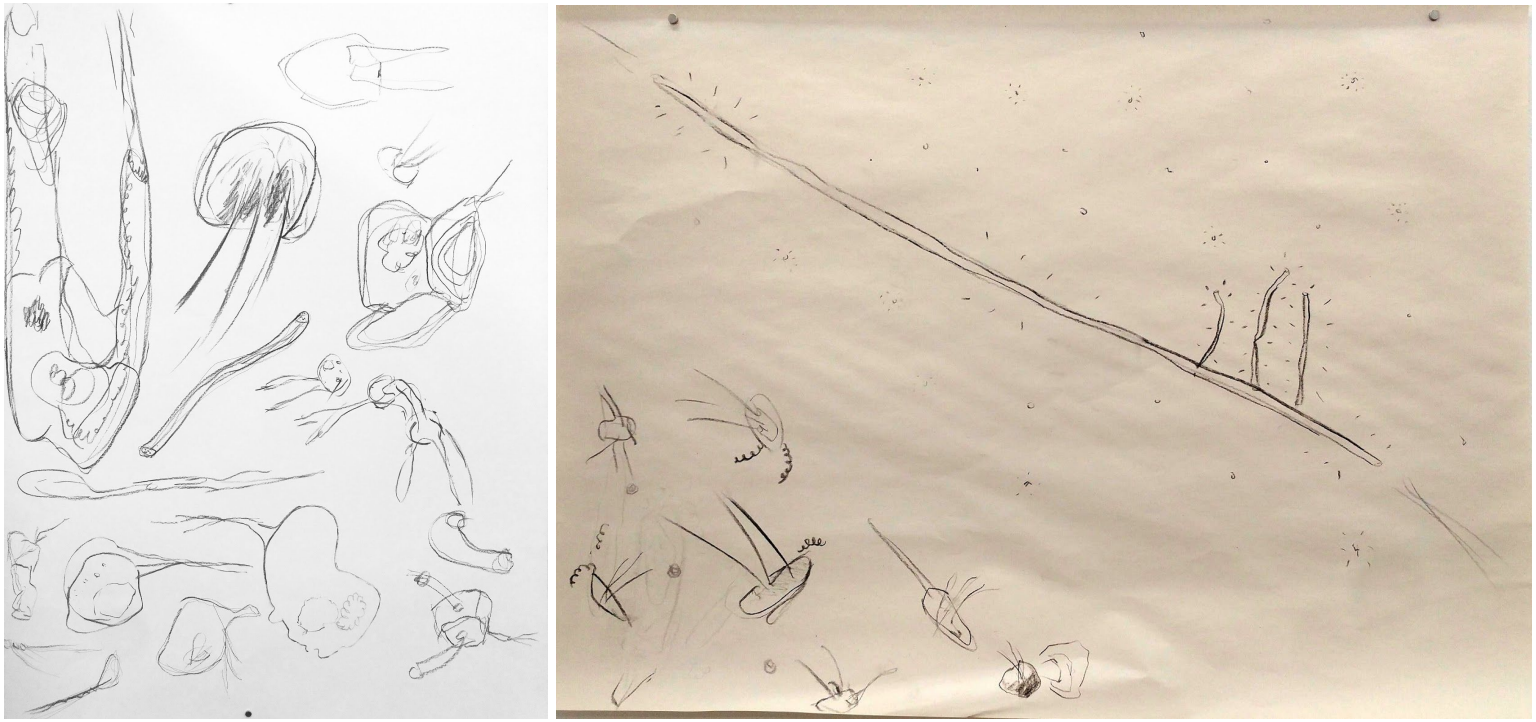

Figure 2. Hayley Carruthers. Charcoal sketches. 2019

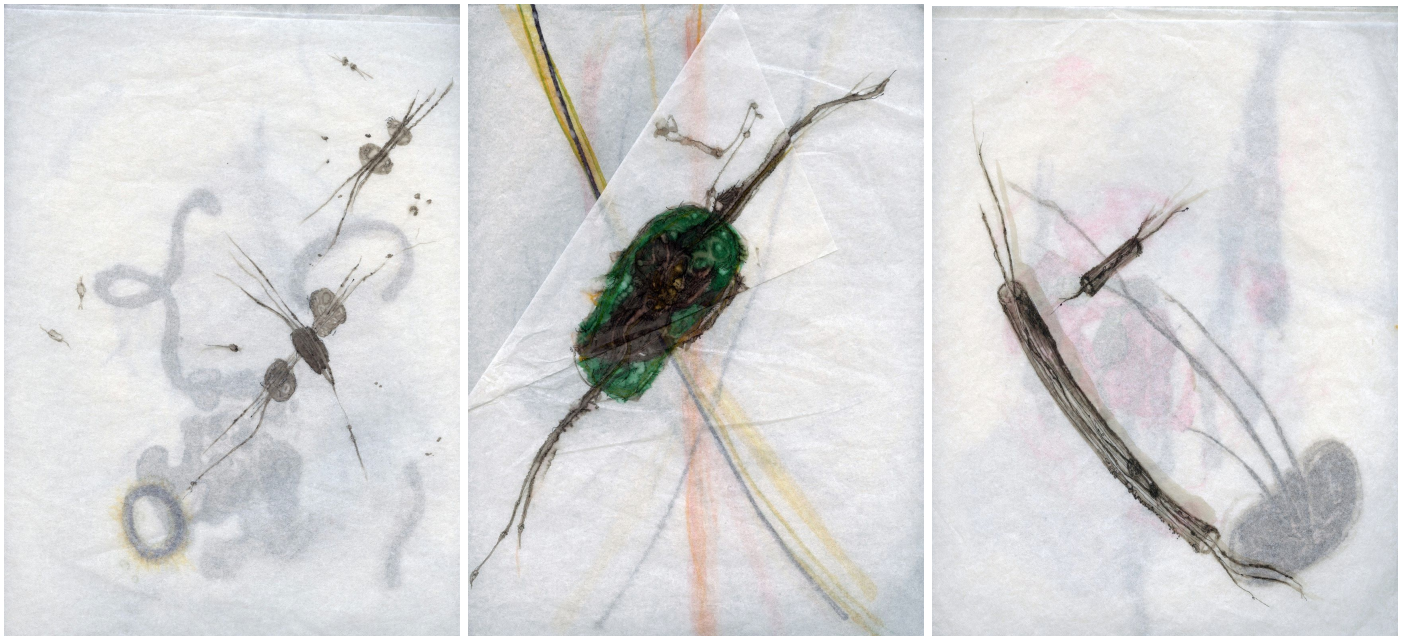

Figure 3. Hayley Carruthers. Stacks of assorted *Specimen Drawings*, 8”x10”, alcohol ink on silkspan tissue paper. 2019

Transmissions and Material Encounters

Memory and mental imagery flicker and shift. Just like the way vision works. Eyes moving rapidly and continuously to update the image in the brain so the brain can then tidy up the input, removing the noise. Just as it is impossible to perceive reality as a still image, it is impossible to perceive memory and mental imagery as a still image.

To fully transmute the image means to also transmute the noise; like a microscope detecting the out-of-focus objects above or below the sample, a piece of lint, a smudge on the glass, particles from the air. The ink entangles with the fibers of the tissue, traveling over dust, skipping over holes, reacting with other inks. Clear alcohol pushes the coloured inks out of the tissue and to the side, creating lines and bubbles –small traces of movement. The ink shifts around a drawn mark reaching tendrils across the material. As if they are speaking a language of formation the feathery and odd dispersion of the ink creates an instance for a different rendition, an instance

for how a different form might look and function. They flowed into my mental imagery as I tried to imagine what they were doing. Are they expanding, dispersing, transforming? Do they want to interact with the other forms? The forms can communicate as a result of my communication with the material.

> Matter actively delimits the forms it can take and is thus an active participant in the process of making. If we are willing to listen, the materials we work with (our own bodies, but also metal, clay, paint, fabric… etc.) will tell us which forms they can hold and sustain, and which they cannot. Or rather, this knowledge will emerge between the vital materiality that we are and that which we encounter and with which we interact. (Jones 28)

Material is not what it is but what it does. The tissue paper possesses transparency, fibres, strength and delicateness. It has the ability to stretch; the capacity to rip, wrinkle, and crinkle; to hold ink and to move with similar fluidity to paint. The generated forms arise through movement. The movement of memory into the movement of the body. Movement from arm to hand into the flowing ink, tissue fibers, spray of paint can, the air circulating the room. Between my hand and material there is a synapse. A transmission from one matter to the next. From my mind to the mind of the material. In this process of making I correspond with the material to create a space where I can revisit and transmute internal sensations. These internal sensations are then entangled with the vitality of the matter. Resulting in the drawing being the trace of the synapse, a visual and material concoction that embodies a familiar yet unknown realm. Existing in the space of not what it means to know, but what it means to embody.

The strings one is less uncomfortable to revisit than the lumps one. I was laying on my stomach in the top bunk, looking directly at the circular divots in the headboard. My eyes trace over the stickers I put there.

And then everything is black-blue and spanning out to infinity. There is no particular noise, but maybe the echo of a dark room submerged in fluid. The strings glow with a bright silvery aura. There is a string like a tightrope stretching into the distance. This one does not glow so much. The other strings stand on it, in a way that string-like forms may stand. Their bodies waiver with a light vibration.

The strings are too thin. My brain is too tight, it itches, like a hair is being pulled through it. I am scared. Scared by what I see, scared for the silver forms, and scared for myself.

When I see the stickers on the headboard again I am misplaced and anxious, not sure from where I have come, and not sure where I have arrived…

Figure 4. Hayley Carruthers. *Untitled Light Space*, 5’x7’, alcohol ink, silkspan tissue paper and spray paint on stonehenge. 2019

Light and Seeing What Can't Be Seen

Untitled Light Space (fig. 4), explores light in relation to optics, knowing and reality, and seeing what cannot be seen by using a methodology of maintaining strangeness. Light and our eyes play tricks on our perception. When watching the backs of my eyelids under a warm light I witness how my eyes cannot focus or stay still. I cannot see yet am intruded by so much visual noise. My visual space is filled with warm colours, hot reds, pink and oranges. But it is also covered in speckles of purples, greens, blues, and colours that I do not know because before I can identify them they fade away. In *Untitled Light Space* I limited myself to a bright colour palette of yellows, pinks, and oranges. I drew, making marks and forms as if I was seeing them dance over my eyelids. It became a space where I could float around in the uncertainty of my vision. The almost-too-bright-to-look-at pink and yellow background acted as a light source so when I closed my eyes I would see similar colours and be taken to a similar space. I could then draw out the sensation only for it to transmute to something else.

Great Ambiguity of the Stimuli of the Eye

Artist Rune Peitersen investigates similar notions of vision and perception by emulating aspects of vision that escape perception. Whereas in *Untitled Light Space* I explore the elements of vision through my own subjectivity and the process of drawing; Peitersen makes use of photography and other mechanical technologies such as the Mobile Eye[8] to attempt to understand someone else's perception of reality and to recreate elements of the experience.

Peitersen's investigations with the Mobile Eye suggest that vision appears to be out of our control. The strangeness of what we see is always being reconstructed, re-imagined, and made familiar by the brain. I then wonder if we have to bypass the control over our vision so we can remain open to seeing the strangeness of our everyday experience. Peitersen finds a method of doing this by isolating aspects of the visual process so they could be experienced without the brain 'tidying up' the data. *Observer Effect: A Tree in the Forest* (fig. 5), a series of Chromogenic prints, used eye-tracking data to visualize the foveal[9] vision of Peitersen's eye. The eye

[8] The Mobile Eye is a device used in "scientific research to track the human gaze and decipher visual impulses imperceptible due to the power of the brain to erase visual 'noise'" (Madzoski 2010).

[9] The fovea covers only a small area in the field of vision yet it contains the highest amount of photoreceptors in the retina which support colour vision and high acuity (Hendrickson 327-334).

tracking data only records the information perceived by the fovea and ignores anything that is out of focus. Peitersen (2011) writes, “In the images each foveal spot represents 1 frame (25 frames per second). By combining the spots I try to create an impression of the data used by the brain to construct the visual experience.” The visual experience generated from the fovea data looks like something out of nightmare or science fiction, clusters of constellations being burned into the retina. By highlighting the function of the fovea, the unsettling yet strangely familiar imagery serves as a reminder of the uncertainty of one’s vision.

Different from Peitersen, my interest in the ambiguity and unknowability of vision lies in my own subjective embodied account of visual experience. Peitersen emulates aspects of vision as if they could be experienced in isolation. Whereas, in my practice, I aim to make a place for the strangeness of visual experience without isolating it from other aspects of vision or neural sensations. In *Untitled Light Space* I found a way to ‘bypass’ the control over my vision by corresponding with colour –the bright pink and yellow that emulated light– and material such that I could continue to ‘see’ the experience I wished to investigate. It was a method that led me to understand that once I thought I saw something with my mind it would already be gone and when I transmuted it with material it would become something else.

In her essay “Black Hole of Vision: On Rune Peitersen's Saccadic Sightings"*,* curator and critical theorist Vensa Madzoski reflects on the limitations of vision explored in Peiterson’s 2010 exhibition *Saccadic Sightings: Einstein and Bohr:*

> If our eyes were to be turned into a camera, it would be a rather poor device. More precisely, it would not resemble a single-frame snapshot camera, but a video stream of a mostly blurred visual field with only spots of clarity. Our eyes move rapidly and continuously to update the image in the brain, and it has been concluded that the brain, resembling a high-tech processor, cleans up the received input. Paradoxically, one of the functions of photography is to remind us of the impossibility of our eyes to perceive reality as a still image - as the saccadic scanning of our eyes show, there is nothing fixed or stable in nature. Matter is always in flux. (Madzoski 2010)

Pietersen’s visualizations of eye tracking movements (fig. 5) and Madzoski’s response bring forth the notion that perception is not a still image, but something that is constantly moving and changing. This idea comes into play in *Untitled Light Space* where I tried to conceive the ephemeral quality of light, flash, shape, colour, and speckle that washed over my closed eyelids. It is impossible to

capture this experience as a still image just as it is impossible to capture reality (without the aid of a camera) as a still image. Reality (eyes open) like internal sensations[10] (eyes closed) shifts and flickers.

Figure 5. Rune Pietersen. *Observer Effect: A Tree in the Forest,* 220x20x15 cm c-prints on dibon, 400×165 cm (variable). 2011

This image has been removed due to copyright restrictions.

[10] I'm also referring to other 'internal' sensations including optical phenomena such as afterimages and phosphenes (experience of seeing light without light entering the eye), and other 'visual' sensations such as mental imagery and memory.

Research into the human visual system challenges the 'truthfulness' of what we really see. Light –light frequencies– exist in physical reality but the experience of colour is an internal subjective sensation, a transmutation of electric impulses from the eye to brain[11]. The 'reality' that is perceived around us takes form in our minds. This makes me think back to William Kingdon Clifford's term 'mind-stuff' as it challenges the distinction of mind as interior and matter as exterior. If our perception of reality is in flux, matter is in flux, mind-stuff is in flux –interiority and exteriority merge. I think back to the visions I experienced as a child and how they existed both internally and externally, coming from my mind but presenting themselves before the dark wall of my bedroom.

Untitled Light Space investigates the role of light in revealing the uncertainty of perception –of what cannot be seen. Since our brain interprets light to generate an experience of physical reality, I began to wonder what it would look like to see in the absence of light.

[11] There are many other aspects to the external world that our eyes cannot detect, such as infrared radiation, ultraviolet rays, X rays, and gamma rays (Russell 50).

Figure 6. Hayley Carruthers. *Untitled Light Space* detail

A Vision in the Dark

I am startled, shaky, anxious, confused about where I am. The parts of me that know logic —that know it's only a vision– weave in and out of the part that is trapped, no longer me. I am sentient, aware and lost, but then I'm gone again only to be and see vast space and electromagnetic pulses.

No no nononono, not again.

The endless black-blue is back. No light, yet my eyes seem to make their own. Tiny sparks of silver flick in a backdrop of haze. There is no particular noise other than the panic sizzling in the back of my head.

Then I hear colour. I didn't know I could hear colour. A shout erupting from my head painted orange into the black-blue.

Memories of the past day flood into my eyes and ears, contorting until they change into a form that has no size yet appears small. Orange and blue, shaped like a peanut, it rests as if it is under a microscope, being continuously zoomed out while its appearance remains the same.

Figure 7. Hayley Carruthers. *Untitled Darkness*, 5'x8', alcohol ink, silkspan tissue paper and spray paint on academia. 2019

Darkness and Seeing What Can't Be Seen

> There are sensations which do not correspond to anything outside the body. In so far as they imitate the qualities and forms of external things, they thereby often give rise to illusions, phantoms, or appearances with no corresponding reality.
>
> Jan Purkinje (1823)[12]

Untitled Darkness (fig. 7) is composed of spray paint and sections of tissue paper mounted on top. The work is large such that it draws a relationship to the human body, but it is not large enough that it is monumental or dominating. The drawing offers rewards for looking closer. Smaller colours and forms appear that would not otherwise be seen from far away; texture contrasts between the fibres, wrinkles, edges of tissue paper and the flatness of the spray-painted background are revealed. Different forms and planes shift between resting in the foreground or background. There are moments of 'silence' where only the painted surface is revealed. Lines of light greys and other various colours imply trace and movement as if something might have been there a moment ago, too quick to see what it was such that you can only see where it has been. There is a sense of navigation, as if someone is moving in the darkness, eyes seeing and trying to make sense of an intangible space.

Untitled Darkness was generated from a hypnopompic experience where coming out of sleep I watched my memories from the evening before swivel and churn into an odd orange and blue form suspended in the darkness of an unlight room. In the absence of light there is still a lot to see and it could take place both internally and externally. In darkness we may not see the objects around us,

[12] Czech physiologist Jan Purkinje (1787-1869) is a well known figure who conducted observations and experiments on the physiology of the senses, observing subjective sensory phenomena in the subject of optics and neuroscience (Wade. 2001).

yet the cones in our eyes continue to fire. We see light in different forms, colours that are hard to describe, images that appear then disappear[13]. What might this inability to see look like if it was to be visualized in a physical form?

Within the theme of 'visualizing what cannot be seen' I see *Untitled Darkness* being in conversation with the work of artist Dove Allouche. In *Negative Capability,* a 2018 exhibition at Contemporary Art Gallery in Vancouver, Allouche showed a series of works that investigated the idea of 'making visible what otherwise remains hidden'. Using processes of reprography, Allouche allows the medium to become the subject and the process of its fabrication to generate the imagery (Contemporary Art Gallery, 2018). As a consequence of Allouche's process, the imagery appears strange and otherworldly.

The series titled *Fungi* (fig. 8)[14] are square images with a subject in the center that could be described as a spore, a cell, or bacteria. The images look microscopic, bodily, or alien. It seems that they are suspended in a space that is hard to identify, possibly a rich layered liquid solution. The central form then takes on new meaning as it is no longer a descriptive depiction of a physical subject. It then shifts into being a representation of other forces such as growth and time. The images are descriptive yet non-descriptive; appearing familiar yet foreign, evoking a sense of wonder. "While an almost impossible state [*not knowing*] to maintain, especially for humans so quick to jump to reason, this temporality is imperative for Allouche's practice: it is the one that allows his imaginative inquiry to hover so long at the edge of darkness" (Contemporary Art Gallery, 2018).

My process, similar to Allouche, exists within the realm of not knowing. Allouche makes visible what cannot be seen through the source of time and the subject's materiality. In contemplating darkness, subjective sensory phenomena and hypnopompic imagery my process lacks the physicality of its subject, whereas I have to take a different approach to material.

[13] There is a German word for this phenomenon, *Eigengrau,* meaning 'intrinsic grey', which describes the experience of visual effects in the absence of external light. Also sometimes referred to as *Eigenlicht* meaning "dark light" or "brain grey" (Wade, 2001).

[14] In this series, Allouche focused on a species of spores predating human presence that are known for eating away works of art. He collected these spores from the Center for Research on the Preservation of Collections at the Museum of Natural History in Paris. The images were made by blowing the spores through a pipette onto plates and after a period of growth they were then photographed (Contemporary Art Gallery, 2018).

Figure 8. Dove Allouche, *Fungi* series, 2016, installation view from ‘Negative Capability’, Contemporary Art Gallery, Vancouver, September 28 - December 30, 2018.

This image has been removed due to copyright restrictions.

Figure 9. Hayley Carruthers. *Untitled Darkness* Detail

Swirling Around Chance and the Unknown

In approaching similar questions and a desire to ruminate in the unknown, *Untitled Darkness* faces a different kind of material challenge –how do I visualize what might only be electrical impulses into something mineral based? Allouche investigates unseen geological phenomena through a source of its physicality. Yet when contemplating unseen subjective sensations I have to take a different approach to making and material –one that recognizes the material's vitality and allows for correspondence in the process. The material and process can then become a conduit for my internal imagery.

This process of beginning to articulate the mental imagery from my hypnopompic experience into the physical world through an artistic language of material transmutes the original imagery into something *other*. Trying to clearly articulate the experience was not the intended goal, but rather to use it as a branching point to initiate a dialogue with material that would create an instance for something familiar yet unknown. Articulation –that of which seeks reason– is then limiting when it comes to exploring the vitality of such an internal experience. To tell of this experience (which I consider to exist within the realm of personal knowledge) through artistic practice, would be to allow it to grow and unfold with the material.

With this type of thinking as part of my process, I draw from the theories of Timothy Ingold discussed in his book, *Making: Anthropology, Archaeology, Art, and Architecture* (2013). When approaching the concept of articulation, Ingold discusses how personal knowledge exists within a different framework of 'telling':

> Articulation - or what nowadays goes under the name of 'joined up thinking' - may be the friend of reason, but is the enemy of sentience. It arrests feeling. [...] Where articulate knowledge takes the form of statements about the known, personal knowledge both grows from and unfolds in the field of sentience comprised by the correspondence of practitioners' awareness and the materials in which they work. [...] Relative to articulate knowledge, personal knowledge is not buried deep down in the psyche [...], but rather swirls around and between the islands that articulate knowledge joins up' (Ingold 111).

In *Untitled Darkness*, I negotiate what Ingold describes as the passages between articulate knowledge. Interacting intuitively with the material, I begin to follow a process of the unknown. Corresponding with the alcohol ink, tissue paper, and paint, I think with my hand to draw from the visual memory of my hypnopompic experience. Using the fluid medium of ink and the tissue paper as a semi-transparent material that does not have much substance until it is given colour and laid over another substrate, I begin to build an orchestra of odd forms and colour similar to the visual environment I experienced. Some marks and forms were repeated and

eventually mutated into a new mark entirely then the new mark would repeat. Ripped edges follow and interrupt drawn marks and wrinkles in the tissue paper mimic the drawn lines folding and unfolding where they like. The creation of one drawn form, rip, tear, or wrinkle became generative to the next. The response of the ink and the layering of colour, marks, and paper generate instances for the unexpected.

Utilizing a layering –a collage type– method, I see similarities between my mode of making and that of some Surrealists, however, as the Surrealists were invested in making the familiar strange using scientific imagery; my practice instead begins with examining the strange. Surrealist Max Ernst utilized collage and images from science magazines and books as a method to present psychological perspectives (fig. 10). His 1921 series of watercolour and ink drawings made on top of images of microscopic sea life (fig. 11) make an analogy between the invisible and the unconscious. The chance fragmentation of collage using scientific imagery aided Ernst in finding ways to transport the viewer from the ‘commonsense’ world into a dreamlike one (Gamwell 245).

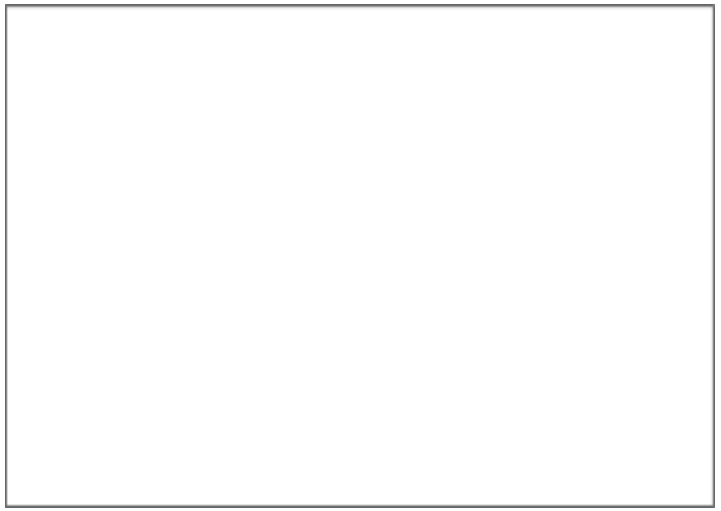

Figure 10. Max Ernst. *The Gramineous Bicycle*. Collage with paint. 1921 (left)

Figure 11. Max Ernst. *Plantation farcineuse hydropique parasite,* watercolor & pencil on paper. 1921 (right)

These images have been removed due to copyright restrictions.

Chance became a key component in my process of making that resists making the strange familiar. Chance also plays a role in scientific discovery. Published in 1953, W.I.B Beveridge's *The Art of Scientific Investigation* discusses the roles of chance, creativity, and intuition in scientific investigation. Beveridge states that chance cannot deliberately be evoked, but one can be on the lookout for it. He suggests that scientists can train their powers of observation to cultivate an attitude of mind that is on the lookout for the unexpected. Attitude of mind for discovery is different from the attitude of mind for proof (32). In relation to my work and visualizing the invisible, chance instances lead to the discovery of what was unseen and unknown. While I try to resist making the strange familiar, learning to be on the lookout for chance (the unexpected) means to be open to strangeness and to allow it space to flow.

Sometimes I'll just be sitting at the table and the yellow wall reminds me of the squishy mass inside my skull. Or I'll be walking outside and almost step in a clump of mud. And it comes back –the lumps one.

I don't like to think about it because it makes me feel like mush. So I try to resist. In a space with no colour, no up or down, exist brown lumpy cubes with string wrapped around them. They stare at me.

My head is wrapped in brown. Brown lump. I lose my sense of self into silver pings of pain and fear. No-no-no-no-no.

Awake with a start. My eyes were already open. Am I awake?

Figure 12. Hayley Carruthers. *Untitled Mental Specimen Space*, 4’x6’, alcohol ink and silkspan tissue paper on stonehenge. 2019

What the Brain Contains

> Similarities between scientific illustrations and some paintings created by artists makes me wonder whether the artist was unconsciously painting not only what the brain was interpreting, but to some extent, what the brain contains.
>
> Javier DeFelipe (2010)[15]

Scientific imaging processes attempt to reveal spaces and forms that cannot otherwise be seen. Before modern imaging techniques arrived, anatomical knowledge was dependent on dissection and visual exploration. Understanding the inside of the body required skills in anatomical observation and visualization (Wildevuur 195). Traditional hand-drawn methods from the microscope, such as Ramon y Cajal's, were regarded as subjective and met with skepticism as they presented artistic aptitudes such that scientists have to discern between what is an artifact and what is a real element (DeFelipe 12). Science academics Antigoni Avramouli, Maria Gonidi, and Maria Lambropoulou summarize in their article "Microscopy as a form of art"; "artistic creativity relies on a subjective interaction with the environment, which, if applied in the scientific environment, could be construed as fraudulent" (197). I contemplate this notion while making my drawings and I begin to wonder if microscopy drawings are not considered to be truthful representations of scientific fact, then what are they representations of? They teeter away from the scientific yet they do not quite reach the realm of art. They exist in an illustrative space where in trying to render something 'real' they became something else.

The shifting planes in *Untitled Mental Specimen Space* (fig. 12) recall a microscopic or macroscopic space. The organic shapes and forms look somewhat like bacteria; familiar, yet unknown figures. Flea-like forms, lines and splotches reminiscent of eye floaters move around the picture plane zooming in and out; much like traditional microscopes that cannot observe a structure inside a sample without also detecting out-of-focus objects above and below it.

[15] Javier DeFelipe is the author of *Cajal's Butterflies of the Soul*, a book collection of Roman y Cajal's drawings. In a foreword to Cajal's drawings DeFelipe ruminates on the modern colourful scientific renderings of the brain and the similarities to artistic creativity (51).

Years later, neuroscience imaging has expanded with an array of microscope techniques[16] and fluorescent staining methods such as Brainbow[17](Schoonover 52). These processes utilize light (in some cases electrons) and fluorescence to generate colourful and textural otherworldly images of internal forms and spaces. Yet like the microscopy drawings, they still remain to be approximations of life, a way of perceiving the real through a non-real rendering.

Non-Real Renderings and Entangled Subjectivity

Historically, the visualization of science has progressed in a constant interchange between scientific application and artistic interpretation, and a debate between the realms of objectivity and subjectivity. As previously discussed with *Untitled Light Space* and Rune Peitersen's work, the 'truthfulness' of our vision is not as reliable as we think. 'Objective looking' then is not so far removed from subjectivity, in fact 'objective looking' is nearly impossible.

In their book, *Objectivity,* science historian Lorraine Daston and science philosopher Peter Galison address the history of objectivity and what it means to look at the world scientifically. Daston and Galison document how the rise of the mechanical image (the photograph) as an objective image polarized that visual space of art and science in western history. From the sixteenth century through the eighteenth "the relationship between art and science had largely been one of collaboration, not opposition" (187) It wasn't until the nineteenth century that the Romantic artists defended the imposition of self in art and scientists insisted the opposite; scientific images had to be purged of any trace of self (187). By the twentieth century faith in the objectivity of the mechanical image was unraveling. Removing the trace of self, the interfering eyes and hands of the scientist was proving to be impossible (189). Ideas of 'truth' and objectivity were challenged by the obstacles of communicability posed by subjective mental processes. Underlying

[16] Some of these techniques are confocal microscopy (uses a laser to increase optical resolution and contrast of a digital image taken through a microscope), two-photon microscopy (similar to confocal microscopy, two-photon microscopy uses infrared light and can penetrate through thinner living tissue), and electron microscopy (uses electron beams instead of light) (Schoonver 118-123).

[17] The discovery of Green Fluorescent Protein (GFP), a molecule that was isolated from a strain of jellyfish, revolutionized biomedical research. GFP can be cut and pasted adjacent to the gene of any protein of interest. GFP-marked mice were used to mark neurons in fluorescent colours. This led to the creation of Brainbow, a method of distinguishing individual neurons using fluorescent proteins (Schoonover 79).

human subjectivity is then an area of overlap between art and science. Chance, imagination, and intuition as Beveridge's *The Art of Scientific Investigation* outlines are others.

Untitled Light Space, Untitled Darkness, Untitled Mental Specimen Space were born out of a subjective process that embraces ambiguity and what cannot be seen –the unknown– as a field of generative inquiry. A subjective approach –entangled with ways of understanding from neuroscience– that corresponds with material to resist making the strange familiar by embracing ambiguity, uncertainty, chance and transformation can shift the way we perceive and think –how we view the role of our brain, ourselves, consciousness, what we are, and what is around us. Not everything is as it seems. Perception, memory, and thought are uncertain, matter is always in flux. The external is not separated from the internal, mind is not separate from matter. Embracing strangeness and resisting familiarity can influence how open we are to interacting with ourselves, each other and the world around us.

Most scientific renderings seem to want to achieve an 'articulate-ness' that is contradictory to my approach to image making, yet through the processes of their visualizations most of the imagery appears strange and 'otherworldly'. It's one thing to see through the mind's eye. When this 'insight' is externalized through the artist's hand, further entangled with scientifically sourced visualizations, then vision can be considered as part of a network of representations, and the unknown aspects will never allow stasis but will fuel new questions.

I perch on top of the desk crouching on my knees while my brother sits in the office chair. We are playing a game on the computer when it happens again.

I am dropped into a pool of speed. I have shrunk or the desk has grown, stretching out beneath me. My body feels compressed, my brain like an elastic with a current rushing through it. A loud WHOMP WHOMP threatens closer and closer. My knees crunch further into my chest. I am frightened, aggravated, and losing my grasp of self.

I urge my brother to talk to me. I ask him to speak in slow motion then maybe he can counter the vortex in which I am stuck.

Figure 13. Hayley Carruthers. *Learning to See the Unknown: Drawing Out the Strange* thesis exhibition install. 2020

Blowing up the Line and Onward

The performativity in my work is tied to physical labour. They are one and the same. The performance is the labour (or –is laborious) –the way my body and mind move, interact, and think with the material. As previously discussed in “Personal Knowledge”, my upbringing ingrained in me the importance of labour enacted through the body in the day to day. This has culminated for me in a need to make through the body, to move, and to draw in order to think and to be, to learn, and exercise my mind and body. Performing is moving and thinking, performing is labour, labour is thinking.

In my thesis installation I made the leap from paper to drawing on the wall. The wall drawing (seen in fig.13 and fig. 14) was a way to take the doodles–the lines–out of my sketchbook and explore them in large format on their own rather than as a smaller detail within a drawing. What happens when I keep the line solid? What happens to my wrist, my arm, my body, and my mind when the page becomes bigger –when it becomes the wall? It was a more laborious process than doodling in a sketchbook. The wall became the page and my arm the pen.

I had to physically zoom in and out, traveling up and down on and off the ladder. My whole body worked into it. Drawing on the wall was almost as if I was instigating a bout of Alice in Wonderland Syndrome. Up the ladder, down the ladder, step back–zoom out–move the ladder, step on the ladder–zoom in–and draw again. I was big and small, close then far, high then low.

Figure 14. Hayley Carruthers. *Learning to See the Unknown: Drawing Out the Strange* wall drawing detail. 2020

Everytime I work through the process a new discovery happens, an anomaly, a new decision made by the material, a new unconscious shape that reveals itself. New strangeness unfolds. It is like a self-dissection of the brain and material process, like I found a way to step into my mind and the material's mind.

But sometimes I worry that after iteration and iteration, the process will become too familiar. I will come to know all of its secrets then I will become the sole manipulator, the material will have no more say. I worry that the strangeness I find will somehow become familiar.

But for the moment there exists an infinite amount of possibilities. So much still left to not know.

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