

Summer 8-2017

Liminal Surfaces

Georgina E. Grenier

University of Maine at Orono, georgina.grenier@maine.edu

Follow this and additional works at: <http://digitalcommons.library.umaine.edu/etd>



Part of the [Art Education Commons](#), [Art Practice Commons](#), [Curriculum and Social Inquiry Commons](#), [Environmental Studies Commons](#), [Esthetics Commons](#), [Fine Arts Commons](#), [Gifted Education Commons](#), [Interdisciplinary Arts and Media Commons](#), [Metaphysics Commons](#), and the [Printmaking Commons](#)

Recommended Citation

Grenier, Georgina E., "Liminal Surfaces" (2017). *Electronic Theses and Dissertations*. 2755.
<http://digitalcommons.library.umaine.edu/etd/2755>

This Open-Access Thesis is brought to you for free and open access by DigitalCommons@UMaine. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of DigitalCommons@UMaine. For more information, please contact um.library.technical.services@maine.edu.

LIMINAL SURFACES

By

Georgina E.C. Grenier

B.A (Honors) Slade School of Fine Art, University College, London. 1983

M.A. Goddard College 2003

A THESIS

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Fine Arts

(In Intermedia)

The Graduate School

The University of Maine

August 2017

Advisory Committee:

Susan Smith, Adjunct Professor of Intermedia, Advisor

Gene Felice, Assistant Professor of Intermedia

Dr. Owen F. Smith, Professor of Intermedia, Director of Intermedia

Copyright 2017 Georgina Grenier

LIMINAL SURFACES

By Georgina Grenier

Advisor: Susan Smith

An Abstract of the Thesis Presented
in Partial Fulfillment of the Requirements for the
Master of Fine Arts
(in Intermedia)

August 2017

The poet Ben Okri wrote: *"Stories are the secret reservoir of values: change the stories individuals and nations live by and tell themselves, and you change the individuals and nations."* (Stibbe)

In the early 21st Century we are facing numerous environmental problems that are being caused by human activity. This era is termed the Anthropocene , a time when accumulated pollutants are causing detrimental ecological change. Ocean creatures are threatened by increasing seawater temperature, acidifying pH levels and melting ice. On land we are experiencing droughts, alteration of biomes, extinctions and an atmosphere that contains less oxygen per breath than it used to. I wondered how humanity had allowed this to happen. What tales have we told ourselves that led to this situation, and how might we devise new tales that might lead to a less polluted future?

I see our environment as a structure of surfaces. Material surfaces on which we live, existential surfaces that enfold our thoughts, and liminal surfaces that transition awareness of these through experiential learning. I researched non-toxic printmaking techniques to attach images to surfaces, both physical and cognitive, as a way to bring

about recognition that we are part of the natural world, and need to reconnect to it. if we are to begin to solve human-caused environmental damage. The textured surfaces and prints I created in my thesis work are intended to be visually compelling, yet unsettling. An audience for my work would need to articulate new language if they are to assimilate the educable moments it offers.

The research presented here uses the concept of surface to unify information about language, cognition, biology and art history as they give context to my artwork about the Anthropocene. I present research that indicates humanity's present difficulty is not a sudden occurrence. Rather, it is the continuance of centuries of behavior built on faulty assumptions derived from metaphorical language and imagery that gave rise to generational practices of acquisitiveness and economic expansion at the expense of the environment. I present a real-world consequence of our actions: the invention of plastic, useful in many ways, but like the sorcerer's apprentice with too many water buckets, is now a profound danger to aquatic ecosystems.

DEDICATION

This thesis is written with immense gratitude for the support and encouragement of Susan Smith and SueAnn Gaitings. To my beloved family who surely felt ignored during this process: you were always generous, kind and never, ever forgotten. To Skye, a new granddaughter for whom the environment should change. Thank you to Gene Felice for the enthusiasm with which he shared his microscope expertise, and to Owen Smith who supported me in this program, often as a head on a monitor during the many times when I could not attend class.

TABLE OF CONTENTS

DEDICATION	v
LIST OF TABLES	viii
LIST OF FIGURES.....	viii
Chapter	
1. INTRODUCTION	1
2. SURFACES AND GAPS BETWEEN	5
3. MISUNDERSTANDINGS FROM METAPHORICAL LANGUAGE.....	12
3.1 Language in Industry.....	14
3.2. Compulsion for New Language.....	18
4. MESSAGES IN SHORTHAND: METAPHORS.....	20
5 VISUAL REMINDERS.....	27
5.1 Building on the Past.....	32
6. THE PROBLEM OF PLASTICITY, A REAL WORLD CONSEQUENCE.....	36
6.1 Estrogen Mimicry.....	44
6.2 Plastics and Pollution in the Environment.....	46
7. FINDING NEW LANGUAGE.....	51
7.1 Transfer.....	53
8. METHODOLOGY	58
9. CONCLUSION.....	70
11. PORTFOLIO	73
11.1 Bates Mill Silkscreen Prints.....	73
11.2 Making Sourdough Bread.....	74

11.3 Culturing Protozoa: Photographs and Video.....	77
11.4 Printed Systems Paintings.....	81
11.5 Volvox	84
11.6 Islamic Lines.....	86
11.7 Images of Abandonment and Acquisition.....	89
11.8 Truth Project.....	90
11.9 Liminal Surfaces.....	98
11.10 Work With Students.....	102
BIBLIOGRAPHY.....	104
BIOGRAPHY OF AUTHOR.....	110

LIST OF TABLES

Table 1. ... Non-Literal uses of the Words Pig, Swine and Hog from the BNC.....	34
Arran Stibbe. <i>Pig Phrases</i> , in “ <i>As Charming as a Pig: the Discursive Construction of the Relationship Between Pigs and Humans</i> ” 2003	

LIST OF FIGURES

Figure 1.LED lit ornament of figure on a horse, Fort Andross Flea Market 2016. Photograph. <i>Georgina Grenier</i>	3
Figure 2.Flea Market Photographs, 2015 <i>Georgina Grenier</i>	7
Figure 3.Rachel Whiteread <i>Untitled (Rooms)</i> 2001.....	8
Figure 4.Mountain Top Removal, Pike County, Kentucky. Retrieved July 10.....	10
Figure 5.Stills from T.V. commercials, Photographs, 2015 <i>Georgina Grenier</i>	17
Figure 6.Artemesia Gentileschi “ <i>Judith Beheading Holofernes</i> ” Oil painting (1612-14).....	24
Figure 7.Edward Hicks “ <i>Peaceable Kingdom</i> ” Oil painting (1830-32).....	27
Figure 8. John Constable “ <i>The Bridges Family</i> ”. Oil painting (1804)	29
Figure 9.Dorothea Lange “ <i>Florence Owens Thompson, Migrant Woman</i> ” Photograph, 1936. Retrieved July 1, 2017.....	31
Figure 10.Children collecting plastic detritus on a beach from “Marine Litter Solutions”.....	39
Figure 11.Albatross’s stomach contents of plastic bottle caps Retrieved July 10 2017	50
Figure 12.Banksy: “ <i>Sirens of the Lambs</i> ” Retrieved June 26 2017.....	52
Figure 13.Goya Etching from <i>The Disasters of War</i> . Retrieved June 7 2017.....	60
Figure 14.Andrea Sulzer 2012 “ <i>Material Assumptions</i> ” Retrieved July 5 2017.....	61
Figure 15.Hester Stinnett Print: “ <i>Breach</i> ” Retrieved July 4 2017.....	62

Figure 16.Tony Cragg, Leaf, 1981 Found plastic objects. Installation: 67 x 52 in Retrieved June 30 2017.....	65
Figure 17.Museum of Arts and Design, NYC Exhibit of plastic pollution for the Reef Project. Retrieved June 2017.....	65
Figure 18.Bates Mill Fabric Print 14 x 16” Silk Screen print on Arches 88 paper, Georgina Grenier, and anonymous 1908 drawing.....	73
Figure 19.Loaves. Georgina Grenier photographs of sour dough bread loaves.....	76
Figure 20.Amoeba social behavior, Georgina Grenier, video stills 2016	80
Figure 21. ... Three amoebae flow towards each other, Video still, 2016 Georgina Grenier.....	80
Figure 22.Photopolymer prints <i>Drip</i> and <i>Creature</i> Georgina Grenier.....	83
Figure 23. <i>Volvox</i> 2016, 18x20” Etching and Carborundum print Georgina Grenier, 2015.....	84
Figure 24. <i>Islamic lines</i> . Silk screen over four copper plates. 32 x 24” Georgina Grenier 2016.....	87
Figure 25. <i>Images of Acquisitiveness and Abandonment</i> , photographs of deer taxidermy. Georgina Grenier 2016	88
Figure 26.50 Artist multiple books each entitled “ <i>Truth</i> ” Georgina Grenier, 2017.....	89
Figure 27. <i>Liminal Surfaces</i> photograph. Georgina Grenier, 2017.....	100
Figure 28.Detail of student drawings about climate change, Georgina Grenier, 2017.....	101

CHAPTER ONE

INTRODUCTION

In Book VII of The Republic, written in 350 BCE Plato uses the metaphor of a cave wall bearing flickering shadows cast by a fire to sum up our ability to determine what is real. The cave contains beings who have been confined in its dark interior, and have experienced nothing else. He presents his idea in a conversation between Socrates and Glaucon:

...”And do you see, I said, men passing along the wall carrying all sorts of vessels, and statues and figures of animals made of wood and stone and various materials, which appear over the wall? Some of them are talking, others silent.

You have shown me a strange image, and they are strange prisoners.

Like ourselves, I replied; and they see only their own shadows, or the shadows of one another, which the fire throws on the opposite wall of the cave?

True, he said; how could they see anything but the shadows if they were never allowed to move their heads?

And of the objects which are being carried in like manner they would only see the shadows?

Yes, he said.

And if they were able to converse with one another, would they not suppose that they were naming what was actually before them?

Very true. And suppose further that the prison had an echo which came from the other side, would they not be sure to fancy when one of the passers-by spoke that the voice which they heard came from the passing shadow?

No question, he replied.

To them, I said, the truth would be literally nothing but the shadows of the images.”

(Plato. Translated: Jowett, Benjamin. <http://classics.mit.edu/Plato/republic.8.vii.html>)

My theoretical and studio research originated with documenting second hand items in flea markets and housing materials abandoned in rural Maine landscapes. At first, these items made interesting photographs, but it soon became clear that so many rejected and abandoned objects have accumulated that a businesses can be run re-selling them. Vast gyres in the Pacific concentrate plastic trash, but on land we have flea markets where unwanted items accumulate.

While some items are functional antiques such as cast iron kitchen items and cotton quilts, there are numerous plastic toys and ornaments with forgotten significance. Many are unrecognizable widgets. One of the commonest abandoned objects in Maine landscapes are barbecue grills. They are too inconvenient to remove from remote woodland cabins and are discarded under the trees to rust. I realized that these accumulating items made of **long-lived** substances such as plastic are becoming a significant environmental problem, yet we keep manufacturing them. We have no alternative to plastic because it is such a useful, malleable, multi-purpose substance. A single plastic item is cheap to produce but has high costs in terms of pollution and wars over oil needed for its production. We do not have land-based gyres of plastic trash, but flea markets and landfills match that function.

Zlavož Zizek commented:

“While just looking, we are always hunting among objects, looking for what we desire or fear, endeavoring to recognize some pattern; on the other hand, objects themselves

always "stare back," vie for our attention, throw at us their lures and endeavor to entrap us."

SLAVOJ ZIZEK, *Enjoy Your Symptom!: Jacques Lacan in Hollywood and Out*

from http://www.notable-quotes.com/z/zizek_slavoj.html

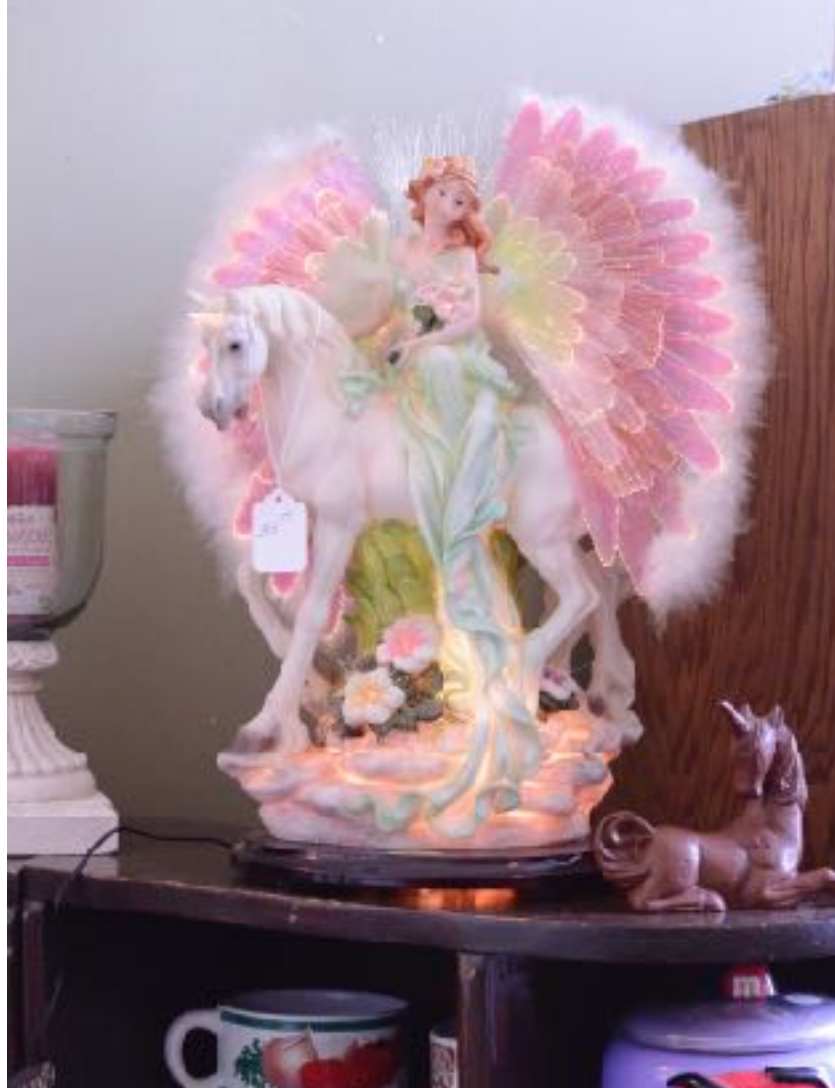


Figure 1:
Photograph of LED lit ornament of figure on a horse.
Fort Andross Flea Market 2016
Georgina Grenier

My academic research and creative project are concerned with how we have arrived at a situation in which we are becoming swamped with discarded items. The physical problem of the objects' presence and pollution from their production are self-evident, but it is the context for their arrival and the framework of ideas that brought about such excess that intrigues me. How can we be so foolish as to think this level of consumption can last? How can I use my studio work to shift ideas back towards a connection to nature in which we recognize the precious and finite resources Earth has?

I did not have a preconceived notion of what this creative project would look like, or where research about the Anthropocene would lead. Edwards, Gandini and Forman (461) observed that learning is cut off if its goal is too fixed:

“Do not be concerned about the project modifying its theme. What holds a project together are the gradual transitions ...”

Though this observation relates to children's learning, it could be applied to any endeavor. To have pre-determined the outcome is to preclude thorough research. The form of my artwork changed greatly as new information was assimilated and studio research occurred. Edwards et al also use the phrase “... *they are related in the life of the project as experienced*” As I experienced this project, there were many factors that affected the outcome of my research and creative work. Its progress was frequently altered by having to structure time to make it available outside my full-time work day as a public school teacher, being persistent, and meeting all the other responsibilities that occur in being in a partnership with other human beings whom one loves.

CHAPTER TWO

SURFACES AND GAPS BETWEEN

As I considered the existence of the objects abandoned in landscapes and flea markets I realized that though the objects are inanimate, their arrival caused change in the past. This change is affecting us now and will continue to do so in the future; their presence cannot be expunged. At all times, objects cause activity and ideation to occur that takes them into account: peoples' past actions that used them as intended, disintegration and abandonment in the present, and in the future when origins might have been forgotten, when they remain stored in homes or are re-purposed. For some items, obsolescence has meant relegation to a flea market, for others it has meant abandonment in nature where the sight and odor of their pollution registers uncomfortably.

Some objects remain attractive and useful, or gain an aesthetic quality as we utilize them by participating in their presence as an audience, or a collector of their image. No matter what it is made of, each one takes up space and has a surface which marks the physical limit of its structure and the beginning of a relationship with the space between me and it.

Objects have imprinted themselves on us, denting our awareness and diverting ideas.

I saw analogs to this in my printmaking practice. As a printmaker, I create and deform physical surfaces in many ways to make them retain ink, the vital, unpredictable part of printing. Do we respond as printing plates have done in the past with unavoidable repetition (see Goya on page 60), or do we allow the possibility of unique,

innovative behavior (a metaphorical re- inking) that might allow us to avoid compulsion to buy and consume?

The concept of surface can be used to describe the physical limit of an object's substance. It is a tangible boundary, separating inside from outside. It marks the interface of its volume with the environment, and may have a material all of its own such as the ceramic wall of an ornament or cookie jar.

Surfaces can also be thought of as ephemeral demarcations that give form to things with no physical substance such as one's understanding, parameters of belief and behavior. These are intangible surfaces such as histories and fables that still influence us in the present. (Beuys and Vollker, 75)

Heidegger wrote that we are constrained by what he termed the "*fourfold*": sky, gods, mortals and Earth. He opined that we require a dwelling place: a space to live in relationship to our need for shelter and the support the Earth affords us. We are not necessarily secure in our dwelling space and have survival needs which elicit what he called "anxiety". Our immediate needs are food and shelter, and the need for these vital resources lurks at the back of our minds and directs our actions.

Heidegger thought of life as an interlude of time between birth and death, situated on the Earth, our dwelling place (Critchley). We are aware of it seeming to drop by in instants which adds urgency to make ourselves secure and stave off our future absence- our death. The unavoidable awareness of time passing, marked by days and seasons changing adds subliminally to our need to make our lives comfortable. We do this by acquiring "*things*" and "*thinging*" them (Rickert 229) a concept Heidegger used to describe not only the physical presence of an object, but the uses and pre-disposing

of behaviors it causes. We know our space in the world through physical interaction with the *things* in it, and cannot undo the effect of *things*, once they have had been experienced.

Things (objects) affect us with their structure, form and function. They passively order us to carry out actions in accordance with their purpose. Though they are not alive, objects affect us by being present. Children often imbue their toys with feelings and I am not sure this habit is entirely lost as we grow up.



Figure 2: Flea Market Photographs: Left, ceramic pig ornament. Right, American flag ceramic cookie jar. 2015
Georgina Grenier

In Heidegger's view, a more developed item (such as a software update) might seem superior, more useful and to offer a horizon of new possibilities. New things are seen as ways of moving forward, away from the apparently inferior things of the past.

Newness combines with our ingrained physical and metaphorical habit of looking forward, and makes the future into new territory.

As beings who are aware of their numbered days and finite lifetime ticking by, Heidegger thought of the passage of time as a subliminal constraint, the “sky” of the fourfold. His model of mortality, a dwelling place, change over time, and the presence of god-like “*things*” as a fourfold that envelopes our existence is expressed in obscure language, but I found it useful as a way of unifying my research. It gave rise to the idea of surface as a concept that validated my creation of printed, textured, and distorted layers, and the question of whether they should be contiguous or have gaps that would be an absence of form, strategically placed, sieve like, to allow an audience to fill in the spaces.



Figure 3: Rachel Whiteread, *Untitled (Rooms)* 2001
The cast space around stairs and inside rooms.

Another description of surface came from Marcel Duchamp who originated a concept called the *infrathin* (Claire), an idea with a cognitive presence rather than a physical one. It is the happenstance of differing experiences occurring in the same location, or temporally. A person sitting in a chair that has just been occupied will sense residual warmth, whereas the first sitter will not. Additionally, One can know whether someone has been smoking because of the smell of their mouth; we can differentiate clean from smokey breath using memory. The *infrathin* is an invisible, tenuous separation of these events that enables them to be recognized as having happened: before and after, same and different.

This description of surface as an intangible gap occurring in time or perception became an additional unifying thread for my thesis research in which I looked for reasons why our cultural framework has led us to continue polluting the environment in ways we know are dangerous, yet appear unable to stop.

Why is there a gap between what we know we ought to do and what we actually do? On the one side of this gap is the certainty of history with all the mistakes we know have been made, on the other is a conceptual future in which we intend to do better, but have repeatedly failed to reach. The existence of a gap implies there must be something adjacent to it that establishes its presence. Between history we can inspect, and hope for the future, the present slips by as an interface, a temporal gap, where the past becomes the future. We seem to remain entangled in the patterns of the past, stuck and unable to function in the present so as to avoid a future of increasing disconnection with nature. To bend this trajectory towards a connection with environmental need requires a deep change in how we function, a move away from

industrial production of consumer objects and concomitant pollution. My responses to our apparent inertia in stopping life-threatening pollution, and how we became disconnected from environmental health are presented in this thesis.

The example of mountaintop removal in the Appalachians illustrates the dilemma of knowing what we did is harmful, but achieving a better future seems almost impossible.

Each day, citizens dwell in proximity to clearly observed destruction of their local environment. The removal has pros and cons: compare “... *a smaller mining equipment fleet, less fuel consumption and less labour...*” and “*Supply and demand say that this is a valuable resource, worth destroying large areas of countryside...*” both arguments are enmeshed in the past, may lead to increased cancer risk, removes



Figure 4: Mountain top Removal, Pike county, Kentucky. A mine sits above a community of houses in Pike County, <http://www.mining-technology.com/features/featuremountaintop-mining-in-appalachia-do-the-rewards-justify-the-risks-4168906/featuremountaintop-mining-in-appalachia-do-the-rewards-justify-the-risks-4168906-4.html>
Retrieved July 10

millions of tons of rock into valleys nearby that plugs streams and pollutes water supply to 300,000 people, the likely future.

Compared to the vastness of mountaintop removal, an everyday, tiny, anonymous action to benefit the environment may appear pointless, but the totality of millions of such actions has a significant effect, like the tiny perforating interference patterns on the front of a wave, this may be all that a person can do.

The Free Rider problem occurs when the consequences of one's actions are known to be good, such as polluting less, but the effects of one's virtuous behavior are not detectable (Hardin). This may lead to individuals free-riding, a situation in which *negative behavior* is also considered invisible. Thus, buying an inefficient car that emits more exhaust free-rides on the beneficial actions of people who drive less polluting cars, or leaving plastic detritus on a beach assuming it will be cleaned up by others. A free-rider does not contribute their share of beneficial behavior to the collective action of a society acting responsibly.

As I found later when I researched microorganisms, we free-ride on the collective action of organisms we cannot see that produce oxygen in Earth's aquatic ecosystems when we acidify oceans and allow plastic to degrade in the environment. Investigating social responsibility and truth-telling as a way to re-connect to nature became part of my thesis work in "Truth Project" and in the prints I made for "Liminal Surfaces". Teaching my students not to be free-riders became a part of my creative work and teaching practice.

CHAPTER THREE

MISUNDERSTANDINGS FROM METAPHORICAL LANGUAGE

In “*Change in Art & Design: A Speculative Field Guide*” (Kerr, n.d.) A passage from “*Zen and the Art of Motorcycle Maintenance*” (Robert Pirsig) describes a reason for our not being able to change:

“.....If a factory is torn down but the rationality which produced it is left standing, then that rationality will simply produce another factory. If a revolution destroys a systematic government, but the systematic patterns of thought that produced that government are left intact, then those patterns will repeat themselves in the succeeding government”...

If one sees misunderstandings as having created the gap between where we are and where we need to be, changing our language to to clarify misunderstandings is vital. The aesthetic of using recognizable imagery, or abstract shapes, and inclusion of words in my work relates to my research of how we structure language.

In fall 2016 I observed two amoebae who appeared to be sharing their prey. As I tried to describe their actions, it became obvious that attributing positive human traits such as sharing could not be applied to a tiny creature without a brain. The wording I fell back on anthropomorphized them inaccurately. The realization that humans tend to use convenient language incorporating euphemisms and metaphors to communicate information, often leading to misunderstandings was incorporated into my printmaking work in which I chose to provide minimal information to viewers. The web of context for much of our visual and spoken language, especially that which has widened our

disconnection from nature, became the focus of academic research in support of my creative practice.

In *Ambient Rhetoric*, Thomas J. Rickert (184) describes J.R.R. Tolkien's creation of twenty languages in the Lord of the Rings trilogy and creation of cultural histories that give context to their vocabulary. Tolkien wrote a history of Elvish culture which presented ... “ *a rich, ambient scramble of environment (land and sea, mountains and meadows, flora and fauna) history, peoples, and gods, all of them entangled across enculturation, purpose, activity, equipment, event, and story.*” Though fictional, Tolkien felt he must create and explain an invented history if a reader were to understand the nature of the language and events narrated in his literature.

Heidegger claimed that (Rickert 185) that all beings take part in what they are and how they manifest themselves their world. We may feel as though free will exists, but our actions are subject to the constraints and pressures of the situation in which we exist. Just as Tolkien's elves felt compelled to remove themselves from the time of “men” when their existence became incompatible with humanity's down to earth, non-magical practicality, we are now being compelled to drastically change our ways and there is no other habitat we can remove ourselves to.

3.1 Language in Industry

We have grown used to the ubiquitous pressure to consume and acquire possessions that it would be very difficult to manage without them. Our way of life has led us away from making our own products and instead toward a dependency on

purchasing them. Even when my family lived without electricity and raised much of the food we ate, we still had a car and washing machine to access locally.

Prosperity, has become synonymous with success, and is said to be illustrated through economic expansion, which in turn helps frame the impulse to acquire more possessions, as desirable. Metaphorical language and imagery that lauds success expressed as purchasing power is ubiquitous. It is not only anthropocentric, but often uses metaphors for strength that hint at androcentrism, which may preclude ideas embedded in a less muscular (arguably feminine) or even a neutral point of view from being accepted. Thus, steady progress, strong economic growth and expansion are good, whereas the opposite: slow growth (presumably feminine) is “anemic” a word that implies blood and menstruation. Conservation, an increasingly important activity for the environment, is seen as less desirable because it has a connotation of placatory, weak behavior compared to terms such as “energy dominance” (Collins). Advertising content of some organizations alludes to aggressive, acquisitive actions, rather than taking account of ecological need when optimism about growth is expressed. The American Chemistry Council’s (ACC) view that opportunities for economic growth will abound uses phrases such as:

be pro-competitive

a driving force

stimulate future growth

significantly expand

aggressively pursue

cutting-edge

Environmental concern is present in some corporate language, but in Exxon's website, the wording in this context includes "nurture": "*Chemistry produces fertilizers that nurture crops*", an awkwardly expressed concept. A victim-like aspect occurs in language such as:

"Modern landfills are lined with industrial strength plastics to prevent toxic run off into sensitive waterways or drinking water sources."

(Exxon Mobile: <https://energyfactor.exxonmobil.com>)

Or: "*On the energy offensive: Scoring big with the NBA*"

uses sports language, a domain of muscles and power.

(Exxon Mobil)

Rickert (185) writes that a statement, once made, always exists. Its presence never "exhausts what it is". A true statement can "*endure against what is concealed*" But how is correctness and factuality arrived at?

Bruno Latour (in Rickert, 205) describes the situation of gun ownership in which a gun can be thought of as inert, not doing any harm all by itself (Latour attributes this to the National Rifle Association) but harmful only when someone uses it to shoot bullets. Whereas Heidegger wrote that objects have a being that affects the world around them simply because they exist in it, Latour wrote that an object such as a gun has a potential for action when it exists as a "*gun in the hand*" rather than a "*gun in the cabinet*". The gun in the hand is subject to the system of language and ideas that the human gun-holder has, which, combined with a gun's clearly intended potential, that of aiming bullets, makes it more than a mechanism in a cabinet.

Plastic in the hand is also subject to the system of language and ideas that plastic-users have. Combined with its own potential to be infinitely moldable and beneficially multi-purpose (disregarding its pollution potential), its role is much more complex, seemingly benign and therefore harder to extract from society. If one were to view plastic by the damage it causes, it could be seen as having the purpose of being a tool for pollution by accelerating economic expansion. Seen this way, it appears much less benign, but this is an idea for which there is little narrative.

While language from corporations and informational websites that support them still use words that promote a sense of empowerment through purchasing and expertise, advertising on television aimed at everyday consumers is becoming gentler and reflects changing gender role expectations. Males are seen participating in functions that used to be almost always female e.g. car sales. In this context, I refer to physical dimorphism of humans and not the broader issue of trans-gender people, or how one expresses gender. My observations relate to what is commonly seen in commercials that promote acquisitiveness and consumption. I believe the loosening of traditional gender roles may allow more flexible thinking about the environment.

Eco-feminism is not the subject of this thesis, though I am sympathetic to it. How we express what it means to be feminine or masculine has been distorted away from simply being human.



Figure 5: Stills from T.V. Commercials, 2015.

Family enjoys French toast, IHOP commercial.



Child learns to ride bike with two nervous parents watching, insurance commercial.



Father in supermarket with child in cart, commercial for orange juice. Strangely, he appears to be alone in the store, a place where one would expect to see lots of people.

3.2. Compulsion for New Language

The Nigerian poet Ben Okri wrote a poem in honor of those who died in the Grenfell Tower inferno (June 14, 2017) that killed at least eighty people. It burned so fiercely because the cladding around the building was flammable and allowed the blaze to spread so fast it trapped those inside and killed them. He created new metaphors in his poem, using “cladding” as a way to describe the practice of economic skimping and willful ignorance about safety that led to the tragedy.

Excerpts from Ben Okri’s “A Poem for Grenfell Tower”:

... “Those who were living now are dead

Those who were breathing are from the living earth fled.

If you want to see how the poor die, come see Grenfell Tower.

See the tower, and let a world-changing dream flower”...

....”It happened in the minds of people who never saw Them.

It happened in the profit margins.

It happened in the laws.

They died because money could be saved and made.

How it looks, how it sounds, not how it really is, unseen”...

...”But if you really look you can see it, if you really listen

You can hear it.

You’ve got to look beneath the cladding.

There’s cladding everywhere.

Political cladding,

Economic cladding, intellectual cladding - things that look good

But have no centre, have no heart, only moral padding.

They say the words but the words are hollow.

They make the gestures and the gestures are shallow.

Their bodies come to the burnt tower but their souls don't follow"...

June 23, 2017, Ben Okri

(<https://www.ft.com/content/39022f72-5742-11e7-80b6-9bfa4c1f83d2>)

New ways of accessing what is seen and felt that break through our habits of thinking are needed in order to re-connect with the environment around us. We need to see and understand what is ... "beneath the cladding" of our consumption. It is from occasions such as the tragedy of Grenfell Tower that are so completely beyond description that language becomes used in new ways so that we can better understand such an event. We do not have an overnight blaze with a start and a finish, but a slow, rolling process of equal calamity of which we do not have adequate understanding.

CHAPTER FOUR

MESSAGES IN SHORTHAND: METAPHORS

A metaphor is a construction of language that is not factually accurate but conveys an impression of actuality to its audience. We understand a common meaning from their use, often learned in childhood through physical association (Lakoff and Johnson, 1980). They have become embedded in our way of thinking as images or linguistic devices, even if we do not know the origins of the metaphors we use. The intended meaning of a metaphor is still being transmitted long after the circumstances that led to its creation are gone. Examples are having many irons in the fire, breaking the mould, hammering something, or someone, being a king-pin. These relate to 19th and 20th century metal working practices, whereas a no-frills affair, is a phrase relating to lace-making, meaning of plain appearance, or in today's meaning: economizing, providing the basics.

Metaphors are used when we do not have convenient words to express ourselves and often relate to how we function physically (Lakoff and Johnson). We look forward, stand tall, don't look back, take aim at a goal when we are expressing dynamism, but lay down and die, feel out of touch, and act coldly when we are in a negative frame of mind. For organisms that do not walk on two legs such as snakes, standing tall is not something they would aspire to, if they have aspirational thoughts at all. Reptiles feeling warmth towards each other might not apply since they are cold blooded. Language construction can therefore be seen to apply mostly to experiences relating to human perceptions, and is an obstacle to the understanding of non-human

outlooks. The numerous metaphors and euphemisms we employ often work in a proprio-receptive manner to reinforce patterns of thought that may not be accurate, and subsequently, to acquisitive and self-preserving behaviors. It is language that provides recipes for our behavior, allowing us to slide over the facts of a situation until we do not notice, or ignore the facts “under our noses” that are doing harm. This is the case with environmental change in which our language, and especially the language of individuals who are making economic decisions contains for example: pro-growth, positive projections, enlargement and expansion to serve their customers, at the expense of the natural world.

For me, the most evocative visual or verbal language contains no borrowed constructions, no shortcut is taken and someone is communicating what they observe without resorting to well-used means. It is from this territory that new understandings evolve as I try to make meaning from a new, unfamiliar experience, or convey the experience to others.

Wendell Berry wrote: *“We are using the wrong language. . . . We have a lot of genuinely concerned people calling upon us to “save” a world which their language simultaneously reduces to an assemblage of perfectly featureless and dispirited “ecosystems,” “organisms,” “environments,” “mechanisms,” and the like. It is impossible to prefigure the salvation of the world in the same language by which the world has been dismembered and defaced.”* (in Stibbe 165)

We are used to solving problems in systems that we are external to, in the abstract, as scientists do, which may add to the sense that we can control nature.

Currently, the problems we are facing enfold us; we are on the inside of the problem; we are the cause, and must examine ourselves. We do not yet possess the necessary language that might help us understand that we are the subjects of our behavior, rather than in control of our situation.

Who is the “we” in this context? “We” refers to humanity as a whole, yet acknowledging we are all potential victims, as we now are in the Anthropocene, may not be a concept that both genders are equally familiar with, and for some individuals, not understood at all. Gender identity and roles are becoming more fluid, and this greater flexibility is welcome, but my point is that the language we have available to talk to ourselves about environmental concern and generate change is not shared by all. It may be better understood by those comfortable with a role of caring and conserving, who may be indomitable, but do not have equity in what should be a heritage of nature, in common (Haraway). If the stories we tell ourselves contain language that continues to make economic expansion more desirable than the consequences of removing trees, then systemic change is not likely.

In *“Language and Gender”* (Sunderland, 40) language use as a means of systemic bias is described. Though efforts have been made to embed neutral terms that do not exclude either sex, this has not always been well-received. In an effort to make all voices and identities heard, some individuals will have to concede their ground, rhetorically.

The language that is embedded may have changed in institutions, but in everyday situations, judgements are often still made in a traditional way. Terms such as “loser” or “stupid” are forms of public denigration (Schilling) used by a male authority

figure to reinforce the idea that a person in charge has a right to express judgement, even though it may intimidate or silence the recipient of the language. It also illustrates that accordance of strength is applied differently to males and females. Females are strong when they protect, endure, persist, are the wind in the sails of others, and are good mothers. Males are also strong when they protect, endure and persist, but they are accorded strength in addition when they dominate physically, win, adjudicate and punish. These traits do not match the concept of patient, loving, nurturing, strong archetypal motherhood, or more nurturing roles of fatherhood. Empathy, discussion, and displaying emotion when males are hurt are still not as common as tough, pragmatic, implied threat behavior shown by how much mess, pain, fatigue and muscling one can endure. Political and business decisions are still made predominantly by males, and their internal language may not be conducive to working with Gaia or Mother Earth whom they might still assume is perpetually patient and supportive.

Realizing that referring to the Earth as a goddess, Mother Earth, or Mother Nature may perpetuate spoilage and pollution of a patiently waiting mother-figure, concerned ecologists have transmitted new phrases to make awareness of environment feature more in political decision-making. The simile, "Spaceship Earth" likens humanity's only home hurtling alone through space to a machine, arguably a male stereotypical domain. However, embedding the Earth-machine concept in our thoughts may actually be an unhelpful step. A machine responds to commands, therefore we could order the Earth-machine to stop environmental change if we wanted it to, even though we do not have that ability. A machine is a system that an external adjudicator regulates, but we are the system in need of regulation, and we do not self-regulate.

Decision makers may not realize that females are capable of vengefulness, murderous intent, familiar with blood, gore and pain, and have implacable determination.

Artemisia Gentileschi was an Italian painter in an era when female painters were not easily accepted. Artemisia was raped by the landscape painter Agostino Tassi, but was never vindicated. The decapitation is graphic, practical and unsentimental. The painting was initially kept out of sight because it was thought to be too realistic an image to have been painted by a female.



Figure 6: Judith Beheading Holofernes (Artemisia Gentileschi, 1612-14)
<http://www.uffizi.org/artworks/judith-and-holofernes-by-artemisia-gentileschi/>

Despoilment, deflowering and abduction are verbal metaphors for physical violence against women, including rape. Themes such as the Rape of the Sabine Women have been depicted by numerous male painters and were in their time, acceptable, if appalling topics to create. What was their point in doing this?

Behaving with honor towards “her”, a personification of Earth as a deep-rooted, enduring, supportive female that originated in mythology ought to occur, but perhaps it is the passive, embedded acceptance of detrimental (even if unwitting) behaviors that have been dominant and a reason why our behavior is still framed in terms of control and regulation of nature.

It seems that we know how to achieve a more positive environmental state, but cannot simply take a shortcut to get there. History shows that populations go through a cycles of war, dislocation, death, disease and starvation that elicit change. Non-human species that are now struggling to survive are already experiencing this.

Deep ecology, a radical change in ecological thought, maintains that a completely new paradigm must be created in which the comfort of humans is not the focus of ecological concern. In this view, we do not imagine we can regulate nature in any degree, but recognize our animal nature and take part in the natural world no matter the cost. “Cost” used metaphorically implies discomfort, illustrating how hard it is to write about ecology without using words that entrap us in our comfort zone of not acting to avoid polluting behavior.

“Finding the 'right' metaphors might, just possibly, allow deep ecologists to mobilize the popular allegiance necessary for the long revolution. But until those

metaphors are found, or invented, the current poverty of our metaphors leaves the West with a distorted cultural conception, a lingering conception- still very much in keeping with the now-outmoded modern project - of nature as a simple system.” (Sabloff)

CHAPTER FIVE:

VISUAL REMINDERS

An androcentric affect is present in Hicks' Christian allegorical painting of the "Peaceable Kingdom" in which carnivores exist peacefully with herbivores, led by a little white (male) child.



Figure 7: Edward Hicks. *"Peaceable Kingdom"* Oil painting (1830-32)
Online image www.metmuseum.org/art/collection/search/11081) 11

A Utopian ideal is presented of a natural environment in which predation is no longer necessary. The landscape is lush and promising now that danger from being eaten is gone. In the middle distance white Europeans can be seen standing, presumably making friends with indigenous peoples who are kneeling and being presented with a box containing what appears to be fabric, perhaps to cover their bare

skin. The transaction depicts white people giving their largesse, by implication, to less civilized people. They are beneficent in this painting. Hicks was a Quaker and painted this image over a hundred times. His intention was likely kind, yet unwittingly condescending. Visually, Europeans have not only re-organized the animal kingdom, but non-Christian people also. This is a landscape in which other cultures and life forms appear to not mind imposition of Western values. Humans do not wish to be eaten, and the vegetarian sheep and cows we see in the picture don't either, but what will the now non-predatory lions and wolves eat? How does plant-life feel about being eaten? The change to the order of nature that this picture shows is desirable in one sense: an allegory of freedom from suffering, but it is also a nightmare involving starvation, cultural abuse and overpopulation.

The overarching message that "Peaceable Kingdom" transmits is that human-kind can control nature by improving it, assuming there is Christian biblical dominion over it. Like pruning a tomato plant, nature won't mind the injury, and will grow back; a bit less of it will rebound. That our way of living is now causing widespread transformation of a planetary ecological system and the system is adapting to the new situation, is seen as merely an inconvenience, not part of our overall consciousness. We are finding that nature is often unable to rebound. The system we are altering is not a passive, inert object like a Peaceable Kingdom, or a jigsaw puzzle that can be remade repeatedly. We are altering the ecosystems of living things who will move, change, or metaphorically retaliate. Cocooned in our houses and jobs it feels as though we are separate from the emerging necessity to adapt that is occurring all around us.

Some images have helped humanity to see our situation from outside our Earth-dwelling and have re-shaped how we can gauge our position in the scheme of things. The Apollo 8 astronauts photographed Earth from the Moon in “*Earthrise*”, 1968. For the first time, humans could see Earth, knowing it is our home, as a planet against a dark, enormous universal sky (Rickert, 214). The new representation of Earth as a small blue marble with swirling white clouds, alone in space helped frame the feeling that where we dwell is an ecosystem of rocks, water, air, human and non-human organisms which need each other and affect one another. It is much more than the sum of our economic activity. in which we seek to live “the good life”.



Figure 8: *The Bridges Family*. John Constable 1804
http://www.tate.org.uk/art/images/work/N/N06/N06130_10.jpg

The eight healthy-looking Bridges children and two parents exemplify living the “good life”: they play the harpsichord, wear neat white clothes or suits, have a painted landscape on the wall and a house in which to hang the picture.

An abundance of art historical images capture moments of security in times that may have been risky. Comfort, nutrition, leisure, and sufficient wealth and dominion over the environment to be clean and stylish are shown in this painting. The production of artworks such as these signifies a level of cultural stability in which skillful individuals could be trained and made available to create them. These are artistic records of a truth told in order to celebrate abundance. They occur in many contexts: Egyptian pyramids, Renaissance castles, society portraits of the nineteenth century, and advertising today. We can share a mutual congratulation of having risen above the need to persist and struggle not to succumb. That this is a good life is not questioned, but it does not necessarily correlate with an ethical life. As observers we can occupy the cognitive picture-space of freedom from worry, remaining a step or two removed from an unfiltered natural world. The comfort and delight in attractive things that screen us from the reality of struggle are exemplified in my screen print made from a drawing found at the Bates Mill in Lewiston Maine (see page 73).

The social and economic cost of unchecked industrial progress and faulty agricultural practices is illustrated by Dorothea Lange’s 1936 photograph of Florence Owens Thompson, a migrant pea-picker and mother of seven children. She is only 32 but has a heroic, resolute face that seems to convey that even though she is suffering, it is bearable. She is thin, but not starving, care-worn, dusty, but not unattractive.



Figure 9:

<https://upload.wikimedia.org/wikipedia/commons/5/54/Lange-MigrantMother02.jpg>

Florence Owens Thompson, Migrant Woman. 1936.

Photograph by Dorothea Lange

Poverty caused by the dust bowl has a gritty glamor provided by this image. We have a romanticized notion of what is occurring from this photograph and may misunderstand what it represents because it seems as if these conditions can be tolerated. Dorothea Lange's image is eighty-one years old, but economic practices that marginalize people, leaving them helpless or without adequate means are still occurring.

... "Forced labor is the type of enslavement used across the world to produce many products in our global supply chains. The fishing, textile, construction, mineral and agriculture industries are particularly laced with forced laborers. The private economy – businesses and individuals seeking to create a profit – exploits 90% of the world's forced laborers, meaning that the desire to produce a profit is the largest motivating

force behind the institution of slavery.” (<http://www.endslaverynow.org/learn/slavery-today/forced-labor> . 2017)

5.1 BUILDING ON THE PAST

When we have direct experiences that present unfiltered, new information, a process of interpretation occurs as we assimilate it. We give the newly arrived information context, setting it against similar experiences that eventually allow us to make a judgement about it. Pelowski et al describe this as an expansion of the self which may happen without conscious awareness, but when we become aware of it, in charge of it perhaps, the alteration of self via sensory means is what they describe as “*satori*”: the sense of knowing that an open mind can bring (Kostelanetz and Cage, 1987). A similar process can occur with the Japanese aesthetic “wabi-sabi” in which opposites combine to create strong emotions such as the fleeting, brief beauty of falling cherry blossom, age-polished wood, cracked surfaces and distortions in raku ceramics. These experiences are perceived without judgement, with no jump to a conclusion that something is ugly because it is old or distorted. (Koren, 1994) The qualities of an experience wash over us and we absorb them all, without closing any channel of information.

Adopting an idea without examining its context can lead to misunderstanding, and when some notions become entrenched, shameful behavior can occur. Racism and ethnic prejudice are two examples, but typically, these attitudes are guarded against. The research presented here focuses on our ideation about non-human life, rather than racial matters and ethnic intolerance. We remain mostly oblivious to speciesism i.e. a bias that one’s own species has a greater claim to ownership of rights and habitat than

other species. I am particularly concerned with ways in which language is used so as not to recognize habitat destruction, or take climate change seriously, and why such language exists. Language that marginalizes non-humans may also be language that marginalizes human rights. This might be convenient in the short term, but it is always ethically challenged and environmentally unsustainable in the long term.

We have consciences and care deeply about those we love, shown in anecdotes of caring for family and pregnancy related in my work *“Truth Project”*, yet we seem able to suspend conscience when it is directed at things that are not comfortable to contemplate or lives with which we cannot make common cause. It is often the sentient beings we wish to take advantage of that become misrepresented in our language.

In the case of pigs that are butchered and eaten, pig-related metaphors bely their nature and our relationship to them. In my experience of raising several pigs at my house, they enthusiastically ate restaurant left-overs and corn, but did not usually overeat (“pig out”). They had plenty of room for their excretory needs and were sociable and clean. Our pigs rooted up a field “for us” and roamed in a large area. We referred to them as “Meat Pig” and “Ham” to our children so that they would always understand this was the fate of the pigs they knew, but after a few years we stopped raising them because it was too stressful to euphemistically “send pigs to market”.

In his paper *“Pig”*, Arran Sibbe documents attitudes towards pigs and lists negative phrases associated with them. He notes that a pig is a misunderstood animal who has the capacity to be far more than colloquialisms suggest. William Hedgepeth writes that rats who have been trained to fear the dark and flatworms who have been trained to contract in bright light (The Hog Book, 179) can be ground up and fed to other

animals. These animals learn the same behavior more quickly after eating the brain (rats eating rat brains) or the whole body, in the case of planarian.

We eat pork frequently, often consuming creatures who are frightened and have been raised in unpleasant conditions. What lessons might we be consuming from eating pork? For cultures who eat pigs, dissociating positive experiences of pigs, or accurate perceptions of them from what is collectively done to pigs when they are butchered becomes a way of keeping emotionally distant from them.

Table 1. Non-Literal Uses of the Words Pig, Swine and Hog from the BNC

Expression	Grammar				
No direct presuppositions		rotten mean pig	Adj + N	the car's a pig	N
awful pig	Adj + N	savage pig	Adj + N	you pig!	N
beastly pig	Adj + N	self-righteous pig	Adj + N	pig!	N
capitalist pig	Adj + N	selfish little swine	Adj + N	he is a pig	N
drunken swine	Adj + N	selfish pig	Adj + N	behaving like a pig	N
fascist pigs	Adj + N	self regarding swine	Adj + N	hog the limelight	V
fat pig	Adj + N	stupid pig	Adj + N	Direct presuppositions	
filthy pig	Adj + N	the pig police	Adj + N	making a pig of herself	N of hrs
foreign pigs	Adj + N	unbelieving swine	Adj + N	as sick as a pig	simile
greedy pig	Adj + N	unfeeling pig	Adj + N	tuck in like a pig	simile
absolute pig	Adj + N	ungallant swine	Adj + N	bleeding like a stuck pig	simile
ignorant pig	Adj + N	unscrupulous swine	Adj + N	as fat as a pig	simile
insufferable pig	Adj + N	untidy pig	Adj + N	drunk as a pig	simile
imitating pig	Adj + N	old fat pig	Adj + N	happy as a pig in poop	simile
lucky pig	Adj + N	Meaning dependant presuppositions		happy as a pig in the mire	simile
lying pig	Adj + N	a pig sty	N mod	rich as a pig in shit	simile
male chauvinist pig	Adj + N	go the whole hog	Idiom	squealing like a stuck pig	simile
misogynist swine	Adj + N	a pigs ear of it	Idiom	sweating like a pig	simile
murderous pigs	Adj + N	a pigs breakfast of it	Idiom	stubborn as a pig	simile
patronising pig	Adj + N	a major pig out	Idiom	stinking pig greedy	Adv +
pompous pig	Adj + N	to pig out	V + out	pig sick of them	Adv +
		she was a pig to me	N	pig ignorant	Adv +

Table 1: Arran Stibbe. *Pig Phrases*, in "As Charming as a Pig: the Discursive Construction of the Relationship Between Pigs and Humans" 2003

The language used in this table relates to a time when food and the process of raising it was far more commonplace than it is now. Food production is out of the mainstream of experiences for most of us and we have not seen pigs die (Thompson, F. 1949 p. 12) but we understand what the phrases mean and still use them.

“The killing was a noisy, bloody business, in the course of which the animal was hoisted to a rough bench that it might bleed thoroughly and so preserve the quality of the meat. The job was often bungled, the pig sometimes getting away and having to be chased; but country people of that day had little sympathy for the suffering of animals, and men, women, and children would gather round to see the sight.”

Metaphorical and euphemistic language is one way we keep such imagery in a shuttered place in our conscience so we do not have to keep justifying the death of animals we consume. Flora Thompson’s writing makes the butchering of animals for food visible in our imaginations. We know they suffer, but we avoid understanding it or empathizing with destruction.

When it comes to economic expansion promotional metaphors already exist and euphemisms are ready to “pave the way” for a “cost of doing business”. “Stock” phrases are ready to use to justify for example, why the removal of trees, mountaintops or farmland is necessary. It is language that keeps us moving towards greater production and purchasing power, activities which are described as advantageous, more pleasant and empowering (American Chemical Council).

CHAPTER SIX

THE PROBLEM OF PLASTICITY, A REAL WORLD CONSEQUENCE

Plasticity is the quality of being able to be molded into any form. Plastic, a material named for this quality has become indispensable to us as the material used to produce innumerable mechanical parts, for example, insulation for electric wires, and mass production of items that are no longer made from natural substances. Prior to plastic, functions such as food storage were carried out in ceramic, glass or wooden containers. Piano keys were made from ivory, jewelry was made from metal and gemstones or glass. Toys were made from wood, enameled lead or glass. Dolls were made from leather, organic fabric, wool, human or animal hair attached to a ceramic head. There were no Lego bricks. Cooking implements were wooden, metal, or ceramic. SanClements (20) describes how natural polymers such as cattle horn or hooves could be softened and molded into items such as book covers or hair ornaments.

Plastic has taken the place of horn, tortoiseshell, wood, animal and plant fibers which we used to use; it is certainly hard to contemplate the amount of horse hooves we would need for chair stuffing and glue if we still depended on animals for furniture we take for granted. Metal, glass and ceramics which were often used for food storage have been mostly replaced with plastic packaging.

Plastic has become embedded in our way of life because we now have no viable alternative to it. It would be an immense upheaval to reorder our lives to do without cars, computers or synthetic fabrics. Plastic has allowed very rapid expansion of our capabilities by making conduits for electricity in insulated wires, safer food storage, medicine delivery, and human comfort. At the same time, our expanding ability to

manufacture has caused the loss of habitat for non-human organisms, or even humans that are in the way of progress. Plastic production causes pollution, and once made, it does not decay as animal and plant products would.

Michael SanClements describes the manufacture of plastic from oil in his book *Plastic Purge* (47) : Crude oil from the ground is a mixture of substances that when heated sufficiently to be vaporized, can be “fractioned” off at particular temperatures and condensed to produce liquids for diverse uses. Plastic that we are familiar with is made from naphtha using a technique called “cracking” that results in ethylene and propylene production. These two polymers are the basic units of plastic, composed from chains of carbon compounds. Monomers are the single molecules of carbon compounds that are polymerized through heat into plastics. Ethylene (a gas) polymerizes to make chains that become polyethylene used in plastic bags and flexible plastics. Propylene polymerizes into polypropylene used in clothing. Polymer chains can be melted and formed into a myriad extruded, blown or molded forms and dyed to make the many plastic items we use.

While the material cost of an individual plastic item is cheap, for example a non-bioplastic food bag, there are less obvious costs that make the true cost of a plastic item greater, and these may not be taken into account:

The oil extracted for plastic manufacture extracts a price in terms of wars, factory maintenance and operating expenses

Emissions remediation from the oil fractioning process

Transportation to point of use

Life of the product if not recycled

Disposal or storage

Removal from oceans

According to the United States Energy Information Administration 2,595,880,000 barrels of oil were used in 2012 to manufacture all the plastic we used, or approximately 8% of global oil production. (SanClements p.54)

Seeking to find a good definition of a polymer, the building block of plastic materials, I came to the American Chemical Council (ACC) website that presented their optimistic conclusion: *“Polymers affect every day of our life. These materials have so many varied characteristics and applications that their usefulness can only be measured by our imagination. Polymers are the materials of past, present and future generations.”*

To their credit, the ACC site also contained many references to environmental concerns, but these seem less convincing when the same organization offers an opinion regarding President Obama’s decision to curb oil exploration in the arctic. The ACC states (Dec 20, 2016) on its website: *“This action by President Obama in his last days in office is another disturbing example of short-sighted policy decisions made by the Administration to limit access to oil and natural gas on federal lands.”*

This organization that gives the public information about plastic products and chemical industry policies had expressed an opinion without giving facts in support of President Obama’s action, or against it. A desire to keep business as usual was telegraphed in their effort to present the prospect of job security, competitiveness and innovation, rather than environmental concern about habitat destruction, oil spills, or private industry operating on tax-payer funded land.

A post on marine plastic removal from 2016 refers to efforts made in 2011.

“Global Plastics Industry Effort to Combat Marine Litter Grows in 2016.”

<https://www.americanchemistry.com/Media/PressReleasesTranscripts/ACC-news-releases/Global-Plastics-Industry-Effort-to-Combat-Marine-Litter-Grows-in-2016.html>

It appears to be a statement that by May 2016 (the date is ambiguously expressed in the website and it could be 2011), sixty-five plastic associations in 34 countries had signed a series of goals agreeing on action steps for plastic removal.

Their Progress Report “Marine Litter Solutions” contains images such as this one of children enthusiastically removing plastic from a beach (in plastic bags)



Figure. 10. This picture is from the Marine Litter Solutions pdf <https://www.marinelittersolutions.com/wp-content/uploads/2016/05/2016-Progress-Report.pdf>
Children removing plastic trash from a beach.

The image implies that children enjoy the activity and that perhaps marine plastic litter problems are literally a walk on the beach, even though using children to pick up plastic that may be emitting endocrine disrupters is questionable. An adult is wearing protective gloves, but the children are not. Their bags appear to be almost empty.

The article also describes successful Congressional Legislation in 2015 to have manufacturers such as Unilever, L'Oréal, Colgate/Palmolive, Procter & Gamble, Johnson & Johnson remove plastic microbeads from products such as toothpaste and skin cleansers. Recycling of plastic wrap for food is described as successful in Vancouver, as is a goal (it is a goal only) to reduce to zero, the spill of plastic pellets used in plastic manufacture during transportation. It is acknowledged that these tiny pellets about the size of split pea might enter the ecosystem and be consumed by marine animals leading to malnutrition and death.

In looking at the list of projects to help reduce marine plastic litter, many are educational, goal setting, or small area clean ups, but not resolute, active removal of product from oceans. Relatively fewer projects are occurring in the U.S compared to other regions such as Asia or Europe. On the website one can also find “emerging” policies that are in opposition to remediation of plastic production regulations. On December 21, 2016, this statement was released:

...“U.S. trade policy has focused on promoting strong, enforceable rules to help boost the international trading system. In addition to high standards on tariff liberalization, there is an opportunity to pursue measures to remove regulatory and other non-tariff barriers to exports, and promote a more integrated and efficient regulatory environment. Such provisions are essential to eliminating barriers that may

act as a drag on economic growth and job creation. Given its global footprint, the chemical sector can be a key focus for efforts to drive greater global regulatory coherence for U.S. manufacturers. Increasingly, U.S. chemical manufacturers are facing regulatory and other non-tariff barriers in accessing overseas markets. The negotiation of high quality trade agreements provides a key opportunity to address these 21st century barriers.”

News & Resources, www.americanchemistry.com/News_and_Resources/?topic=254.

... “The competitive advantage of American chemical manufacturing, largely due to shale gas, provides a unique opportunity to drive a broader expansion of manufacturing in the U.S. Maximizing this opportunity will require the development and implementation of a world leading, pro-competitive policy and regulatory environment: on energy, infrastructure, tax and trade. The chemical sector is heavily dependent on engaging in global markets—and with a strong and growing trade surplus, we are trading from a position of strength. It all starts with shale gas.”

The language used by the ACC links economic growth to the extraction of gas from shale: fracking. This is a process whose safety is not guaranteed.

So while lauding the Lautenberg Chemical Safety Act, passed June 2016, Dominique Browning, Co-Founder and Senior Director of Moms Clean Air Force said:

"The new bill is both a health bill and an environmental bill—because these chemicals also enter our air and our waters. It is the result of a decade of work. It is the

result of Republicans and Democrats reaching consensus. It is the result of environmentalists and the chemical industry sitting down together to figure out what each group could live with."

It does not seem that the chemical industry is consistently sincere about its intentions to be less of a polluter.

Boyan Slat is a person who is evidently sincere about ocean clean up. He is a Dutch environmentalist aged twenty who has a seemingly simple solution to plastic removal. He has started a project called "The Ocean Cleanup" for which he is raising funds to create and deploy collection booms that will utilize ocean currents to bring the plastic to a collection barrier rather than use boats with booms and nets to catch it. It is a passive system and has the potential to remove almost all the plastic, including micro-plastics from the top layer of ocean water in a decade or so from the five gyres where it collects. He gave a TED talk at age eighteen (<https://www.youtube.com/watch?v=ROW9F-c0kIQ>) in which he describes his process and caught the attention of donors who have provided money and support. A prototype boom was deployed in the North Sea in 2016 which helped identify engineering flaws. A second TED Talk on May 11 2017 (<https://www.theoceancleanup.com/milestones/pacific-cleanup-trials/>) describes his research and practical, iterative problem solving. He now has a research team and cleanup systems ready to start cleaning up the Pacific garbage vortices by mid 2018.

Plastic detritus not only has an external surface that degrades, but also a vast surface within its volume which will ultimately be unfolded and exposed to decomposition if the detritus is not removed. UVA (Ultra Violet light occurring in sunshine) light has a wavelength of approximately 315-400 nm, with an especially

effective wavelength of 369nm (UVA-1) which can make plastic more rigid and brittle by polymerizing (curing) it (Light Tech LightSources 2017)

Materials such as glass, ceramics and metal also persist in the environment, and have been used for thousands of years to make utilitarian items, but they have not caused pollution that is as persistent as that of the petroleum industry. A ceramic or glass vessel is almost inert over time. If it degrades i.e. breaks into shards, or into tiny pieces, they resemble the rocks and sand it came from. Pollution in ceramic production may come from silica, talc and fumes during firing, but it has a much lower volume.

Steel produces atmospheric pollution in the form of gaseous sulphur oxides, coke dust, carbon dioxide and naphthalene during its manufacture, but it rusts or is recycled once it is no longer needed. It can also be reclaimed, especially from buildings, and re-used in a new location. Steel production produces emissions that can pollute water used in quenching the molten steel, but this water is re-used after cleaning and filtered to remove contamination. Byproducts of steel production such as slag, the limestone and ore impurities generated during the melting process are used by construction industries, rather than accumulating in landfills. Sulphur dioxide and hydrogen sulphide emissions are captured in control equipment. (<http://www.greenspec.co.uk/building-design/steel-products-and-environmental-impact/>)

The parent substance for steel is iron ore, ubiquitous in Earth's crust. While conversion to steel produces pollution, it is not as widespread and damaging as the role plastic plays.

6.1 ESTROGEN MIMICRY

Research described in 2011 has revealed (Yang, Chun Z. et al) that plastic food-containing items can leach small amounts of chemicals that act as estrogen mimickers that are particularly harmful to fetal through juvenile age mammals. Leaching from the container is increased by common stresses such as microwave radiation, moist heat from boiling or being washed and originates from additives to the plastic such as colorants.

The stresses to plastic food containing items including baby bottles were:

- Samples placed about 2 feet from a 254-nm fluorescent fixture for 24 hr, simulating repeated UV stress by sunlight (e.g., water bottles) or UV sterilizers (e.g., baby bottles and medical items)
- Samples autoclaved at 134°C for 8 min, simulating moist heat stress in an automatic dishwasher
- Samples heated in a microwave 10 times for 2 min each, using a 1,000-W kitchen microwave oven set to “high,” simulating heat and microwave radiation stress to reusable food containers.

These are effects one can expect to produce in everyday situations.

Recently there has been concern about plastic water bottles containing BPA (poly-bis-phenol), and this substance became less common in their manufacture, but other chemicals that act as estrogen analogs are also present. It is not clear which substances they are, or how strong their effect is and they may be just as harmful as BPA. Almost every plastic container the scientists looked at leached estrogen-acting

(EA) substances, regardless of whether it contained BPA. Some containers were found to emit more EA substances than BPA -free items.

Plastics from 455 types of food containers such as baby bottles, food bags, food boxes were sampled from diverse stores such as Target, Walmart, Trader Joe's and Whole Foods located mainly in Austin, Texas and Boston, Massachusetts. The last two stores are understood by the public to market organic and safe foods in safe packaging. It was found that most plastic packaging, especially blue and green tinted materials leached estrogenic substances, BPA -free or not. The appeal of BPA-free bottles is understandable, but trust that a plastic container without BPA is harmless, is misplaced. Disturbingly, estrogenic activity (EA) has been found to have an effect on the structure and function of many types of cells in vitro and in vivo. Baby bottles, BPA free or not leach EA substances, especially when microwaved.

To quote the study's conclusion:

“ Many scientists believe that it is not appropriate to bet our health and that of future generations on an assumption that known cellular effects of chemicals having EA released from most plastics will have no severe adverse health effects (Gray 2008; Talsness et al. 2009; Thompson et al. 2009) Because we can identify existing, relatively inexpensive monomers and additives that do not exhibit EA, even when stressed, we believe that plastics having comparable physical properties but that do not release chemicals having detectable EA could be produced at minimal additional cost.”

Facts about BisPhenolA (BPA), a site linked to the ACC via the Food and Drug Administration (FDA) declares that according to 2013 FDA research it is safe. BisPhenol

A, the plastic that is present in some water and baby bottles, canned food linings, and juice carton interiors is so rapidly eliminated from the body that it is unlikely to cause detrimental health effects in normal consumer exposure situations. However, the National Institute for Environmental Health reports that epoxy resin containing BPA is used in some dental sealants, as a liner for canned goods, baby bottles and plastic tableware. It has been found in breast milk and 93% of 2,517 urine samples collected by the Center for Disease Control from individuals age 6 and up. The temperature of the contained item may cause BPA to leach in greater amounts, therefore microwaving a bottle or food container may cause release of the compound. It describes BPA as an endocrine disruptor along with other compounds such as dioxin, other polychlorinated bis-phenols, and DDT. Risks include a greater chance of developing endometriosis, lowered fertility and some cancers. All this for a substance that is excreted quickly enough not to do any damage!

6.2 PLASTICS AND POLLUTION IN THE ENVIRONMENT

As the 2015 paper by Ignacio Moreno-Garrido^{*}, Sara Pérez, Julian Blasco states, extremely small particles of matter have been present on Earth for as long as it has existed. They have come from natural events such as volcanic eruptions or hydrothermal processes. What is of concern is that humans have engineered similarly sized particles less than one micron that are not natural to our environment. (Moreno-Garrido et al 2015) They are used as components of toothpaste, antibacterial and anti fungal substances, cosmetics, clothing fibers and more. Our water treatment even use them. They are especially prevalent in digital technology. While they have utility in the short term, it is not clear what their long term effects might be.

The exhibit “Nanotech: The Invisible Revolution” 2016 at the Musée de la Civilisation, Quebec gave a positive view on our use of nanotechnology:

“A Fantastic Voyage in NanoWorld”

Today's "nanos" can be found in electronic gadgets, cosmetics, sports equipment, and medical treatments. Thousands more promising new applications are also on the way. Nanotechnology has drawn on as well as influenced science fiction, sometimes in dark visions of a future world where humanity is at the mercy of developments in technology. Such future images can affect public perceptions. Debates have intensified, and in the last few decades enthusiasm for scientific discoveries has increasingly given way to a certain wariness.”

Why is the word “wariness” used? What are the concerns that might be debated? Nanoparticles have properties that are related to their size. Whereas a larger particle might be inert, a nanoparticle is so small that 30-40% of its atoms are distributed on its surface, making it much more reactive. Moreno-Garrido et al., have found that silver and gold nanoparticles have made their way into marine ecosystems from sewage sludge and run off, then absorbed by creatures such as brine shrimp where they have toxic effects. Creatures eating brine shrimp therefore also consume this material, though they may be larger and less affected initially.

It is not just nano-sized particles that are of concern, being simply a small, edible-sized piece of trash may clog the digestive system of a fish. In their paper “Nanoplastics in the aquatic environment” (Mattsson, Hansson and Cedervalla) state that in 2012, 280 tonnes of plastic were produced, with two-thirds of this being for packing materials such as plastic bags, and housing components such as plastic pipes. One-

tenth of this plastic production is expected to end up in the ocean, where it is a “severe and potent” pollutant. They describe plastic as being one of the most significant littering agents in the world. 60-80% of marine debris is plastic, with the majority coming from land-based sources, and only about a fifth coming from the fishing industry.

A micro-sized plastic particle is considered to be between 1mm and 5mm in diameter and a nano-sized particle is considered to be between 1 and 5nm. The plastic particles that are merely of small size will eventually give rise to nano-sized ones. As with metallic particles, the small size alters the chemical and physical properties of the material. An example of surface area to volume that is shocking is that according to Mattson et al a plastic grocery bag that has been broken down into 40nm particles will, they surmise, produce a surface area of 2,600 square meters. A path up the food chain is initiated when bacteria and algae absorb plastic nanoparticles, and are then eaten by filter feeders such as brine shrimp which are then eaten by larger fish.

For now, plastic items in flea markets are on land, isolated from the ocean and aquifers and sunlight, protected in homes. Their degradation will be slow, but will occur eventually. At some point, the houses that contain them will perish, and the plastic they contain will be set free, exposed to sunlight and degradation.

What originates as land-based plastic ends up in ocean gyres discarded from ships and beaches. According to The Guardian newspaper (Neslen) up to 29.1 items of rubbish are present per square meter in the Indonesian archipelago which has the world's second highest concentration of shoreline marine debris after Sicily, which has 231 items per square meter of ocean. Also, in 2014, 311 metric tonnes of plastic were

produced around the world, a 20-fold increase since 1964. It is expected to quadruple again by mid-century.

Algae and diatoms provide about a third of our planet's oxygen, in addition to that produced by trees and plants. They are also the foundation of our aquatic food webs, and depend on the actions and well-being of these tiny organisms to keep the world healthy, yet they remain out of everyday awareness. Their existence is threatened by the presence of plastic in our water. The large pieces are not a problem for them; their problems arise when large pieces of plastic detritus break down into sufficiently small particles that can be eaten. Plastic contains solvents used in its manufacture that can be released under these conditions, as well as substances such as estrogen mimickers that can enter our food chain. As mentioned, all the plastic in our oceans and lakes will eventually breakdown into nano-particles, thereby increasing the surface area that can leach contaminants into water. It might take many years, but unless plastic is removed from aquatic habitats, this breakdown is unavoidable. By entering the food chain at the bottom, plastic residues will reach us.

Reaching "us" is an anthropocentric concern. On its way down the food chain, plastic in large pieces is a threat to non-microscopic sea life. Photographs of turtles enmeshed in plastic packaging, dolphins in plastic nets and birds with gullets full of bottle tops are heartrending.



Figure 11: Albatross's stomach contents of plastic bottle caps. <http://peakoilbarrel.com/wp-content/uploads/2014/07/midway-albatross-21.jpg>
Retrieved July 10 2017

CHAPTER SEVEN

FINDING NEW LANGUAGE

Boyan Slat is a person who is evidently sincere about ocean clean up. He is a Dutch environmentalist aged twenty who has a seemingly simple solution to plastic removal. He has started a project called “The Ocean Cleanup” for which he is raising funds to create and deploy collection booms that will utilize ocean currents to bring the plastic to a collection barrier rather than use boats with booms and nets to catch it. It is a passive system and has the potential to remove almost all the plastic, including micro-plastics from the top layer of ocean water in a decade or so from the five gyres where it collects. He gave a TED talk at age eighteen (<https://www.youtube.com/watch?v=ROW9F-c0kIQ>) in which he describes his process and caught the attention of donors who have provided money and support. A prototype boom was deployed in the North Sea in 2016 which helped identify engineering flaws. A second TED Talk on May 11 2017 (<https://www.theoceancleanup.com/milestones/pacific-cleanup-trials/>) describes his research and practical, iterative problem solving. He now has a research team and cleanup systems ready to start cleaning up the Pacific garbage vortices by mid 2018.

His work and practical attitude are a contrast to the 5-Gyres project website in California that features better coffee cups with environmental messages on them, but does little to fundamentally rethink how the problem of plastic detritus in the ocean can be solved.

The artist Banksy nudged consciences about eating animals in “*Sirens of the Lambs*” 2013, a truck hauling animal puppets with humans inside, through New York City to be slaughtered. The heads moved as if pleading to be let out. The animals

represented in Banksy's truck are part of a body of work describing environmental problems in a disphoric theme park in England.

He intends to dispel acceptance of consumerism by putting objects and graffiti in new contexts so that new thought associations can be made.



Figure 12: Banksy. *Sirens of the Lambs*
[http://i.dailymail.co.uk/i/pix/2013/10/12/
article-2455637-18B0A3E600000578-878_634x425.jpg](http://i.dailymail.co.uk/i/pix/2013/10/12/article-2455637-18B0A3E600000578-878_634x425.jpg)
Retrieved 26 June 2017

When we have direct experiences that present unfiltered, new information, a process of interpretation occurs as we assimilate it. We give the newly arrived information context, setting it against similar experiences that eventually allow us to make a judgement about it. Pelowski et al describe this as an expansion of the self which may happen without conscious awareness, but when we become aware of it, in charge of it perhaps, the alteration of self via sensory means is what they describe as

“*satori*”: the sense of knowing that an open mind can bring (Kostelanetz and Cage, 1987). A similar process can occur with the Japanese aesthetic “wabi-sabi” in which opposites combine to create strong emotions such as the fleeting, brief beauty of falling cherry blossom, age-polished wood, cracked surfaces and distortions in raku ceramics. These experiences are perceived without judgement, with no jump to a conclusion that something is ugly because it is old or distorted. (Koren, 1994) The qualities of an experience wash over us and we absorb them all, without closing any channel of information.

7.1 TRANSFER

Metaphors and similes are a way of mapping experiences, transferring them from one domain to another to facilitate comprehension (Proctor and Larson) This occurs when individuals who are discovering new information are authoring language to describe what they have discovered. For biologists, it may mean describing living things as self-organizing, or ecosystems as alive. It is often figurative language that helps explain new facts by offering a mental tool for considering implications and raising new “if-then” questions (Lotto). For scientists who use a disciplined way of working in an experimental method, loose, figurative language may not be accurate, but it helps express meaning derived from numerical, non-verbal data. Constructing new metaphors and descriptive language therefore broadens how much we can know and eventually embeds the new finding in all of us.

In *Plant Behavior and Intelligence*, Anthony Trewavas quotes Barbara McIntock (1984) “*A goal for the future would be to determine the extent of knowledge the cell has of itself and how it uses that knowledge when challenged.*”

McLintock uses the idea that cells have self-knowledge (a transfer of human values) but this has not been shown (Larson et al). Swarming behavior of cells and insects has been shown to be apparently self-directed e.g. slime molds who move collectively to food sources and bees who communicate pollen locations.

So far we have not found out how a system of living things capable of independent actions cooperates with itself. This also applies to the Gaia concept of the Earth being a living sentient system (Larson et al) a metaphor that is appealing to many.

Cells are so tiny that they are not visible to everyday experience, in contrast to large animals such as pigs, sheep, or plants that we destroy with full awareness. We have no language other than science-based metaphors to describe them, but animal and plant behavior outside of laboratory experiments indicates that consciousness and autonomous behavior are more ubiquitous than thought (Trewavas, A. and Baluška, F.) This behavior is present and can be observed in wild behavioral systems, in situations of freedom, outside a laboratory but is not yet part of scientific thinking or part of common understanding because we interpret it with language that is inadequate to acknowledge its uniqueness, or difference from us. It is known that roots avoid objects in soil, bending their growth around obstacles before they bump into them, but it is not understood how this occurs (Trewavas et al).

As an animal, humans are not well equipped to survive without help. We have no claws, lightning-quick reflexes, or sharp teeth that would let us hunt. Nor are we built to be grazing creatures. Instead, we rely on ingenuity, tools and possessions to protect us in habitats we create. Self-awareness and a vision of an improved future are an

incentive to us to make useful things, but we also acquire items that are enjoyably luxurious, even if they are useless, or even dangerous to our survival. The significance given to possessions is shown in burial sites which equip a deceased person to have success and comfort in the after-life accompanied by all their belongings. The reverence of ownership occurs world wide; corpses are typically disposed of with sentimentally important souvenirs of the life they lived. In some cases entire model armies are buried, or living people were killed so they could continue their work as slaves after death.

Desire to live free from the suffering of hard labor, disease and hunger have led inexorably to inventions that make us more comfortable, yet detach us from the sense that we are animals too, and part of an ecosystem over which we do not have dominion. Whereas aboriginal peoples' folk wisdom of honoring land, plants and animals has led to sustainable, if less comfortable life, Western acquisitiveness has resulted in extinctions, desecration of land and destruction of plant habitat. Cultures in which habitat, animals and plants are harvested sustainably and even death itself is part of life's journey, have been marginalized or eradicated. For example, the destruction of forests in North America and Canada narrated in *"Barkskins"*, by Annie Proulx (2016) describes the removal of almost all forested land by timber companies in the last 150 years and the devastating effect this has had on the populations of First People living in Maine and Canada. The destruction was carried out to acquire timber for constructing European settler housing in new towns, railroads and factories.

Proulx documents the destruction of old growth forest that occurred not only in the United States, but in Hawaii, New Zealand and Europe through the researched lives of the characters in her novel. At the end of the book it is found to be very difficult to re-

establish forest tracts or rare plants because the soil matrix in which they lived is radically altered. The animals, fungi and bacteria needed for nutrition are absent and transplanted trees do not flourish.

Proulx comments in the New Yorker:

... "For me, the chief character in the long story was the forest, the great now-lost forest(s) of the world. The characters, as interesting as they were to develop, were there to carry the story of how we have cut and destroyed the wooden world. There was the real tragedy, and there was no way to make it seriocomic. But rather than calling it an environmental novel I think of it more in the sense of a writerly nod to human interplay with climate change, what some in the humanities and arts are beginning to think of as a cultural response to the environmental changes we have inherited in the so-called Anthropocene."

What then, is the "being" of a cell? How might the tiniest of living things react when challenged? The loss of just one cell, or just one tree might make little difference, but the alteration or death of the majority may be very significant for all life. In any case, the destruction of one individual is not an event that can be detached from consequences. Each organism affects its surroundings, as well as other lives. A slight perturbation occurs each time one is killed. I differentiate our killing of it from a natural, non-human caused death.

Whereas Annie Proulx used the giant matrix of trees and forest life to foreshadow our problems in the Anthropocene, I chose to explore how the appearance of cells and cellular behavior might be used as a way to bring attention to the invisible surfaces and

interactions that occur in nature. I did this in my work with students and in my printmaking practice.

CHAPTER EIGHT

METHODOLOGY

Research for my thesis project occurred in two ways. Firstly in socially engaged art projects in which examples of contemporary truth descriptions were gathered, and in the creation of textured surfaces in collaboration with students who had learned about microorganisms. Secondly, by creation of work that avoided verbal language completely. These were paper forms and prints derived from the surface patterns of microorganisms. I categorized this work as a creation of diverse liminal surfaces: printed surfaces, pages of books, and textures, seen by an audience external to the work, but from my side of it, it was a process that increased my research-based understanding of language, media, and ecology, and led to a narrowing of options for studio work. Ultimately, and ignoring accidental sleights of hand, it could have had no form other than that which I created.

An intaglio print is an interaction between surfaces: a textured substrate, a layer of ink, and paper. Intaglio and woodblock prints have a subtle texture from the printing plate, the ink surface and slight alterations of consistency due to the hand-making process and laid patterns in the printing paper. The subtle changes in ink color, transparency and texture make a rich sensory experience for the viewer.

I wanted to expand my use of surface texture and three-dimensional form in a print so that an audience could be engaged in a process of discovery of color, shadow and depth as they viewed a relief made of multiple printed forms. By using fluid, irregular shapes and multiple printing processes I wanted to avoid the realization that

one was looking at a print at all, but at a relief surface that is a vehicle for arousing curiosity.

In my thesis project I used embossed textures, sewing and printmaking processes to create structural forms and surface patterns of minute creatures seen in algae and protozoa that I cultured. Students at Paris Elementary School in grades 1-6 viewed these creatures with a microscope, then contributed their drawings of them to this work, and shared their concern about climate change in writing within the texture of the print. Their collaboration created a layer of understanding that extends from my work beyond the Lord Hall Gallery. All of our understanding turns these prints into liminal surfaces.

As a printmaker, I wished to move beyond my personal tradition of using a plate to reproduce almost identical images for sharing information, or the multiplication of a single image.

Even though a handmade print as a means of information sharing is no longer needed, it remains a way of making a personal statement that is equally as gripping as a digital image. In Goya's etchings of the Napoleonic Wars (known as "The Disasters of War"), we know that he was deeply moved by what he saw and responded to it at length in images such as that in Figure 13 (page 60) of a man being bayoneted.

For me, the handmade nature of this work conveys deep emotion in a way that a modern photograph captured in hundredths of a second does not. Persistent effort was required to depict the truths in Goya's image. The quality of persistent making registers subliminally. Goya found this horrific event worth memorializing, and it becomes even



Figure 13: Goya, Etching from The Disasters of War http://multimedia.uga.edu/media/images/GMOA-Goya-Con_razon_o_sin_ella.jpg
Retrieved June 7th 2017

more emotionally resonant because of my awareness of the physical effort and emotional stamina it required.

Andrea Sulzer from Brunswick Maine created 3D forms from tracing paper that she had painted and drawn on. The transparency of the paper allowed her to use multiple thicknesses to create layers of color intensity (in her work from 2012) as well as using the rigidity of multiple thicknesses to provide structural strength and thinner layers to afford flexibility. Each of her unique domed shapes (above) is derived from snap dragon flowers and has sewing pins that hold it together. Halves and quarters of circles can be seen, which I found distracting in the context of this being about an organic, non-human related form. The entire work was described by her as being

without a prior concept of what it should be (Tuite). The construction of the work itself led to understanding of the form she was researching. Sulzer's open-ended approach has also been the way I work, and matches descriptions by John Cage of not repeating oneself by working from a place of easy understanding and old ideas.

Seen together, the paper domes are a collage of pieces derived from an organic form, a snapdragon flower. They are not one contiguous, convoluted relief surface and one cannot touch them. Examining them visually made me curious about what was thought during the process of making them. I could not obviously relate them to snapdragons, but I was amazed by the shimmering colors, matt and gloss layers of paint, and translucency.



Figure 14: Andrea Sulzer 2012 *"Material Assumptions"*

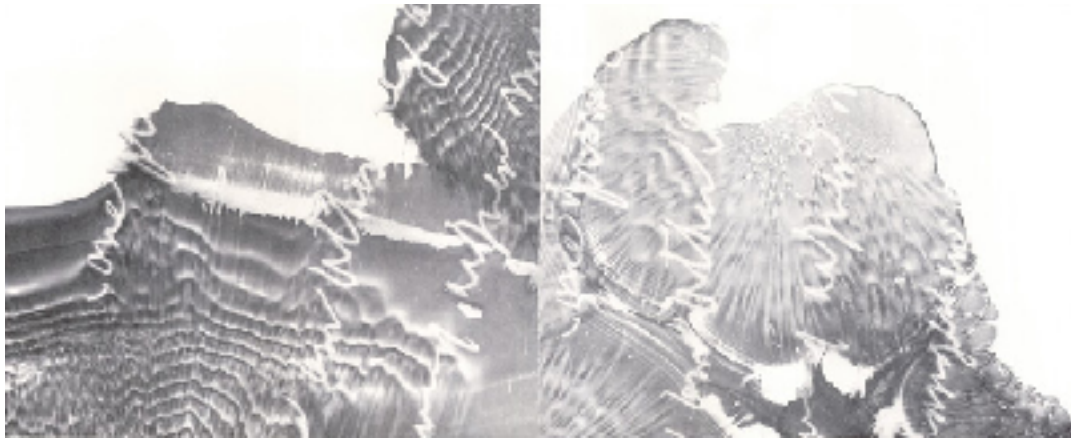
<http://curatorbk.blogspot.com/2012/05/art-current-andrea-sulzer-at-perimeter.html>

Andrea Sulzer, 2014 exhibition, Chase Gallery, Belfast Maine

Another artist who is a printmaker who influenced my work is Hester Stinnett who used the Japanese process of suminigashi to create patterns of ripples in floating ink films and combined this with lithography to add text to her prints.

Figure 15: Hester Stinnett Print: *"Breach"* 14.5" x 35.5".

(<http://www.hesterstinnett.com/works/juncture/juncture05.html>)



She creates prints that contain multiple processes, resulting in unique works that often contain textures of impressed items such as coiled wire that enclose sections of the image, and magnified written script. Her work prompted me to use natural forms and embossed surfaces.

Satori, a process of Zen thinking, signifies “the unlearning or elimination of habitual and problematic ways of feeling, acting, perceiving and thinking,” and thereby the completion of what psychology would call a “schema change” (Pelowski and Akiba) allowing a better insightful perception and interaction.” For me, this is a wordless, formless sensation often evoked by interaction with color and forms I do not recognize. It can occur anywhere, but especially in proximity to visually complex material. The self I

had brought to the examination of the artwork (or flea market display) had been changed. An awareness had been added that cannot be expunged, and made this experience an educable one. Once can realize that ... *“There is no such thing as the ultimate nature of reality. Penetrating to the depths of being, we find ourselves back on the surface... and so discover that there is nothing, after all, beneath. That is what it is for all phenomena to be empty.”* (Garfield, 11 in Pelowski and Akiba.)

I had learned something in a wordless, visual way through the experience of color and form in views through a microscope, the shelves of flea markets and reconnection with nature through artwork that had extracted particular aesthetics from it. The knowledge had slipped in beneath the surface of my conscious thoughts.

I set about creating surfaces that might offer audiences a new perception of things. These would be surfaces that used colors associated with plants, but not have forms that viewers were familiar with. I wanted viewers to ponder what they saw, responding to it in a wordless, satori-like way, similar to my experiences in flea markets where the sensory information was so overwhelming that it led to suspension of categorization and judgement about what was experienced. These surfaces would be made of completely biodegradable material so that in years to come they would safely and completely disappear. While the artworks might be absent, the ideas they gave rise to would remain. The ephemerality of this work supported my belief that an artwork should not be collectible, or have monetary value connected to its permanence as part of an economic system of acquisition. I would give it away, casting its effects on the future for as long as the artwork had material existence.

I did not want to create plant forms from plastic detritus as Tony Cragg did, or use plastic to create art about a plastic pollution problem (Reef Project Installation) because these materials, although diverted from landfills and sequestered in artworks, leave too big an environmental footprint and deflect attention from their role as pollutants.

Nor did I want to invent creatures that were entirely fictional because these forms might subliminally communicate their origin as gratuitous self-expression, something that also seems unethical. Any life forms I presented needed to be derived from research.

It was more logical for me to use sustainably produced materials that will decompose relatively quickly. The Reef Project is a cooperative project in which people donate crocheted reef segments created using hyperbolic crochet patterns developed by Margaret Wertheim who founded the Institute for Figuring, an organization that explores the aesthetic dimensions of science, math and engineering. I considered the idea of crocheting a giant surface, but did not have the patience to follow through with it.

Instead, I used the textures, surface patterns and colors of algae and microscopic creatures I had researched. These creatures were chosen because our existence is dependent on their health. They clean our water and provide about a third of the oxygen we need, along with trees and other land-based plants. The existence and health of microscopic life is largely ignored because it is invisible to us without magnification. This creates another missing layer of understanding of our environment and one I wanted to educate people about. I began to see the surfaces I was creating as liminal. That is, educating by bringing about a change even if the change is not articulated in words.



Figure 16: Tony Cragg, *Leaf*, 1981
Found plastic objects. Installation: 67 x 52 in.
<http://www.lissongallery.com/artists/tony-cragg>



Figure 17: Museum of Arts and Design, NYC Exhibit of plastic pollution for the Reef Project
http://crochetcoralreef.org/Content/exhibitions/toxic-seas_clip_image011.jpg

My creative thesis projects were made in a process that aligns with the ecological problems we are facing now. I avoided art materials that are plastic, required hazardous solvents, or would create a waste problem as they accumulate in homes and studios. I researched materials that would be healthy for me to use, as well as being safely and completely biodegradable.

My first efforts began with making heavily textured paper, but they were not successful. The powdered cellulose was bleached and I did not know what had been used to do this (I imagined dioxin) and it was easily inhaled. The watery paper slurry made the skin on my hands itch and crack.

I found that Japanese papers and glues, and water-based printing ink (Akua ink) made from a honey, vegetable oil and pigment emulsion provided a way of working that was sustainable in the way I required it to be. Traditional Japanese glue and paper matched perfectly; no wrinkles occurred because the absorbency of the paper and the drying rate of the glue were in harmony in a way that modern, acrylic glues were not. I felt a connection to whomever had discovered these processes that are still so practical and efficient. In keeping with not using acrylic-based media, and mindful of not always looking forward (metaphorically) using simple, traditional substances need not be disregarded. Rice starch, water-based ink and unbleached plant-based papers met my needs of being non-toxic and were extremely versatile.

Japanese Gampi tissue-weight printmaking paper was surprisingly strong. Colored with natural dyes, it could be sewn, soaked, printed, shellacked, starched, and repeatedly embossed without tearing or leaching its color. It had just the right amount of stretch when wet to vacuum pack itself onto deeply embossed textures. The slimy rice

glue allowed re-positioning of paper for several minutes before it began to get sticky and immovable. Rice starch glue is made by soaking rice flour in cold water, or for thicker use, almost boiling water. It soaked into the tissue easily, disappearing when dry, but reactivated by a mist spray of water. Not only could Gampi and thick printmaking paper be glued together smoothly, but they could be separated. Spraying the starch-glued paper with water, even when it had been in place for several days allowed separation of embossed and molded layers. Diluted rice glue was mixed with iridescent green mica powder to make a system of cracks visible as it dried, and glowed in the light.

Texture was created using a cement layer about half an inch thick with a pattern of raised areas that were derived from the arrangement of a volvox colony. This relief surface was used to apply pattern to thick etching paper, newsprint, tissue paper and glassine paper.

In one print I wanted to make an example of peeling away layers as if to model peeling away layers of one's thoughts. The cement plate was used to emboss thick printmaking paper coated with rice starch and Gampi tissue. While still wet, the embossed paper was suspended and the Gampi tissue was peeled off the surface and left to hang free as it dried. It retained the texture and stiffness once the rice starch had dried. Shellac made the peeled off tissue transparent.

I began to see the paper forms I made as self-contained systems that support each other (even though each has structural integrity) and interact with each other aesthetically. Basic scientific ideas such as homeostasis, the process of maintaining a balance of conditions that an organism needs for its good health such as correct salt balance, or hormonal flow became a model for the surfaces I created. Homeostatic

balance mechanisms depend on conditions in the entire living system, and may be affected by conditions outside the system (Meadows, D.) Negative conditions trigger events that shift the balance back to beneficial conditions. At various times, the prints I made were run through my printing press, cut up with scissors, ripped up, and destroyed in a random way, then reassembled so that I could circumvent my tendency to design work that is a harmonious whole.

The assemblage contains many enclosed shapes created by sewing, compressing, distorting and creasing printed paper. They are held in stasis, in a Utopian sense, by all the opposing tensions and compressions in the paper. If one system is disturbed, all are slightly affected. I brought about equilibrium that I considered to be the best possible outcome, though I wondered how a paper structure could ever act as more than a metaphor for the situation we are in. How could it actually become a real system that slowly loses its stability because of its integral qualities? If I forgot about it, ignored it, did nothing to protect it, let it be eaten by insects, and finally discard it, it will disintegrate and be set free to provide something tangibly useful.

A response to an artwork is a combination of the outlook the viewer brings with them as they perceive the work, the way the work is interpreted in the moments of experience, and the result this process leaves imprinted on the audience. In the context of my artwork, this meant creating work that used the characteristic colors and forms of microscopic creatures to create liminal surfaces that might alter perceptions of nature. I intended that viewers should struggle to describe what they saw, and thereby come up with new language to describe it. If possible, the colors, patterns, shapes and textures should provide a direct sensory experience that was non-verbal. It was necessary to

use a scientific, deductive method for this that gave my aesthetic decisions a rationale. I cultured protozoa and algae so that I could rely on my own photographs of them, rather than those authored by other people. I used them to create my work. All creatures were released into the water they came from, invisible and tiny though they were. I researched how people perceive truth, facts and variations of facts to structure their lives. The results were included in *Truth Project*, a collection of small books that will be returned, one to each participant, to share with others. I found that a systemic sea-change is occurring. Even if truth is hard to define, my search for veracity is ongoing.

CONCLUSION

To bring about a change to more sustainable economics and environmental presence, we need a shift in overall thinking from the ground up that attunes the outlook of those who will eventually make policy decisions to the environmental health of our planet. My artwork is an agent of this change in that it raises awareness of the natural world and helps us reconnect to it. I hope that some day policy makers will be drawn from individuals who find the perpetuation of pollution literally “*un-thinkable*”. I am thankful to the many individuals who care deeply about the environment and act regularly on its behalf. Their number is growing, and change is beginning.

A response to an artwork is a combination of the outlook the viewer brings with them as they perceive the work, the way the work is interpreted in the moments of experience, and the result this process leaves imprinted on the audience. In the context of my artwork, this has meant creating work that uses the characteristic colors and forms of microscopic creatures to create liminal surfaces that might alter perceptions of nature and bring about reconnection with it. To ground the audience’s perceptions in authentic, natural occurrences, I felt it necessary to culture protozoa and algae so that I could use my own photographs of them to inform my work, rather than rely on those authored by other people, or my imagination. All creatures were released into the water they came from, invisible and tiny though they were.

We are born into a network of templates for behavioral patterns such as those I describe in chapter four, learning their meaning and context as we develop awareness as children. These are thought structures often drawn from spoken and written language and a frequent medium for the exchange of ideas. Our words have meanings

that perpetuate an ecology of thought that currently roots us in behavior that is increasingly unsustainable for Earth's ecology. To encourage new thought patterns that might reconnect us with nature and sustainability, I created work that is not intended to be easily understood, that unsettles thought, and requires new words to describe it.

Consideration of how we structure our thoughts through multiple forms of language may seem like a digression, but it determined the final form of my thesis project. Research in support of my creative work focused on what *is* occurring in the environment and why it came to be, not what might have happened had we been more thoughtful. My work is not a lament about the state of things. It is, I hope, a mechanism for positive change. It is from the acknowledgment of mistakes and misunderstandings we have experienced that a comprehension of failure and subsequent redirection might occur. I utilized aesthetics that made my work compelling to look at, understanding that a response to my artwork is a combination of the outlook a viewer brings as they perceive the work, the way the work is interpreted in the moments of experience, and the result this process leaves imprinted on the audience. In this context, it meant creating work that used the characteristic colors and forms of microscopic creatures to create liminal surfaces that might alter perceptions of nature and bring about reconnection with it.

I concluded that we are part of a system that weaves past and present together, framing how we make meaning in the extant moments of our lives, and which propel us into the future. My artwork is a small part of this framework of change because it provides an interval of contemplation, a time when meaning becomes mutable and new language is created.

Patterns of behavior build, surface-like on what came before, and there is a strong possibility that we might remain anchored to outlooks that are no longer beneficial such as continual expansion of the economy at the expense of the non-human creatures who share our planet. *Liminal Surfaces* was an attempt to bring about a change in language we use, derived from visual experience of this work, even if it is subliminal. The collected anecdotes in the the fifty-two books of *Truth Project* utilized deliberate language choice as people expressed their thoughts while reflecting on what is actually true. Conversations with the writers led to deep discussions about how we recognize reality, but also exposed how the expression of it is clarified and channeled by common experiences. Each book will be returned, one to each participant, to share with others, spreading person to person how we are connected and what stories we tell ourselves. Even if truth is hard to define, my search for veracity is ongoing.

PORTFOLIO

11.1 Bates Mill Silkscreen Prints



Figure18: *Bates Mill Fabric Print* 14 x 16" Silk Screen print on Arches 88 paper, *Georgina Grenier*, and anonymous 1908 drawing from which these two prints were derived (top left)

When I visited the Bates Mill Complex in summer 2016 to help Amy Curtis with her 9th Biennial exhibit, the floors and walls still exuded an oily smell from the lubrication of now absent machines. Lint from decades of cotton weaving was working its way out of the cracks in the floorboards, as were stains from vacated looms and dye chemicals, cotton bales and brick molds. The staff gave me a tour of the entire Bates building, including a floor where giant silkscreen frames stood that were once used for printing bed covers and fabrics. These were eight feet tall and had keys in each corner so that the frame size could be varied. My mother-in-law's aunt and her own mother had been skilled workers in the mill who punched Jacquard pattern cards for the looms. The building I had heard them reminisce about was instantly recognizable from their words. I could picture the empty floors full of people working, and imagine these two

women present. I wanted to cry for all the tough memories and pride that had been lost. For them, even though it was extremely hard work, this place had provided a community that was vibrant and creative. It was also a home to the French and Irish communities in Lewiston. A fleur-de-lis and shamrock leaves are still present, marking the territories of immigrant groups.

I was shown a filing cabinet with carefully packaged, annotated sketches of designs for fabrics, and decided to make a small version of one from a 1908 drawing and donate the prints to the mill store so they could raise money for repairs. These were hand drawn designs that had been rescued from a dumpster. The designs are reminiscent of flowers, but not any particular flower. Although pleasing to look at, these designs offer the idea that we need not observe nature. Seeing it as it really is, is not necessary. A gap is created thereby, between what actually exists and an abbreviated, metaphor of it. If one does not see the real thing quite as often, a sliver of ignorance of nature can creep in.

11.2 Making Sourdough Bread

I had believed that I needed store-bought yeast to make bread. I have made bread for years, filled with many types of flour, pureed foods and fruit. It had become a meal eaten for breakfast and provided energy all day. I trusted that it would be nutritious and bought yeast to make it from our local food co-op.

A day came when I had forgotten to buy yeast and could not make any bread. Exasperated, it occurred to me that historically, bakers have never had access to store-bought yeast and must have had another resource. I resolved to find out how they made bread. I began a sourdough, wild yeast culture and have kept it going for three years. I

became aware of the constant battle yeast fights not to be invaded by other microorganisms that might also rise dough, but not digest gluten so well. High gluten bread can lead to health problems such as diabetes and joint pain. If the temperature is too warm, the culture is invaded and overrun with bacteria that make inedible, gummy bread. If it is kept refrigerated, the yeast stays dominant in the culture and much finer-grained loaves result. Too much water in the mix, and the dough becomes acid-tasting due to acidophilus waste. I began to think of a yeast culture as a system with inputs and outputs. In its own world, isolated in its container, it can be kept under control in the dark and cold, ready to eat gluten for me, and rise the dough with its communally exhaled breath. When it gets too warm, yeast is overrun by invaders who can multiply more quickly. The invaders are present all the time, but kept in check by conditions unfavorable to them. Gradually though, the invaders are becoming more cold adapted, but then I assume, so is the yeast.

My complacency about store bought yeast was maintained by the convenience and speed with which it works. It is a super yeast that makes a huge amount of carbon dioxide, causing a risen dough in about an hour, yet this is insufficient time for gluten to be broken down and makes the bread much less nutritious. Sourdough bread takes at least twelve hours to rise, giving the yeast time to digest the gluten. It is commonly accepted that mass produced commercial white, or tinted brown bread is what bread is actually like, and we trust that it is healthy. With its connotation of desirability, this perception is an example of misplaced trust in a food that many of us grew up with. It is a staple food made from flour that is typically bleached, bromated and milled from wheat that is not sustainably produced. Even though it is delicious, soft and easy to deal with

for lunchbox sandwiches and hot dog rolls, it is not as nutritious as it used to be. Mold will not grow on it. We have come to believe that we need not make bread ourselves, and most people buy it cheaply in handy plastic bags, dependent on its convenient availability. Sourdough bread making in artisanal bakeries is returning, but for many there is little choice but to purchase a facsimile, a lie of bread.

I include bread making in my portfolio because it is a performance each week to resist the urge to go along with convenience, plastic bags and super-yeast.



Figure 19: Loaves. *Georgina Grenier*

Top: The Scream. A failed loaf. Ketchup added. Fall 2016.

Dough presented a face; the hive mind of yeast.



Bottom: Happy loaf.
Spring 2017.

These loaves of bread were not contrived to come out this way.

11.3 Culturing Protozoa: Photographs and Video

Although I knew that yeast was responsible for making bread rise, I knew little about it and had become dependent on a product that had been selected for ability to produce carbon dioxide quickly. Experimenting with sourdough cultures had made me curious about other microbes. I began collecting local pond water and culturing organisms that were present on lettuce leaves and hay. Within a couple of weeks paramecium and vorticella could be seen. I purchased a portable microscope so I could observe them and take pictures and video.

Water from near the surface did not contain much at all, but the scum at the bottom contained viscous looking worms, algae and water fleas. I found out how to culture various organisms by providing nutrients for their growth such as eggshells, lettuce, rice grains and oatmeal. Pretty soon, I had very protective feelings towards a stinking bowl of slime.

Haeckel's drawings of microscopic life are intricate and graceful, but like the Bates Mill fabric designs, they present a symmetrical, beautiful illusion of what is seen. I wanted to see for myself what Haeckel tried to show.

One organism could not be found in this ooze: an amoeba. I bought a culture of them and put them in their own bowl, feeling it was not fair to let them loose in a culture of Maine pond organisms. I fed them dried lettuce but soon found that dry lettuce has dried organisms on it that rehydrate, infiltrate the culture and kill the amoeba.

Amoeba prefer shade and will hide underneath rotting lettuce, conforming their bodies to the shape of it. Several times I saw an amoeba "ambush" prey by suddenly extending themselves to engulf an organism that was eating the decaying lettuce. As I

tried to describe the behavior of amoeba I realized that I was attributing their behavior with human expressions as if it was deliberate behavior. I had read that microorganisms do not have a mind; they act in response to what prompts them to move, eat and reproduce, no more. Deliberate behavior was thought impossible because it would mean that a creature had an awareness of cause and effect, and time. Without a brain, microscopic creatures are thought to be non-sentient. Behavior of amoeba though, seemed different. I saw them working together to catch creatures. Two or more would be close to each other and surround a creature so it could not swim away.

Gradually they would engulf and digest it. I filmed this behavior and began to research how this was interpreted by scientists. I observed many times that a trapped creature became frantic and struggled to escape. Should this be interpreted as instinctive behavior, as if from a chemical mechanism that allows survival, or purposeful behavior that implies awareness of the end of existence? The word “frantic” implies awareness of something unpleasant or fatal about to occur, and therefore awareness of time, so is frantic the right word choice? At an even more basic level, why would molecules be worried about the body that contains them being eaten? I am not a biologist and don’t know enough about how animals have evolved to behave in this way, but I began to question what it means to be alive, and have awareness.

The creatures were contained in a bowl-world with no means of changing their situation. They became polluted, and judging by the smells the cultures emitted at various stages, this seemed dependent on what I fed them. My first bowl of stinky slime was split in half and topped up with clean water. Several more splittings led to too many bowls and they were all eventually released back into the pond.

I filmed many interactions between protozoa and one was especially memorable. Amoebae are not thought to have intentional behavior because they do not have a body structure that resembles a brain where thinking occurs. Without one, it is thought that memories and strategic behavior cannot develop. On one occasion two amoebae appeared to work together over about nine minutes to trap an organism and split it between them. They flowed their bodies into what appeared to be a cul de sac shape, then both creatures extended pseudopodia and pinched the victim in half.

Both amoebae flowed off in different directions taking their half with them. It was hard to see this as coincidental behavior. The two amoebae had persisted in their goal of catching prey, they had appeared to use one another's bodies as a surface to trap prey.

Amoebae do not eat each other, although they eat just about anything else. They recognize each other and "choose" not to engulf, even if their pseudopodia are entangled. They ooze apart from each other, perhaps because of a chemical signal that stops the typical behavior of trapping and digesting. Observing the physical structure, surface patterns and feeding habits of these minute creatures lead to many prints, and eventually my thesis project.

Social behavior in amoebae is observed in mass migration in slime molds, and has been observed occasionally between a few amoeba when they hunt by Ilse Walker (Trewavas et al). Recognizing that my vocabulary was not adequate to describe what I saw because it attributed human intentions to creatures that are radically different to us made me question how humans can understand nature when the words and concepts

we need do not exist. I could name the processes I saw in scientific terms, but not what they signified.

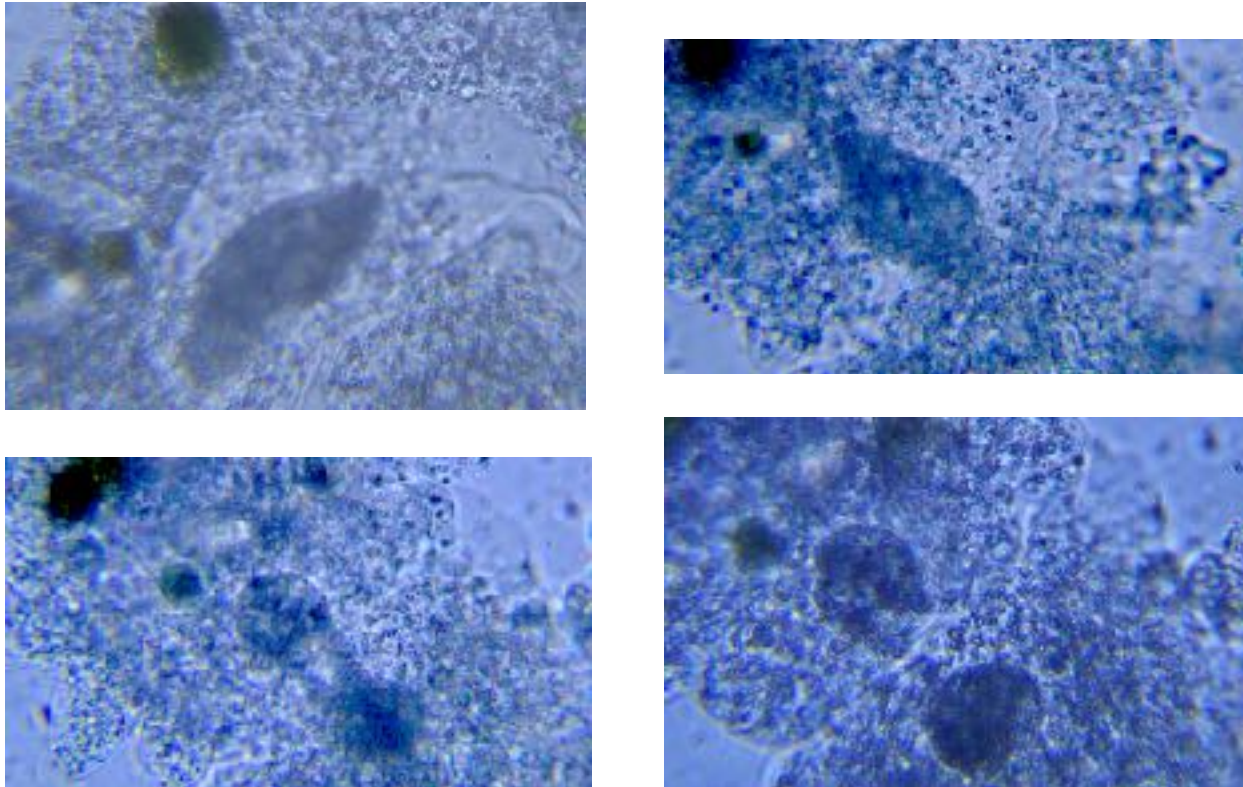


Figure 20: Prey is trapped (top left), pinched and separated by two amoebae.
Video stills, 2016. *Georgina Grenier*



Figure 21: Three amoebae flow towards each other, often showing similar flow shapes.
Video still, 2016.
Georgina Grenier

11.4 Printed Systems Paintings

If I were a scientist I would conduct experiments to find data which would support my hypothesis. This is not a process open to an emotional interpretation; the data I would find must be given the most logical interpretation, regardless of how I felt about it, and verified by others. Science experiments build on knowledge, structures and patterns that have already been observed.

As an artist I also collect data, data I have derived from observation using an “If, then” format i.e. if I allow an opaque ink film to crack as it dries, then what kind of prints can be made from the shapes it leaves? I too find ways to determine structures and patterns. This is also an experimental process and brings knowledge that might remain subliminal into the articulation of mindful thought when the work is complete and has an audience. Responses are unique for each audience member, and offer alternative paths to discovery. I use a systems approach to analyze the inputs of data collection, techniques, media, research, purpose, life commitments and the ways in which they combine to make an output i.e. an artwork. I used a systematic approach to painting which involved no personal manipulation of medium except establishment of the situation in which the medium was set free to run, drip, repel, fractalize, crack, granulate and crack.

Why do this? I was wondering how an amoeba could constantly expand its body in any direction without cracking its surface. I found out that an amoeba’s surface is made of tiny tubules, not solid at all, but just enough to retain its gel interior and have infinite flexibility, much like a flowing paint film develops fractal-like cracks on its rim as it dries.

The numerous films of cracked, opaque ink and smears of graphite were opaque to ultra-violet light. I used an ultra-violet exposure unit I built to create prints of marks with very delicate, fading shapes and fractal-like edges. As the ink puddle (with a minute amount of soap in it) expanded over the surface it was on, it got thinner.

Eventually the ink at the edge got so thin it split into fingers which split over and over again until the impetus from the middle of the film had gone, or the ink dried and could not flow.



Figure 22: Photopolymer prints 2016
Top: *Drip*
Bottom: *Creature*
Georgina Grenier



11.5 Volvox

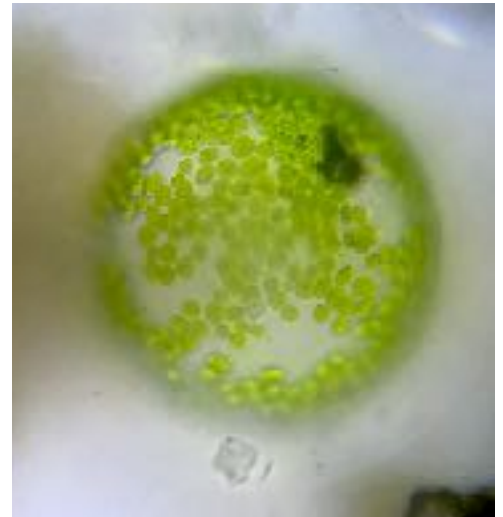
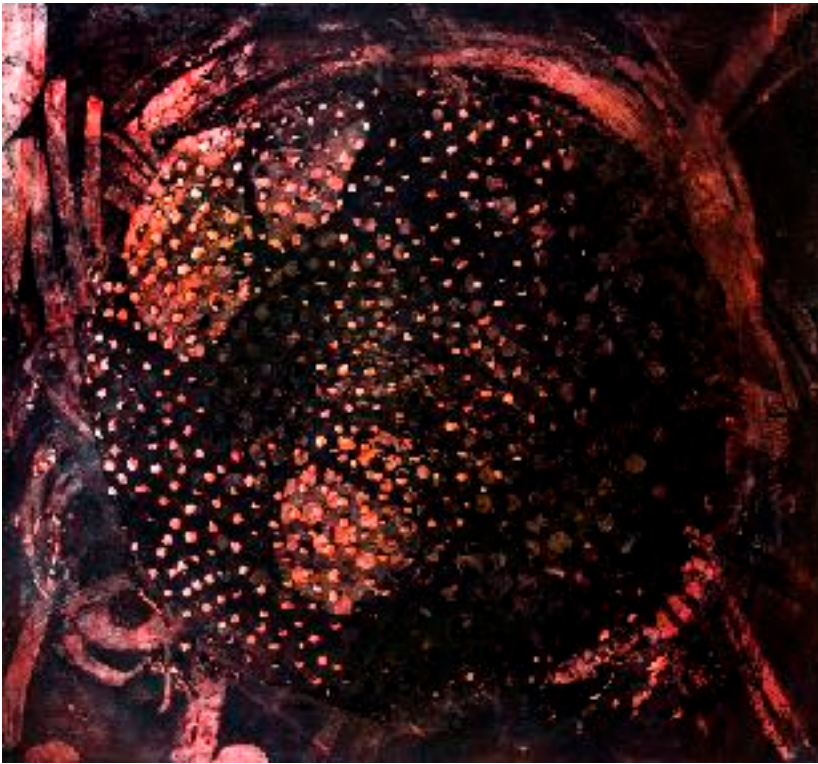


Figure 23: *Volvox 2016*, 18 x 20", left.
Etching and Carborundum print derived from my photograph of
a volvox colony, right. *Georgina Grenier*

This print 18x 20" print was the beginning of a series of works created by using heavy textures in the surface of a printing plate. The dramatic textures are transmitted to the printing paper when the image is printed or embossed.

Deep texture allows for easier layering of differently colored ink as well as creating a haptic experience when viewing the print. I also wanted to make holes passing through the plate where no ink could be printed since there would be no texture

to hold it. A reference photograph was used to locate where to bite holes all the way through the thick copper.

The print was based on the spherical arrangement of creatures in a volvox colony. I thought the print would have a circular pattern of bumps rising above the ink, but the walls of the bitten holes contained texture and therefore retained ink,. They printed as glossy black, raised areas. Only the largest holes produce color-free areas in the final print. color was provided by using an additional plate coated with carborundum grit. The biting process took two days and was combined with drilling, sanding and gouging textures into the metal.

I printed this image in two ways: as an intaglio print using two plates: copper and carborundum which resulted in many subtle colors, and as a block print. with no ink being wiped into the holes, leading to the circular pattern being much more visible.

11.6 Islamic Lines

I observed patterns of perfectly synchronized, rippling cilia on microorganisms, and they reminded me of traditional lattice patterns in Islamic art. I began to wonder if the surface of an organism could be created from similar networks of lines. I consulted a book about Islamic patterns and found that complex surfaces of intersecting line segments formed with a compass, or string and a straight edge appear in tile mosaics, ceramics vessels, on building walls, domed roofs, and in manuscripts. Some designs show tiny, accidental imperfections of hand work which distort their pattern, others show deliberate changes in angles so that a curved architectural form can be covered. Interlocking kite and dart are also used, but these may not repeat, spatially. These were noted by British mathematician Roger Penrose.

The practice of not allowing pictorial representation of objects led to systematic line patterns that are intended to allude to universality (and perhaps awareness of God) through the use of networks of repeating designs. One contemplates endless intersecting line segments and infinity, rather than an artist's interpretation of reality. Copying and incorporating nature has been a feature of Western art history occurring in portraits, landscapes, household items and status symbols until painters such as Cézanne, Matisse and Duchamp began to purposely diverge from imitation. Artists have depicted divinity in numerous churches and cathedrals in well-established traditions of iconography, even though these build on pagan roots. These images have provided numerous visual metaphors which have been absorbed into our way of thinking, making it necessary to create an alternative if one is to change the narrative.

An Islamic lattice design does not depict nature in the imitative way Western artists have often used. It fosters inward imagining of what the sublime might be. At first, I thought the prohibition against depicting nature was extreme censorship, but in a sense one is free to imagine anything in the presence of an abstract design.

Our awareness of nature is often distorted in Western culture, influenced by a plethora of images and options that have led us to utilize and marginalize its viability.. I began to see the anonymous Islamic lattice patterns as less intrusive than Western depictions of realism because one is not provided with obvious images that direct one's thoughts. The pondering of transcendent matters is left to the viewer, not the subjectivity, ideas and representational skills of the artist.

The lattice pattern which appears in these prints is a rotation of eleven parallel lines carried out ten times.

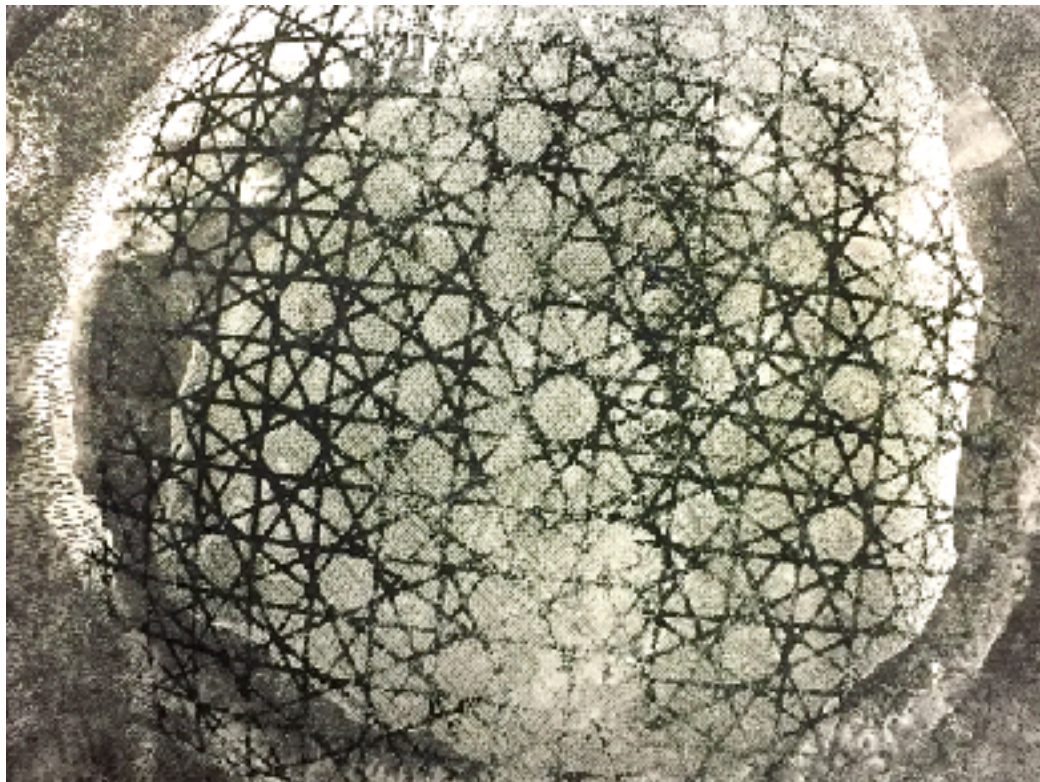
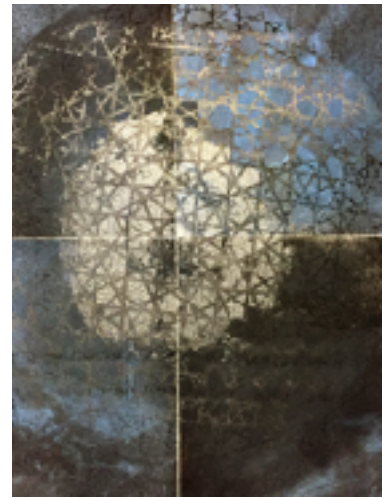
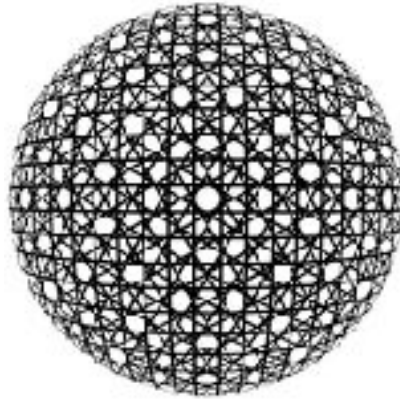
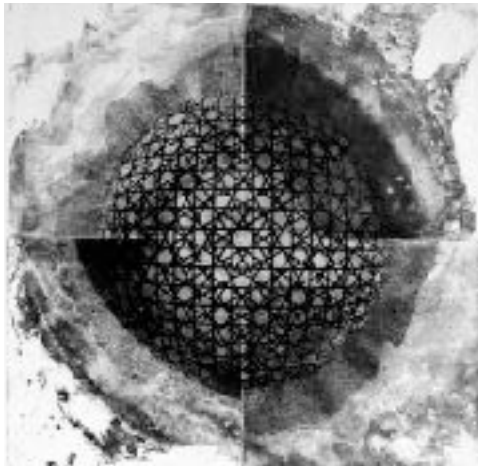


Figure 24: *Islamic lines*. Silk screen over four copper plates. 32 x 24" Georgina Grenier. Fall 2016

11.7 Images of Abandonment and Acquisition



Figure 25: Images of Acquisitiveness and Abandonment

Of all the encounters I had with relinquished objects, abandoned taxidermy was the most memorable. It occurred in a flea market in Canada. Two deer heads and a black bear head were found in a setting that combined opposites: An animal's life, and its abandonment as a commodity.



Photographs. *Georgina Grenier* 2016

11.8 Truth Project



Figure 26: 50 Artist multiple books each entitled
"Truth"
Georgina Grenier

I am drawn to experiences that are held in common, far removed from the esoteric isolation of some modern art. The practice of working with every-day events, people and materials is of great interest to me because, though these are not an art medium in a traditional sense, every-day existential experiences are the socially-

engaged media of many lives. They are an intersection from which we can extract experiences and gain insight through the drama of wages, food, love, life and death that occurs for everyone. We must all negotiate the human condition and for me, it provides profound material to work with.

The goal of my socially engaged art project is connected to the 2016 election and the widespread feeling of dismay, manipulation and cheating that I encountered afterward. Many people that I know felt unrepresented and betrayed by the electoral process and are deeply worried about the future of civil, democratic society if opinions can be substituted for fact as a basis for decision making. For them, facts indicate, for example that Global Warming should move us away from fossil fuels, and migration from South America is at an all time low, therefore a border wall is not needed.

It would be simplistic to say that all voters who opted for Republicans believe that Global Warming is not happening, or women should not have reproductive choices, but for them, these issues were not significant enough to make a difference, even if believed. For me, they were deal-breakers. I believed my choices were based on facts, and still do, but my confidence in media, of being possibly manipulated has made me want to check my information. There does not seem to be a middle ground of tolerable solutions that can be discussed that might help us deal with the problems we face. Global Warming is either happening, or it is not and can be ignored. Discrimination must be fought, or we acquiesce and tolerate it, our inertia validating its presence. With such high stakes, the need for facts is paramount. One would hope that if everyone had accurate knowledge, we could keep moving forward and make things better.

Through my socially engaged art project (SEA) I wanted to re-acquaint people with the process of truth-telling, of ferreting out truth, because it seems as though the act of becoming aware, of having clearly understood facts has ceased to matter to a large proportion of people, or at least the facts they appear to believe seem to stretch common-sense, even as they are vehemently believed. A sincerely held trust in the words of public figures seems to have been taken advantage of, and no one appears comfortable admitting it has occurred. A suspension of curiosity, increasing cynicism and inability to draw on authentic experience seems to prevail, which is not the same thing as lack of integrity. I do not believe that individuals who work for minimum wage, or who deal with economic insecurity each day lack that!

The Truth Project began as a parallel project to my thesis work about plastic detritus in the Anthropocene, our current geological age in which human activity is causing environmental change. Considering the dire state of ocean acidification, the ever increasing amounts of waste plastic and depletion of resources, a vital question had become “How did we get to this situation?” As I listened to people make political speeches in fall 2016, I realized that many claims were not credible, but just as important, the context of the falsities depended on misinformation having been disseminated over the long term. One could not make claims such as Global Warming being a hoax and have it be tolerated if there had not already been groundwork laid to make such a claim receivable. Was misinformation broadcast as lies out of the blue, or was it the descendant of a series of tales and attitudes that have shaped thinking for many years?

I wanted to find out what people regard as examples of truthfulness. Does

veracity matter to them, do we still care about integrity and recognize it when it is met?

Another aspect of my project stems from my capacity as a teacher in which I meet many adults who are capable and thoughtful individuals, but who do not feel included as an audience for modern art. Its apparent simplicity, often exploring new territory that lacks familiar aesthetic beauty can seem like an affront to them, resulting in a sense of disqualification or inadequacy about expressing their opinions. When the project got underway, it became apparent that many people very much wanted to be a part of a shared art experience in the more traditional sense of being uplifted by it. The authentic presence of an art project to participate in, desire to share and learn what others felt was much appreciated.

One of Helguera's observations is that socially engaged artists are likely to be preaching to the choir. Among people I associate with, most of them are liberal, if not Democrats. Many are very environmentally conscious, and have similar political views to me. I wondered where in my community I could find people who might participate in an art project who did not share my views. My extended family is split vehemently along political lines to the extent that we deliberately do not talk about politics when we meet. I feel estranged from them, even though they are kind, decent people. While I believe their outlook is misinformed, they are just as sure that I am misinformed too. A goal of my socially engaged art project (SEA) became to make an object that could be shared between people of differing opinions that examined the issue of truth- how one feels in the process of transmitting or receiving it, or of creating a lie. With so many information sources that appear to be accurate, yet without context in one's own experience, facts

that are indisputably correct can be presented as subjective, alternative facts: non-sequiturs that can slip in and take the place of evidence-based reasoning.

Marshall McLuhan commented:

“Ideally, advertising aims at the goal of a programmed harmony among all human impulses and aspirations and endeavors. Using handicraft methods, it stretches out toward the ultimate electronic goal of a collective consciousness.”

(https://www.brainyquote.com/quotes/authors/m/marshall_mcluhan.html)

If we depart from direct experience and evidence to inform decision-making, we become dependent on second hand sources as McLuhan describes, to shape culture in a myriad of purchasing decisions, celebrity opinions or votes in an election. In the long term we become increasingly detached from the consequences of our behavior. We can more easily be made to believe alternative facts because we no longer have ways of finding out the truth, or assessing context. Facts become solely presented by media, and only researchers and witnesses actually know them. Socially, we depend on knowing the truth, and have an expectation that we are being told it, but what happens if we do not have truth as a basis for our actions? At this particular time, knowing how people perceive truth in everyday situations and having a vehicle for discussing it seems incredibly important. I decided to collect narratives about truth-telling from as many people as I could, and make a small, hand-sized book of them that could be shared. The presentation of all fifty books was part of my thesis project. I wanted to make a presentation of truths and make the concept of truth-seeking as attractive as possible so that it would be memorialized in the display.

I began this project by thinking I could ask people directly for their experiences of truth-telling, but realized that this was too intrusive. I needed guidelines for participants to make them feel comfortable responding and after several drafts to clarify language (tested on neighbors) I found that offering two choices helped individuals frame their thoughts and gave cover to people who wanted to participate but did not want to reveal deeply private situations. The two choices were broad enough to allow any range of response, and anonymity gave additional reassurance that material could be shared without embarrassment.

The two suggestions for writing were to share an anecdote about a time when an individual experienced truth telling, or to write a reflection about the importance of truth in society. It was pointed out that truth telling runs a gamut from being a malicious lie, to fudging the facts, to being a heroic whistleblower. Writers were encouraged to submit any form of writing they were enthusiastic about and to write about truth from any perspective, including not using the suggestions I gave. In answer to questions about how long the writing should be, my response was to make it as long as necessary to say what ever the writer wanted to say.

It became clear that people wanted to be active, to have a chance to be resistant to the 2016 election result. Discussing truth had become disconcertingly important, a stand one could make and a persuasive argument for me to hook a commitment to write. Additional inducement was made when I explained that I would make fifty artist multiple books containing their writing and return one to each of the first fifty people to contribute. I made a package of blank greeting cards with a Truth design on the front and containing a small information sheet about the project. The card served as a visual

reminder to act. These were distributed to an audience at a performance by Debi Irons and five people responded. People who were willing to participate in the project were more likely to be at ease expressing themselves, or have a personal connection with me that convinced them to participate. Some work colleagues felt they were inadequate writers or could not have anything important enough to say but managed to write very short, insightful thoughts for which I am very grateful. In the process of collecting writing, I realized that the ability to read and express oneself in writing was something I had taken for granted. Wisdom about truthfulness could be presented in ways that did not require writing or email. Therefore, some entries are the result of interviews.

To broaden the range of people who had access to this project I contacted Goddard College MFA Writing email list, Maine Organic Farmers and Gardeners Association, Maine Arts Education Association, my local newspaper, the audience at Debi Iron's Resist the Backlash dance performance, numerous teachers, Orono staff, The Friends Society in Portland, A Somali group in Lewiston, Western Maine Takes Action (a Resist group), the Otisfield Church congregation (none of them responded), and Facebook.

I find it painful to be deceitful, even a little, which is not to say I never lie, but if I do, it is to be polite and the discomfort makes me tongue tied. I was moved by the generosity of people who responded, but disappointed by the glibly expressed assurances of others who repeatedly told me they would respond, then didn't. Some individuals who I meet several times a week still assure me they will write, but so far they have not. It is irksome that they are telling white-lies.

Fifty-two people donated their words. These were transcribed from conversations, or cut and pasted from emails and placed in an InDesign document.

The book pages are 5 x 7 inches and printed on Moab paper off-cuts from Talas. Covers are made from discarded prints I have made that would otherwise add to the accumulating piles of work in my studio. I wanted to make each book unique and precious so that each writer felt validated and thanked when they found their page. Couples who responded had adjacent pages, family members were grouped, though I am the only person who knows the relationships between pages. While some handmade books are not functional, mine were designed to feel and act like a book that could be read in a traditional way. I explored Japanese book binding methods to stitch the pages together, but abandoned this in favor of staples. Research of traditional Japanese glues, woodblock printing and Gampi tissue paper emerged in my creative projects for my thesis exhibit which are made from paper and wheat paste or rice starch glue and non-toxic inks. By choosing substances that are not long lasting in the environment, some day the books will rot,- a positive design feature in accordance with trying to avoid accumulating detritus.

Having worked with Amy Curtis to build her biennial exhibits, I came to appreciate her minutely detailed, systematic approach as I organized over 2,500 pages into books. I developed a series of steps as I worked that made the process go smoothly. This process evolved from errors in printing and my scatter-brained misplacing of pages. It became laborious, yet quicker to be very methodical. I came to deeply appreciate systems approaches to things.

Many of the anecdotes are anodyne, yet there is no doubt they were deeply felt, and sometimes shaped lives. I know that some of the donors have far more difficult experiences they could have shared, yet asking for more felt like an intrusion of privacy.

My project would not have worked if any pressure had been applied to get more intimate or heart-rending donations. I wondered if the anecdotes given were a means of conveying much deeper passions about truth and began see them as a front that establishes a comfortable distance between public avowal and anxiety about experiences too painful to recount, a slight lie, in effect. I realized that sharing trauma was something that most respondents saw as self-indulgent. They applied their hard-won insights by framing them in experiences that could be widely understood and not cause stress to the reader.

This became one of my most satisfying projects to complete.

11.9 Liminal Surfaces

Research of ways in which language is used, ecology, plastic production and art history lead to a clear sense of what this work should and should not be.

I wanted the work to:

- have a connection to prior knowledge an audience might have, yet not fill a gap in understanding with convenient recognition.
- be socially engaged so that one part of the viewing experience might inform another
- be a new process for me, an education in my thinking and practice as well as for those encountering it
- be intriguing to look at

- have a research-based rationale that provided a basis for aesthetic decisions I made
- use media that were non-toxic and completely biodegradable leaving a minimal environmental footprint
- avoid the creation of an artwork of monetary value and permanence

“There, in the liminal space where the particles in a material begin to change from one configuration to another, new quantum effects appear.” (McKee., 2016)

I do not claim that I am creating new matter, but in the liminal space I refer to, where words are not clear, what is seen is not understood, and one’s habits of mind are nudged, a re-learning occurs as information is transmitted. It is a space of transition between not knowing and making meaning, between transience and certainty.

What I know is transmitted in the work I create through the aesthetics of surfaces I construct. It does not need to be told, literally.

The Liminal Surface prints drew attention to the minute life forms that we cannot see. We might surmise they are there when we tread on slimy green algae or smell brackish water, but we cannot see them because they are microscopic. Ernst Haeckel represented them in detailed, intricate images that imply accuracy because of the clarity of his work. I admired them for the painstaking skill and composition sense he employed, but it is misleading to think they are realistic. The organisms he drew are arranged in symmetrical, corps de ballet-like arrangements and are not eating each other, which belies their ongoing survival battles.

As I tried to describe what I saw in my microscope, I realized the words I ascribed to their behavior were not adequate. There were none to convey a non-human

experience. I considered that an artwork communicating by non-verbal means could draw attention to the presence of life forms we do not appreciate.

An image of a layer of existence which we know very little about, but supports all life came to mind. I created a series of delicate structures using surface textures, colors, and forms I saw in my microscope. I included prints from the Bates Mill in gold on black paper. It seemed fitting this design from 1908, referencing the effluent from the mill that produced it should be included. By not having something that was easily defined, perhaps new ways of thinking could arise.

In the context of print making, texture pervades everything and I made a relief surface that functioned much as my invisible surface of microscopic life did. One could not touch it, but scanning the contours and relationships of color within it, created a journey that transitions between known and unknown and imprints itself on conscience attention being paid to it.

Figure 27: Top right and lower left
Liminal Surfaces
May 2017. Georgina Grenier

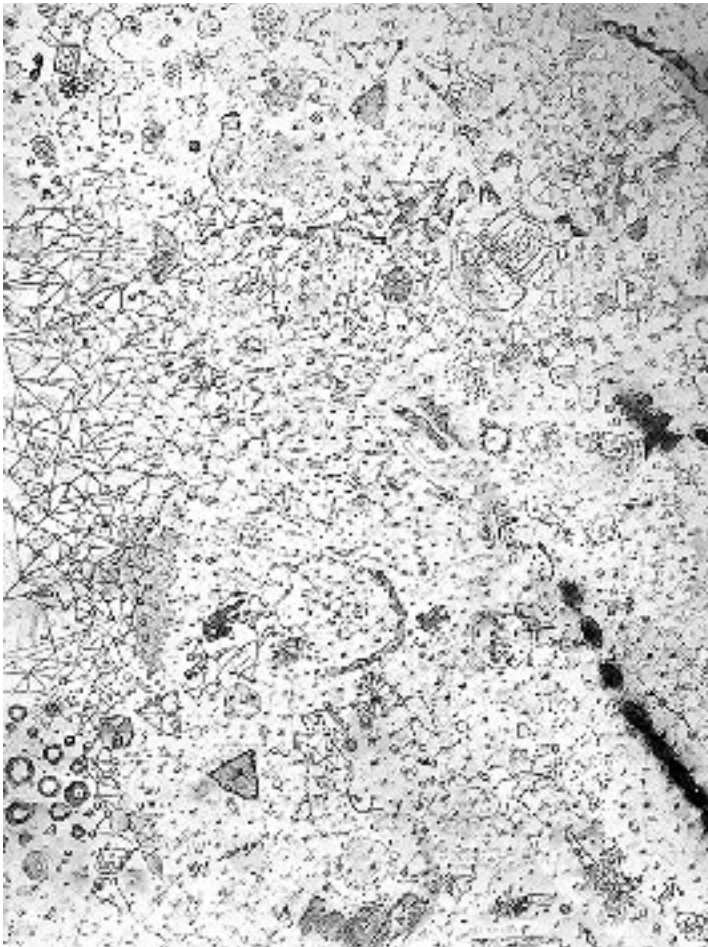


11.10 Work With Students



Figure 28:
Detail of student drawings
about climate change.

Below: entire printed
surface covered with
student comments and
drawings about climate
change



*Georgina Grenier and
MSAD17 students
May 2017*

My wage-earning life is as a public school teacher. I work with gifted and talented students in an education system that often does not recognize them or satisfy their creativity and curiosity. I designed ecology units that took most of a year for students to complete in which they learned about microorganisms, climate change and made a short movie about their concerns. Not wishing to depress them too much, I did not dwell on the difficulty of cooling the climate, or de-acidifying the oceans. I wanted to lay a foundation of hope for them that something could be done, and that they could be the ones to do it. I brought in one of my 48" textural prints and turned them loose on it to make use of the bumpy surface and add their thoughts in drawings and words about climate change. Many of them (about twenty students) drew diatoms, copepods and lots of polar bears. This activity cemented optimism and completion of a year-long project.

As John Cage said: *"Left to itself, art would have to be something very simple-it would be sufficient for it to be beautiful. But when it's useful it should spill out of just being beautiful and move over to other aspects of life so that when we're not with the art it has nevertheless influenced our actions or our responses to the environment."* (Kostelanetz and Cage)

I hope that is the case with the students I teach.

BIBLIOGRAPHY

American Chemical Council. *"Administration's Move to Withdraw Significant Portions of OCS from Energy Exploration Puts U.S. Manufacturing at Disadvantage."*
www.americanchemistry.com/Media/PressReleasesTranscripts/ACC-news-releases/Administrations-Move-to-Withdraw-Significant-Portions-of-OCS-from-Energy-Exploration-Puts-US-Manufacturing-at-Disadvantage.html. Online article. 20 December 2016. Retrieved 2 January 2017. Web.

American Chemical Council. *"The Basics: Polymer Definition and Properties"*.
<https://plastics.americanchemistry.com/plastics/The-Basics/> Retrieved 14 January 2017 Web.

American Chemical Council. *"A Pro-growth, Pro-competitiveness Agenda for Chemical Manufacturing. 3 Reasons America's Leading Manufacturing Industry is Poised to Drive Economic Growth and Job Creation Nationwide."*
www.americanchemistry.com/Pro-Growth-Pro-Competitiveness-Agenda-for-Chemical-Manufacturing.pdf. Retrieved 14 January 2017. Web

American Chemical Council. *"Facts about BPA"*.
<https://www.factsaboutbpa.org/safety-assessments/fda-research> 2013-16. Retrieved 14 January 2017. Web.

Anonymous Online Image. *Maine Mill Boys*.
<http://contributors.pressherald.com/wp-content/uploads/2015/08/USM-LAC-Franco-American-mill-workers-mural-pic.jpg> 14 January 2017. Web.

Beuys, J. and Harlan, Volker. *"What is Art?: Conversations with Joseph Beuys"*
Clairview Books. 2004. Print

Slat, Boyan. The Ocean Cleanup <https://www.theoceancleanup.com>

TED Talk #1 <https://www.youtube.com/watch?v=ROW9F-c0kIQ>

TED Talk #2 <https://www.theoceancleanup.com/milestones/pacific-cleanup-trials/>

Retrieved July 10 2017. Web.

Collins, G. *"Shades of Trump"*
<https://www.nytimes.com/2017/06/29/opinion/energy-week-rick-perry-trump.html?action=click&pgtype=Homepage&clickSource=story-heading&module=opinion-c-col-right-region®ion=opinion-c-col-right-region&WT.nav=opinion-c-col-right-region> Retrieved June 28, 2017. Web.

- Claire. n.d. *“Notes on the Gap Between Art and Life Working in the Gap. How has Modern Art Blurred the Line Between Art and Life? How can this Gap be Bridged? Does this Gap even Exist?”* in Talking to the Listening Tree Art Journal for BA Fine Art, Chelsea Art College, University of Arts London Posted on January 30, 2012. Web
- Critchley, Simon. Being and Time, Part 6: *Death*
The Guardian.<https://www.theguardian.com/commentisfree/belief/2009/jul/13/heidegger-being-time> 8 June. 2009. Retrieved July 17 2017. Web.
- Dellinger, O. P. And Gibbs, David. The American Journal of Psychology, Vol. 19, No. 2 *“The Daily Life of Amoeba Proteus”*. DOI: 10.2307/1412761. pp. 232-241. University of Illinois Press. (Apr., 1908), www.jstor.org/stable/1412761 Retrieved 16 November 2016. Web.
- Chow, Lorraine. *“Koch-Funded Group Tries to Persuade 200,000 Science Teachers That Climate Change Is Debatable”* 3/30/17 <https://www.ecowatch.com/heartland-institute-climate-science-2334892782.html> Retrieved 26 June 2017. Web.
- Darwin, Charles. *“On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life”* www.darwin-online.org.uk/content/frameset?pageseq=3&itemID=F373&viewtype=side (1859) Retrieved 11 January 2017. Web.
- Edwards, Carolyn P, Lella Gandini, and George E. Forman. *The Hundred Languages of Children: The Reggio Emilia Experience in Transformation*. Westport Connecticut: Ablex 1998. Print.
- Garfield, J. L., & Priest, G.. *“Nagarjuna and the Limits of Thought”* Philosophy East and West, (2003) 53(1), 1-21.
- Garner, Dwight. New York Times *“Annie Proulx’s ‘Barkskins’ Is an Epic Tale of Logging and Doom”* Books of the Times, Review. 16 June 2016. Retrieved 14 January 2017. Web.
- Gray, J. ed. *State of the Evidence: The Connection between Breast Cancer and the Environment*. 5th ed. Breast Cancer Fund.
<http://www.breastcancerfund.org/assets/pdfs/publications/state-of-the-evidence-2010.pdf> 2008. Retrieved 4 June 2011. Web.
- Fenchel, Tom. *“Ecology of Protozoa, the Biology of Free-Living Phagotrophic Protists”* Science Tech Publishers. Madison Wisconsin. Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo. (1987) Print.

- Gormley, A. *"Art in the Time of Global Warming"* Published in Long Horizons: an Exploration of Art and Climate Change, British Arts Council. (2010). Web.
- Hedgepeth, William. *"The Hog Book"* Dolphin Books. Doubleday and Company, Garden City. New York (1978) Print
- Heidegger, Martin. *Being and Time*. John Macquarrie and Edward Robinson (tr.). Harper San Francisco, (1962). Print.
- Hicks, Edward. "Peaceable Kingdom".
Online image www.metmuseum.org/art/collection/search/11081 (1830-32) 11 January 2017. Web.
- Lakoff G., and Johnson M., *Conceptual Metaphor in Everyday Language*
The Journal of Philosophy, Vol. 77, No. 8 (Aug., 1980), pp. 453-486 Journal of Philosophy, Inc. <http://www.jstor.org/stable/2025464> Accessed: 08-06-2017 12:04 UTC Web.
- Lakoff G., and Johnson M. *"Metaphors We Live By"* Chicago : University of Chicago Press, ©1980. Print.
- Levshon, Cressida. *"Page Turner: This Week in Fiction: Annie Proulx Discusses her Upcoming Novel, Barkskins"* The New Yorker, 14 March 2016. Web. Retrieved 14 January 2017. Web.
- Haraway, Donna. *"The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others"* in Lawrence Grossberg, Cary Nelson, Paula A. Treichler, eds., *Cultural Studies* New York; Routledge, 1992) , pp. 295-337.
- Helguera, Pablo. *"Education for Socially Engaged Art: A Materials and Techniques Handbook"* Jorge Pinto Books Inc. MD. (2011) Print.
- Koren, Leonard *"Wabi-Sabi for Artists, Designers, Poets and Philosophers"* Imperfect Publishing, CA (1994 and 2008) Print.
- Kostelanetz, Richard, and John Cage. *"The Aesthetics of John Cage: A Composite Interview."* The Kenyon Review, vol. 9, no. 4, 1987, pp. 102–130. JSTOR, www.jstor.org/stable/4335884 . Web.
- Light Tech Light Sources
<http://www.light-sources.com/solutions/specialty-fluorescent/applications/industrial-curing/>
Retrieved July 10 2017. Web.

- Lotto, R.B. "*Blackawton Bees*" *Biology Letters*. 7, 168–172 doi:10.1098/rsbl.2010.1056 <http://rsbl.royalsocietypublishing.org/> (22 December 2010) Retrieved May 10, 2017. Web.
- Mayhew, Henry. *London Labor and the London Poor*. Oxford University Press (2010). Print.
- Mckee, Maggie: "The Physicist Who Might Have Discovered a New Building Block of Matter" in *Wired*. com <https://www.wired.com/2016/06/physicist-might-discovered-new-building-block-matter/> June 24 2016 Retrieved July 3 2017. Web.
- Meadows, Donella. "*Thinking in Systems, a Primer*." Chelsea Green Publishing (2008) Print.
- Moore, C. J., Moore, S. L., Leecaster, M.K. Weisberg, S. B. "*A Comparison of Plastic and Plankton in the North Pacific Central Gyre*". *Marine Pollution Bulletin*. Volume 42, Issue 12 Pages 1297–1300 (December 2001) Murphy, Callan. and
- Musée de la Civilisation exhibit: "*A Fantastic Voyage in NanoWorld*" <https://www.mcq.org/en/activite?id=385240>. (2016) Web
- National Institute of Environmental Health. *Bisphenol A (BPA)* www.niehs.nih.gov/health/topics/agents/sya-bpa/ 14 January 2017. Web.
- National Institute of Environmental Health. *Endocrine Disruptors* www.niehs.nih.gov/health/topics/agents/endocrine/index.cfm 14 January 2017. Web.
- Neslen, Arthur. "*Dutch prototype clean-up boom brings Pacific plastics solution a step closer*" <https://www.theguardian.com/environment/2016/jun/22/dutch-prototype-clean-up-boom-brings-pacific-plastics-solution-a-step-closer> .Web.
- Norris, Vic, Franck Molina, and Andrew T. Gewirtz. "Hypothesis: Bacteria Control Host Appetites." *Journal of Bacteriology* 195.3 (2013): 411–416. *PMC*. Web. 4 July 2017.
- O'Brine, T and Thompson, R.C. "*Degradation of Plastic Carrier Bags in the Marine Environment*" *Marine Biology and Ecology Research Centre, School of Marine Science and Engineering, University of Plymouth, Drake Circus, Plymouth, Devon PL4 8AA, UK. Marine Pollution Bulletin* 60 (2010) 2279–2283 2010
- Okri, Ben. "*Grenfell Tower*" *Grenfell Tower*, June 2017: a poem by Ben Okri <https://www.ft.com/content/39022f72-5742-11e7-80b6-9bfa4c1f83d2> Web.

- Pelowski, M., Aiba, F., and Palcios, V. *“Satori, koan and aesthetic experience: exploring the “realization” of emptiness in Buddhist enlightenment via an empirical study of modern art.”* Psyke and Logos pp. 236-268. Nagoya University, Japan, (2012). Web.
- Plato. *“The Republic”* Translated: Jowett, Benjamin. <http://classics.mit.edu/Plato/republic.8.vii.html> 360 B.C.E Retrieved May 28 2017. Web.
- Proctor, James D. and Brenda M., H. Larson *“Ecology, Complexity, and Metaphor”* P.1066, BioScience. December 2005 / Vol. 55 No. 12. Web.
- Rathje, William. *“Rubbish”* Harper Collins: NY (1992) Print.
- Rickert, Thomas. *“Ambient Rhetoric: The Attunements of Rhetorical Being”* University of Pittsburgh Press. (2013) Print.
- SanClements, Michael. *“Plastic Purge: How to Use Less Plastic, Eat Better, Keep Toxins out of Your Body, and Help Save the Sea Turtles!”* St. Martin's Griffin. New York, (2014). Print.
- Sabloff, A. Ch. 6. Missing Metaphors in *“Reordering the Natural World”* University of Toronto Press. (2001) <http://www.jstor.org/stable/10.3138/9781442679221.13> Retrieved 20 June 2017. Web.
- Schilling, David. *“Has Politically Correct Culture Gone Too Far?”* <https://www.theguardian.com/news/2015/dec/14/politically-correct-culture-millennials-generation> (2015) Web. Retrieved June 30 2017
- Stibbe, Arran. *“Ecolinguistics: Language, Ecology and the Stories We Live By”* Routledge (2015) Print.
- Stibbe, Arran. *“As Charming as a Pig: the Discursive Construction of the Relationship Between Pigs and Humans”* Society & Animals 11:4 © Koninklijke Brill NV, Leiden, 2003. Web
- Sunderland, J., *“Gender and Language: An Advanced Resource Book”* Routledge, Taylor and Francis Group, London and New York (2006) Print.
- Thompson, Flora. *“Lark Rise to Candleford”* Oxford University Press (1949) Print
- Thompson RC, Swan SH, Moore CJ, vom Saal FS. 2009. *“Our plastic age.”* Philos Trans R Soc Lond B Biol Sci 364:1973–1976.

- Tomkins, Calvin. *"Duchamp, a Biography"* The Museum of Modern Art, New York. (2014) Print.
- Trewavas, Anthony. *"Plant Behavior and Intelligence"* Oxford University Press. (2014) Print.
- Trewavas, Anthony, J. and Baluška, František *"The Ubiquity of Consciousness, Cognition and Intelligence in Life"* <https://doi.org/10.1038/embor.2011.218>
Published online November 18, 2011 Published in print December 1, 2011. EMBO reports (2011) 12, 1221-1225. Web.
- Tuite, Diana. Sulzer Brochure: *"Material Assumptions"*
<https://usm.maine.edu/sites/default/files/gallery/SulzerBrochure.pdf>
(2012) accessed June 11 2017. Web
- Yang, Chun Z. et al. *"Most Plastic Products Release Estrogenic Chemicals: A Potential Health Problem That Can Be Solved."* Environmental Health Perspectives 119.7 (2011): 989–996. PMC. www.ncbi.nlm.nih.gov/pmc/articles/PMC3222987/ 18. November. Web. Retrieved 14 Jan. 2017.
- Zizek, Slatov. *"Slatov Zizek in Examined Life"*. YouTube Online video clip, 10:35. www.youtube.com/watch?v=iGCfiv1xtoU 10 October 2009. Web. Retrieved 14 January 2017.

BIOGRAPHY OF AUTHOR

Georgina Grenier is a public school teacher and artist living and working in southwestern Maine. She was born in England and attended the Slade School of Fine Art, University College London, obtaining a bachelors degree in Fine Art in 1983, then emigrated to America in 1984. After raising and homeschooling a family, Georgina entered the Goddard College low residency program to obtain a graduate degree in education. She is a candidate for the Master of Fine Arts degree in Intermedia from the University of Maine in August 2017.