

The Gedankenexperiments of Katie Paterson

by Mary Jane Jacob

To observe and then to know: that is the goal of science. So, too, with art. If in the former an event or a phenomenon observed – matter, energy, spacetime – depends on the use of instruments, then in the latter artists are the instruments, and through them we assume the position of the observer. Physicist Niels Bohr in the early twentieth century gave credence to the observer, and his “term ‘agencies of observation’ evokes his new understanding of the nature and role of agency in scientific processes.”¹ As time went on a common misconception emerged that the mind of a conscious observer has an effect on events in quantum processes. Yet in life, without consciousness we see nothing. The intertwined relation of the observer and the observed is integral to making meaning for ourselves in the world. And isn’t that the aim of knowledge after all?

With Katie Paterson we have a chance to be that conscious observer. She quantifies, measuring phenomena: *How many dead stars are there?* And she keeps going in spite of the scale of the task, trusting like the astronomer that cosmology is not beyond our grasp and that the measure of things need not be outside our universe but is contained within.

**A webcam
at the edge
of the expanding universe**

The infinite is finite,² whether we go as far out into space as we can manage or as far into ourselves as biology describes and the embodied mind can conceive. The Charles and Ray Eames studio pictured this back in 1977 with *Power of Ten*, using this simple but powerful mathematical multiplier as a visioning tool to suck us out of the force of gravity and into galaxies light years away, then pull us back to the level of a proton below the skin of a human hand only to find that there, in the quantum motion of

particles, there is “a vast inner space,” too.³ And here what might seem a conundrum is a key: the phenomena around us are at once phenomenological and phenomenal. The extraordinary exists in ordinary things all around us, everywhere, everyday.

**Enough forest
grown to print
a 1:1 map of the earth**

“Immensity is within ourselves,” Gaston Bachelard said. Receiving “the immensity of the world,” we transform it “into intensity of the intimate being.”⁴ The “precise example” of immensity that Bachelard offers is “the immensity of the forest” that produces “the always rather anxious impression of ‘going deeper and deeper’ into a limitless world.” No wonder the forest is a place Paterson returns to and, contemplating its immensity, creates art, for as Bachelard explains with images of immensity we “enter into a region of the purest sort of phenomenology – a phenomenology without phenomena...a phenomenology of immense would refer us directly to our imagining consciousness. In analyzing images of immensity, we should realize within ourselves the pure being of pure imagination. It then becomes clear that works of art are the *by-products* of this existentialism of the imagining being.”⁵

**A meteorite recast
and returned
to space**

Paterson probes the immensity within and without our being, interdependent phenomena that bring us from Earth to outer space and back again, then take us to the atomic level of our bodies and everything around us. *Campo del Cielo, Field of Sky* (2012–14) is an extreme project encompassing such a trajectory. A mold is made of a more than 4.5 billion-year-old meteorite that had arrived on Earth; it is melted away and recast into the image of its former self; then returned to space.

**A swimming pool
of water
from every river**

**A window pane
made of sand
from every desert**

**A cellar of salt
collected from
every sea**

**A pie chart
of every color
on earth**

But how to imagine and create an image of the immense and diverse, yet interconnected universe in which we live and of which we are a part? Scientific models are a way that has been around in one form or another for as long as humans have been trying to understand the world and the heavens. Searching for the means to visualize what we cannot see at one time or in one place, what is beyond the space and time we occupy at the moment, and what words cannot fully describe, we create models. Yet as informative or all encompassing as these renderings aspire to be, whether three-dimensional or graphic, they only tell a shadow of the story. We still have to imagine what balls or lines or numbers seek to convey. Our greater understanding of the universe would have never occurred had we not found other ways to imagine and represent it.

Katie Paterson wraps us into the ever-changing expansiveness of the universe, while she wraps her head around what constitutes a given phenomenon, making graspable what is beyond our reach. At times she has employed methods of encyclopedic categorization, but carries this tested methodology to unusual ends. Take *Totality*

(2016), in which nearly all the images of solar eclipses ever made on Earth are brought into the singular form of a spinning cosmic disco ball, what the artist calls “a circular mirror ball of circles through time and space.” Or consider *Hollow* (2016), where over 10,000 tree species are contained in one discreet volume. Like a Japanese Zen garden, this sculptural installation is a model of the world whose vastness is not so much reduced, abstracted, or imitated, as intensified by arriving at the essence. And like a Zen garden, it requires the dedicated, loving care of others who have built it by hand and will tend it into perpetuity. Yet unlike Zen gardens (and traditional works of art for that matter) that are intended to be seen from the outside, at the edge of an implied frame, with *Hollow* we are invited to enter into a microcosmic forest. And like these gardens and art at its best, this work encourages contemplation, its meanings catapulting us to worlds that are wider and more encompassing.

**A garden
of lost meteorites
fallen to the sea**

**A garden grown
with a spoonful of earth
from every planet**

Each of Katie Paterson’s works is a *Gedankenexperiment*.⁶ Each is a work of thought by which we come to know, a foray into the empirical world that seeks to aid us in knowing better, deeper, clearer. Each employs the proxy space that scientific experiments occupy as a stand-in for the actuality of a glacier, the desert, or the universe. While *Gedankenexperiments* originally came about as a theoretical exercise, now what seemed only imaginary centuries ago can be realized thanks to advanced technology. So for her work *Inside this desert lies the tiniest grain of sand* (2010) Paterson can have a grain of Saharan sand chiseled to 0.00005 mm so that she can place it back where she found it. She also draws upon mathematical models from theoretical physics and the observational tools of experimental physics at her disposal to conjure the nature of phenomena that make up our and other worlds.

**A set of sand pails
in the form
of world mountains**

Comparative analysis, longtime a favored methodology for *Gedankenexperiments*, has been used to tell the story of the measurable that exceeds normal sight. In one of history's seemingly simplest and yet most profound *Gedankenexperiments*, Galileo Galilei posited that objects of different masses fall at the same rate, such as when dropping two objects off the Leaning Tower of Pisa. Or take Carl Sagan, who brought popular interest to the study of the universe, making his point through comparison: "A handful of sand contains 10,000 grains, more than the number of stars we can see with a naked eye on a clear night."⁷ With *Sand Pail Mountains* (2016) Paterson models the relative mass of Earth's greatest heights, nesting each within the other in toy-like fashion but with precise accuracy.

Yet the relationships Paterson draws are not only measurable but also causal in offering explanations of the past, how things came to be in the present, and what patterns lie ahead in the future. Things are not as separate and static as they may seem. So her reinsertion of a Nano-grain in the Sahara Desert reminds us that mountains were once and will again be sand. This thought echoes an idea that spans the infinitesimal to the infinite, and is present everywhere. Paterson also reminds us, lest we forget in our human-centered world, we are but variations of particle patterns and always in motion.

Paterson employs ways of seeing that, while actual, depart from conventionally acknowledged. As someone with dyslexia, she has experienced the greater ease that comes with reading signs systems like Morse code. "I can read a score like a language," she has said.⁸ This ability is proving to be an asset for dyslexic scientists who are able to detect patterns within vast quantities of visual data, for example, black holes.⁹ So if, as cosmologist Max Tegmark states, "our most accurate description of our cosmic history is a mathematical description," does that mean that those who learn and perceive in other ways might more readily grasp certain phenomenon within the

cosmos?¹⁰ Another way of experiencing differently, hence knowing, comes with time-space synesthesia as units of time are perceived in spatial relation to the individual.¹¹ Paterson says: “I can’t work with ordinary calendars. To me days and months and years are circles within circles and going back in time is a kind of concertinaing of circles.” The artist is fond of referring to the form of the concertina. Like a fan, each of her projects opens and closes, expands to reveal more, contracts and condenses to be one whole; one holistic idea. Like the musical instrument from which it takes its name, the concertina’s folds produce more sound, work in concert with one another, and reverberate with a deeply resonant timbre. And because the parts of the concertina are fully bound to each other to become one instrument to produce sound, connectivity is intrinsic to its function.

In the task of looking differently, thinking differently, art is a tool to gain knowledge and understanding. Moreover, it is not just one way to know, but an especially insightful way. Perhaps this is felt by the scientists, technicians, and enthusiasts with whom Paterson collaborates and who, in doing so, shift what they do normally in their jobs to carry out the *Gedankenexperiments*. This practice began during her studies at University College London when she drifted away from the School of Fine Art and ended up in the adjacent Rock & Ice Physics Laboratory. The scientists, she says, were open to interacting with an artist. They were dealing with “ideas of the possible or impossible, and they didn’t question why an artist was there.” Curiosity connected them.

Later, in 2010, Paterson became artist-in-residence at the London Astrophysics Group in the College’s Department of Physics and Astronomy. She had met Professor Ofer Lahav, the Chair of Astronomy, the year earlier; he has been pivotal in creating a map of all the known and recorded dead stars for her wall-size, laser-etched aluminum panel, thusly called, *All the Dead Stars* (2009). From this experiment they “concocted,” as the artist puts it, the idea of an artist-in-residency post in his department, and Paterson secured a grant to make that idea real. Immersed in that environment and the concepts explored in lectures, she absorbed what was around her. And she was attracted by the energy of people talking in formulas: “Their words sounded like

poetry.”

Perhaps most of all, Paterson found satisfaction in searching to understand the unknown through a field that is at once on the edge of abstract knowledge yet totally relevant to our lives as humans. This world of extraordinary reality – matter, phenomena, vastness existing within a continuum, all contained within a web – stretched the imagination so far that one had to visualize it in the mind’s eye.

Furthermore, she found their field was a vast web, too, each research unit a cell within a larger body, each organism needing to coordinate with the other. It is a field where “people work together, collaborate, sharing knowledge, feeding from each other’s knowledge.” The question of authorship fell away as they became a community of makers.

The collaborations that have ensued and which are Paterson’s *matière*, all have taken on this sense of a shared space among dedicated and invested persons: scientists, technicians, enthusiasts, and the artist. She puts it this way: “I am asking others to access all they know.” This opens up their processes to thinking differently, using their knowledge differently, enacting who they are differently. Working on her projects unlocks for others their own questions, and in the process, their knowledge is validated and valued.

A live phone line to a distant glacier

One such collaborator is Ken Doyle, an experimental engineer-scientist who had worked with NASA. He was the first to jump in to a productive art-science dialogue with Paterson, creating the underwater microphones used inside the glacier to realize *Vatnajökull (the sound of)* (2007–8). They continue to collaborate.

Working together can be personally fulfilling when each party finds clarity of meaning in the process. Likewise it is gratifying to see that experience happen within others who

are involved. Paterson senses this within those with whom she works. And beyond this, she also sees that such collaborations are a humanizing process. Built on trust, there is a social aspect that makes it more than an agreement, a contract, or a task. Meeting and working with others “extends the circles outward,” she says. There is an energetic connection. “The relationship makes the art work, and the work would lose something crucial without it.” These collaborative encounters feed those who join the artist and lead to unexpected outcomes as the circles continue to unfold.¹² Thus, Principle Researcher Dr. Dieter Lang was able to find a way to measure moonlight, a task he would never have been given at the multinational lighting and optics manufacturer OSRAM where he is employed, to make with Paterson *Light Bulb to Simulate Moonlight* (2008).¹³

The creative potential of everyone, not just those identified as artists – the idea that each person has the creative capacity to cultivate his or her own life – was the foundation of the philosophy of American social and educational reformer John Dewey. Decades before Joseph Beuys’s well-known adage, Dewey articulated the terms by which each person was an artist. To him, anyone who works with conscious intent and care undertakes what they do as an art; as they develop this into their life’s work, they live their practice.¹⁴ This sense of invested care goes to the heart of the experience Paterson’s projects afford to those with whom she works. They meet with shared intention, and it is a bond, indeed. They learn and then return to what they do changed, resuming what they do renewed.

This touches on another essential point Dewey made. Creating – not just being creative as it has come to mean within art circles, but giving yourself fully in a creative act – is a growing process. With growth we have a feeling of aliveness. This, according to Dewey, is what an aesthetic experience is. We feel a sense of vitality with the growth that comes from aesthetic experience. And this means not just looking at art, but – as with Katie Paterson and her collaborators – by participating and doing what we do with care. For as Dewey said: “The process is art and its product, no matter at what stage it be taken, is a work of art.”¹⁵

**Music bounced
from the moon's surface
missing notes left in space**

**Every model
of the moon
released into space**

**A circular lamp
simulating
the moon's halo**

Katie Paterson's art is a poetic practice. "I'm obsessed with the Moon," she says. The Moon rules us, determines the months of our calendar, pulls the tides, and at times it shuts out our sun. Unmistakably present over all else in the sky, it is our connecting point to what lies beyond. One of Paterson's first works was *Earth-Moon-Earth (Moonlight Sonata Reflected from the Surface of the Moon)* (2007). Recently she worked with Japanese Moon-bouncers, amateur radio operators who relay communications to the Moon, to send silence to the Moon. There is faith in such acts that are beyond human time and place yet grounded in fact.

As we struggle to see and know better, language has its limits. The words that describe the very real passage of mountains to and from sand or the ontological transformation of a meteorite can only stand in for what occurs to matter over eons. Even phrases that are at once actual and poetic, such as the funerary "earth to earth, ashes to ashes, dust to dust," fade in and out of meaning as they become commonplace. Language is a representational abstraction, so it falls short of fully capturing reality beyond our own moment in time and space. And when that happens, the sense of the real becomes unreal.¹⁶

In such situations, the koan may be the most succinct and truthful form of expression: *meteorites are meteorites*, to paraphrase ninth-century Chinese Chan master Qingyuan Weixin, who laid out three stages of understanding the universe. Poet Alan Watts

translated him this way:

Before I had studied Zen for thirty years, I saw mountains as mountains, and waters as waters. When I arrived at a more intimate knowledge, I came to the point where I saw that mountains are not mountains, and waters are not waters. But now that I have got its very substance I am at rest. For it's just that I see mountains once again as mountains, and waters once again as waters.¹⁷

Langjökull, Snæfellsjökull, Solheimajökull (2007) are records made of ice from three Icelandic glaciers that were played until they melted. Are glaciers glaciers? While circular and self evident in meaning, Paterson's poetic projects offer notions of reality that are at once present and illusive. So when presenting her work at a critique in her adopted home of the Rock & Ice Physics Laboratory, she recalls a fellow student bemoaning: "Is this it?" Yet maybe art goes further because it exists in another reality. Perhaps those who have supported Paterson's envisioning by working with her sense this, because they somehow feel, too, that poetry is lacking in the laboratory.

**An ocean wave
stored in a deep freezer
returned in one million years**

In her art Paterson seeks to visualize the perfect puzzle that is the universe with its visual patterns and mathematical synchronicities. Furthermore, each work does not exist in isolation but must be taken as a whole. And as her oeuvre grows, it becomes clear that all her work is one grand experiment, one unfolding concertina, both *Gedankenexperiment* and *Gesamtkunstwerk*, all connected.

**The topography
of all planets
merged into one**

Connectivity for Bohr was the essential lesson of quantum mechanics: "we are part of

the nature that we seek to understand.” In other words, by his account, the key point is “quantum wholeness.”¹⁸ No longer are objects and beings discreet and disconnected from each other or from the world on Earth and beyond, without effect on each other. Contemporaneously to Bohr’s explorations Dewey addressed his friend Albert Einstein’s use of interconnection saying that:

The conclusion of Einstein, in eliminating absolute space, time and motion as physical existences, does away with doctrine that statements on space, time and motion as physical existence... [and] compels the substitution of the notion that they designate *relations of events*. As such relations, they secure... the possibility of linking together objects viewed as events in a general system of linkage and translation. They are the means of correlating observations made at different times and place... they do the business that all thinking and objects of thought have to effect: they connect, through relevant operations, the discontinuities of individualized operations and experiences into continuity with one another.¹⁹

Interdependence is what Buddhists call it. It is represented by the web-like model Indra’s Net in which any pearl touched reverberates throughout. It speaks of our interconnectedness and the interdependency of all things in the universe. Its origin goes like this:

When Indra fashioned the world, he made it as a web, and at every knot in the web is tied a pearl. Everything that exists, or has ever existed, every idea that can be thought about, every datum that is true — every dharma, in the language of Indian philosophy — is a pearl in Indra’s net. Not only is every pearl tied to every other pearl by virtue of the web on which they hang, but on the surface of every pearl is reflected every other jewel on the net. Everything that exists in Indra’s web implies all else that exists.²⁰

Beginning with observation, Paterson stays true to the scientific method of observation: we observe our environment to understand it. But she also adds her experience of it, perceiving as a mindful body, as an embodied mind. Then the world is

pulled apart, seen in parts and in greater wholes, to find out how one thing is related to the other. From phenomena observed, ideas catapult. The connections inherent in her work, that imply actions and reactions, affect others, too, as they embody the work. Raphaël Rivoire, an art historian and researcher, wrote to the artist of the experience of coming upon her exhibition 'Le Champ du Ciel, Field of Sky' at the Frac Franche-Comté, Besançon, France: "I see so much more than art...with all the mystery of the universe. All the works are so [ambiguous], mostly, between light and shadows, presence and disappearance, making and unlimited finishing."²¹ There was a sense of wholeness to these works as they exist in space and over time, an open-ended system that requires time to complete.

When one observes deeply, then the identities of artist, poet, scientist, philosopher, and even viewer meld into the experience of a lived practice. Meditation on the nature of time and space, for Paterson, happens for those able to look through the Keck telescopes, into deep space and back in time as they see the 13.2 billion-year-old light of the oldest stars. Working with astronomers at the W. M. Keck Observatory,²² she broadcast *Ancient Darkness TV* (2009), later undertaking the lifelong projects *History of Darkness* (2010–) and *The Dying Star Letters* (2011–). The energy within black holes, into which no light can penetrate, became the ultimate endpoint for the journey in *Candle (from Earth into a Black Hole)* (2015) before the flame goes out.

**A candle scented
as if journeying
from planet to planet**

**A candle
burning the length
of a neptunian night**

**A candle layered
with the sky's colours
from dusk til dawn**

In mid-2005 Paterson used the time between her undergraduate and graduate studies to undergo a self-experiment: she became the subject of her experience of geological and cosmic phenomena as evidenced in the landscape of Iceland. It was a simple enough undertaking – contracting herself out as a chambermaid in a hotel for the long summer, an activity not too demanding on her hours or her brain, so that there was time to observe and to think. Cleaning rooms, she said, became like cleaning her mind. The repetition of the activity established a rhythmic order to the day; it was a service like that the monk performs in the temple grounds as a constructive complement to the spiritual work of prayer.

Being in Iceland was an experiential way of coming to know, to know this place through its glaciers and geysers, to feeling at once on this planet and on the Moon, and to experience the sense of spacetime embedded there. Being in Iceland, with time to have a mindful experience, gave her confidence to look at the evolution of life back to the beginning of the Earth. Eight years later this quest took the form of *Fossil Necklace* (2013). Having collected physical evidence of all the major events in geological history, and having had these bits of time fashioned into spherical specimens, they were strung together as beads. It is as if we could see all time at once, and hold the world in our hand (or as in the case of the Eames film, be both in outer space and underneath the skin of the hand at once). It is a circular timeline, a cycle in planetary time. It tells a story of connectedness and change. Paterson is driven to conceive and execute such cosmographies of the Earth and universe.

**A ring
containing every element
in the universe**

To see deeply is to see widely. The questions, along with our perceptions, change when we widen the frame of observation and consider the universe. And with that we are transported from mere observation to embodied experience. Becoming conscious at such a level of heightened awareness, as Dewey said, “takes up into itself meanings

covering stretches of existence wrought into consistency.” But this does not happen quickly. It is the result of a “long continued endeavor; of patient and indefatigable search and test.” The idea is, in short, art and a work of art. “As a work of art, it directly liberates subsequent action and makes it more fruitful in the creation of more meanings and more perceptions.”²³ For Paterson, her time in Iceland was an inspiration that further opened up a path.

What are the conditions required to pursue a deep and insightful path? Like in the universe, it is an issue of time and space. With time and space, universes open up. But it takes time to bring to consciousness one’s imaginings and intuitions, to draw out what already exists within, as well as to understand the import of, for instance for Paterson, what science teaches. Time allows for discovery that can lead to the kind of ideas Dewey called art. Opening the mind to see more clearly, to see something new or see anew, is to engage the question with your whole being. This, too, is the space of the Buddhist open or beginner’s mind where insights occur as we see anew. When we finally see – have that ah-ha moment, experience a revelation – we say “we see the light.” Clear understanding is light; clarity is insight. So it is no wonder that delving into outer and inner space, Katie Paterson uses light as a subject and medium.

**Festoon lights
matching the brightness
of a constellation of stars**

**Pier lights flickering
in time with
lightning storms**

**The speed of light
slowed
to absolute stillness**

Creative time started for Paterson as a child through a nearly daily practice of daydreaming in solitude. For Bachelard, what he calls intimate immensity starts at such moments: “As soon as we become motionless, we are elsewhere; we are dreaming in a world that is immense.” And from such dreaming, “the real product is consciousness of enlargement.” For him, through immensity “two kinds of space – the space of intimacy and world space – blend. When human solitude deepens, then the two immensities touch and become identical.”²⁴ This not only opens up space to imagine but to imagine space. As this philosopher says, “the daydream transports the dreamer outside the immediate world to a world that bears the mark of infinity.” In fact, he adds, “one might say that daydream is original contemplation.”²⁵ Thus, rather than subjecting daydreaming to the pedagogical disciplinarian’s scrutiny as lack of focus, the mental gymnastics that can occur in daydreaming follow deeper levels of consciousness. This meditative time, as in the case of this artist, can be a productive creative process.

Katie Paterson has kept a log to see just where time goes: how many hours a day are devoted to the administrative tasks of being an artist and how many to creative tasks. Now creative time is not just a matter of time management, and this could be a depressing or anxiety-producing exercise for some. But for Paterson it is another way to look holistically, guided by a desire to live holistically. Maybe if we can compile the data on how we live the day, we can reformulate it into the lived practice we seek, not be subject to serendipity but live intentionally, and cultivate patterns by which creativity can come about with greater frequency – because creative time opens up time in ways that no clock can record.

Then the space required for a creative path is empty space. Buddhists recognize the state of emptiness as the open space where all potentiality resides. It is an in-between space where possibilities remain open. How do we structure or have open space? It is in this space where Dewey thought artists and scientists do their real work and where real discovery happens. It is creative space. And he said: “the artist cares in a peculiar way for this phase of experience...does not shun moments of resistance and tension” but “rather cultivates them, not for their own sake but because of their potentialities, bringing to living consciousness an experience that is unified and total.”²⁶ So open

space is also the space of consciousness.

Thus, coming to consciousness occurs in the in-between space and time of the creative process. Tegmark, writing of the work of neuroscientist and psychiatrist Giulio Tononi put it this way: “A conscious system must thus strike a balance between too little integration (such as a liquid with atoms moving fairly independently) and too much integration (such as a solid). This suggests that consciousness is maximised near a phase transition between less- and more-ordered states...” For Tononi consciousness occurs in certain physical systems; it is not a matter of the non-physical soul. Rather consciousness “depends on the complex patterns into which atoms are arranged”; it “is an ‘emergent phenomena’ whose complex behaviour emerges from many simple interactions,” as Tegmark puts it. Or more simply: “consciousness is the way information feels when processed in certain ways.”²⁷

Furthermore, Tegmark points out that Tononi has made “the compelling argument that for an information processing system to be conscious, its information must be integrated into a unified whole.” Thus, “it must be impossible to decompose the system into nearly independent parts – otherwise these parts would feel like two separate conscious entities.”²⁷ Is this the wholeness Dewey cites as the quality of an idea arrived at after “patient and indefatigable search and test” and which “is, in short, art and a work of art”? Is this the experience he says is “unified and total”? For Dewey, such wholeness characterizes all true aesthetic experiences. Is this why Paterson strives for wholeness in her art, using all the materiality that exists to make her work?

**A pillow filled
with fragments
of deep space**

Consciousness is also a matter of spacetime as Andy Clark, who researches the philosophy of the mind, points out. He cites the Optical Acceleration Cancellation (OAC) in the example of the outfielder who has to run to catch a fly ball, observing that success “involves running in a way that seems to keep the ball moving at a constant

speed through the visual field...OAC is a strategy that works by means of moment-by-moment self-corrections that, crucially, involve the agent's own movements." Thus, the experience must be embodied.²⁹ So it is no wonder that Paterson must travel the Earth's circumference, making it is a part of her practice and her path.

**A map
of galaxies
still to come**

How can we cultivate consciousness and stay attuned? To Dewey aesthetic experience was a tuning fork. Encounters with art, nature, or felt moments – making, observing, being with others, living – can connect us to something greater and give insight. To Paterson, it is to have aesthetic experiences in the world or in the mind (and Dewey also believed thinking is an art process) and from these to make art. Yet finding the time and space or spacetime to see deeply remains a challenge. One bit of advice is to take up a daily practice: a continuous training in self-rhythm by which to find a balance between poles which allows flow to happen. An ongoing practice sustains being in balance. One has to come to know this by experience, but when it is found, it offers possibility and enables the capacity to act.

Paterson asks: "Where do we feel our orbit?" Consistent and productive tasks are one way to follow a daily rhythm. This was the pattern she set up in Iceland; her concentration was further aided by being away from her usual routine with its demands and diversions. Paterson tried tending a one-meter patch of moss in a Zen garden. Previously she had already begun sitting, understanding intuitively that practicing Zazen was a means establishing a rhythm and freeing the mind. She tried other ways, too: fixing her gaze on an object for one minute to see what might come from looking intently to develop the capacity to find significance where it might otherwise be missed. But to do this as a way of life – not just an experimental exercise, an occasional retreat, or with a residency award – is among this artist's aims: to become attuned to the seasons, access the landscape, follow the rhythms of her orbit, to have a life practice.

A daily practice is nourishing. That is its purpose. Its goal is to be generative, that is, what Dewey called simply, growth, and he pointed to a biological necessity that without growth and renewing, any living thing will stagnate or die. Growth is not an option in life; it sustains life. So he reasoned that if we cultivate ourselves, we will experience a growth in consciousness. Consciousness, he said, makes us feel alive. “When ideas are not released,” Paterson adds, “I don’t feel good. Migraines are a physical manifestation of not being creative enough,” of being out of balance with the universe. But when ideas come naturally, flow quickly, it feels freeing, and with this freedom comes the feeling of vitality. “I feel fully alive when making the most of my whole mind and body, accessing all my capabilities, seeing things more clearly. This is creativity – what it is to create – and grow.”

Clarity, creativity, and freedom: that is Paterson’s formula for a healthy way of being. Freedom to arrive at a point of clarity by which creativity can arise and be acted upon: this is not just *her* remedy, but one multiplied through the endless examples of others over time, for it is, as Dewey intuited and reasoned, a fully human way of being. While seeing more clearly, having insight, discovering an idea: “Then a nanosecond can feel like five years,” the artist says.

**A projection of slides
containing
the wind**

Paterson’s *Book of Ideas* is a repository of daydreams. This compendium (from which entries are cited from time-to-time throughout this essay) contains ideas that might be realized or never concretized.³⁰ At its best perhaps the goal should be to forever remain a beta-copy, always to be added to, to stay a book never finished.

**A library of books
made from the earth’s
oldest forest**

**Every page
in a book
made from a different tree**

**A forest
of unread books
growing over 100 years**

Bachelard wrote: “The word vast, then, is a vocable of breath. It is placed on our breathing, which must be slow and calm... It expresses a vital, intimate conviction. It transmits to our ears the echo of the secret recesses of our being... With it, we take infinity into our lungs, and through it, we breathe cosmically, far from human anguish.” And he suggests that patients who suffer from anguish should pronounce vast. “For it is a word that brings calm and unity; it opens up unlimited space. It also teaches us to breathe with the air that rests on the horizon, far from the walls of the chimerical prisons that are the cause of our anguish.”³¹

I have experienced “breathing as a timekeeper of life,” said Paterson. The awareness sought through Zen – being observant and respectful of each small everyday thing – is brought to bear when we sense vitality and when we feel life slipping away. She describes the experience of being alive whilst being with others in dying as “hyper-experiential.” Of this sensory experience she cites by way of example the cemetery in Koyasan, Japan: “There is a vibrancy there. The energy is managed, like a garden and it is still growing. It is a visualization of open heart, with light, energy, and compassion rippling out in spheres back in time.”

“I treat my work like it was alive, a living being, sentient in some regard,” Paterson shared. “Therefore if alive, I must treat it with respect, care and compassion, for it to live and grow. This requires cultivation. I feel like I’m deceiving my work if it’s made carelessly, overlooked, rushed. With *Future Library* (2014–2114), it more literally does live and grow; it needs to be tended with compassion over the years to come.” And so it will be as the manuscripts of 100 authors collected over 100 years await the maturity of

a specially-planted forest in Oslo so it can be pulped and the books can be made. The artist adds: “Only compassion, hope, and trust will allow it to be fully realized in 100 years.”

By contrast, *All Dead Stars* (2009) was a physical and real example of the transformation of matter and that stars, like all things, are connected. Thus, they are part of us. It takes compassion to inhabit such understandings. Paterson gives them form, creating ambitious projects. But “I need to sustain strong willpower to see many of my works through,” she adds. “I must not only have belief but also compassion for the work: I must feel for it. I must always have a belief from the outset, that the work deserves to be brought into being – and I distinguish this belief from a value judgment on the work.”

Hers is an embodied practice and it flows through all her work. Katie Paterson’s intent is to *be* the work. In following that path she helps us understand there are many and wider circles of existence. Her social practice is the compassionate life of society. Dewey said the consciousness gained through art enables us to see the consequences of our actions on the planet. Paterson contemplates: “We can look through a telescope to the edge of the universe, but then we can’t live harmoniously on earth.” What if there was:

**A reset button
for the universe
pressed only once**

Would it be a more compassionate world the next time?

1. Karen Barad, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (Durham, North Carolina and London: Duke University Press, 2007): p. 130.

2. Max Tegmark, *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality* (New York: Alfred A. Knopf, 2014): pp. 316–7. Tegmark discusses the problems of measuring, questioning: “So why are today’s physicists and mathematicians so enamored with infinity that it’s almost never questioned? Basically, because infinity is an extremely convenient approximation, and we haven’t discovered good alternatives.”

3. *Powers of Ten: A film Dealing with the Relative Size of Things in the Universe and the Effect of Adding Another Zero*. Film. Directed by Charles Eames and Ray Eames and narrated by Philip Morrison, 1977.

4. Gaston Bachelard, *The Poetics of Space* (Boston: Beacon Press, [1958] 1994): 184, p. 193.

5. Ibid: p. 184.

6. Barad: pp. 287–8. “Gedanken (/ g*-d a h n ‘l<n /adj.) ‘Gedanken’ is a German word for ‘thought.’ A thought experiment is one you carry out in your head. In physics, the term ‘gedankenexperiment’ is used to refer to an experiment that is impractical to carry out, but useful to consider because it can be reasoned about theoretically. – *The Jargon Dictionary*. Gedanken experiment: An experiment carried out only in imagination or thought; an appeal to imagined experience; a thought experiment. – *Oxford English Dictionary*. As Barad continues, Einstein and Bohr “made famous and extensive use of gedanken experiments to challenge each other’s understanding of quantum phenomena.”

7. Carl Sagan, *Cosmos* (New York: Ballantine Books, 2013): p. 207.

8. All quotations of Katie Paterson are taken from an interview with the artist by the author February 3–5, 2016 and subsequent email correspondence.

9. See Annie Murphy Paul, “The Upside of Dyslexia,” *The New York Times* (February 4, 2012) and Schneps, Matthew H., Brockmole, J. R., Rose, L. T., Pomplun, M., Sonnert, G., and Greenhill, L. J., “Dyslexia Linked to Visual Strengths Useful in Astronomy,” *Bulletin of the American Astronomical Society*, vol. 43 (2011).

10. Tegmark: p. 271.

11. Neurophilosophy: The cognitive benefits of time-space synaesthesia,
<http://scienceblogs.com/neurophilosophy/2009/11/19/the-cognitive-benefits-of-time-space-synaesthesia/>

12. These collaborative encounters Thomas Hirschhorn calls “unshared authorship.” Confronted, as artists like Hirschhorn are for their work with people in social contexts, the question of who is the author is a recurring irritant. Hirschhorn feels the model of shared authorship does not apply because it always means dividing up just 100%. And for some critics like Claire Bishop, it is a miserly concept indeed, fraught with artists’ abuse of power and relationships of mistrust. So Hirschhorn invented the term unshared authorship to describe what he sees as a dynamic model with a multiplier effect that can happen when each person takes responsibility. Then the final sum of

the equation is not fixed. Thomas Hirschhorn in conversation with Yasmil Raymond, University of Chicago October 27, 2016. Also See Claire Bishop, *Artificial Hells: Participatory Art and the Politics of Spectatorship* (London: Verso, 2012).

13. Lang's research on lighting for prisons and schools put his heightened awareness of the dynamics of light on individuals to practical and beneficial use.

14. John Dewey, *Art as Experience* (New York: Penguin, [1934] 2005): p. 4.

15. John Dewey, *Experience and Nature* (New York: W. W. Norton, 1925), p. 373.

16. Barad: p. 125. This author cites, "Aage Petersen, in an article entitled 'The Philosophy of Niels Bohr,' writes: Traditional philosophy has accustomed us to regard language as something secondary, and reality as something primary. Bohr considered this attitude toward the relation between language and reality inappropriate. When one said to him that it cannot be language which is fundamental, but that it must be reality which, so to speak, lies beneath language, and of which language is a picture, he would reply "We are suspended in language in such a way that we cannot say what is up and what is down. The word 'reality' is also a word, a word which we must learn to use correctly."

17. Alan Watts, *The Way of Zen* (New York, Pantheon Books, 1951): p. 126.

18. Barad: pp. 247, 118–9.

19. *John Dewey: The Later Works, 1925–1953, Volume 4: 1929 The Quest for Certainty*. Edited by Jo Ann Boydston. (Carbondale and Edwardsville, Illinois: Southern Illinois University, [1984] 2008): p. 117.

20. Timothy Brook, *Vermeer's Hat: The Seventeenth Century and the Dawn of the Global World* (London: Profile Books, 2008): p. 22.

21. Email exchange with the artist dated October 18, 2015, regarding Katie Paterson's solo exhibition at Frac Franche Comté, Besançon, France, from June 6 to 18 October 2015.

22. Paterson undertook a research trip to the Observatory in 2009 with another key collaborator, Prof. Richard Ellis, California Institute of Technology, USA.

23. Dewey, *Experience and Nature*: p. 371.

24. Bachelard: pp. 184, 203.

25. *Ibid*: pp. 183–4.

26. John Dewey, *Art as Experience* (New York: Penguin, [1934] 2005): p. 14.

27. Max Tegmark, "Solid. Liquid. Consciousness," *New Scientist*, April 12, 2014.

28. Ibid.

29. Andy Clark, "Embodied Prediction," in T. Metzinger and J. M. Windt, editors, *Open Mind: 7(T)* (Frankfurt am Main: Mind Group, 2015): p. 12. As Clark puts it: "Instead of using sensing to get enough information inside, past the visual bottleneck, so as to allow the reasoning system to 'throw away the world' and solve the problem wholly internally, such strategies use the sensor as an open conduit allowing environmental magnitudes to exert a constant influence on behavior."

30. Katie Paterson's forthcoming *Book of Ideas* will be published in 2017.

31. Bachelard: pp. 196–7.