

Astro-Material Poetics and the Unknowable Horizon

Scott Massey, 2026

Master of Fine Arts in Visual Art (MFA) Thesis Essay

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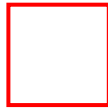
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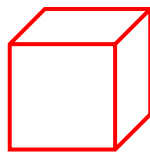
A point does not comprehend a line



A line does not comprehend a square



A square does not comprehend a cube



Forward ($x, y, z, t \leq \infty$)

A cube exists in three dimensions. This is also where we exist; we are three-dimensional beings in time. Thus, we comprehend the line, and we comprehend the square and the cube.¹ And though we have developed maths to infer beyond the cube², we do not comprehend the results in any meaningful way.

For a point to understand a line it would have to move in some direction, but it would also need to remain at all of its prior positions as well. These possible positions are infinite, regardless of the distance travelled. For a line to understand a square the same holds true, as it does for the square to the cube. To comprehend the next dimension beyond the cube, we would need to move through spacetime in all directions, X, Y and Z simultaneously, all while retaining access to each previous position.³ This explains why our attempts to observe a next dimension tend to fail our capacities. This is our (current) limit.

This is also one of the departure points for my work: imagining a next dimension, teasing out the nature of time, contemplating the implications of infinite

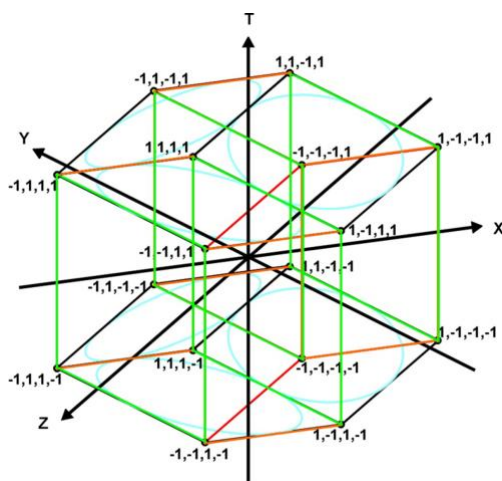
¹ I am not sure we comprehend the point. The point is not the period at the end of a sentence, it is a singularity, defined within general relativity as the point at which gravity becomes so intense that spacetime is no longer definable. In mathematics, the singularity is the point at which a given mathematical object is not “well-behaved”, for example, infinite.

² In order to map the cosmos, Einstein employed four-dimensional (hyper-dimensional, non-Euclidean) geometry: “The gridlines of Einstein’s four-dimensional map are light beams.” (Ferris, p 73)

³ As far as we know only light is able to move like this; whether light has memory is an interesting question.

space. Ideas trained like telescopes toward an ulterior dimension elusive to understanding, collapsing space and time into some unified whole – a pale flicker of illumination of this intangible realm held within each work. And, as with Olber’s paradox, artworks appear as pinpoints of light, not to fill the sky but mark an ill-behaved path through a dynamic universe whose significance is both utterly apparent and terrifyingly incomprehensible.⁴

I have pondered visualizing the fourth dimension for years; it would seem an impossibility. Certainly, language is not up to the task but in 1827 August Möbius



https://math.univ-lyon1.fr/~alachal/diaporamas/cours_PC/chap2022_03_Espaces_Vectoriels_POLY.pdf

offered up mathematical equations that describe the geometric complexity of 4D space. Mathematics is the one arena/language/platform where the incomprehensible nature of the universe we find ourselves in on very large and very small scales can offer *some* explanations. But seeing

a tesseract still doesn’t get us there, and Minkowski’s consolidating of time as the fourth dimension of spacetime sends us into non-Euclidean (non-absolute) territory

⁴ Olber’s Paradox explains why the night time sky is still dark despite a nearly infinite number of stars in every direction all shining their light toward us. “The universe cannot be both infinite and eternal.” (Coles, p7)

that “leads to many of the well-known apparent ‘paradoxes’ of relativity.”⁵ (Turok, 138,139) (Calder, 110-114)

But mathematical ontologies have limited applicability in the “real world” owing to the fact that reception and understanding tends to be relatively low among the general public. This is certainly true for me; the heart is willing, the mind not so much. So how *does* one visualize an infinite number of 3D spaces intersecting and entangled within each other? As the point/line/square/cube graphic that opened this text suggests, entities existing in a lower dimension see a truncated view of any object entering from the next dimension up. A two-dimensional being will see a sphere entering their plane only as a growing or shrinking line; or if seen from the ‘outside’ as smaller or larger circles or points. (Abbott, 133-147) Thus any higher dimensional object entering a lower dimensional space will only be revealed according to the constraints of that space. Henry Segerman’s work offers some illuminating visualizations of how 4D objects might present themselves as shadows in our three-dimensional space.⁶ So, even though Plato’s elemental polyhedra have long been relegated to the history of esoteric geometric powers, geometry continues to be a foundational language helping us to

⁵ Hermann Minkowski is best known for his foundational work of geometric interpretations of the special theory of relativity.

⁶ Segerman is a professor of mathematics at Oklahoma State University whose research investigates three-dimensional geometry and topology.

understand the complex and invisible structures of time and space, and even dimensions currently beyond our capacity to prove.⁷

<i>t</i> for TIME

Up until the 20th century we believed that time was the same everywhere. But then space and time were proved to be a unified field and we discovered that a mass slows down time around itself, things ‘fall’ toward the point of slower time, and there is a different ‘time’ for every point in space. Time suddenly became *malleable*. The distinction past/present/future is only partially useful here, in our immediate vicinity. The ‘present’ depends on the precision with which we determine time. “Our ‘present’ does not extend throughout the universe. It is like a bubble around us” (Rovelli, 43). Rovelli has postulated that time, like matter, is granular at its smallest scale called Planck time.⁸

Time, space and mass are inextricably bound, and together they are elastic. Like the relationship between a camera’s aperture, ISO and shutter

⁷ In his dialogue *Timaeus*, Plato associated the four classical elements (earth, air, fire and water) with the five regular polyhedra, with the sphere representing the heavens, as both the sphere and the heavens are perfect. While Plato’s cosmology is no longer accepted for obvious reasons, his belief that “mathematics provided the most direct approach to an understanding of the inner harmony of nature” (Young, 73) remains relevant.

⁸ Planck time, or minimum time, is 10^{-44} seconds: a hundred millionth of a trillionth of a trillionth of a trillionth of a second. (Rovelli, 83)

speed, a change in one variable necessitates an equalizing inverse change in one or both of the others. In the vicinity of an extremely large mass, or when travelling through space at even a fraction of the speed of light, time slows down. This is called time-dilation. It is incredibly difficult to conceptualize this effect, even if one understands Einstein's theory of general relativity. We have no real way to experience this phenomenon, and so must trust the results of experimental physics proving that minute changes in the relative passage of time do in fact occur. The elasticity of time is therefore a fundamental property of motion through spacetime and proximity to a gravitational mass.

I like to imagine being a photon, those restless fleet-footed carriers of all information.⁹ Photons have zero mass, and so they fall entirely on the left-hand side of Einstein's famous equation.¹⁰ Pure energy. Nothing we know of travels faster than light, but light does have a finite speed denoted as c .¹¹ All matter moves slower than c . Like *a lot* slower. And if you imagine being a photon it's not a great leap to imagine speeding past all the slow matter, which must appear to a photon as

⁹ All the information we obtain about objects in the universe is carried to us by light. Light in this context means the electromagnetic spectrum, not just the sliver we refer to as "visible".

¹⁰ This is mass-energy equivalence. What $E=mc^2$ also tells us is that even a small amount of mass contains an immense amount of energy, which is the basis of the atomic bomb. To his credit Einstein was not in favour of exploring the darker implications of his research into militaristic applications.

¹¹ c is equal to 299,792,458 meters per second (in vacuum).

utterly static and motionless.¹² Photons do not exist *in* time; uncannily no matter how far a photon travels, no time will have passed from its frame of reference. Light is the field where time shows up, and time unfolds at the speed of the photon.

You or I will never catch up of course, but perhaps the gravity-well of an artwork might succeed in slowing down the unfurling of time around itself just enough to trace relativity and create a small bubble of temporal distortion in which all the invisible threads connecting the work to the process of its making, and its possibility to even just exist, can be read.¹³ An art that functions as “a tear in the universe”. (Aycok)

An art practice may be understood as a constellation: discrete artworks cohering through common lines of inquiry, shared formal and material relationships and methodologies of making, together forming a pattern of connected temporal-material bubbles. As Benjamin remarks: “Ideas are to objects as constellations are to stars”, which is to suggest that meaning is found in and through relationships. (Benjamin, 34) But the relationships in my work do not exist in isolation; formal references may even stretch back at times to paleolithic monuments, though vastly earlier stimuli emerging out of deep geology and

¹² This is not entirely correct. Protons, electrons, neutrinos and other elementary particles move very close to the speed of light, but since we can't ‘see’ these I'm conveniently ignoring them.

¹³ Here's the essential insight of relativity: nothing is fixed, not space (everything is moving relative to everything else) and not time (gravity, velocity and extreme distances affect the rate at which time is perceived to pass between internal and external viewers). There are no absolute reference points in spacetime, just an infinite number of different ‘nows’.

astrophysics are obviously also present. More recent references are found in the legacies of Earth Art, appearing through formed or manipulated natural materials and systems, recalling the works of Robert Smithson, Nancy Holt and Hans Haacke among others. I especially appreciate the subtle sensitivities of artists such as Felix Hess, who began his career as a physicist before entering the world of art, but carried his science-minded interests forward into his work, or Rivane Neuenschwander, a Brazilian artist who employs a process she calls “ethereal materialism” in her practice. Contemporary references are present as well, through shared parallel inquiries with the work of Katie Paterson and Rosa Barba, whose practices mediate astronomical phenomena, light as a medium and deep time geology through corrupted apparatus and process-based materiality.

It should not come as a surprise to learn that actual stellar constellations are merely an accidental arrangement between stars; their “relationship” is a fabrication formed by our innate desire to see patterns and meaning where none exists, a tendency called pareidolia. The stars making up a constellation may be many hundreds or even thousands of light years apart, and some of the stars may not even exist in their “now” anymore; thus, the real meaning held within the concept of a constellation is a breaking of our linear conception of time.¹⁴ Unlike

¹⁴ This is called the Relativity of Simultaneity, a fundamental concept in physics that states whether two spatially separated events happen at the same time is not absolute, it depends on an observer’s reference frame.

the heptapods in Ted Chiang's *Story of Your Life*, we have not developed a suitable language to incorporate the multiplicity of "presents" that exist in the universe, though I am absolutely suggesting that art offers us a form of language that can certainly contain multiple frames of reference.¹⁵

When functioning as expected a clock presents sequential tallying digits denoting the passage of time. What is a clock presenting when it endlessly displays



Even a Stoppered Clock. Scott Massey

random number fragments, appearing as incoherent runic symbols? There arises a conflict between the expected and the actuality for which the implications are not immediately apparent. Does

this mean we are late for something? Ahead of schedule? Or has this new apparatus enlarged invisibility (Vogl, 17) by forcing us to admit that we don't really understand time well at all? What even is *time*? Does this not-clock now begin to mark the incommensurability of hearing something like "the Earth is 4½ billion years old"? As our few human centuries slowly pile up against the backdrop of our

¹⁵ Chiang's short story was the basis for Denis Villeneuve's movie *Arrival*. Heptapod language is not structured linearly so past, present and future are equally accessible and equally relevant within a given conversation. This non-linear structure is related to the linguistic form of center-embedded text.

planet's forty-five hundred million centuries, they scarcely register. What infinite abyss lies just beyond the ever-receding horizon of our knowledge?

Matter is Nothing - Materials Matter

On a vast frozen expanse holes are bored almost two and a half kilometers deep somewhere in the Antarctic ice sheet. Into each hole is dropped a tether, along the lengths of which are strung hundreds of highly perfected sensors with one singular purpose: to capture the fleeting trace of the smallest particle known to exist, a neutrino.¹⁶ Neutrinos are so minute that despite about 8 trillion trillion of them crossing Earth's path every second, most will pass clean through the entire planet without ever touching another bit of matter.¹⁷ As if nothing was even there.

It often helps to have a simple scale example to explain what “nothing there” means, and this one gets shared often: if the nucleus of an atom were a tennis ball, the surrounding field of electrons would sit about three kilometers away. This is highly simplified and not totally accurate as far as particle physics goes, but it's close enough to still surprise.

¹⁶ First postulated by Wolfgang Pauli in 1930. AKA “Little Neutral Ones” thanks to Enrico Fermi.

¹⁷ Minute in this case means small of course, but Fermi's nickname also points to their properties of having extremely low mass and lack of electric charge, ie: neutral and weakly interacting. These properties necessitate some rather strange methods and environments for detection.

In the search for neutrinos, the IceCube Observatory is not alone in its endeavour. Other grand neutrino traps are currently operating in similarly unusual places: Super-Kamiokande in Japan, Borexino in Italy, ANTARES in France, and the Cubic Kilometer Neutrino Observatory at the bottom of the Mediterranean Sea. Each site patiently waiting for some small spark of evidence for tiny particles that fill the universe but rarely make their presence known anywhere.¹⁸

“Matter is a cloud made solid by our limited macroscopic existence.”
(Rovelli,133) The baryonic matter that makes up absolutely everything we can see is made of particles mostly comprised of empty space. Matter made of next to nothing.¹⁹ Nothing we can measure, nothing we can observe because the wave collapses when we look.²⁰ If all the space between the matter that comprises the Earth disappeared, the leftovers would collapse into an ultra-dense sphere about 100 meters in diameter. While quantum physics confirms that matter is essentially composed of next to nothing, a “reflex of probability” as Heisenberg proposed

¹⁸ Neutrinos are not observed directly, but when they happen to interact with ice [or heavy water] they produce electrically charged secondary particles that in turn emit Cherenkov light, as a result of traveling through the ice faster than light travels in ice. (Source: <https://icecube.wisc.edu/science/icecube/>)

¹⁹ This is a fancy way to say “ordinary”. Baryons are particles like protons and neutrons which make up most of the visible matter in the universe.

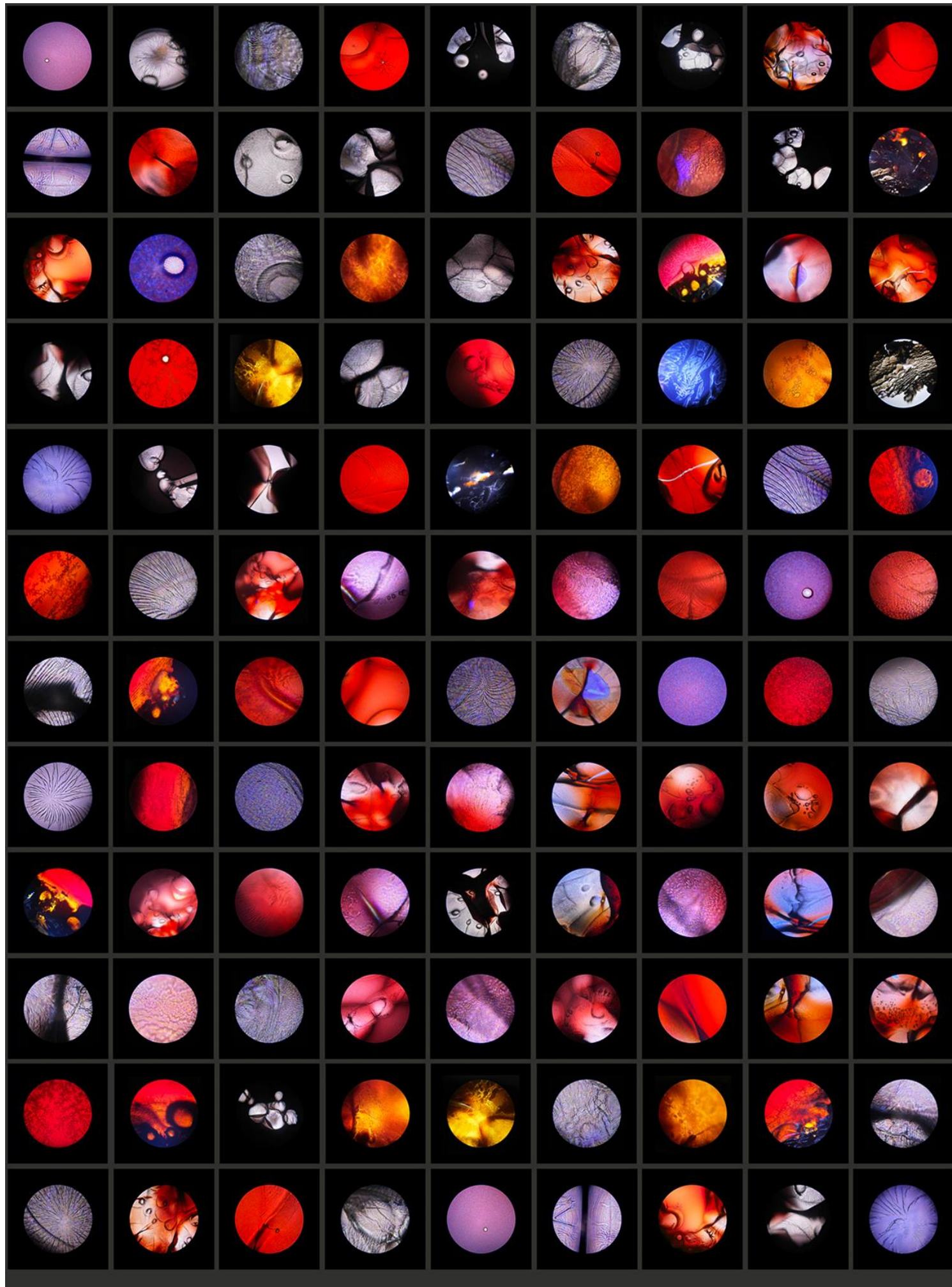
²⁰ I am referring to the “double-slit” experiment here, which has shown that light and matter behave as both a particle and a wave, depending on the presence (or not) of an “observer”. This wave-particle duality has many interpretations, yet remains one of the big mysteries in physics.

almost exactly one hundred years ago, we still find ourselves here, in matter. And this seems to matter quite a lot, especially to artists.²¹

Every material has a history, a primary identity or meaning, a disposition, a sensual quality, an ease or a hardship while being variously fashioned. These characteristics are always in flux and determined by application or use or even memory and relationships. While it would be easy to invoke Object Oriented Ontology in defense of this statement, I prefer Hayles' position that it is "the resistance objects offer to human manipulation and understanding" where learning really starts to happen. Hayles cites Andrew Pickering's "mangle", a "cyclic process of a human prodding and probing a nonhuman object to answer some question" (Hayles, 168) as a dialectic of inquiry and resistance wherein the resistance of objects tells us not what they are but what they are not. (Hayles, 169) Within this indeterminate space, multiple meanings are formed, made and unmade and made again until some resolution becomes fixed within the work, and an answer to a question perhaps not even posed solidifies out of its making.

The question of making sits at the heart of my practice. "Your hands learn to do things that you could spend a whole day trying to write about and articulate." (Stockholder) In the process of constructing an artwork, I adopt a "design thinking"

²¹ Theoretical physicist Werner Heisenberg was one of the main pioneers of the theory of quantum mechanics.



The sun was born in darkness, to shine for a time, only to return to darkness (macro orbitals grid), Scott Massey

methodology (Ellison, Borden). Similar to Pickering's "mangle", design thinking is an iterative, non-linear process that includes activities such as ideation and solution generating, creative thinking, sketching and drawing, prototyping and evaluating. It is even more exciting when an idea for an artwork necessitates the construction of apparatus to even begin the art. The sub-apparatus of my work: the set-ups, the mock-ups, the jigs and devices, the considered jury-rigging, the assemblage and deconstruction and re-assemblage, the judicial tossing away and saving of fragments. This exquisite process is where I lose myself, as if I am channeling a welling energy that seeks expression through a possible artwork. An astro-material poetics if you will.

In my past work I have incorporated steam, growing grass, micro-currents from trees, dripping milk, ground-glass lenses, an egg frying on a light bulb, mirror polished anthracite, burning film slides, and many other unconventional materials to produce artwork. Through my experimentation with these materials I have come to know steam as a cloud, grass as a desirous and efficient energy converter of light, that trees conduct electrical conversations, the curious symmetry of milk crowns, or the darkening effect of artificial illumination. Engaging with a multitude of materials is the most obvious and sensible way for me to articulate ideas that are difficult to readily relay.

Ideas tend to have demands about the kinds of material they prefer to speak through so I try to remain sensitive to this. Concepts of protracted deep time seem to get relayed more effectively through materials that have actually experienced deep time, so geologic samples make a lot of sense. Similarly, the deceptively simple ground glass lens enhances our physical capacities, allowing us to move beyond the limits of our biology, while it also functions to compresses immense spatial distances within our grasp of consideration, pointing to a radical shift in our perceived place in the universe.

Materials and apparatus carry with them a set of expectations about their function and purpose, but they may also present a set of unanticipated effects that arise through our interactions with them. When Joseph Vogl examines the implications of Galileo's telescopic views, he asserts that the augmented visibility produced by two glass lenses in a tube carries with it the inverse effect of also enlarging invisibility. (Vogl, 22) The sudden realization that the familiar celestial bodies understood to be circling us had celestial bodies circling *them* dismantled two thousand years of belief in a geocentric falsehood, and this posed the inevitable question of what else were we missing. Vogl goes on to say that despite the enormity of this new revelation, there is another unfolding at the same moment, that "this event marks a change in how the meaning of seeing and visibility is determined." (16) *The instrument becomes a medium*. Vogl calls this

transformation “denaturing the senses”. Using the example of the telescope, this invention is “not just an extension or improvement of the senses, it creates the sense anew: it defines the meaning of vision and sensory perception...” (17).

Essentially what has happened is the telescope has opened up the theory of vision, a “reciprocal determination”, in which the human eye is simply another example of

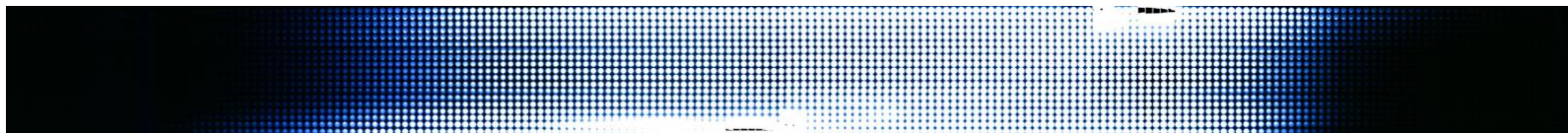


Set-up for *The Day Breaks*. Scott Massey

“applied geometry [within an] optical system [of] denatured vision.” (18). Just as Galileo’s telescope heralds an expansion of visual meaning, I see my corrupted apparatus functioning in a similar fashion, upending the original significance of an object or device in order that its new state of being leaps to a second order of

meaning through the work, into an “awkward space between sensory evidence and abstraction”. (22)

This is the information I contemplate as I clean and organize a small box of discarded enlarger lenses I received from a local photo lab after their transition from analogue to digital printing. My intention is to use these lenses to capture light rather than project an illuminated image onto light-sensitive paper. While arranging and labeling each lens according to focal length my mind is running another task, iteratively visualising various possible constructions to fix each lens into discrete tubes, and how to direct the light information they will gather in some controlled way onto a recording medium. The completed work appeared, both in my mind and later materialized, like so many of my projects: an experimental apparatus. This one was designed to trace a narrow band of skylight stretching from the eastern horizon to the west continuously from dawn to dusk, recording the imperceptible changes in colour and light intensity that we rarely ever just watch unfold. The apparatus was affixed on top of a hacked desktop scanner, sealed into blackness by a light-blocking skirt.



The Day Breaks. Scott Massey

At approximately 4AM, the sky above was black as pitch, but the eastern horizon was ever so faintly hinting at lightening, and I began to make scans every ten minutes or so. This continued until the sun broke free of the horizon, after

which I slowed down the scanning interval until the sun began to set, and the process inverted itself for dusk and the onset of night.²² In all, the process took about twenty hours to complete, but there was much work to be done with the resulting scans. Each of the 210 scans needed to be edited and cropped, then rotated 90° and stacked side-by-side like fence boards into one continuous image. The resulting 48-foot-long photograph presents a time-lapse bell curve of light intensity changes over one single day.

Like so many other phenomena, the dawning and dusking of day is a slow event, for which I in turn slowed down to witness because of the work I was making. This protracted observing opened up space for contemplating the nature of light, its strange duality as both wave and particle, and the endlessly fascinating ways sunlight interacts with Earth's atmosphere. Mirroring the constructed apparatus created to capture it, light "expresses the contradictory properties of what is discrete and what is continuous, what is local and what is spread out" (Labutot, 116).

In the age of digital dematerialisation of the art object, performative sculpture asks for a real and personal confrontation. As these works unfold in time,

²² Dawn is not sunrise, it is the time of twilight before sunrise when indirect daylight is scattered in the Earth's atmosphere, ie: the first lightness of morning. This is the same for dusk.

or even perform their own making, they become multidimensional; they cannot be suitably experienced via a mediated and grossly reduced interface.

Space (... .-.- .- -.-. .)

..- .- - - - - .- - - - .²³

Over ten consecutive days in December 1995 the Hubble Space Telescope captured 342 separate exposures of a small region of empty space in the constellation Ursa Major, the Hubble Deep Field (HDF).²⁴ Any single exposure would have revealed very little of anything to see. However, when the images were stacked together, the combined light information revealed an exquisite surprise. Within this tiny region of black space was a sparkling field of objects, over 3000 galaxies, some of the youngest and most distant ever seen as they were in the early universe, their light only reaching us now after billions of years. Any map of astronomical space is always also a map of time. Thus, the Hubble Deep Field image gave us a picture not just of how galaxies form, but an exponential increase in our estimation of the size and age of the

²³ Morse code is typically sent via radio waves, an early version of wireless communication technology. Interestingly, radio waves propagate through the vacuum of space extremely easily. Every radio signal ever transmitted from earth will travel outwards forever. Every pre-digital television show, every radio station broadcast.

²⁴ Small in this instance means about the size of a tennis ball seen from about 100 metres away. The HDF area comprises about 1/24,000,000 of the total area of the sky.

universe and the abundance it contained. Yet another instance of diminution for humanity.



The HDF is at the centre of this image. The Moon as seen from Earth would fill roughly one quarter of this image.



Hubble Deep Field by Robert Williams (NASA, ESA, STScI) - Hubblesite.org: <http://hubblesite.org/image/388/gallery>, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=396007>

The true size of the earth was first determined by a stick. A stick stuck in a hole at a particular place, replicated by another stick at another particular place



Manipulated stock vector by Desertsands

some ways away. Far enough away to mark the drift, an angle translating the position of the earth from the sun, first here and then there, or more accurately at the same time here and there. Near to the equator at high noon, when the sun is directly overhead, everything goes flat. This is the time of no shadows, when we stand on top of ourselves.

And so, the first shadow-less stick at one particular place at high noon is compared to the second shadowing stick at the other place far beyond the horizon. The readings of the two sticks and their resulting shadows (or lack thereof) carefully measured against their lengths, the angle of one inscribed across the ground, the very ground being measured for the first time, had enormous implications.

The idea was ingenious and simple, but like most simple and ingenious ideas they are only this in retrospect. The test looked more like a child's game if we're being honest; certainly not a setup that would confound all previously held assumptions about



Manipulated stock vector by Desertsands

the scale of the world. The two unassuming sticks poking up towards the sky served to fill in some missing numbers to a calculation whose result would define the size of the Earth.

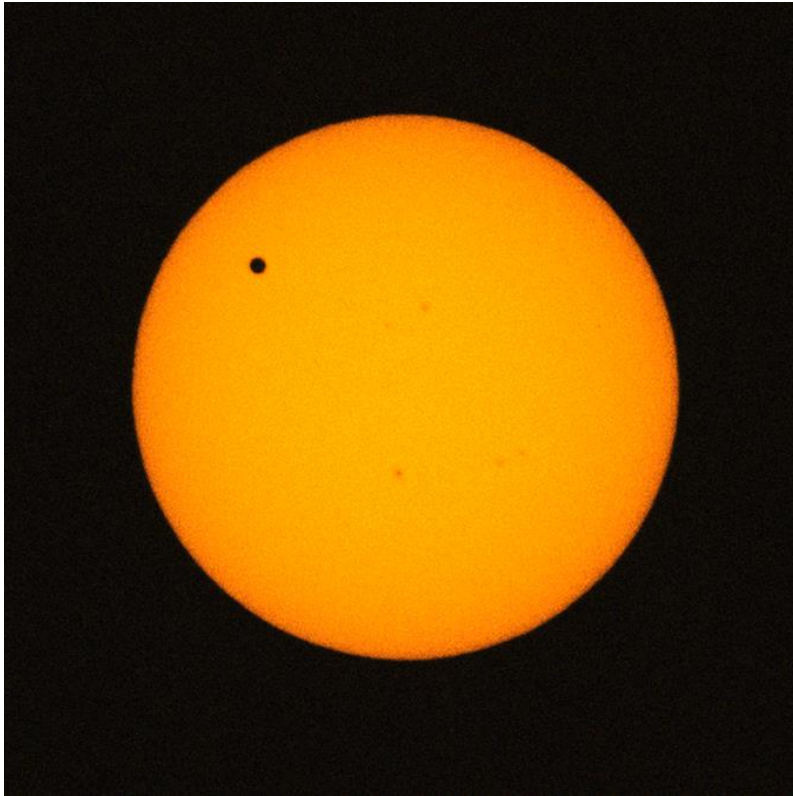
The distance between the Earth and the sun is called an *astronomical unit* (AU). The history of astronomy is filled with anthropic references, which is ironic because if there's one thing astronomy has shown it is that we are, in relative terms, completely insignificant. But I don't want to play the relative game because for all we know we might just be the only beings having made measurements between sticks and stars.

In 1769 on the island of Tahiti, strained and very serious eyes were trained on the sun. This was an auspicious date: Venus would cross the disc of the sun in what is called a 'transit'. There have been others: 1631, 1639, 1761, 1874, 1882, 2004, 2012. And more to come: 2117 will be the next available viewing. There is a pattern in these dates, can you see it?²⁵ I missed 2004 for reasons I cannot recall though I suspect it had something to do with recently becoming a parent; but I did witness the 2012 event from the vacant desert somewhere in Nevada. Armed only with a small filtered telescope and my Hasselblad, sweating it out in the heat, I

²⁵ Transits of Venus reoccur periodically. A pair of transits takes place eight years apart in December followed by a gap of 121.5 years, before another pair occurs eight years apart in June, followed by another gap of 105.5 years.

watched a tiny black dot crawl slowly across the blazing orange disc of the sun for five hours (really big events tend to happen slowly).

This was nearly the same view that Cook and his team assembled to witness in the middle of the south Pacific. But they were, much like Eratosthenes' sticks, not



Transit of Venus, 2004. Scott Massey

alone in their effort; another group was stationed in Fort Churchill, Manitoba and a third group had gathered at the Arctic tip of Norway. Each of the groups were instructed to make measurements at four critical moments of interaction between the sharp black void of Venus and the Sun. Measurements were compared and calculations made for the values

of 'solar parallax'. Their results defined the true and actual distance of the astronomical unit (and extrapolating from this, the size of the entire known solar system).

This expanding frame of reference continued with the Hubble Deep Field that opened this section, and has recently entered a new phase with the launch of the James Webb Space Telescope. The JWST has now peered into the furthest

reaches of space using infrared astronomy. Recall that longer wavelengths propagate through space extremely well. Thus, the red-shifted light information being gathered from the infrared band picked up by the JWST has been traveling since the earliest age of the universe.

Artists (and scientists) visualise the imaginary. Einstein “worked a great deal with *gedanken* (thought) experiments of this kind” (Coles, 15) to arrive at his theories of relativity. Visualizing is a process that runs almost constantly in some cordoned off space of my brain while I carry out the obligatory duties of my day. These visualizations are my deep bore holes into the vast ice sheets of artmaking, waiting for those elusive connecting particles of possibility and meaning to arrive as I labour in fabrication, reveling in the “vertigo of the visionary.” (Labatut, 54)

I like to imagine eccentric machines and curious objects and then set about building them. As Valerie Olsen notes, “experimental projects are...able to hybridize incommensurate things.” (p 18) Often these imaginary constructions are based on some real-world referent, such as a slide projector or a ventifact or an antique school chair. Things rarely work out straightaway, and typically a number of iterations must be accomplished before a work is deemed to be acceptable, but the process is my retreat from the quotidian demands of life. If the resulting artworks also describe, interpret, elucidate or incorporate some natural phenomena, then so

much the better. In discussing artmaking, Lucas Aspina stated: “You don’t aim to create a thing, you aim to create a meaning, a multitude.” (Aspina)

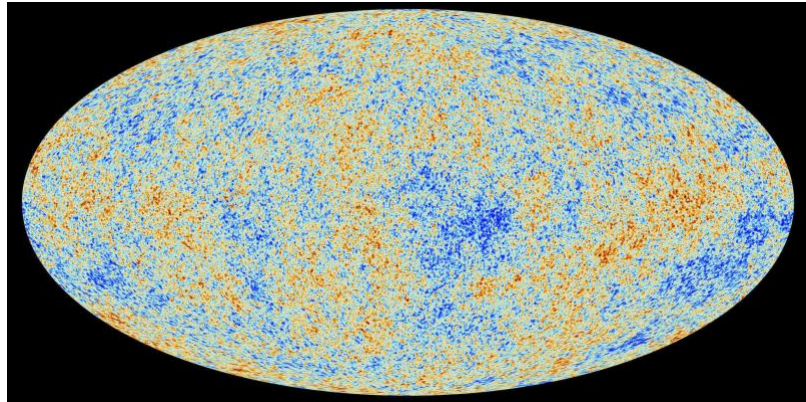
The Unknowable Horizon

There are two types of Deep Time that we have evidence for: geologic and astronomical. Geologic time investigates Earth’s geologic processes for definitive signs from the past that elucidate the Earth’s evolution over billions of years, including evidence inscribed into primordial rock and trapped in ancient ice. What the evidence makes abundantly clear is that the presence of *Homo sapiens* is barely noticeable on this time scale. Even when we include archaic human presence stretching back 2-million years, it is a thin slice of time out of scale to the ~4500-million years of the earth’s age.

This considerable stretch of time is dwarfed when we look at things on an astronomical timescale. Now the evidence opens up a period stretching back almost 14-billion years, but even this is not the whole picture. This is just the size of our “observable” universe, where light from distant galaxies can actually still reach us. There is an unknowable region beyond the observable that we cannot ever see, and it is moving away from us faster than light.

The history of geologic and astronomical sciences has been one of discovering a continuously diminishing pre-eminence of our place in the universe.

As the previous sections describe, scale is the overriding context of the universe. We are too puny of presence and time to comprehend a large



ESA and the Planck Collaboration

latitude of scale, though as we have seen there are tools and methods we may use to reach cognitively further. Over vast astronomical distances, difference is “expressed not spatially but over time.” (Morrison and Morrison, 4) Looking deep into space is looking far back in time. The furthest thing we can “see” is the Cosmic Microwave Background (CMB), the earliest visible record we have access to, the literal shadow remnant of the birth of the universe.²⁶ No information prior to the CMB is accessible to us, because all matter before this was opaque to light and existed as plasma, a high energy state of utter chaos.²⁷ The conditions of the early universe that caused the CMB is one of a number of cosmic relationships that point

²⁶ Visible in this case means on the electromagnetic spectrum and readable by sensitive radio equipment. The CMB is so far away and so deep in the past that its signal has been stretched into the microwave band.

²⁷ The very early universe was a dense soup of plasma (nuclei stripped of their electrons by the intense radiation field) that was opaque to light. When things cooled down enough for the atoms to recombine was the moment light became visible. This moment of recombination created a shell of expanding light that continues outwards in all directions. (Coles, 61)

to “the interface between particle physics and cosmology” (Coles, 73); there appears to be an essential connection between quantum physics and astrophysics, one helps explain the other and vice versa. The universal Ouroboros.²⁸ Which is the tail and which is the mouth of the universe?

“And in time we come to see that not only are we on the sidelines of the universe but that it’s a universe of sidelines, that there is no centre, just a giddy mass of waltzing things, and that perhaps the entirety of our understanding consists of an elaborate and ever-evolving knowledge of our own extraneousness, a bashing away of mankind’s ego by the instruments of scientific inquiry until it is, that ego, a shattered edifice that let’s light through.” (Harvey, 28)

The cosmology of physics is just this: a set of carefully planned experiments

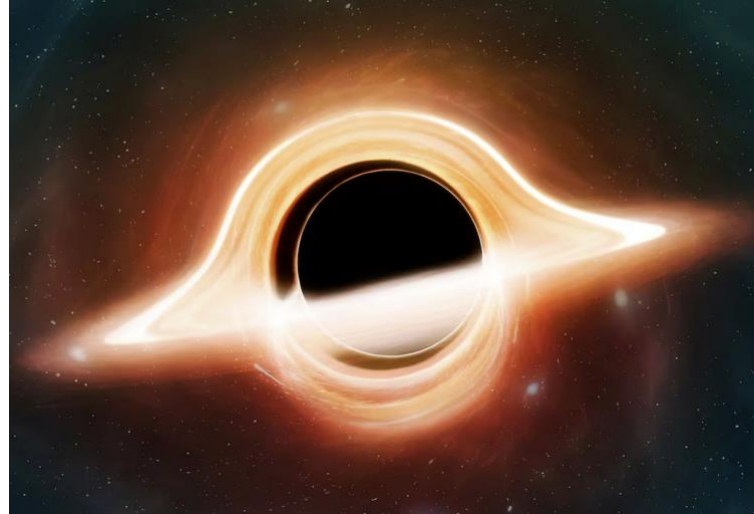


Conterminous (the distance of a thing), 2025. Scott Massey

with the ultimate goal of understanding why anything exists at all. I suppose I have adopted a similar methodology for my practice; artworks as experiments for understanding, materials massaged into form, which in turn become portals for

²⁸ British cosmologist Martin Rees used the ouroboros to illustrate the various scales of the universe, ranging from 10^{-20} cm up to 10^{25} , connecting the subatomic to the supra galactic. (Wiki)

thought, and resonant affective chambers of mediated contemplation. If the function of science is to continuously confront the unknown with propositions of understanding, my work proposes artistic possibilities to set up the conditions for my own stratifying layers of meaning. Like Tauba Auerbach “I want to learn new things constantly” too, and I do this through the physicality of making and contending with materials.²⁹ And like scientific experimentation, artistic experimentation is full of failures. In



Mark Garlick/Science Photo Library/Getty Images

seeking out one thing, the scientist (and the artist) discovers another set of unexpected things as they work to move ideas into physical reality. Yet the iteration of failure is a necessary and fruitful process, one that tends to be erased from the final presentation of a completed work.

A few years ago, I fell in love with coal, specifically the metamorphic form called anthracite. Anthracite has a density that is not just about its material substance: there's the inconceivable temporal chasm of its geology; the hegemonic function of mining industries and the communities that rely on them; the progress humankind has benefited from through the exploitation of energy wrung from its

²⁹ <https://art21.org/watch/art-in-the-twenty-first-century/s11/tauba-auerbach-in-bodies-of-knowledge/>

properties; and the resulting negative consequences of our overuse of coal as an energy source that has begun to threaten us all. We have discovered hidden, interconnected boundaries we didn't even know existed.³⁰

The geologic history of coal is a magnificent story that I won't relay here, but suffice it to say that thanks to the emergence of an enzyme with the ability to digest lignin, no new coal will ever be formed on the Earth as we know it.³¹ Interestingly, there is a corollary with the history of coal now being recognized through our overproduction and waste accumulation of plastic in the biosphere. The solution could be just one enzyme and a million years away. Through the making of one artwork these are just a few of my learnings.

There are certain works I pursue simply in order to put me in a position of the utterly experiential. With these, I am not the least bit concerned about an audience for the work, the effort is simply an excuse to be wholly present to an experience. One series I continue, if very infrequently, takes me to remote locations far from human influence. I recall one session, high above the treeline on the side of a mountain overlooking Cathedral Lake in Similkameen/Sylix territory.

I left our remote camp just before midnight and hiked up for an hour on a

³⁰ The burning of coal is the largest anthropogenic source of CO₂ contributing to climate change.

³¹ This enzyme was first developed by mushrooms and other fungi.

trail I had scouted earlier that day to know where I'd be going. Not sure that it helped any (everything looks unfamiliar at night) but the climb acclimatized my eyes



Via Lactea (Joshua Tree National Park). Scott Massey

to the dark. I found my working spot and proceeded to photograph small squares of the night sky on a single piece of Kodak Ektar film for many hours. I lost count

after three hundred or so exposures and stopped when the first faint hint of light hit the eastern horizon.

When using analogue film in an experimental way, there is no guarantee about the outcome. Digital photography is so *safe*, and it comes with an insurance policy full of hefty premiums. But it really didn't matter; the take-away, the gift of all this effort and risk was my experience. Because resting there against a boulder in the dropping temperatures on a bed of alpine heather, with a vault of stars peering down upon me, it was so dark I was literally seeing by starlight. Whatever an artist decides to offer the world, it is but a shadow of everything that was invoked in order to see it exist.

Despite my insistence here that primary experience was the driver for these works, there remains as well the desire to communicate this experience through the work, to relay the involvement of making in order to point to the overlooked but rather wondrous truth that the stars are still “out” during the day. So not *ars gratia artis* but art for knowledge sake.³² Thus, for me the practice of artmaking is integrally connected to my desire to “learn new things constantly”, to translate things that are difficult to grasp, to reflect an inner cosmology.

³² *Ars gratia artis* is used as a motto by the Metro-Goldwyn-Mayer film studio around the head of the lion in its logo. Strangely the usage is grammatically incorrect; the proper arrangement should read *ars artis gratiā*.

Literary theorist Raymond Williams coined the term “Structure of Feeling” as that which describes the totality of cultural complexities that artists draw from. Typically referenced in historical or sociological frames, I would argue that certain paradigmatic shifts resulting from scientific discoveries would also be applicable. One of the reasons I suspect that “Structure of Feeling” is not typically associated with scientific discoveries is two-fold: the implications of such are difficult to translate for the lay public and thus become diminished, and also large shifts in science-based knowledge take much longer to fully understand and the implications become diffused over time. I would point to the theories of relativity as prime examples of this. Now well over a century old, and despite enormous shifts in our understanding of time and space, most people do not comprehend the magnitude of meaning embodied within these proposals.

Epilogue

This paper is essentially a story of two interrelated cosmologies. As astrophysicist Peter Coles notes, the “aim of cosmology is to place all known physical phenomena within a single coherent framework”, from the cosmic to the quantum. Our current and well-developed scientific cosmology “is experiencing something of a ‘Golden Age’ ” (Coles, 10) and I have outlined a few examples of how

this has been established since Eratosthenes drove some well-positioned sticks into the earth. The knowledge we have gained in the intervening years, especially the last few hundred, has been nothing short of extraordinary. This scientific cosmology has been applied adjacent, against, upon the continually developing cosmology of my work.³³ Neither exists to explain the other but rather it is for me, like Heizer's massive granite slabs communing with equally imposing concrete



NASA/JPL-Caltech

blocks, a mutually beneficial relationship of cosmic inquiry.

In 1990, Carl Sagan convinced NASA to have *Voyager 1* spin around and take a photograph back towards Earth, the iconic *Pale Blue Dot* image, taken from about 6 billion kilometers away.³⁴ If the earlier revelatory first images of the entire Earth set against the darkness of space was humanity's collective realization of the fragile beauty of our home

planet, the *Pale Blue Dot* image revealed just how improbably alone and

³³ In reference to Michael Heizer's *Adjacent, Against, Upon*, 1977. The artwork juxtaposes three large granite slabs in different relationships to cast concrete forms. Source: <https://publicartarchive.org/art/Adjacent-Against-Upon/4f646967>

³⁴ Voyager 1 is a space probe launched by NASA in 1977. It is the most distant human-made object from Earth.

infinitesimal we are.³⁵ Having travelled now for almost fifty years, *Voyager 1* is well past the orbit of Pluto, soon to be the equivalent of one light-day away. Not a light-year, but the distance it takes light to travel in twenty-four hours; and *Voyager* is not even outside of our solar system yet.

Despite the on-going loss of true darkness in the night sky, as the stars are being obliterated by stray artificial light and increasing numbers of satellites, this is still a remarkable moment for observational astronomy. With each improvement in our ability to perceive further into space, deeper in time, and into the smallest units of matter that exist, we are filling in the last missing gaps to the most comprehensive and sophisticated cosmology ever conceived.

In his “future history” science fiction novel *Last and First Men* from 1930, Olaf Stapledon writes “...existence has ever been precarious. At any stage of [its] career [humanity] might have been exterminated by some slight alteration to [its] chemical environment, by a more than usually malignant microbe, by a radical change of climate, by the manifold effects of [its] own folly.” (236) “Or by some celestial event.” (Jóhannsson). All of this should point to the wonder of being alive on this impossibly alive planet right now, knowing what we know, understanding

³⁵ Though not the first, the *Blue Marble* photograph is probably the most famous, taken by an astronaut aboard the Apollo 17 spacecraft on its way to the moon in 1972.

something about what it all means, and recognizing how tenuous and essential we are despite the seeming insignificance of our place among the fields and stars.

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