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***One Candle, One Life, One Planet: The Jewish Festival of Hanukkah and the Deep Meaning of Small Differences,* by Robert Pollack¹**

How do we measure the importance of an event, the meaning of the difference it makes? As a scientist my answer is simple: the bigger the difference, the more important the event. By this measure the most important event by far must have been the beginning of the world of Nature of which we are a current part.

The world of Nature began about 13.7 billion years ago, in an instant at which both time and space began. As time has gone forward, the universe has expanded from that dimensionless point until today it is of unknown volume. At the same time as it has expanded, the material within space has been gathered into clumps, and clumps of clumps, by the force of gravity. Today our Sun is one of one hundred billion suns in the clump we call the Milky Way or, from the Greek for “milk,” our galaxy.

We do not even know how many suns there are. Light itself sets a cap on what we may know of the universe. A light-year is the distance light travels in a year, traveling at about 300,000 kilometers per second. Because the universe began 13.7 billion years ago, the part of it that we can know is a sphere that is 13.7 billion light-years in radius in all directions from us. Space may go on in all directions beyond this radius, but since nothing in nature travels faster than light, no information from beyond that radius can have reached us in the time since the universe began.

The lights of nature that we can and now do know, therefore, include not only our sun, but also the hundred billion suns of our galaxy, and a similar number of similar suns in each of about a hundred billion other galaxies in the observable universe, and beyond the limits set by the speed of light on what we may know, we have no reason to exclude as much or more of light from stars invisible to us, as well.

This quantitative trivialization of our own sun’s significance within the world of Nature, however unexpected, is only its most local aspect. Gravity is not strong enough to account for the clumping that has occurred, unless the universe is filled with a kind of matter that contributes its mass to gravity but that does not interact at all with the energy and atoms we are made of; we call this material dark matter, and there is much more of it in the universe than there is of the stuff we are made of.

That is not even a complete picture: the universe is also expanding too fast for it to have been flung out by an initial push. We call the energy that causes the universe to expand ever faster “dark energy.” The entire Universe we can know, the material and forces that we can detect and experience, are only a small minority of the material and forces that permeate the universe.

But what meaning is there to our knowledge and its limitations? Do any of us live as if the Sun were no different from, no more important than, any of those other stars, seen or not seen? Certainly not, because the Sun's significance lies in it being the source of light for us. The meaning we give to its light is not measured by its importance to the universe -- where it makes no difference at all -- but to us, where it is absolutely essential.

This odd human capacity for finding meaning is not found in nature except through our own choices. Where did it come from? About 4 billion years ago, which would have been between two-thirds and three-quarters of the time that time has been, the atoms and forces of the universe we are part of came together in the form of an assembly of atoms – a molecule – with the curious capacity to form copies of itself.

More curious still, that molecule, DNA, also had the capacity to encode information. Most curious of all, some of that information served the DNA encoding it in the business of the making of copies of itself. From that feedback loop in nature all life has emerged, each form or species another experiment by DNA at encoding a new and different set of information, but always one that works to allow its survival through time, despite constantly changing circumstances.

The experiment of our species' DNA is only a few hundred -thousand years old. The last ancestor of our species and another living species – the chimp – died off around 7 million years ago. Since then the DNA changes that have been fixed in our lineage include ones that allow for an opposing thumb, a linguistically skilled larynx, and an unusually slowly maturing brain. Our brains mature so slowly that we need years before we are able to fend for ourselves. Our nearest relatives get there in weeks. What advantage is there to such slowness? It adds to all the benefits of social life one distinctive novelty: that initial giving of meaning to nature, which we experience as the giving of meaning to ourselves, that is, self-awareness.

By the time a baby is born, its DNA has encoded a brain full of structures, some encoded and some self-organized, all poised to become the home of a mind, but whose billions of neurons are not yet connected in a stable way. Our brains respond to sensations and to human interaction from birth. From those responses another feedback loop – this one of mind and not of matter – yields a set of stable neural networks we each experience at the end of our long infancy as the emergence of a very young but mindful person, with our own self-awareness.

Our brains do not contain these minds at birth; a mind emerges through weeks, months and years of interaction with some small number of other members of the species, usually but not necessarily our biological parents. For people in this role, the newborn must be of such deep meaning that he or she is fed and cared for despite being wholly without any utility to anyone as measured by their own immediate survival. Our version of DNA does not encode a thought, but it does encode this path to mindfulness

and meaning, through a survival strategy that depends on a novel human capacity for sharing -- interdependence -- to get us through a uniquely extended period of dependency.

We need love and are capable of giving love, both without measure; and from those inherited, inborn capacities emerges a human being with the sense that some acts are right and others wrong. This has been true for every human in all generations. It is equally true that this DNA-encoded strategy of survival through interdependence leaves us at risk of becoming an adult who chooses to live in a world of imagined, total independence.

In the end, whether one takes that path or whether one holds on to the experience of interdependency to become an adult who chooses to share in an interdependent way throughout a lifetime, we all have some sense of right and wrong linked to the biological necessity of freely-given love in each of our pasts. If we do not know it earlier, we learn it when we return to a state of total dependency at life's end.

The authentic religious choice is always to insist that we not ignore the wrongness of an act even though right and wrong are not among the facts of nature as understood through science. That may be a surprising fact, but it is so: science itself operates by a very clear set of boundaries of right and wrong in experimental protocol, but the facts of nature it uncovers do not contain any evidence for the existence of those notions of right and wrong, outside of the mental worlds of human beings.

In particular, it means that we may not excuse wrong acts by a claim that they serve the practical, rational, utilitarian "greater good for the greater number." The non-violent students in Cairo who called upon the life of Dr. Martin Luther King as they stood their ground in Tahrir Square knew this, and we do too, from the ancient Jewish Festival of Passover. Under the Pharaohs, there is no doubt that the greater happiness of the greater number in Ancient Egypt was dependent upon a small number of troublesome Hebrew slaves to do the dirty work, even of making bricks without straw. But slavery, we know, is wholly without love, and so always wrong.

This sense of right and wrong is quite specifically human, and in that sense it is from nature, but not of nature. Indeed, the religious component of the acknowledgment of the existence of right and wrong as meaningful is the parallel acknowledgment that this is so despite the absence of these categories in the world of Nature. In the Jewish tradition, for example, this second acknowledgment takes the form of prayers that give thanks for this very world, though it has no intrinsic meaning of right and wrong within it. As Rabbi Adin Steinsaltz, whose works have been noted in this Journal, said once to me in a conversation about evolution, "The Holy One says to the angels, 'Make for Me a creature who can *decide* to say Thank You. I do not care how.'"

Just as our Sun has an importance to us beyond its place in Nature, the biological necessity of freely given love may also give meaning to other otherwise meaningless

events of Nature, informing and determining their relative significance to us as well. I work in three worlds of the mind, and would like to offer an example from each of how small differences can provide deep meanings that lead to novel choices: from my Jewish life, there is the 2200-year-old Festival of Hanukkah; from my earlier career as a biomedical scientist, my collaborative work in the new field of palliative medicine; and from my current life as a teacher in the Earth Institute, the struggle to find a language that would enable each of us to think as if we were no more nor less than one of seven billion members of one unsustainably successful species.

Hanukkah

We live today in a Global Village, sharing increasing digital connectivity and cultural homogeneity, with English as its first language and the United States, for better or worse, as its capital. The United States began only 235 years ago, with the 1776 Declaration of Independence. About 2400 years ago an earlier global cultural hegemony emerged with similar rapidity, as a result of the astonishing military success of Alexander the Great.

The Hellenistic Empire founded in 332 BCE by his conquests incorporated the Macedonian, Seleucid, Persian, Judean, and Egyptian empires under one language and culture: Hellenism. Rome displaced the Hellenistic Empire after only a few hundred years, but for that time, Judea was in a state of divided loyalty and self-identity, even in the presence of the Second Temple in Jerusalem. Jews who identified with the Greek philosophical roots of Hellenism or with its great power were willing to change their own observances accordingly, while Jews who held to the obligation of Temple sacrifices to be made to an ineffable Presence were in a state of simmering rebellion.

The 167 BCE rebellion of Judah the Maccabee, son of Mattathias the Priest – who declared a revolt when he refused to sacrifice pigs to Zeus in the Temple in Jerusalem – succeeded well enough that Judea remained independent of the Hellenistic Empire until 63 BCE, when the Roman general Pompey conquered Judea and appointed his own High Priest. A Jewish revolt against the rule of Roman appointees led to a Roman response that included the destruction of the Temple and the fall of the Zealots at Masada in 73 CE.

An eight-day festival of Light and Dedication [Hebrew: Hanukkah] of the Temple was first celebrated in the winter of 164 BCE, about a little less than 2200 years ago. It has been celebrated by Jews everywhere, ever since. The festival is marked by the lighting of a candle each night which is then used to light first one, then two, then eventually eight candles; one more each night for eight days.

Hanukkah is celebrated each year in the month of least light and longest darkness, just at the end of the waning of the moon, as ever more darkness surrounds us. Though the narrative of the festival is miraculous – one small, sealed bottle of sacred

olive oil was all that was found, but it lasted a full eight days until more oil could be sanctified, so that the light did not go out – for our purpose it is most significant that the tradition asks that we light one more candle each night, not one fewer. So, the lights of Hanukkah, like the standing wave of river-water in Robert Frost’s “West-Running Brook,”² push back against the flow of nature. They are brighter every night even as each night gets darker sooner and even as the oil they represent was running down.

These lights are a hope, a prayer, and an offering of light, in the expectation of light coming back to us. And every Hanukkah so far, light has come back, first with the dawn, then with the waxing of the new moon, then with the longer days of spring. What then is the larger meaning of the choice to light first one candle, then two, and so forth? It cannot be the longer days and shorter nights of spring each year, because those require nothing more than the materials of the universe and gravity, one of the forces that bind them together.

In all cases and for all parts of nature, meanings are not there, except when we find them there. To find a meaning in an aspect of nature is to be a human being; the discovery may be in one’s head, but it is no less a part of nature for that. The days come back in their full length after every new moon and after every winter solstice, merely as one of the consequences of being on a planet that tilts on its axis of rotation as its moon rotates around it, and as both planet and moon travel in an annual ellipse around our sun. And yet the candles of Hanukkah have an intrinsic weight and significance that outshines all those ten trillion billion suns, because, uniquely, they mean renewal when all seems lost.

Palliative care

My next example goes to current policies and future trends in medical care that make sense in political terms, in fiscal terms, in business terms, in utilitarian terms, and in professional terms, but are wrong nevertheless. The U.S. has a nursing facility population of about 1.5 million people. Many of those currently residing in these facilities will die either in the facility or during a related hospitalization. As our population ages and the cost of medical care continues to increase, many of these skilled nursing facilities have given way to the necessity, or, worse yet, the temptation to uphold institutional policies that optimize the institution’s balance sheet at the expense of the dying person.³ Consequently, many patients do not realize a ‘good death.’

It is deeply important to all of us to see that patients who enter a palliative care facility because medical science can at that moment not claim the capacity to bring about a cure of their terminal state receive the most humane, dignified, and joyful care possible in their circumstances. While skilled nursing facilities have succeeded to some degree to ease the passing of many patients much remains to be done to overcome the many barriers that stand against achieving this outcome for all. Among such barriers

are: impersonal “institutional” habits, lack of professional teamwork and understanding of the issues, convenience of transfers, and an irrational bias against “giving up,” to mention a few.

For the past eleven years, the Center for the Study of Science and Religion has been examining and promoting discussion around the issues that lie at intersection of science and religion. For an equal amount of time, the Terence Cardinal Cooke Health Care Center (TCC), a 729-bed facility serving a diverse population of geriatric, AIDS, dialysis, and other patients, has endeavored to bring compassion, information, and expertise in symptom management to the bedside of TCC residents.

About six years ago I was befriended by the Medical Director of TCC, Dr. Anthony Lechich. Dr. Lechich is a physician who is active in Catholic life. Our common interest emerged immediately: the CSSR is dedicated to the premise that the essence of right action is a full measure of respect for every human being regardless of economic utility or intellectual capacity; Dr. Lechich, and the Catholic Church that supports TCC, have precisely the same obligation. We quickly decided to work against the chaotic and unpredictable outcomes at the end of life in many institutional settings by establishing a small but remarkably effective countervailing model: an academic internship program for Columbia University undergraduates at TCC.

Six years into the program, Dr. Lechich and his student interns have begun to construct a novel and experimental protocol. Students are asked to interact with a diverse residential and subacute hospital population of individuals of advanced illness, age and dependency. We bring together not only the patient’s family and doctors, but also nurses and nursing assistants who have been physically and emotionally engaged in the care of individuals in terminal decline.

This line of research could only have emerged from the initial decision to give our own new meaning to the end of life, by the commitment to accept a person who may die very soon as nonetheless as valuable and important as the life of those who may for the moment be far from death.

Surviving the Anthropocene

The fourth of the five Books of Moses is called *Numbers* in English, but in Hebrew it is called *BaMidbar*, that is, to paraphrase the title of a popular children’s book, “*Where the Wild Things Are*.”⁴

In *Numbers 13*, the Israelites are in the first months of their wanderings, having successfully crossed – on dry land! - the Sea of Reeds to escape from Pharaoh’s armies into the desert Wilderness of the Sinai peninsula. Scouts, including one named Caleb, travel from their desert encampment into the Promised Land of Canaan. They return forty days later, reporting that the Land is good, but reducing themselves by self-mockery and self-deprecation.

31] But the men who had gone up with him [Caleb] said “We cannot attack that people, for it is stronger than we.”

32] Thus they spread calumnies among the Israelites about the land they had scouted, saying, “The country that we traveled and scouted devours its settlers. All the people that we saw in it are men of great size;

33] we saw the Nephilim there – the Anakites are part of the Nephilim – *and we looked like grasshoppers to ourselves, and so we must have looked to them.*”

The punishment for this failure of self-respect is direct and to the point, in *Numbers 14*:

31] Your children who, you said, would be carried off – these will I allow to enter; they shall know the land that you have rejected.

32] But your carcasses shall drop in this wilderness,

33] while your children roam the wilderness for forty years, suffering for your faithlessness, until the last of your carcasses is down in the wilderness.

34] You shall bear your punishment for forty years, corresponding to the number of days – forty days – that you scouted the land: a year for each day. Thus you shall know what it means to thwart Me.

Neither Moses nor Aaron escaped that consequence of communal self-deprecation. Joshua—the other scout who along with Caleb had not made the fatal mistake of self-deprecation—would lead the next generation of Israelites to that Promised Land, but only after an additional forty years—one year for each day—so that the generation of self-mockery would die off to leave their children to enter it with confidence. But their children did, and here I am.

Forty years is a long time, but today with good medicine, good food, and good luck, it is only the first half of a lifetime. That is enough time to begin to think about where we are today. Are we—like those self-deprecating, paralyzed scouts—grasshoppers in our own eyes?

The answer matters, because we are in an odd time in human history. We are already well into what my most well-informed and dispassionate colleagues in the sciences tell us is a new geological Era, the Anthropocene.⁵ The Holocene—the previous 11,000 years in which all of our texts and all of our communal experiences including those in *BaMidbar* must have occurred—ended a few centuries back, when our species began to refashion the planet in our own image.

In those few centuries our numbers have outstripped the numbers of any other animal our size by a factor of about 100,000-fold. The carbon dioxide we continue to put

into the atmosphere by burning coal and oil for our transportation and our electric power, may reach a concentration that would irreversibly heat our planet's atmosphere and oceans, making our days here—or anywhere else on Earth—considerably different and more difficult than they are today.

We have known about the need to control our planetary addiction to the burning of coal and oil—so much like a person's addiction to tobacco—for closer to forty years than forty days. But, like those scouts in the Bible, we have for the most part acted as if the problem were gigantic; we were but grasshoppers in our own eyes.

I am a scientist by training. That means I have been taught the craft of converting my curiosity into a set of ideas that can be tested. This notion of testing—we call it doing experiments—is the key step in science, because when the test fails, there's no choice but to say of our idea, "It's wrong," and move on. That way, science keeps itself from wasting more time and effort than necessary on ideas that can be proven wrong by testing.

We are not grasshoppers; we are people. But what does that mean in the light of science?

Many ideas cannot be put to the test by an experiment designed to disprove their validity, simply because our imaginations will always outrun our technologies. In Lucretius's time, the notion of all of nature being made of atoms was one such notion. Only after two thousand years did our capacity for testing the idea allow us to say with confidence that the Epicurean vision of a universe made of combinations of invisible, indivisible 'atoms' reflects the physical reality of things.

I do not know if there will be a time when the commandment to Love your Neighbor as you Love Yourself will be proven or disproven by experiments in a refined technology that may combine today's molecular neurobiology with a better understanding of human genomic regulation. Until that day, it remains the case that any of us may choose to love the stranger as we love ourselves, because for our species, while the consequences of an action are bounded by the facts of nature, the choice of action is not.

From the ideas that can be tested, have been tested, and have been found to survive the test, science has built up a remarkably clear vision of our place in the natural world. It is a vision that allows us to choose to act to prevent our planet and our descendants from being overcome by our past actions.

We are chemical, science says, made of only a few elements, the same elements that fill the universe: Hydrogen, Oxygen, Carbon, Nitrogen, Sulfur, and Phosphorus. But so are grasshoppers.

We are complicated, science says, with one chemical, called DNA, so complicated that it carries in it an instruction book for the construction of a whole new creature from a single cell. But so are grasshoppers.

We are a species, science says, with each one of us being fertile, that is, capable in principle of being the source of DNA for the formation of a new generation of individuals in our species. But so are grasshoppers.

We are mindful, science says, with brains so big, so complicated, so capable of learning and imagination, that we have become quite dependent upon our mental worlds. The mental world makes humans different not only from grasshoppers but from everything else alive.

Our mental worlds are expensive: we spend upwards of a quarter of the energy we get from food on the upkeep of our brains, this tissue no larger than two clenched fists. In our special mental power lies our hope and our liberty, if we would only take responsibility for each other's future.

Look around for the person who looks most different from you. That person's DNA and your DNA are about as similar or different, as your DNA is from your biological brother or sister's DNA. In nature, we are simply and completely all in one family; it is in no way a metaphorical notion.

So we are each mistaken, science says, when we choose to live in a mental world in which we think that any one of us is special. This is the modern way of seeing others as grasshoppers. And of course, if everyone thinks that way about someone else, it is no different overall from everyone thinking of themselves as grasshoppers as well.

So let us resolve today to do better than those Scouts in the Torah. Let us resolve today to begin to see each other as equally valuable, equally rare, equally vulnerable, no matter what differences there are among us.

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Notes

¹ This paper derives from a talk presented to the Yeshiva University Foundation for International medical relief of children, New York, December 7, 2010. The author thanks his CSSR colleague Cynthia Peabody, Rabbi Rolando Matalon, Rabbi Dov Taylor, and Dr. Anthony Lechich for their suggestions

² West Running Brook

by: Robert Frost

'Fred, where is north?'

'North? North is there, my love.
The brook runs west.'

'West-running Brook then call it.'
(West-Running Brook men call it to this day.)
'What does it think it's doing running west
When all the other country brooks flow east
To reach the ocean? It must be the brook
Can trust itself to go by contraries
The way I can with you -- and you with me --
Because we're -- we're -- I don't know what we are.
What are we?'

'Young or new?'

'We must be something.
We've said we two. Let's change that to we three.
As you and I are married to each other,
We'll both be married to the brook. We'll build
Our bridge across it, and the bridge shall be
Our arm thrown over it asleep beside it.
Look, look, it's waving to us with a wave
To let us know it hears me.'

'Why, my dear,
That wave's been standing off this jut of shore --'
(The black stream, catching a sunken rock,
Flung backward on itself in one white wave,
And the white water rode the black forever,
Not gaining but not losing, like a bird
White feathers from the struggle of whose breast
Flecked the dark stream and flecked the darker pool
Below the point, and were at last driven wrinkled
In a white scarf against the far shore alders.)
'That wave's been standing off this jut of shore

Ever since rivers, I was going to say,
Were made in heaven. It wasn't waded to us.'

'It wasn't, yet it was. If not to you
It was to me -- in an annunciation.'

'Oh, if you take it off to lady-land,
As't were the country of the Amazons
We men must see you to the confines of
And leave you there, ourselves forbid to enter,-
It is your brook! I have no more to say.'

'Yes, you have, too. Go on. You thought of something.'

'Speaking of contraries, see how the brook
In that white wave runs counter to itself.
It is from that in water we were from
Long, long before we were from any creature.
Here we, in our impatience of the steps,
Get back to the beginning of beginnings,
The stream of everything that runs away.
Some say existence like a Pirouot
And Pirouette, forever in one place,
Stands still and dances, but it runs away,
It seriously, sadly, runs away
To fill the abyss' void with emptiness.
It flows beside us in this water brook,
But it flows over us. It flows between us
To separate us for a panic moment.
It flows between us, over us, and with us.
And it is time, strength, tone, light, life and love-
And even substance lapsing unsubstantial;
The universal cataract of death
That spends to nothingness -- and unresisted,
Save by some strange resistance in itself,
Not just a swerving, but a throwing back,
As if regret were in it and were sacred.
It has this throwing backward on itself
So that the fall of most of it is always
Raising a little, sending up a little.
Our life runs down in sending up the clock.
The brook runs down in sending up our life.
The sun runs down in sending up the brook.
And there is something sending up the sun.
It is this backward motion toward the source,

Against the stream, that most we see ourselves in,
The tribute of the current to the source.
It is from this in nature we are from.
It is most us.'

'To-day will be the day....You said so.'

'No, to-day will be the day
You said the brook was called West-running Brook.'
'To-day will be the day of what we both said.'

³ Gawande, Atul, "Annals Of Medicine: Letting Go- What should medicine do when it can't save your life?" *New Yorker*, August 2, 2010

⁴ http://en.wikipedia.org/wiki/Where_the_Wild_Things_Are

⁵ Zalasiewicz, J., et. al, *GSA Today*, v.18, p. 4 (2008), "Are we now living in the Anthropocene?"