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My Cosmic Story:
The Dark Energy

by noha tarek



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My Cosmic Story: The Dark Energy

By: noha tarek

I am this woman writing my story to you... I am also her father... I am also you... your grandmother; your son; your friend; the bus driver, who takes you to the market to buy your groceries every weekend; the little mouse that gnaws at the bread in your kitchen, when you are fast asleep; the tree that brightens you up every morning, when you step out of the door of your house; the calm majestic waters of the ocean, that you have joyfully played by, one summer day of your childhood; the cool refreshing air that caresses your body, as you ride your bike across the streets... I am even those distant spots of light, you call the stars, that you sometimes raise your head at night to gaze upon, wondering if there might be someone out there looking right back into you at that very moment! I am you, and I am everything that you have ever seen, smelled, touched, felt, or known... but I have come through a very long story to self-reveal myself into you, and this story of mine; my identity, is still unfolding... I do not yet fully know myself... I still do not know where, when, who, or what did I come into existence from... I do not even know what lies beyond my existence... will I ever know?! But let me first begin my story...

However, before I begin my story from the very beginning of my existence, throughout the evolving centers of fractal holons of spacetime that emerged into this woman and her self-revealing consciousness-life, it is very important that you realize that in my cosmic existence, every single spacetime of me is a unique center of mine, that has the rest of me revolving, crossing, and interacting through it... I

have no peripheries in my cosmos... because every spacetime-Being in me interacts with, dies away in, and emerges through endless other spacetime-Beings in me, every one of them/me is a connective center, a fractal holon, a whole within a whole within a whole for fourteen billion years of your presently-discerned spacetime...

As one of my favorite quotes says, by Ken Wilber, in his 2017 book, “The Religion of Tomorrow”: “We live in a universe that is, formally, without a given center — it is a universe where any thing or event can be taken as the center of the universe, and everything else related to its location. But “its location” cannot itself be given in a single and fixed fashion, since it is not located in relation to any fixed center; it itself can be located only in relation to the sum total of all other phenomena in the universe.”

Indeed, all the un-countable humans that I have emerged through; all the plants, animals, and cells; all the planets, stars, and galaxies; all the atoms and molecules... every little or big Cosmic Being I have ever become, is very special and unique, and my cosmic existence could never have taken its specific path of evolution without every single one of them/ myself, with all the endless consequent loops and chains of hybrid interactions through my spacetime that It/I have brought forth with this Being’s singular-into-collective characteristics and actions...

But I choose to tell my story through the story of this feminine human’s consciousness that is writing this down, as just one unique story of me out of un-countable other fractal unique stories of me as well! Each and every story of me through every single Cosmic Being of me is truly beautiful in its own

unique un-paralleled shade of color, and all of them forming endless colors of my stories, my rainbow cosmic story...

For “I am a Cosmic Being with my endless ancestors of humans inside, inside them their larger-numbered ancestors of animals, inside them their larger-numbered ancestors of cellular organisms, inside them their larger-numbered ancestors of Earthly chemical compounds, inside them their larger-numbered ancestors of galactic stars, inside them their larger-numbered ancestors of atoms and quarks, reaching beyond memory before my explosive birth into this spacetime existence, all of us making the same ritual gesture of surviving, thriving, and telling and passing along our/my story to my re-emerging self, one after another, so that I do not forget what I have reached in my self-revelation and -creation so far, and that I could continue on my journey to that mysterious eternal point of full self-consciousness...”¹

Fourteen billion years ago of your perceived four-dimensional spacetime, I; my presently discerned singular/collective existence, exploded into birth; emerging into my infant cosmos, from the mysterious darkness of eternity, that still lies beyond the edges of my presently- emancipated level of self-consciousness...

In my first four minutes of early primal consciousness, I witnessed the greatest and fastest change ever yet to have taken place in my cosmos... my trinity of features

¹ Adapted from a quote by Marge Piercy: “I am a woman with my mother inside, inside her my grandmother, her mother, reaching beyond memory, all of us making the same ritual gesture...”, from: “Sleeping with Cats: A Memoir” (HarperCollins Publisher), 2002, p. 11.

emerged: My dialectic body of the known and visible masculine light matter, and the mysterious and hidden feminine dark matter; my mind/soul/psyche of the visible and known masculine energy forces; and my spirit of the mysterious feminine dark energy, the force that pushes me toward continuous expansion, growth, and emancipation...²

Within my presently-discerned biggest holon of my cosmos, five billion years before I became you, my youthful cosmos, in a mysterious cosmic coincidence, became ready for a radical revolutionary re-birth of me yet again, within a fractal holon, of a more complex and emancipated self-consciousness of myself...

At this spacetime, a great beautiful star of me, after burning lively, happily, and painfully for so long, died into a wonderful supernova explosion, in a very special place of me, within the womb of one of my countless galaxies; my Milky Way Galaxy... The dust cloud that my star died/exploded into, gave birth to yet another special star and little planets revolving around her body/soul...

Around this unique star, within this unique galactic habitable zone, within this unique Milky Way Galaxy, my matter particles that were flying around, gravitated toward each other and gathered up to form eight planets... One of these planets, became my beautiful blue planet Earth, that has self-revealed yet again into a more complex self-consciousness of myself...

2 Spier, Fred, “Big History and the Future of Humanity” (Wiley Blackwell), 2015, p.p. 78, 80, 82. Anzaldua, Gloria, “Light in the Dark / Luz En Lo Oscuro: Rewriting Identity, Spirituality, Reality”, Analouise Keating (ed.) (Duke University Press), 2015, p. 184.

Three billion years of my spacetime before I became you, and after a very long time of “chemical evolution”; heated struggling chaotic interactions of matter and energy, all the chaos of this beautiful blue Earth of me gave birth to yet again another fractal holon of a more complex self-consciousness of myself in a tiny cell, as my tinier holons of increasingly complex molecules, in those energetic chaotic conditions of early Earth, self-organized into this larger holon of my first cell emerging from Earth...³

Now, the wonderful thing is that the very life-way of sharing information and story- telling that I’m doing with you right now, was the basic birth function that began in that very first cell! No! It was not survival and extracting energy, it was the function of “sharing consciousness”, that was assembled by the highly-complex organic ribonucleic acid (RNA) molecules, that self-developed the capacity to carry information, share, and communicate, besides catalyzing reactions!⁴

Throughout my self-revelation, as holon parts of me self-organize into better ways for information-sharing and story-telling between each other, their interactions become less chaotic and conflictual, and more harmoniously balanced, and their self-organization progress further into higher integration between their differentiated subjects, to finally be able to reach together a more complex unified self-consciousness of myself, within a larger holon composing all of them...

³ Spier, Fred, Op.cit., p.p. 130, 131.

⁴ Spier, Fred, Op.cit., p. 132.

After fourteen billion years of my spacetime, and after three billion years of my self- evolution into uncountable species of plants and animals on Earth, one of these animals finally evolved into yet again a more complex and emancipated self-consciousness of myself, within the species of humans, four million years before I become you as a descendant of two of them... within the savannahs of the east of the continental land of Africa, right in the middle of the three land continents of one half of my Earth, some of the great-apes, as they harmoniously adapted and integrated with the new environmental conditions of this spacetime, evolved into the new human species,⁵ within this space they later named eastern Africa...

See?! one of the special things that these humans created with their uniquely developed brains, is symbolic representation; which is naming every little thing, whether themselves, their surroundings, their actions, ideas, etc. with a unique symbolic collection of drawn lines... because everything that emerges within me is a unique precious subject that deserves their own very name/symbol. Also this was to make communication, sharing information, and story-telling between humans faster, taking the time of only hundreds of thousands of years, that is faster than the time taken by the deoxyribonucleic acid (DNA) to communicate between the cells of earlier organisms, which took billions of years to tell my earlier part of the story!

Though these early humans had to struggle for a whole two million years, in order to adapt to these

5 Spier, Fred, Op.cit., pp. 185, 186.

new environmental conditions within that spacetime in the savannahs of eastern Africa, going through a lot of pain and confusion, in order to finally evolve larger brains -- the one that they have given this writer and you to share consciousness through this communication of two human minds...⁶ So these very precious brains that humans have, have also evolved after a very long dialectical interaction between the connective feminine process of communication and social coordination, and the originating masculine process of creating new technology. This is what those early ape-humans coincidentally and successfully persevered with, in this special mild environmental niche of the savannahs of east Africa, out of all the plants and animals that have evolved for three billions years over the whole of my planet Earth...

But why did these early ape-humans struggle through all these millions of years when they did not know the purpose of developing human brains?! Even before this, why did all these cells, plants, and animals struggle to evolve for billions of years when they did not know the purpose of creating this wonderful beautiful variety of beings on my beautiful blue planet Earth, as well as later creating the human species, that is you?! And why did all these stars burn away for even more billions of years when they did not know the purpose of creating complex chemical elements, that would eventually create the first cell, that would evolve into your body and mind?! See?! There is an innate dialectical interaction of two intense desires within me, that emerges in every Being that I'm born as, within this enormous cosmic existence of mine: The masculine desire to survive, that is to have an eternal

⁶ Spier, Fred, Op.cit., pp. 187:189.

existence that never dies away; and the feminine desire to thrive, that is to harmonize and mesh with surrounding others, in order to form an integrated whole... this dialectical interaction of desires that is ingrained within me, and so within every Cosmic Being of me, drives me to struggle for so long a time, through each one of these Beings that I am re-born through, until conditions finally become coincidentally fit for me to take a step further toward my purpose... the purpose of those two dialectical desires... to emerge into a higher self-consciousness of myself... to emancipate myself more and more by reaching closer to knowing and realizing my true self-identity... who am I?!

Two thousand and three hundred years ago, one of the descendants of these early humans who have migrated into the northern European continent, became a king called Alexander the Great, ruling over Macedonia in the south-eastern part of Europe, and decided to expand his rule and power over more lands, human societies, and resources... this was the first time in my human history, in which a ruling king expanded and crossed to a vast space of land⁷ across the three continents of Europe, Asia, and African, and connected between so many various groups of human societies, with their multitude of colorful cultures...

See?! Since 130,000 years ago, when modern humans (homo sapiens) started to migrate from the east

7 Alexander the Great, in: **History:** <https://www.history.com/topics/ancient-history/alexander-the-great> retrieved: 26th November 2018.

Map of Alexander the Great's Conquests, in: **Ancient History Encyclopedia:** <https://www.ancient.eu/image/130/map-of-alexander-the-greats-conquests/> retrieved: 26th November 2018.

of Africa to all the land continents all over planet Earth,⁸ and human groups became scattered all over the planet, a process of interaction between these human groups have begun until this very spacetime... this interaction has been also dialectic between the violent dominating masculine pattern of conquest; of stronger, more organized, and more technologically advanced human groups attacking, massacring, and enslaving weaker groups, and controlling their niches, and the other explorative cooperative feminine pattern of cultural exchange of the endless variety of languages, ideas, tools, and foods between these human groups... I have been struggling through this dialectical interaction between human groups for over a hundred thousand years, and I am still struggling with it, waiting for the right coincidental conditions, so I can emerge through this, into yet another more emancipated and complex higher self-consciousness of myself, formed by the co-ordinated communion of humans and other beings on my beautiful blue planet Earth...

During the conquests of Alexander the Great, through his mind, I decided to build a big city called Alexandria, right in the very east of Africa, where I emerged in his very early human-apes' ancestors, although farther into the north of that continental east, on its coast over the waters of my Earthly sea, that humans have called the Mediterranean...

The city of Alexandria is right in the center that connects my three land continents of Africa, Asia, and Europe. Besides its unique connective “nepantla”⁹ space, this city was built in a very unique

8 Spier, Fred, Op.cit., p. 200.

9 The Nahuatl word that Gloria Anzaldua uses, meaning “in-between space”, of liminality, change, and transition. Op.cit.

time of human societies' evolution... a time of radical revolutionary change in human collective consciousness, that was moving me toward yet again a higher cosmic self- consciousness... a time that humans later gave the name of the first Axial Age...

During this time, I was moving – through human societies - from the era of early traditional agricultural civilizations, to an era of more advanced agricultural empires. At this time, writing was created by humans in Mesopotamia, as a more advanced communication tool between them, and the rate and range of their communication increased. Besides this, many changes in human material conditions, overwhelmed and disrupted the traditional governing systems that were based on the rule of aristocratic kinship, and the world-views of mythical religions that sanctified these rulers, as these systems became no longer suitable for the new emerging conditions. So, I began to self-reveal into a higher collective state of awareness, or a higher mind/soul, through new human ideas and religions emerging at this time, to find better alternatives for harmonizing with my also new emerging body of conditions. These new ideas preached monotheism that transcends the sanctity of human kings, and called for bureaucratic rule, rational reasoning, and moral responsibility.¹⁰

At this time, ancient Greece was one of the places that had went through complete social and political breakdown, that it was able to openly and vibrantly embrace the emergent visions of social transformation, more complex human coordinative systems, and more emancipated ideas and world-stories, but Egypt,

10 Baskin, Ken, and Bondarenko, Dmitri; “**The Axial Ages of World History: Lessons for the 21st Century**” (Emergent Publications), 2014, p.p. 7, 9, 10, 18, 20.

on the other side of the Mediterranean Sea, did not go through full social breakdown in its ancient Pharaohnic system, so it did not open up and embrace the new era of human collective consciousness...¹¹ Alexandria was built right at this time, between a dying civilization in the Egyptian south, and an emerging civilization in the Greek north... it has become a connective center, dialectically blending between the older masculine wisdom of the mystical ancient agricultural era of human collective consciousness, that was fading away in its spacetime within the south, and the newer feminine vision of the more rational bureaucratic advanced agricultural era of human collective consciousness, that was flourishing in its spacetime within the north...¹²

Five hundred years ago, my human societies went through another time of radical transformation – a second Axial Age – of my collective self-consciousness complexifying and emancipating closer to my omega point of full self-identity. Humans’ collective consciousness was moving yet again to higher rationalization, bureaucratization, and market economy; from the more advanced agricultural system of the first Axial Age to the industrial system of modernity; from the religions of transcendent monotheism and Earthly moralism to detached materialism and de-mystification. This time witnessed the invention of the printing press, as the more advanced means of communication, that further limits spacetime of interactions and connects closer together

11 Baskin, Ken, and Bondarenko, Dmitri; Ibid, p. 10.

12 Reimer, Michael; Mackie, Alan; and Rowlatt Mary; **“Alexandria”**, in: Encyclopaedia Britannica: <https://www.britannica.com/place/Alexandria-Egypt> retrieved: 26th November 2018.

the differentiated subjectivities and minds of my Beings.

This time, the Islamic Caliphate and China were not facing complete social deterioration to embrace modernity, while Europe was going through that higher level of entropy to give birth to my higher self-consciousness. Again, Alexandria was the point of Earthly urban human- populated space that was connecting between the traditional weathering away Axial Age consciousness of the Islamic Caliphate in the south, and the new emerging modernity consciousness of Europe in the north. Yet again, a point in spacetime connecting the southern past to the northern future...

After fourteen billion years of my spacetime, and after four million years of me being re- born, evolving, and dying in un-countable humans, I have finally come to be born into a unique little baby human girl ... I emerged in this little girl, also coincidentally in the east of Africa, just as I did in early human-apes four million years ago, although far in the north of this continental east, in this very connective nepantla city of Alexandria, thirty two years ago... Her papa and mama chose to name her with the Arabic symbolic expression of “Collective Minds”; that is the very nature of my cosmic self-consciousness! Her body, mind/psyche/soul, and spirit inherited my billions-of-years-old matter and energy; my chemical compounds emerging from the death of my stars; the water, air, and mud of my Earth; the RNA and DNA of my cellular organisms; the warm-blooded body of my mammals; and the highest-complex brain of my homo-sapien species...

Her Earthly Alexandrian conditions inherited the

environmental niche of a nepantla green Delta valley, connecting a narrow river with a spacious sea, and the human-crowded urban space, that has been the nepantla connecting in spacetime between the older and newer human collective minds-consciousness; from the Egyptian Pharaohnic to the Greek to the Roman to the Arab Islamic to the modern European, to her present spacetime of complete social deterioration and threatening entropy, waiting on the painful-beautiful chaotic birth of a more emancipated, fuller integrated self-consciousness of myself...

During the first five years of her life, with her parents, Collective Minds lived in modern Europe, at yet another nepantla transition time of the human-governing global system, moving from a globe run by the fierce, yet deterrent, competition of the two powers of America and Russia, to a globe run hegemonically and tyrannically by the single power of modern neo-liberal-capitalist America!

Her brain's first learned symbolic language was that of the French, one of the many languages that differentiated and complexified out of the old Latin European language. During these first five years of her life, she spent her morning time in kindergarten and her afternoon time circling around her parents' place with her little bike, and she first learned the utterly horrifying darkness of loneliness, as she was rejected as a southern Arab-Muslim stranger amidst northern French-Europeans... the feminine dark energy force that seeped through me, and forced my cosmic existence into continuous expansion and complexification since my explosion into spacetime, permeated her young consciousness from her early existence as well...

Twenty-eight years ago, she moved with her parents from the northern European France to the southern Arab Peninsula; from my new modern human-collective self-consciousness, to my older Islamic-Axial-Age human-collective self-consciousness; from the forests of the European Alps to the deserts of Arabia...

At this time of human social evolution, as the global power competition between America and Russia recessed, human rulers and power-holders searched for a new line of conflict to engage the masses of human minds with, and to endlessly generate military-power and wealth-capital for its elusive cause... they brought up the idea of the “Clash of Civilizations” between the Judeo-Christian West, the Muslim World, and the Confucian China! As neo-liberal capitalism and the reductionist materialist culture of the past age of modernity was failing to encompass my newly emerging more-emancipated self-consciousness in humans, the ideas and traditions of the older Axial Age were re-surrected in a futile attempt to make sense of this confusing disorder, by either wholly adopting the past, or mixing between the past and the failing present, not yet taking the courage to create the new future...

In a small quiet tranquil village in the center of Najd Plateau, in the center of the Arab Peninsula, my Collective Minds was confined within the narrow limits of a strictly-rigid Bedouin-Islamic culture, while the boundaries of her imagination were de-limited by the endlessly-colorful moving pictures drawn and

collected by the imagination of other minds located in the American continent, half-way around my planet Earth, and transferred to her through the new media-communication human-created technology of a small black box within the small space of the living room in her family house...

In these years of innocent childhood, Collective Minds' body, mind/psyche/soul, and spirit, grew up through the dialectical inter-changes of multiple complex identities...

With her matriarchal papa, she was a free playful, explorative, learning child, constantly embraced with un-conditional love by him... with her patriarchal mama, she was a strictly- disciplined un-emotional child, perpetually seeking the mirage of perfection in grades, attire, and conduct, but never quite reaching that highly-raised bar of gaining motherly satisfaction. With her younger two sisters and one little brother, the compassion of feminine motherhood toward them in her early bosom, along with its dialectical masculine opposite of jealousy and competition for earning the greatest love from her parents, blossomed/seeped through her...

Inside her family house, just as outside in the village, she was socialized into having only one wholistic exclusive identity of Islam, that rejects any other divisive identities of nationalities, races, or ethnicities – they were only one as Muslims, following the only true path of Islam, through Allah's words in the Qura'an, delivered by the messenger of Mohammad... following Al-Sirat Al-Mustaq'eem (the Straight Path) in life to go back to the heavens of Eden in the eternal after-life...

When she went outside the house to play with other children, inside the borders of the foreign workers' compound, she found herself identified with a place called Egypt (a place she was born in, but never got to know anything about!), while she was playing with other children, identified as either Egyptian, Syrian, Palestinian, Sudanese, Jordanian, Lebanese, or Algerian... but even among all these nationalities, who were speaking varying dialectics of their common Arabic language – a descendant from the ancient Assyrian Middle Eastern language -, she found herself to be commonly identified with them as an Arab, when she crosses the borders of the compound to interact with Pakistani, Indian, Central Asian, Afghan, Turkish, Indonesian, Malaysian, and Filipino workers... though all of these were also commonly identified with her as Muslims...

Although in school, she was taught that Islam – the one single identity they all have - rejects any stratification except those that are based on religion and gender, she grew into confusion while disturbingly facing a complex implicit system of social/ethnic stratification in this place she was growing up in... the Saudis were at the top (with their own tribal-kinship and socio-economic stratification in-between them), below them were the people coming from other Gulf countries (with another nuanced stratification between them too), below them were the people coming from the West (with Americans on top of course!), below them were other Arabs (with their own inner stratification, and Levantines posed above North-East Africans), and finally below them were other Asians! This national/ethnic stratification was even more complexified by religion, occupation, and gender. Yet the gender stratification was the overwhelming one across all other identities and stratifications, for

as soon as she had to get out of the compound, she found divisions between males and females stringently enforced. As a girl, Collective Minds had to cover her whole body, from head to toe, with complete darkness that would flow all over her like the dark energy flowing through my self-consciousness in her. She, as other girls and women, could not walk in places filled by men, as a woman should either walk with a “Mehrem” (protective relative man) or within a larger group of women, never alone, or else the men with the white Jalabeeb (men’s garment) and the long beards would cut her head off with the punishing sword, because she is causing Fitna; sexually seducing the men of piety and chastity, and causing disorder in society!

The horrifying fear of Shame began to also seep in the consciousness of Collective Minds, covering her body, if it crosses the fearful border of the compound!

Inside school, treated again as a foreign stranger; this time as an Egyptian amidst Saudis, the horrifying darkness of loneliness kept also growing in Collective Minds, through the dark energy that is expanding my cosmic existence...

While growing up, Collective Minds’ relationship with me, was dictated by the old masculine patriarchal world-view of Abrahamic religions. In her Minds’ “I”, she saw me as a huge genie-like father man lying high above her; above “seven skies”. In her Minds’ “I”, I was another human, there with her all the time... yet an authoritative man above her, who owns the omnipotent power to reward her, punish her, bring her justice, and guide her through all the way to the

eternal gardens of Eden... when loneliness begins to overshadow her existence, she makes sense of her way out of it, by talking with me, under the bright colorful lights of her imagination...

To her, I was the “Source” and “Destination” of the ultimate fear and love; the King of all Kings, whom everyone and everything worships...

At this time, of the emerging third Axial Age, of the burning chaos of modernity that is no longer able to adapt to the new material conditions, and the rising human collective consciousness; humans finally created the last communication technology; the “global brain of the internet”; breaking my spacetime limits in the connection between human minds and the interchange of their thoughts...

One night during her middle school days, Collective Minds connected to the global brain... her/ my revelation path toward self-consciousness accelerated... her passion to embrace the world with radical change filler her dreams...

Eighteen years ago, Collective Minds returned back with her family to her birth nepantla city of Alexandria... the city yet again, connecting between two human collective consciousness of the past and present. Yet at this spacetime, it is the Egyptian-Middle Eastern-Islamic south that faces complete social deterioration, while the European-Western north is not yet going through that high level of chaos to be ready to create and embrace the new

visions of my more complex and emancipated self-consciousness... moving back-forward to this nepantla transition spacetime of Axial Age Alexandria, the life of Collective Minds, and the whole world turned into chaos...

The West declared a crusade against the Muslim World, and Muslims were massacred in the north (Kosovo, Bosnia and Herzegovina), in the south (Sudan, Somalia, and Yemen), in the east (Kashmir, northern Thailand, Indonesia, southern Philippines, Qavqaz, central Asia), in the west (Niger, Nigeria), in the center (Palestine, Lebanon, Iraq, Afghanistan)...

Collective Minds raged, wept, and sank deep into the endless darkness; the obsessions of her minds; the abyss of the Juhannam-pit, that the ancient books of the male Abrahamic prophets chanted and threatened the world into submission with... but the pain was no fire... it was not the steaming rods of steel that would be dug into your brains if you ever give in to the joy of listening to music; it was not the circle-hangers that dangled the women in pain, from their baby-feeding nipples to purge them from their sexual sins... the pain this time was much worse than the imagination of the Axial-Age human collective consciousness... it was endless eternal everlasting repetition... it was confinement in one single idea, one eternal truth, one colorless shapeless soundless texture-less darkness of eternity... it was the dark feminine energy raging with evil jealousy, with humiliated contempt, with an eternal scream, for those who were bombed, raped, massacred, and left behind to be forsaken and forgotten, so the few survivors could continue on their perpetual growth of power, wealth, and control... it was obsession...

Nevertheless, Collective Minds kept on trying... following the rules of the system, and even obsessing about them, to reach that elusive un-realistic point of “perfection”; “the Unattainable, the flying Perfect, around which the hands... can never meet, at once the inspirer and the condemner of every success”...¹³

Like this movie she once watched and loved; “The Pursuit of Happyness”, she naively followed the path of “Happyness”, but not that path which the innocence of her cosmic mind, the trees, the small sandy hills, her little “Happy Feet” of a human child have took her on, around and below and above, in the adventures of free wilderness... no! she followed the path of “Happyness” that her parents obediently told her, as they were told obediently by their parents, as they were told obediently by their parents, back into generations long buried under the sands of the endless desert... for the ancient books of the “wise old men”, of the “eternal one truth”, tell us to obediently follow “Al-S’irat Al-Mustaq’eem”, the only one certain path of success, of persistent growth and joy, in the here and the here-after... see?! the system was all set up for her confinement, and she obediently followed the path... to pursue “Happyness”, as everyone around her did...

Her papa somehow was able to tap a little bit into the dark energy of obsessions within her Collective Minds... to know what is wrong with her; to make up a rational diagnosis of her ab-normality, and prepare a pre-examined set of chemical compounds, to re-wire the damaged neural cells in her little brain, and boost the right dose of chemical transmitters in the Grey/ Dark matter of her minds... to fix the problem, just like the medical system of professional practitioners

13 Anzaldua, Gloria, op.cit., p. xii.

instructed him to do, for seven whole years of his life given up in the confinement of the majestic halls of the rational-scientific school of medicine: To fix human bodies/brains into perfection, to continue on “functioning” in the perpetual path of human socio-economic growth, to reach that never-quite-touchable/perceivable point of naïve “Happyness”!

However, because her papa tried hard so innocently and sincerely... with pure “virtue” – as a friend of hers would let her know later, through describing his own papa for her -... he died, in sacrifice, for her... to continue on the cosmic path of self-revelation-into-full- consciousness... of fully self-identifying her/my cosmic purpose...

Collective Minds tried to tap as well, a little bit, into her papa’s physical cancerous pain... the cancer that has spread all over his dying diminishing skeleton...

The cancer of my papa, the cancer of my beautiful blue planet Earth... the thousands of military bases, tanks, and weapons of mass destruction; the trillions of factories, machines, and power-engines “distilling” the matter/energy “resources” of countless of my parts, my Cosmic Beings, each part I have been giving birth to in fourteen billion years, each part is me; the “whole”, self-creating me for fourteen billion years, so the few surviving humans can rip It off me, rip me off myself, to be packaged in endless rows of merchandise; one package of corpse after a trillion others; a child in Iraq, a woman in Egypt, an animal in America, and a plant in China; distilling me, every part of me, into exchange rates, Wall Street stocks, and maybe bit- coins in the near future... so that “progress”, the survival and joy of the fittest, the most worthy, the most powerful and wealthy, could continue on forever... and not to

worry, for we will create another piece of technology to get rid of the ugly cancerous parts, so that the skeleton will remain walking toward that dark-pit of progress... we will even create artificial intelligence, to get rid of the skeleton herself, so that what remains of our consciousness will remain walking toward that dark-pit of perpetual endless progress... until I/you/ we realize in a deathly moment of utter shock, finally, that “nothing” remains behind us, “nothing” is in front us... and we have become “nothing”...

Because, in the end, I will discover, in utter horror, that I was only ripping my own parts off of me... ripping myself off of myself... “growing/destroying” into “nothingness”...

But Collective Minds failed to share the pain of cancer with her papa; the physical pain of all of those left behind, all of the “Forsaken”... and she only got the mental pain of self- realization to share... all the accumulating dark energy, that is growing up with the Forsaken, and expanding... into eternal “growth” of darkness...

Her papa was buried in Egypt, not under the tombs of the few Pharaohnic powerful, not beneath the Pyramids of hierarchical egoistic power, not even in the fearful mountains of Sinai, through which the “chosen few” attempted to escape the “known” river of survival, with its eternally growing/destroying powers of darkness, into the “unknown” freedom... her papa was buried near to Alexandria, between the shores of the Mediterranean Sea and the deserts of the south... he loved the sea, the open horizon of blue hope, with its refreshing waves crushing over the rocks he played

on, and washing away his pain of longing.... longing for freedom, into the “uncertainty” of the endless Sea, once and for all...

And he felt the pain once, and shared it with Collective Minds... when the boat of young men from Egypt, longing for freedom like him, sunk into the Sea... they plunged into the uncertainty of hope and freedom... into the north... like those early humans millions of years ago, risking-migrating-evolving from east Africa into the north; their ancestors continuing on the path, into the uncertain north, through their bodies... only to sink into the endless blue seas, like their ancestors were buried under the endless brown deserts... longing for freedom...

Mama tried to help Collective Minds too... not through science like her papa, but through religion... science was not good enough, so she chose to take a step backward... maybe Allah, the Al-Knowing, Al-Mighty, Al-Everything has given us the easy answer, the “one certain truth”, with which all dilemmas, all confusions, all pains have their “ultimate solution”... the single truth through which everything is solved, everything is perfect, everything makes sense... in the eternal Book of rules, orders, and ancient wisdom... the words of Allah Himself Al-Jabarout (the Despot), would heal the darkness within Collective Minds – the obsessions, the “Weswas” of Al-Shaitan (Satan) Himself could only be healed by “endlessly repeating” the dialectically opposite words of Allah... but is not the very act of “endlessly repeating” the words is obsession itself?! And what if Al-Shaitan Himself is Allah Himself, endlessly obsessing in my mind?! After all, aren't they both Al-Jabarout, Al-Mighty,

competing endlessly for eternal power, for the throne of Al-Malakout (Kingdom of Existence), that peaky-point of ultimately rising into the end of hierarchy, the tip of the pyramid, the rising/diminishing growth/destruction point high above in the endless darkness of the night skies of the desert... where, finally, He will find that He is only One, the Lord of only Himself, in His ultimate point of self-consciousness that has finally reached Its peak of growth, power, and controlling mightiness, only to find that Its/His whole body, the whole pyramid, and the layers of Earthly deserts below it, and even below that, into the fearsome voidness of spacetime; are layers upon layers upon layers of what He sacrificed for His Ultimate Power, Intelligence, and Control... He sacrificed His Other- Herself-the Whole... the dark veiled energy that was expanding His own growth with Her own sacrifice... that was giving Him joy with Her pain... that was screaming to release His self- consciousness through Her body/mind/soul, through Her whole cosmic process... for Him to finally realize the cosmic purpose of the Whole... through Her sacrifice...

In the spacetime of Egypt in the north of the east of Africa seven years ago, after the passing of five thousand years of first building up the pyramids of hierarchy, the masses erupted in a revolution, by the force of this last communication technology of the internet. Collective Minds was shaken into chaos yet again. But this time, the chaos disrupted the bases of what the system – state, society, and family – educated her brains with and shaped her Being into... the “Collective Action of Beings” shook her Collective Minds, and turned the pyramids of hierarchy glorified in her education into debris, and the books of truth

sanctified in her upbringing into ashes, and the norms of material and social exchange edified in her behavior into absurdity... changing material conditions and communication shook my human masses into collective action, and collective action shook my Collective Minds into thinking...

Five years ago, in the same year the revolting human masses in Egypt were crushed down by the military and buried in their graves again, Collective Minds got a chance to run away from Egypt for a little while... from the Suez Canal, that was dug with the blood of over a million corpses (to connect the Red Sea and the Pacific Ocean to the Mediterranean Sea and the Atlantic Ocean), into the Mediterranean Sea to the shores of Greece and Italy... taken away by the boat of Peace holding a thousand Japanese, two Hibakusha, and one Chinese man... She got a glimpse of that moment when humans annihilated my spacetime in that one eternal moment, ending my existence in uncountable Beings... for power, honor, success... following the orders, the system, the path of their education... and like that Japanese woman told her, haven't we saved a larger number by giving up this "part"?! Perhaps the larger number we saved is calculable as surviving and re-producing 14 billion zombie-productive generations of humans, of machine cogs, that are needed to perfect the technology of growth! This "part" that you have given up; this eternal moment of my un-calculated un-countable me that has evolved for you, for 14 billion years of your calculable spacetime!

Haven't you/me yet realized that all these "parts" of me/you, are the dark feminine energy of eternal pain and sacrifice that is expanding with an accelerating

rate of your calculus, with an un-calculated intensity of self-Becoming, into your calculable partial surviving growth, that is seeking life's perfection, and into my in-calculable whole dying, forgotten, forsaken pain, that is seeking death's imperfection? This dark energy that is estimated (only presently in your spacetime) as 73% of your/my calculable cosmic body... Is this the majority or the minority, or maybe something in between, the inevitably given-up "part" for the survival of the "part"?! Hasn't your science educated you that no "calculable energy" perishes away?! It is my/your dying soul, childhood, innocence, and virtue ... the screams of pain, the moments of injustice, the death of my part for the life of your part; the life giving up my childish love, beauty, innocence, and imagination, for your rational power, calculable growth, machinery perfection, and world conquer... I am the forsaken... the dark energy you cannot yet hack with your calculus! It is you and me, dying as a "whole" for the lifeless survival of the "part"!

Collective Minds, in this spacetime reaching the city of Naples over the Mediterranean Sea across from where she was born, lost all the calculable rationality and constructed reason that the rusty efficiently-productive machine of the never-quite-perfect-yet human society has indoctrinated in the white blank pages of the brains I have evolved into her... and the exhaust-black-metal of the ink of information and instructions, connected, blended, and finally filled the pages of her brain with eternal black voidness...

Collective Minds returned to Egypt, to be re-buried under the pyramids, along with the masses, who had attempted once more to absorb into their dying Earth

one breath of freedom, only to give in again to the dark stillness of death...

At one spacetime, two years ago, Collective Minds was crossing the borders between the system's university of calculative-social education and the slum area where she continued dying; where the remnants of Beings continue on surviving to die, and grow into the machine- system... crossing the under-ground bridge between education to survive, and surviving to die... and she glimpsed him in this one eternal moment, with the brown eyes I evolved into her...

A young man, with the differentiated features of this Earthly spacetime, dark skin and eternally black wavy hair... covering his mammal body with the fabricated culture of humans in the early 21st century; blank black trousers, blank purple shirt. He was handing out advertisements for private tuition classes, given in an “entrepreneurial” office, in one rusty dark building amidst the endless above-ground rows of rusty dark buildings housing humans to die, before they move into the endless under-ground rows of rusty dark graves, when their share of above-ground oxygen ends...

The advertisements were for classes of Computer and English... see?! Computer and English will make you “marketable”, will make your “linked-in” profile neatly-polished for the CEO's of the business skyscrapers and bureaucratic governments... you will gain paper certifying your expertise in calculable technology and the cultural language of modern multi- national corporations, emanating from the West and following up from the East... why not add it with an MBA

too, all-in-one packet with 14-day trial free?! For the competition of “human resources” is rising with ruthlessness, as the “nature resources” have been done away with!

Some other classes advertised, provide this young rising generation of business-men and bureaucrats with the clues to cracking the exam papers of Thanawiya ‘Amma (the final Egyptian high school exam)! For this is the exam that state-society-family has determined for the children to prove that they have memorized enough, conformed enough, and erased enough of their innocence, to be given a prestigious clog position in the machine, perhaps as equal or a little bit higher in the pyramid than their fathers and grandfathers... for as you know, the pyramid has to rise in perpetual growth of production!

This young man... one of a million calculable others, surviving through advertising survival in the streets, handing out the ad slips, for perpetual hours of linear time under the burning Egyptian sun of Al-Juhannam, with the dark suffocating exhaust of the passing million cars, seeping through his ending share of oxygen... is he one of a million, or a million in one? In that moment of a glimpse I saw, looked into, his dark eyes; the darkness of this eternal moment of pain... his young dark eyes circled with red layers of exhausted perishing skin, dampened with the sweat of his body cells, that are functioning along through him, to keep on running the system’s machine of production ... but the dark eternity of his eyes revealed all the nonsensical pain of this surviving-growing universe...

Collective Minds did not stop by to communicate, to share and contemplate... she moved along, for she is surviving too within the system! She had an education

certification to get, to earn her clog position within the machine...!

“Though I sense a latent whirlwind of energy, I also sense a timeless stillness --- patiently waiting to explode into activity...”¹⁴ What is this beginning/ending point of explosion into existence/non-existence?! This Big Bang, the Great Flaring Forth, the point where my known/un-known border of present self-consciousness lies?

My cosmic spacetime exploded into expansion fourteen billion years ago, and five billion years ago, through my dark un-known mysterious feminine energy, I began to expand faster,¹⁵ right at the very spacetime in which my special Sun, with its seven planets and beautiful blue Earth, have re-birthed me inside my Milky Way Galaxy! Faster and faster and faster, into more complexity, intensity, dis-embeddedness, self-consciousness... from 12 billion years re-birthing into humungous galaxies of one out of a hundred thousand power density; to 10 billion years re-birthing into brilliant stars of two out of a ten thousand power density; to 5 billion years re-birthing into deserted planets, and my beautiful Earth, of 8 out of a thousand power density; to three billion years re-birthing into the lively cells and colorful plants covering my Earth, of 9 out of a hundred power density; to ten million years re-birthing into the multifarious bodies of flying, running, and crawling animals of two power density; to one million years of re-birthing into your human brain of 15 power density; to ten thousand years re-birthing into your

14 Anzaldua, Gloria, op.cit., p. 49.

15 Spier, Fred, Op.cit., p. 77.

cultures, technology, and civilizations of 50 power density¹⁶... to what?!

What is the beginning/ending point? Is it an eternal single moment of birth/death? Of ecstatic love, with the ultimate pain/beauty of finally reaching the point of my full self- consciousness, only to forget it all again, and explode/die/birth again, into billions of years of revelation toward that ultimate point of self-consciousness? Again and again and again.... for eternity?!

I have self-written my cosmic self-consciousness in this paper, because this is what I have found myself to reveal into, in this present spacetime, and I am still continuing on my story... It is like what Marge Piercy has said: “After all, memory changes. Our pasts constantly change... Remembering is like one of those old-fashioned black-and-white-tile floors: wherever I stand or sit, the tiles converge upon me. So our pasts always seem to lead us directly to our present choices. We turn and make a pattern of the chaos of our lives so that we belong exactly where we are. Everything is a prefiguring of our current loves and antipathies, work and faith. We compose a future that leads from where we believe we are at the moment. When the present changes, past and future change significantly with it.”¹⁷

This is what my identity past-into-present-into-future has self-written into this paper... in fact, strangely enough, even my self-writing has evolved with another radical event that happened in my life, right in the middle of me writing this paper! The

16 Spier, Fred, Op.cit., p. 57.
17 Piercy, Marge, op.cit., p. 2.

very event that has shackled my body, preventing it from going to the last class to give my long-sought-after presentation of myself to others! But my mind was not shackled, rather, with the severe ruthlessness of the imprisonment of my body, my mind exploded with more imaginative freedom to balance with the rage of body limitation. It is yet hard for me to share the story of this event, just as many other stories of my life's events, for the fear of shame still covers my existence... but the very intensity of this chaotic event, has somehow expressed itself through my words as I continued on writing this paper... and as I continue on self-revealing, my consciousness will continue on sharing...

I have chosen to tell my story through the fractal holons of what has become into my Being... this is why, in the beginning of the paper, I share my story of the Big Bang, the star that gives me my energy, the Earth and cells that give me my body, and the early ape-humans that give me my brain... then the city of my birth, Alexandria, and how it has connected between the various Axial Ages of human societal evolution, just as it is right now at the time I am born in it!

I do not say all the important events of my life, because there are so many. But I choose to weave between my earlier cosmic origins, some successive events of my life, and some self-reflections, because I prefer to blend into the major events of the cosmos, as well as the contemplations of my consciousness, rather than to just suffice with detailing the events of my life. I also choose to story-tell my life as a second person (the Universe – although I truly believe that the Universe and everyone in it is One!), to emphasize that I am just one single Cosmic Being, and that there are also

so many other stories of Cosmic Beings to tell – each story being the story of the Whole Universe, in One unique color-shade of its cosmos...

About the Author

My B.Sc. and M.Sc. are in the discipline of political science. I have been working also in the field of political and social research. However, my learning, revolutionary activism, and life experiences far transcends any limits reductionistically imposed by capitalist professionalism. I currently aim to redirect my path toward writing, learning, and healing with disadvantaged groups - especially children, to continue transforming our collective consciousness into a new de/civilization!

HUMAN HISTORY IN A HURRY: FROM THE BIRTH OF THE EARTH TO THE ACCELERATING ANTHROPOCENE

By David Bryson

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The long history of this work is in sync with a nice quote from Coleridge: “I should not think of devoting less than 20 years to an epic poem. Ten years to collect materials and warm my mind with universal science. I would be a tolerable mathematician...” and ends with “So would I write, haply not unhearing of that divine and nightly whispering voice, which speaks to mighty minds.” the “nightly whispering voice” is the voice of dreams, which is central to my lifetime science project, and also to the most famous poem by Coleridge – Kubla Khan – came to him in a dream

Charles Darwin appeared to me twice – the first time in a dream, in 1967, starring Darwin & Freud – from behind a tree I watch the two men (they don’t see me) – with his curl/uncurl index finger, the universal gesture for “come this way,” Darwin beckons Freud to follow him into what I perceive to be the Forests of Time – on a comfy clearing there are different mammals sleeping on the forest floor – a chimp, a lion, a giraffe, a zebra, and more - Darwin points to these with the same finger, Freud looks at the sleeping mammals, and then Darwin wags the same index finger at Freud, gently admonishing him for not considering mammalian sleep in his Interpretation of Dreams, published in 1900 – the Dreamer (me) awakes with this dream still alive and strong, and says to his friend “Freud can’t be right!” Mammals have been sleeping and dreaming for 100 million years – sleep must have an evolutionary function, something Freud never considered with his focus on human dreams in Victorian Vienna” – mammals are the first to dream and the first to learn with a capital L - fish, frogs, and lizards can’t learn much compared with a chimp or a wolf - I felt energized and inspired, the way a scientist often does when a new domain of inquiry falls into place – the big picture in front of me: mammalian learning and mammalian dreaming are part of the same evolutionary advance

my main contact with Freud was in medical school – if I did not have this, I suppose I would not have had the corrective dream replacing Freud with Darwin

I quite agree with Freud’s saying “an insight such as this falls to one’s lot but once in a lifetime” - his insight was about human mental activity below the level of awareness; mine was about cognitive evolution in mammals, and then, after intense reading and study, how non-evolutionary, non-genetic development of intellectual tools took daily human life away and beyond the Darwinian first principles of survival and reproduction

from that dream emerged a theory about the cybernetic function of primate sleep – published in the journal Perspectives in Biology and Medicine (University of Chicago Press, 1969) - I now refer to the published theory as the Circadian Theory of Learning (CTOL) - for chimps and toddlers there is Decisional Learning in the waking state, and Perceptual Learning during sleep – Decisional Learning is a pairing of each output selection and consequence of that particular choice of actions (press this bar and no reward happens, press the other bar and

get reward) Perceptual Learning is how the mammal's world is classified (friend, food, danger, harmless life form, etc) – Perceptual Learning pertains to input classification; Decisional Learning pertains to output action and result of action, favorable or unfavorable

a quote from Proust: “the real voyage of discovery consists not in seeking new landscapes but in having new eyes” - here Proust describes Perceptual Learning in artistic terms

inductive logic & other mental gymnastics in schooled adults makes dreaming unnecessary for routine thinking, but creative ideas and images often come from the dreams of artists and scientists – examples to follow – and it is likely that human dreams, before the onset of language and then civilizations, produced a utilitarian classification of their natural world

there is a comparison of the theory with “batch processing” - an activity associated with mainframe computers 50 years ago – after a bank closed for the day, its computer switched to a mode in which all the day's individual transactions are compiled and processed together overnight – the bank performs individual transactions when open for business (awake) and then shut its doors and collated the transactions by category (asleep and dreaming)

the computer team from AlphaGo won a head-to-head competition with the world's best Go player, Lee Sedol – several observers were amazed that the computer system seemed to be learning and getting better with no current input; “it is learning on its own!” - that is what happens during dreams – AI is the hottest subject in computer research, and the single biggest theoretical focus is trying to pry into the software and determine how it came up with a solution or a strategy not known to the AI scientists – it may be that certain insights are not explainable, akin to certain mathematical problems which are not computable – and because the memory apparatus of the mind is turned off during dreaming, making it theoretically difficult to reveal the road-map of a dream – great jazz musicians improvise notes over the chord structure of a tune, and it may be impossible for the brain to be in secretarial mode, recording each and every note, which improvising at maximum cortical capability – a jazz musician playing the same tune tonight as performed yesterday will have the same chord structure but not the same individual notes, and could not repeat the exact notes if asked to do so - are the non-simultaneous operations of the secretarial mode and the improvisational mode a fundamental roadblock for the future of AI?

the fabulous Indian mathematician Ramanujan, in 1914, sent a sample of his pioneering work in number theory to Professor Hardy at Cambridge – Hardy invited Ramanujan to sail from India to England, and in session-after session Hardy tried to have Ramanujan explain the mental architecture underlying his work – the best he could offer was to say that he woke up with the theorems “written on my tongue” - this must have been confusing for Hardy, but confirming for me – no reasonable person could doubt that during sleep, sometimes, the mind is ploughing hard in new fields

the Circadian Theory of Learning posits that the purpose of dreaming,

before civilizations started about 5000 years ago, was to improve categories of survival and reproduction— daily life for hunter-gatherers was focused on survival and reproduction, so nightly dreams are consequently directed and focused on the same

perceptual categories and perceptual frameworks are improved during “nature’s great second course” (Shakespeare) – this is usually hidden from memory - (the last dreams before awakening are much more likely to spill over into awareness than the first dreams of the night)

when asked why remembered dreams don’t seem to benefit the waking life of the dreamer, my response has been that since waking activities in the modern world no longer pertain to survival and reproduction, the evolutionary purpose of dreaming is no longer functional from Darwinian criteria

for nearly a century physicists and cosmologists have been trying to form a Grand Unification Theory – a GUT – which would reconcile the micro-world of particle physics with the macro-world of gravity and $E=MC^2$ – this opus presents the basis for a GUT of intelligence and learning, requiring a cognitive model which separates and also integrates sleeping and waking

the other time Darwin appeared, 10 years later...I was sitting one evening in my office, slightly stoned, and the image of CD appeared- he was standing, in heaven, on the top branch of his Tree of Life (illustration of tree in Darwin’s notebooks – this Tree is the only diagrammatic idea in his voluminous notes – with its trunk and branches it is a schematic for continuous evolution from the deep past to the more recent past) – CD died in 1882, and the 100 year anniversary of his death was a few years ahead – it was immediately apparent to me that my imagined CD was pondering the enormous changes that had taken place: 1882-1982 – a spontaneous bolus of words popped into my mind...

Out on a Limb, Darwin
Looking Down Upon His Species
And By Joving What a Remarkable New
Arrangement Nature is Now
Just a Cup of Tea Later

in geological time, a Century is a mere Cup of Tea

in 1972 I had read the Club of Rome report “The Limits to Growth” and immediately shifted my professional focus to designing a solar heated/appropriate technology health retreat in the southern Rockies which would combine personal health and world health – the report projects 5 variables several decades ahead– population, food production, industrialization, pollution, and consumption of non-renewable resources – and concludes that major actions are required to avoid ecological and economic collapse – global warming was not considered – (the first important public warning of global warming came from James Hansen in 1988) - the MIT computer programmed for the Club of Rome report (developed by MIT Professor Jay Forrester and named “System Dynamics”) indicated that within a few decades a studied variable will rather suddenly oscillate out of control - environmental scientists now

speak of tipping points as a deep general problem for the planet's future

Greta Thunberg, the wonderful Swedish teenager and climate activist, says humans now alive should be acting “as if our house is on fire” - nothing could be clearer than this – as David Attenborough says “We cannot be radical enough.”

September 2019 – the worldwide Climate Strike on September 20 was the largest public protest since the marches against (what I called) Irakattak in 2002 – Greta and Guardian columnist George Monbiot released a video in which they present a simple and inexpensive action towards the environmental emergency: Protect, Restore, Fund – Protect all trees, mangrove swamps, and sea grass as powerful carbon sinks – Restore the same wherever possible – Fund this initiative, which is inexpensive and labor intensive, yielding healthy employment with a purpose

September 2020 – the Living Planet Report 2020 reveals that there has been a 68% decline in mammals, birds, reptiles, amphibia & fish from 1970 to 2020 – viewing the charts in this comprehensive report is startling & dire – impossible to sugar-coat -

I recommend that readers of this opus access this report & ponder the future

the earth's population of insects is in drastic decline – the biggest cause is habitat loss due to intensive agriculture – the article published April 2019 by Francisco Sanchez-Bayo states that “if insect losses cannot be halted, this will have catastrophic consequences for both the planet's ecosystems and for the survival of mankind.”

October, 2020 – a new report shows that bird species which feed from insects on the floor of the Amazon rainforest are in major decline, because of drastic loss of the insects previously present

June, 2019: a report shows that the permafrost in the Canadian arctic is now melting at a rate that was not expected for another 70 years – what had been flat land “had dissolved into an undulating sea of hummocks – waste-deep depressions and ponds known as thermoklast - vegetation, once sparse, had begun to flourish in the shelter provided by the constant wind.”

July, 2019: the International Union for the Conservation of Nature has released (its “Red List”) thousands more of species in critical decline

August, 2019: a new report details how the earth's land is losing its ability to make enough food for everyone: “This is a perfect storm. Limited land, an expanding human population, all rapped up in a suffocating blanket of climate emergency. Earth has never felt smaller; its natural ecosystems never under such direct threat.”

every morning I read the online Guardian which usually has several new articles about the environmental emergency – the evidence is overwhelming

the story of earth, evolution, and humanity – Human History in a Hurry – is best conveyed as exponential rather than linear...

5x10⁹ - ~ 5 billion years – the birth of the earth
5x10⁸ – ~500,000,000 million years – the first fish, our vertebrate ancestors
5x10⁷ – ~50 million years -the first monkeys
5x10⁶ - ~5 million years – the first humans
5x10⁵ - ~500,000 years – the first babies with major brain growth after birth, prolonging infancy & dependency, and producing the huge human brain
5x10⁴ - ~50,000 years – the first human language – a guesstimate with no hard data
5x10³ - ~5000 years – the first cities, the first writing, permanent armies, top down/top dog hierarchies
5x10² - ~500 years – the hemispheres merge with the Voyages of Discovery, Columbus looks out & Copernicus looks up, the printing press and widespread reading, the Renaissance
5x10¹ - the last 50 years – the Anthropocene – there is global warming everywhere & global warring anywhere - for a planetary physician the entire biosphere is on the critical list – some argue that the Anthropocene began with the Industrial Revolution about 250 years ago – if I agree with this, then the last 50 years is the time of the Great Acceleration, described below

stated more telegraphically...
birth of the earth/first fish/first monkeys/first humans/first extended childhood resulting in the big brain biped/first language/first cities/modern world/anthropocene

the physical earth is a million times older than the first cities (~5 billion years vs ~5 thousand years) – the first language is a hundred times older than the modern world (~50 thousand years vs ~500 years) – the exponential time series offers many striking comparisons

99% of the history of non-human vertebrates occurs before the appearance of the first humans – 99% of the history of humans occurs before the first human language

Yale professor Jim Scott read an earlier version of this opus, and wrote “Your warp speed history takes my breath away.” his comment led me to conceive of several levels of warp speed, just as there are different levels of infinity...

(the use of the term Warp Speed here precedes its current political use regarding the rush to deliver coronavirus vaccine)

Warp Speed Level 1 – the exponential time line 5¹⁰^{9,8,7,6,5,4,3,2,1} described here

Warp Speed Level 2: the last 50 years, the Great Acceleration within the Anthropocene

Warp Speed Level 3: Current Climate Catastrophes

Warp Speed Level 4: The Coronavirus Pandemic

the Human History in a Hurry scale only fits for earth years, the time (365 earth days) it takes for one revolution of earth around the sun – it would not fit for a year on Venus (225 earth days) or a year on Mars (693 earth days) – the coincidence that the series is based on 5 and 10,

and also on earthtime, is striking – another coincidence – the presence of mysterious Dark Energy, discovered in 1998, is causing the entire universe to re-accelerate – when? the universe began its re-acceleration ~5 billion years ago, which is close to the time when our solar system and our planet came into existence – tell a 12 year old that the headline announcing the birth of the earth happens at approximately the same time as the universe re-accelerates, and interest in science may have Harry Potter potential – the student would also like the coincidence that the distance to Pluto – 4.67 billion miles – nearly matches the age of the earth – 4.56 billion years

my attraction to numerical coincidences regarding 5 and 10...there are exactly 5 perfect solids, and the average number of sides per solid is 10! ($4+6+8+12+20 = 50$; $50/5 = 10$) – I have been a huge fan of Kurt Vonnegut – in his book Timequake, he writes “that the rerun lasted 10 years is proof that there is a God, and that He is on the Decimal System. He has ten fingers and toes just as we do, and uses them when he does arithmetic.”

esoterically, the coefficients of Bode’s Law (which calculate the position and distance of the first seven planets and asteroid belt from the sun) can be expressed as $4+3 \times 2^{n-1}$ – so the coefficients $4+3+2+1 = 10$ – Bode’s Law has caused tortured headscratching from astronomers - it was Chris Corbally, an astronomer at the Vatican Observatory, who told me he was reminded of Bode’s Law by $5 \times 10^9, 8, 7, 6, 5, 4, 3, 2, 1$

distance is easier to visualize than duration – the distance to the moon is about 250,000 miles – the circumference of the earth is about 25,000 miles – so here is a concrete example of a 10-to-1 ratio – a reader of this opus can use this any time the exponential time scale is contemplated – the birth of the earth, 5×10^9 years ago, is ten times further back in time than the first fish, 5×10^8 years ago – now compare these two durations with the distance to the moon and the circumference of the earth – in both there is a 10-to-1 ratio

a feature of this time series is that I have added research reports and quotes to each category, as they appeared in the world of science – this makes Human History in a Hurry ideal for classroom use - along with the online Guardian, my most common source is the Science Times section of the NYTimes, appearing every Tuesday – (over these decades I have exchanged several dozen emails with Dennis Overbye, Editor of NYTimes Science which appears every Tuesday)

mathematicians are attracted to a sense of beauty and neatness in new ideas – the exponential narrative of $5 \times 10^9, 8, 7, 6, 5, 4, 3, 2, 1$ is neat and unique

about 25 years ago Sky & Telescope magazine announced a “Re-name the Big Bang Contest” - I thought my entry would win – The Emit Event – emit is from the Latin word emittere – to send out, to send forth – and emit is time spelled backwards

said by Dr Johnson - “a man will turn over half a library to make one book”

thus Human History in a Hurry is presented as a Backstory to the Anthropocene, the recent epoch is which humans are trashing our only home – the clever Earth Day poster: “there is no Planet B” -(Silicon Valley billionaires hope to send humans to Mars, but this offers no general solution whatsoever for the planetary problematique)

the first Earth Day was April 22, 1970 so the 50th Earth Day was April 22, 2020 – I could make the onset of the Great Acceleration as beginning on April 22, 1970 – while this is obviously arbitrary, there would have been popular global focus on the 50th Earth Day but Coronavirus took over Center-stage making Earth Day #50 a modest virtual event

my hope is that this exponential narrative provides an intellectual answer to what Timothy Morton calls “a traumatic loss of coordinates”

How accurate are these approximations? Robert Butler: “God cannot alter the past; but historians can”

all the times below are from Wikipedia

5 billion years for the birth of the earth – current 4.56

current 530,000,000 years for the first fish

current 55,000,000 for the first monkeys

current 6-7 million years for the first humans

current 500,000-600,000 years for the onset of huge post-natal brain growth

~50,000 years for the first human language – this is an educated guess– the first cave paintings were about 60,000 years ago, suggesting that the painters might be talking

~5,000 years ago for the Urban Revolution in Mesopotamia

~500 years ago - the Copernican revolution, the Voyages of Discovery, and a host of big changes in civilizations in both hemispheres – the navigable world is doubled in size and becomes round in fact as well as in theory

the last entry-~50 years for the Anthropocene, is the most arbitrary in the list – some nominate the Industrial Revolution in England, starting about 1760, with coal power as the kickoff - others say the Anthropocene began in 1945, with the first atom bomb in New Mexico followed by Hiroshima & Nagasaki – there is a radioactive footprint of these explosions – 1945 is 75 years ago

regardless of when we say the Anthropocene began, all graphs of human data agree that a “Great Acceleration” occurred about 50 years ago – all the graphs – for population, for oil and coal use, ocean acidification, deforestation, biodiversity deterioration such as the huge decline in insect populations, number of discarded plastic bottles, microplastics in the ocean and on the ocean floor, and more are pictured in a Planetary Dashboard in which the rapid rise of every item is mirrored in the rapid rise in all other dials, all shooting upwards in the last 50 years– coupled with fossil fuel revenues is widespread corruption amongst the oligarchs who receive the revenues

experts are now saying that the worst forecasts of several years ago are now being exceeded in damage to the biosphere – the Great

Acceleration is itself accelerating, and is the engine driving the escalating Anthropocene - climate scientist Christina Hulbe stated that “I’ve never been at a climate conference where people say ‘that happened slower than I thought it would’” - what has been called Global Warming is more accurately called Global Heating, or Climate Breakdown, or Climate Calamity, or Climate Chaos or Climate Crisis– the concept of a “tipping point” - where a more-or-less gradual process suddenly blasts upwards is now commonly entering discussions of the Anthropocene – the non-linear dynamics of tipping points has obviously made every projection for a single Anthropocene pathology far less damaging than what has actually happened – a Nature Climate Change report (November 2018) shows how pathological variables – such as warming and habitat loss and pollution interact with each other so that the actual harm is far worse than any single cause of biospheric damage – and the damage is more than what simple addition would suggest – the actual combined damage is multiplicative and exponential –

a positive feed back loop makes melting of polar ice self-accelerating – ice reflects the sun’s rays, dark sea water absorbs the heat rays – thus melting will accelerate the rate of more melting

December 2019 – the Greenland Ice Sheet is now melting 7 times the rate occurring in the 1990s – this is an explosion of meltwater

the Arctic tundra contains much methane, and when melting is substantial, it will release more and more methane into the air – methane is a much more powerful heat-trapping gas than CO2

ever more dire, a November, 2018 report: “Trajectories of the Earth System in the Anthropocene” indicates that past a certain threshold - “Hothouse Earth” - there will be continued warming even if remedial actions are completely enacted – this would be the tipping point to surpass all tipping points in the history of our planet – this is like cancer recurring with metastases resistant to further treatment, or the acute critical condition named sepsis, and which failure of multiple organ systems often leads to death

in his new book Paul Kingsnorth writes that humans have created “an all-consuming global industrial system which is effectively unstoppable; it will run on until it runs out” - I have said “the world is going to hell in a hundred handbaskets” also “we watch and worry as the world gets worse” - the planetary problematique contains a major disconnect between short-term national elections and continental/oceanic degradations

a United Nations report concludes that avoiding colossal damage requires transforming the world economy at a speed and scale that has no “historical precedent”

the total package of time has two components, which I have named Darwinian Dream and Darwinian Drama – the Dream focus makes sleep and dreaming co-important with the waking state; and the Drama is an exponential fast-track - Human History in a Hurry

these two components relate to the two motions of the earth: spin and orbit – the earth rotates/spins around its own axis causing night and

day, the evolutionary infrastructure of the Circadian Theory of Learning – and the earth orbits/revolves around the sun, once every year, which is the basis of 5⁹,8,7,6,5,4,3,2,1 – the exponential time series – I was tremendously pleased on realizing that Darwinian Dream and Darwinian Drama match the two motions described by Galileo

both the dream about Darwin & Freud and the poem about Darwin standing on the top branch of his schematic metaphor for a progressive growth & branching of evolution involve trees...the first occurred in the “forests of time” & and second on the top branch of his “Tree of Life” - I was a passive observer in both...no words are spoken
- two gifts for me from the transcendent importance of Charles Darwin by way of Galileo

William James: “Pragmatism provides a conceptual shorthand in which we write our reports of nature”

email to me from Kai Erikson, – Kurt, born in 1931, has been the pre-eminent expert on the sociology of disasters

“Dear David - I read your piece carefully and think it makes excellent sense. I have printed it out for further readings. With all warm wishes, Kai”

I had saved an article by Kai in which he argued against a permanent solution to nuclear waste – he said that in 50 years science will have devised a better solution, so it makes more sense now to put the waste in temporary holding sites with the expectation of improved storage technique in the future

another email is from Jan Zalasiewicz, who is Chairman, Anthropocene Working Group, made up of about 30 international scientists...”Dear David – Many Thanks for sending me that very neat construct – and with the inclusion of the Anthropocene it seems to be human history in an increasing hurry – all the best, Jan”

I have thought of Human History in a Hurry as a Genesis Update, a scientific creation story

a poem from Robert Penn Warren: “Tell me a story/In this century, and moment of mania/Tell me a story./ Make it a story of great distances and starlight./ The Name of the Story will be Time,/ But you must not pronounce its name./ Tell me a story of deep delight.”

also, over these decades I have fancied myself as the Einstein of Evolution...classical physics first had its Newton, and then contemporary physics had its Einstein – classical evolution first had its Darwin, and has been awaiting its “Einstein” - someone who would say that the theory of Natural Selection is robust & correct, but does not and cannot explain culture, which is not passed through the genes – Einstein does not contradict Newton, instead he reveals that Newton’s clockwork solar system with its linear speed & distances works fine for the planets and moons with our central sun, but these are superseded as the speed of light is approached, and colossal gravitational forces are present elsewhere in the universe– Einstein proved the curvature of space by

mass, which is now how gravity is explained - also, time slows down as the speed of light is approached, while Newton's clock is constant/linear on the earth's surface

so there is a logical niche for an Einstein of Evolution, and this opus claims itself as a nominee, because it encompasses all of Darwinian evolution plus non-Darwinian developments in the last 5000 years

in what follows, the Einstein of Evolution is a voice hidden from view

a favorite quote from Albert Einstein - "nature has not made a priority for us to discover its secrets" - so he utilized the "gedankenexperiment" - his mental experiments, taking place entirely in his mind, were a great help in arriving at his theory of relativity – I translated this stating that nature is characterized by Difficult Discoverability and Copious Comprehensibility – hard to figure out, but once done successfully, problem solution fits together like a puzzle solved – in many Nobel winning experiments, the scientist knows how the published experiment, called the "criterion experiment," would turn out before it was performed

Einstein's Special Relativity and General Relativity are beyond comprehensibility for the most minds – modern mathematics is now so arcane that specialists in one branch of math often cannot comprehend the work of specialists in another

(at the age of 26, I was the sole author of a research report published in the journal Science – fertilized mouse eggs implanting on filter paper and spreading across in 2 dimensions rather than the 3 dimensions of implantation in the uterus - "babies in bottles" run amuk – I could have launched a career in cell biology with this) – after more than a year searching for the eggs inside the chamber an expert at NIH showed me how to make the Millipore filter paper transparent – now when I stained the paper and looked at it with a microscope, I saw that the eggs had attached and embryonic cells were streaming away in all directions! This was the first time anyone had made the cells which were supposed to form a 3-D living mouse had been released to make a wild population of embryonic stem cells in 2-D, with no evolutionary guidance whatsoever

this quest for me about our earth in the waking world of action & events (Hegel labeled history as "daylight") and about the power of dreams been quite personal as well as academic – Levi-Strauss: "anthropology rejoins as one extreme the history of the world and at the other the history of myself, unveiling the shared motivations of one and the other at the same moment"

the combination of CTOL (Darwinian Dream) and the Exponential Time Series (Darwinian Drama – $5 \times 10^9, 8, 7, 6, 5, 4, 3, 2, 1$) - allows me to build a model of cognitive progress and differentiate between the cognitive capabilities of a dinosaur, a rat, a monkey, dolphins, the first bipeds/humans, homo sapiens before and after acquiring language, a scribe in ancient Mesopotamia, Euclid and Archimedes in ancient Greece, leading up to the minds of Galileo, of Darwin, and of Einstein – the cognitive power in each is a qualitative progressing, from dinosaurs to Einstein, and dreaming has supercharged the progress from the monkey-mind to my mind and yours – (it is with the first monkeys that Perceptual

Learning becomes robust)

reading Piaget taught me the difference between concrete thinking and abstract thinking, central to the struggle of the human mind to get beyond listing things - the minds of Mesopotamian scribes were attracted to lists – such as kinds of vegetables, a list of rulers, a roster of official titles – the mind confined to listing lacks the abstract skills (Euclid & Archimedes) required for scientific experiments (Galileo)

in concrete thinking the apple in front of me is more prominent, of higher informational significance, than the set of all apples; quite the reverse with abstract thinking (what Piaget calls formal operations) - now the apple in front of me is a special case of the set of all apples, which is the way the world actually exists – our dogs and cats are a special case of dogs and cats in general

Darwin's theory of evolution provides a comprehensive explanation and theoretical framework for all plants and all animals except for humans after the Urban Revolution 5000 yrs BP – near the end of Origin of Species he writes “much light will be shed on man and his history” - here Darwin intuitively feels that there are unique factors in the history of our special species, unlike the millions of other species on earth – his powerful intuition predicts that future scientists will pry open the non-Darwinian dynamics of human cultures and civilizations – this is exactly the focus of this work

the exponential time line combines two basic mathematical principles: approximation, and scaling – both are difficult for Artificial Intelligence (AI) to model – when we say “there were about a hundred in the audience” rather than “there were about 102 in the audience” you get the picture, but to a computer 102 is simply 2 more than 100 – scaling is the way astronomers and atomic physicists present their work, usually to a base of 10 or 100 – human pain, touch, brightness and loudness are also exponential rather than linear

my first schematization of time was based on 100 (centuries) rather than 10 (decades) as embodied here – I sent an early version to John Updike and he replied in a lovely postcard “Dear Dr Bryson – Thank you for your fascinating paper on the Anthropic Principle and your own schematization of time...I should have had your ideas at hand when I wrote Roger's Version” - in that novel Roger tries to use the main computer at his university to prove the existence of God

the exponential time series I sent to John Updike: Centuries^{5,4,3,2,1,0} – Centuries⁰ is 1 year, timed for the Millennium 2000-2001 – I said it was “a time whose idea has come”

at that time, to John Updike, I was embracing the Anthropic Principle, which considers physical constants (such as the Fine Structure Constant which is very close to 137, with no explanation for why it is 137 rather than 47 or 208) and with all such constants having to be exactly what they are, the whole kaboodle cannot be due to Chance, implying Design instead of Chance– I now reject the Anthropic Principle in favor of the other plausible explanation for how we got here: the Multiverse –

this holds that there were and are a zillion universes, budding off from a central core, therefore it is not hard to believe that one particular universe, ours, has all the dials set exactly to produce stars, galaxies, and our solar system

when Centuries¹, the 20th Century (what Barbara Tuchman called “the Terrible Twentieth”) was an element of the exponential series sent to John Updike, I presented a remarkable pair of opposites...the 20th Century was the last century in which a continent on earth was explored for the first time – Antarctica – and the 20th Century was also the first century in which an object away from earth in the solar system was directly explored for the first time – the moon

3 quotes from Alfred Wallace, who believed that a God must have stepped in, as a deus-ex-machina, to add special abilities to humans... Wallace, from his own biological field studies, came up with the notion of Natural Selection, and just like Darwin, this was triggered by reading Malthus, who stated that human populations grow exponentially, while food supply increase must remain linear rather than exponential – thus humans who are more skilled at living will live longer and reproduce more children than the weak and less skilled, by the brutal calculus of Malthus – whether or not this was actually true during the long prehistorical evolution of human beings depends on how helpful healthy humans were to crippled and impaired children and adults – archaeology reveals long life for some adults with all teeth missing, suggesting their food was first chewed by others

Wallace balked at explaining human refinements as part of Darwinian dynamics:

“I am one who believes that here is something in man which is infinite and which differs in nature as well as in degree from anything that is seen in the lower animals”

“I maintain that the theory of evolution does not account for any of the mental abilities of man. It does not account for our wonderful mathematical, musical or artistic faculties”

“the gulf which separates the ant from Newton, the ape from Shakespeare, the parrot from Isaiah, cannot be bridged by the struggle for existence”

if evolution cannot be the mechanism, the only other possibility that Wallace could imagine was God, designing and shaping the special case of humanity – I have another explanation – in current Artificial Intelligence (AI) research on learning employs neural nets and connectionist theory where activation of connections between “neurons” increases the strength of the connection - a current AI system, with many layers of connections, will make improvements which the AI scientists cannot examine and understand – thus the term “Black Box” for the model – we cannot see inside it to learn the details of its increasing ability to read CAT scans for brain bleeds or tumors, or how the AI system improves its ability to play the games of Go or chess – simulating m after each game of Go, the AI system revises its strategy based on winning or losing – remarkably, there is no need to program the system with any

rules...it starts from scratch making random moves, and after millions of games it can beat the best human player – a graph of improvement shows very rapid gains as the AI system gets going, and then starts to level off as it passes the Go skills of the best human

gather some thinkers together in Uruk (Mesopotamia) or Memphis (Egypt) give them food and shelter, stir gently and slowly, and they will eventually invent writing on walls and clay tablets

the “stirring gently” often took several millennia (there have been 5 million millennia since the birth of the earth)– I used to think, mistakenly, that the advance from subjective thinking in hunter/gatherers to objective thinking in the first cities, was like throwing a switch – reading Einstein taught me that modern scientific thinking required two breakthroughs – first, the rigorous mental gymnastics of Euclid and Archimedes in ~500 BC Greece, where abstract thinking prevails for the first time. and much more recently, the experimental savvy of a Galileo – the Scientific Method

for example, the Egyptian physician Imhotep, writing in 2625 BC, listed 48 cases of ailments and illnesses – no abstraction whatsoever was used to discuss similarities in the conditions – each stood alone – the proper treatment of a stab wound to the arm is distinct from a stab wound to the leg, even though the recommended actions are the same - Egyptian & Mesopotamian music had the same concrete character– each and every piece of music was presented without any abstraction as to style, form, instrumentation, etc – concrete thinking is as solid as concrete

Egyptian & Mesopotamian architects knew that a right-sided triangle with sides of 3,4, and 5 had the property of $3^2 + 4^2 = 5^2$, and used a tool based on 3,4, and 5 in their architectual plans – they even knew that $8^2 + 15^2 = 17^2$, but they did not generalize their knowledge into the Pythagorean theorem: $a^2 + b^2 = c^2$ – concrete knowledge, not the abstract knowledge which is now widely acquired in high school geometry where the teacher points out the essence of abstraction -this did not occur in the ancient world because concrete thinking takes care of daily business – abstract thinking is necessary for experimental science and for math, not necessary to build a bridge or a temple

I believe that Piaget did not realize that “formal operations” - abstract thinking/inductive logic – was not present in the teaching of children before simple aspects of scientific reasoning entered educational systems, especially Euclidean geometry

I also used to think that a bimodal AI system, divided between executing expert decisions and stopping this to improve input classification, was inherently superior to an AI system always in the same configuration – I now believe that the bimodal waking/sleeping model is a cognitive property of mammalian evolution but not a cognitive advantage for AI – a squirrel digging up a buried nut who is startled by a rustle in the nearby bushes has to make a quick decision whether to stop digging and dash to a tree – taking no chances, it usually flees - the decision to flee was either correct or unnecessary, and during the next sleep period the squirrel will improve its perception of danger – separating input improvements from real time events in the waking state has deep advantages...there is no time

urgency with danger looming – input classification is improved without any ongoing random noise from the environment – in summary: during the waking state the realm of purpose interacts with the arena of noise and camouflage, embedded in fluctuating opportunities and dangers; during sleep the realm of purpose is revised and improved, based on inductive analysis of the singular nuggets of learning in the previous waking state – by design, sleep yields better management of the next waking state – this is expressed in the folk wisdom of “sleep on it”

for the squirrel Topological perception, in which a doughnut is completely distinguished from a disc of the same size, is far more important than Euclidean perception, in which the difference between a circle and a rectangle is basic – for the squirrel a hole in a tree provides escape, and it matters not at all if the hole is more like a circle or more like a rectangle

THIS ENDS MY NOTES FOR THE “INTRODUCTION” - NOW APPEARS THE FIRST CHAPTER – $5 \times 10^9 = \sim 5$ BILLION YEARS, THE BIRTH OF THE EARTH

20 years ago it was not known if any other star besides our sunstar had planets – now, with the telescope Kepler in orbit and in action, more than 4000 exoplanets have been discovered – the star with the most planets has 7 in orbit around it, and many have just one planet, so our solar system with 9 planets is at the top of the list, so far - my bias, without any evidence, is that it is unlikely that any star, of the one billion trillion in the universe will have more than 9 planets – I say this from a deep love for our planet – amor mundi – and plead guilty for earthian chauvinism - I also tend to believe, much more strongly though again with zero evidence, that the only planet in the universe with high-tech & high math & high physics is the planet we are living on - if and when there is evidence of a second planet with intelligence equal to or beyond what humans possess, this would suggest that there are many more – one and only one intelligent planet is not unlikely; two and only two intelligent planets is very unlikely

the large number of planets in our solar system is probably due to the explosion of a star – supernova, about one light year away from the gas cloud surrounding the sun – the shock wave produced many protoplanets, which circled the early earth in erratic orbits before stabilizing with the current set of planets from Mercury outwards to Uranus and Neptune

about a 100 million years later, one, possibly several protoplanet(s) crashed into the early earth, tilting it (the circannual cycle of the seasons) and causing it to spin rapidly (the circadian cycle of night and day), and the extruded material from the crash formed our moon, which drifted away to its present location, and continues outward drift very slowly – a study (January 2019) indicates that most of the carbon and nitrogen on earth was delivered by the protoplanet crash 4.4 billion years ago

I was startled to read (December, 2018) that geologists have discovered a huge ecosystem of micro-organisms deep underground – estimated 15-23 billion tons – according to Karen Lloyd (University of Tennessee) “It’s like finding a whole new reservoir of life on earth. We are discovering

new types of life all the time. So much of life is within the Earth rather than on top of it.” this report from the Deep Carbon Observatory is akin to a “subterranean Galapagos” thriving beneath the biosphere

back above ground, seasonal & circadian evolution merge in hibernation – the grizzly bear enter its safe and warm den for a really long night

May 2020: new evidence that our sun, compared with other stars similar in size, is notably notably quiescent – over its ~11 year cycle of sunspots there is much less variation in magnetic eruptions – this could be a major factor in the origin and early evolution of life

the seasonal (circannual) cycle yields climate (summer vs winter), the circadian cycle yields weather (the forecast for today, tonight, and tomorrow)

the moon is doubly important to this story – in a mechanical sense, and in a cybernetic sense – our large moon is so big that it provides axial stability to earth – earth does not wobble more than few degrees in its tilt, making the cycle of the seasons stable throughout biological evolution – Mars tilts wildly on its axis – Venus, without a large moon, maintains a constant tilt because of proximity to the sun - to summarize, Mercury and Venus maintain axial status because of closeness to the sun; earth maintains axial status (tilt of about 23 degrees) because of its large moon, and the next planet, Mars, has no large moon and is far enough from the sun to be largely unaffected by the sun’s gravity, so the axis of Mars gyrates with inherent instability – this instability on Mars makes long-term evolution unlikely – a relatively constant geological environment of earth, for long durations between mass extinctions, provided the background conditions for multicellular evolution on our planet

because of the rapid alternation of dark & light on earth, due to impact which resulted in the moon, this rapid rotation led to the evolution of waking and sleeping – as a thought experiment, if the earth was in perpetual light, mammals would not have evolved sleeping and dreaming – this speculation belongs to the field of “alternate history” in which there is an attempt to develop a plausible story in which fundamental geological or historical events happen differently

the existence of the moon is responsible for both Circadian Metabolism, and Circadian Learning, every night and every day

as I look at the moon now, in 2020, I think back ~50 years ago, to 1969, when the Circadian Theory of Learning was published, coinciding with the first man stepping out of Apollo 11 on July 20, 1969

September, 2019 – a report adds a major event in evolutionary history – about 466 million years ago, ~40 million years after the Cambrian Explosion, a 93 mile wide asteroid collided with a large object between Mars and Jupiter, forming a massive dust cloud which took ~50,000 years to float down to earth, shading sunlight, and ~10,000 years later causing a worldwide ice age – this is known as the Great Ordovician Biodiversity Event (GOBE) -many new life forms appeared in the oceans

speculation about life outside our solar system usually holds that a planet with single-cell life is much more common than a planet with both unicellular life and multicellular life (what happens in the next chapter), and multicellular life is much more common than a planet whose beings are technologically sophisticated – Nobel Prize winner Dennis Gabor quipped that tech-equipped planets, in which the inhabitants surely have discovered atomic energy, may well blow themselves up before communicating outwards to other planets and other galaxies

what would intelligent alien life be like? Mortality? Mobility? Sex? Independent identity? Independent cognition? A genetic code in which mutations do occur rarely, and even more rarely, of benefit? Do they have infectious diseases? Cancer? Do they have a separate brain activity corresponding to sleep? In the War of the Worlds, H.G. Wells had his invading Martians always awake and attacking, night and day: “they do not sleep any more than the hearts of men sleep”

whether or not there exists another high-tech intelligence on another planet in the universe, it makes sense to me to parse this question into not very unlikely/very unlikely – that we are the only high-tech intelligence is not very unlikely – that there is a second high-tech intelligence, and only a second but no more among the billions of planets in the universe, is very unlikely – just us is possible, just us and only one other defies the logic of speculation – (I am repeating this point for emphasis)

I love what Wells said about his imagination at work: “like a great general in dreamland”

there is still no good and widely accepted theory and data for the origin of life – the first living cells could have been formed near oceanic volcanic vents – hyperthermic vents, with water temperature well over 200 degrees -another recent study suggests that land-based hot springs could have been the location where unicellular life got going - higher temperatures favor metabolic activity

a new area of molecular in genetics, which is contrasted with Watson & Crick discovering the genetic alphabet (in 1953), is TADs – Topological Associating Domains – portions of every chromosome are divided into manageable, law-abiding neighborhoods – breakdown of this separateness, in which enhancer genes from neighboring estates suddenly have access to genes they are not meant to accelerate, leading to various kinds of cancer – Watson-Crick is a helical model of genetic information which can be depicted in 2 dimensions; TADs are topological 3-dimensional arrangements of how genes work

it took several billion years for the first cellular life to develop a nucleus, and then there was a sudden increase in oxygen levels – the Great Oxidation Event – resulting from the proliferation of cyanobacteria/ blue-green algae which initiated photosynthesis -this set the stage for multicellular life forms, more than 500 million years ago

Professor E.O. Wilson has said that the two most amazing things about planet earth are biodiversity and the human mind – a brilliant observation

NOW COMES THE NEXT SEGMENT – $5 \times 10^8 = 500,000,000$ YEARS – THE CAMBRIAN EXPLOSION – THE FIRST FISH, OUR VERTEBRATE ANCESTORS

when the moon first formed, about 5 billion years BP, the impact from the protoplanet tilted the earth and set it into rapid rotation, the day and night cycle was about 6 hours – by 500,000,000 years BP, the rotation had slowed to about 24 hours, and has very very gradually slowed even further since then, as the moon now continues to inch away from earth – (literally: about an inch-and-a-half per year)

Human History in a Hurry factors out the world of plants – the biomass of plants on earth is about 100 times more than the total biomass of the animal world – and the biomass of domestic mammals swamps the total weight of mammals in the wild

the Last Universal Common Ancestor – LUCA – lived about 4 billion years BP, and marked the time when plant life and animal life separated

soon after the onset of life there is Circadian Metabolism, and ahead in our story is Circadian Learning

also missing from Human History in a Hurry is the entire world of invertebrates, such as insects and worms – there are more than a million species of invertebrates

the first creatures to eat the flesh of others were scavengers, feeding on dead bodies – then came predation, killing and eating – prey vs predator – and the evolutionary arms race was begun – Darwinian Offense vs Darwinian Defense – a non-stop saga with elaborate manifestations

from the first fish, evolved the four vertebrate categories of amphibians, then reptiles, then birds and mammals – coincidence: the total number of fish species, listed at 29,811, is almost exactly equal to the combined total of the 4 kinds of vertebrates which originated from the first fish – amphibians (6199), reptiles (8240) birds (9956) and mammals (5411) – these numbers are in flux...the discovery of new species is rare; the disappearance of existing species is increasingly more common – more than 300 species of mammals have become extinct in the Anthropocene – the 2018 World Wildlife Report states that human activities have wiped out 60% of mammals, birds, reptiles, amphibians, and fish since 1970 which this opus designates as the Anthropocene/Great Acceleraton – livestock and humans make up 96% of all the mammals now alive

July 2019: a new metastudy combining hundreds of reports shows that the speed of climate disruption is outstripping the capacity of many species to adapt to the disruption

can someone tell me why all of the vertebrate species are in the thousands, while the number of beetle species is several hundred thousand? some Victorian wag answered “because God has an inordinate love of beetles”

The scientific classification of vertebrates, by body characteristics and

how these emerge in evolutionary time, is a world unto itself, found in textbooks and museums – in contrast, another kind of classification comes from native fisherman who work with 3 questions...is it poisonous? If not poisonous, is it good to eat? If good to eat, what is the best way to catch it? objective classification vs lifeways classification

Cambrian “Explosion” has been called biology’s Big Bang – within a few millions years, nearly all body types appeared in the fossil record, including a very primitive jawless fish – the Wikipedia entry for the Cambrian Explosion is excellent

this section, from the first fish to the next section, the first monkeys, is the heart of Darwinian evolution – it is focused on body sizes, shapes, and structures, what textbooks teach and display as the story of evolution – when I studied Comparative Anatomy in college there was no categorical distinction between fish/amphibia/reptiles/rodents and primates - all are grouped together as vertebrates – and conveniently for biology students and teachers, the skeletal anatomy of a vertebrate does not change with death

a caveat to the Cambrian Explosion as Big Bang of evolutionary studies is discussed above – the Great Ordovician Biodiversity Event

reading the first edition of Darwin’s book, Alfred Newton wrote: “It came to me like the direct revelation of a higher power and I awoke the next morning with the consciousness that there was an end to the mystery in the simple phrase ‘Natural Selection’” - this “higher power” which came into consciousness on waking suggests a powerful dream had just occurred– Alfred Newton went on to become the first professor of Zoology at Cambridge

I have constantly stated that many big changes have nothing to do with Darwinian Evolution, which only works through the genes – it is misguided to think of the evolution of music, the evolution of machines, the evolution of female fashions, as if such occurrences were a continuation of Darwinian dynamics in human culture - instead, properly, it is the modernization of music, the modernization of machines, etc – the wonderful film critic Roger Ebert got it classically wrong: “I really believe that Darwin and his followers have more or less accounted for what we see open our eyes each day. I think this is miraculous, but my wife says I bore people with it.” here Roger Ebert thinks that Natural Selection and Darwinian Dynamics pertain to civilization as they do pertain to the natural world - the notion of “evolution” is so powerful, so seductive for superficial thought, that it is widely overused – another common confusion: memes neither evolve or replicate like genes - I reserve the word “evolution” to pertain only to Darwinian evolution, which in mammals starts with sperm, eggs, and then embryos, and the immediate and subsequent fate of each newborn – will it survive? Will it reproduce? the act of reproduction has two broad classes – males fight until a winner emerges, who then as king-of-the-hill mates with one or several females – the other class has the female choosing which male will mate with her, and this produces spectacular features in the appearance of the male, like the male peacock’s fan and the extraordinary dancing displays of birds-of-paradise

the concept of evolution as first set out in Darwin's Origin of Species is so intellectually enticing that it is applied where it does not belong, like the growth of democracies and technical innovations

Friedrich Engels also misplaced the significance of Darwinian evolution – at the London funeral of Karl Marx, Engels said “just as Darwin discovered the law of organic nature, Marx discovered the law of humanities” - there is no “law of humanities” - Human History in a Hurry claims that there are no first principles since the Urban Revolution began; civilization rumbles along by happenstance – Darwinian evolution does have first principles – Survival and Reproduction – so Engels was right in noting that what Darwin discovered is fully correct about the biological world, and he was wrong thinking that Marx had a comparable fix on human affairs

this misconception was continued – in 1929 Marxists proclaimed that Russia was the most evolved state, in which Marxism and Darwinism were fully blended

Engels is one of the few thinkers who devised an exponential aspect for history... starting with the 17th Century which Engels gave a speed of 1 (1x1), then the 18th Century speed was 4 (2x2), the 19th was 9 (3x3), and the 20th was 16 (4x4) – Engels had history accelerating every century since the modern world began, around 1500 AD – the exponentiation of human time – that Engels, quite on his own, came up with an exponential/non-linear schematization of time is a testament to his original intelligence

I also explain happenstance by contrasting dissimilar non-humans with dissimilar humans – the structures and strategies of fish in a coral reef and very different from those of insects and reptiles in a tropical rain forest, yet these differences are commensurable, you can map the sensory organs of a fish to those of an insect – in contrast, it is quite impossible to map the traits of Mandarins in imperial China or the pharaohs in Egypt with the traits and daily activities of a London banker – nearly all of the non-human features in the animal kingdom are explainable in terms of survival and reproduction and are therefore commensurable/mappable one-to-the-other – the structure of eye(s) is widely dissimilar, yet the eye of a fly and that of an octopus have the same essential function, converting light rays into useful categories of ongoing existence

a strong example of happenstance as central to history is the start of world war in 1914 – because the driver of Archduke Franz Ferdinand took a wrong turn in Sarajevo, Gavrilo Princip was able to shoot and kill the Archduke and his wife, and very shortly the trains in Europe were filled with soldiers heading into massive military mayhem – a wrong turn changed the 20th Century – as a soldier in the Great War Hitler escaped sudden death several times

Darwinian Evolution is 100% genetic and 100% inter-generational – (the topics of phenotypic cloning and epigenetics complicate the science, but not its bedrock essence)

a remarkable twist on the twin Darwinian forces of Survival & Reproduction – there is a rodent-like marsupial in Australia for which a

male gains as much weight as possible up until it is a year old, and then for a one month period it seeks and mates with females non-stop, and then drops dead from stress and organ failure – here the urge to merge swamps the urge to survive

in the modern world, natural selection no longer is the basis for human survival & reproduction – there are no longer isolated populations of humans to evolve independently, an essential requirement for speciation - modern medicine keeps alive Type 1 (lack of insulin) diabetes – the bad luck or good luck of the cultural status of parents swamps the genetic heritage of babies everywhere, except for the unfortunate babies who are born with a profound genetic malfunction (such as retinoblastoma – a tumor that expands from the back of the eye into the brain) – science fiction has suggested that post-apocalyptic survival might be in the form of polar cities – perhaps one in the Arctic and another in Antarctica – in the scenario of polar cities the inhabitants still remain Homo Sapiens, the latest and last in our line – the conditions necessary for speciation cannot occur when there is no possibility of physical separation – this reminds me of the impossibility of life on earth originating again – as soon as some new life form appears it will be eaten by existing microbes and macrobes

luck, rather than Darwinian dynamics, is also a big deal in the catastrophic extinctions that occurred 5 times (or 6 times, counting the current sudden acceleration of extinctions in the Anthropocene) – the demise of the dinosaurs 66 million years ago is the most famous mass extinction event

the great evolutionary thinker Steven J Gould taught me 3 principles: 1) the huge importance of contingency in evolution - wind the reel of evolution backwards to the Cambrian Explosion, start the movie again, and this time maybe the little first fish would not have made the cut, thus no vertebrates, no us – 2) Gould distinguished between Diversity and Disparity – Diversity is the many types of parrots, Disparity is the big difference between whales and dragonflies – and 3) Gould believed that unlike the steady & slow march of evolution suggested by Darwin, instead evolution proceeds by “punctuated equilibrium” - not much species change for several tens of thousands of years, and then a relatively sudden change in the structure of molluscs or the fins of fish

some have called Darwin’s theory “the greatest idea ever” - so great that Karl Popper first thought it was beyond proof or refutability, calling it “a metaphysical research program” – later, he changed his mind – if archaeologists found dinosaur bones nearer to the surface than human bones, then dinos would be more recent than humans – this has never happened, and never will

thanks to Karl Popper, I have transplanted his “metaphysical research program” to this opus in that the Circadian Theory of Learning is far more pervasive than any single or group of experiments can validate and become incorporated into the book of theoretical neuroscience

my Darwin/Freud dream might be the greatest dream ever, in that it is a meta-dream about dreaming itself, and it led to what may be the most important theory in the history of cognitive science, if it can be broadly

proved – full rejection of the theory would be if the circadian cycle of waking and sleeping is essentially unrelated to learning – when I have written “the most important theory...” I have added “with the caveat that there have not really been any great theories in cognitive science” (as opposed to great theories in physics or cosmology) - any nominations for a great theory in cognitive science? The only nominee I can think of is the Game Theory of John von Neumann

the “greatest dream ever” was a one-off for me – never again did I have a dream linked to a significant scientific breakthrough – at the other extreme is the Indian number theorist Ramanujan...Professor Hardy invited him to Cambridge hoping to access his secret – the best Ramanujan could offer was that he dreamed about a childhood female icon, and he awoke with the theorems “written on my tongue” by goddess Namagiri – I have used the example of Ramanujan to show that cognitive insights are not necessarily explainable – to record the details of a dream while the dream is unfolding would interfere with dream development and staging – and dreaming is more visual than verbal – I suspect that this restriction, that improvisation prohibits a writable record, pertains to AI insights as well

I imagine Ramanujan thinking and writing his equations while awake, and then exploring numerical patterns from his waking work in his dreams – metaphorically, the blackboard at night

my favorite example of dream-based creativity comes from Robert Louis Stevenson, who explained that during his dreams his “little people” would assemble on a stage and literally act out the next chapter, enabling Stevenson to pick up and continue the story the next morning – yesterday he finished Chapter 7, and tonight his dreams set the state for Chapter 8 -he referred to these friends as “my Brownies– I love my Brownies”

it has brought tears to me when reading the epitaph Stevenson wrote for himself, displayed on his favorite hill in Samoa

Under the wide and starry sky
Dig the grave and let me lie
Glad did I live and gladly die
And I laid me down with a will

This be the verse you grave for me
Here he lies where he long'd to be
Home is the sailor, home from the sea
And the hunter home from the hill

Stevenson also reported that the idea for Dr Jekyll and Mr Hyde came to him in a dream

when Darwin's book hit Victorian sensibilities, it caused considerable distress...two Victorian ladies at tea, and one says “my dear, I pray that what Darwin tells us about our heritage involving hairy apes is not true, but if it is true, I pray that this does not become widely known”

the first insects appeared about 480 million BP (before present) and then

insects went on to evolve wings and flight about 400 million BP

some kind of fish crawled out of water onto land to become the first amphibian – it was already equipped with a bony skeleton, kidneys, and lungs, essential for life on land – this suite of traits was present because of happenstance rather than on purpose – evolutionary adaptations and advantages are never on purpose – by about 380 million years BP fish had bones to regulate calcium metabolism, kidneys to regulate salt/sodium, and lungs to provide more oxygen in murky waters – the first amphibian was lucky to be so endowed, enabling the move from water to land – evolution is happenstance, no plan is followed

dinosaurs get a bad rap – dino predators are all claws & jaws – the study of some dino eggs, all laid together in a special space implies that some dino mothers protected their offspring, and they are nicknamed myosaurs – maybe they grew up to travel as a family

I am amazed by the research on spider evolution – one mutation which greatly improved web structure led to a 37-fold increase in species – we are the opposite: one special species dominating the biosphere

extreme niche specification is the hallmark of Darwinian evolution – the antbird follows the trail of leaf-cutter ants, living entirely on tiny scraps left in the trail

in contrast, the hallmark in the evolution of humans is adaptability rather than specialization

NEXT CHAPTER – THE FIRST MONKEYS, $5 \times 10^7 = 50$ MILLION YEARS BP

the Cambrian Explosion of multicellular body types in the ocean, ~500 million years ago, was sudden and non-trended – the same can be said about the rise of primates, including monkeys, ~50 million years ago – this could not have happened without the famous asteroid which crashed into the Yucatan peninsula 66 million years ago, and knocked out all the dinos (with the exception of the feathered dinos, which evolve into birds) – the asteroid set forests on fire leading to a wipe-out of flying birds which need branches to nest and launch – land-dwelling birds remained, and then evolved in flying birds for the second time

the story in the preceding chapter, most of which is before the first mammals, has the brain in the service of the body- look at a fish or a lizard, and consider that the smallish brain at the front end, near eyes and mouth, works to avoid danger, eat, and find mates -the front end of a fish or a lizard is equipped for sight, for sound, for smell– from a cybernetic perspective, in a chimp, the body is in the service of the brain – in the chimp brain, executive decisions are made, and a record of these decisions is kept – the body of a chimp follows orders from its brain -there is no comparable executive system in a fish – so before the first monkeys the brain is in service of the body, and from monkeys onward in evolution the body is in the service of the brain – a cybernetic flip-flop - in dinos the biggest body is twice the size of the second biggest, with the evolution of monkeys all the way to modern humans, it is the brain which greatly grows in size, not the body

in cichlid fish, if the dominant male dies or disappears, another male takes over - dominance is expressed by a rapid increase in the size of a particular male fish – here it is the body and not the brain that is the basis of survival and reproduction

there is another flip-flop with the rise of mammals – instead of having to dodge the dinos, mammals slept during daylight and were active during the dark, when the dinos were off-duty – when the dinos disappeared, some mammals, and all monkeys but one (the night monkey of South America), became diurnal rather than nocturnal– rodents and other early mammals remained nocturnal demonstrating the essential conservative essence of evolution – even without any dinos, rodents were so well adapted to nightly activity that they remained nocturnal – the first monkeys, 50 million years BP, were a new evolutionary type, and “jumped” at the opportunity to be active in daylight – New World monkeys have prehensile tails, a highly adaptive appendage for coursing through the trees – isn’t it remarkable that a single evolutionary upgrade – the prehensile tail, once it appeared in the first monkeys in the New World became embedded in all descendants? this is like an evolutionary event in spiders described above – a single mutation yielding improved web characteristics led to a 37-fold in the number of spider species

the major role of sleep in mammalian learning is paired with another great advance in mammals: milk production and nursing of infants – the transfer of high nutrition via breast feeding powered especially the growth of the brain

Science Headline: April, 2019 – an actual photograph of a Black Hole was released and made headlines around the world – this Black Hole is 55 million light years from earth, so light reaching us from the photographed Black Hole originated at about the same time as the first monkeys began to evolve

over these decades since the cybernetic/circadian theory of learning was published, I have learned a lot – below I compare what I thought in the 20th Century, and what I now think in the 21st

20th – the 1969 theory presents a “prototype mammal” which could be either a mouse or a chimp – (the theory does note that a young primate plays a lot more than a young rodent, and play maximizes decision-making for the grist of sleep)

21st – the role of REM (Rapid Eye Movement) sleep in rodents is more about cementing into memory important events in the previous waking state, such as the correct sequence of left/right turns in a maze – Matt Wilson of MIT has elegant evidence of a mouse replaying the exact maze sequence in sleeping – a striking fact of this research is that the maze sequence during sleep is played exactly backwards – (last in, first out) – this experimental finding makes any theories about the purpose of sleep which overlooks the role of sleep in mammalian learning is highly deficient and trivial in significance

marmots in the French Alps know every nook & cranny in their territory, this map is a result of consolidation during sleep, memorizing a

3-dimensional maze – I speculate that dinos did not know this rock from that rock

the demonstration of problem-solving in chimps, requiring more than a single day, gives the chimp a clear and uncluttered opportunity to dream up the solution before the experiment resumes the next day – I picture Perceptual Learning as if the brain has a blackboard in which all the separate decisional clusters of the previous state are written on this blackboard, and inductive analysis of the decisions, by looking at them all at once as a group, back and forth, may yield a major new possibility, or tailor an existing input category – sleep provides better management of the next waking state – the better the perception, the less the need for individual decisions

20th – the theory is about a single prototype mammal, a rodent learning a maze or a chimp solving a problem – most of the experiments in the science journals studied training/learning in individuals – these experiments studied learning as represented in a logical schemata, divorced from emotional pleasure or emotional negativity

21st -I have since shifted to the importance of social learning – so my imaginary chimps are dreaming about the shifting allegiances– who currently are friends and who are foes in the troop, and how the social interactions from the previous waking state may be different tomorrow, after they wake up – chimps & humans have mirror neurons, so learning is possible by watching what actions others perform – mirror neurons are a graduation from all learning in mammals being a result of some body movement – probing, jumping, running, twisting etc – picture a male baboon, yawning and displaying his huge canines, which causes a young male nearby to turn away and retreat - then another male takes its place – the rank in the pecking order of male baboons gets new data, as it does also for other baboons observing from the sidelines - all 3 male baboons dream about this episode of fluctuating status

(I have privately noted the daily categories of friend, family, food, foe, and fucking)

rhesus monkeys have extremely complex hierarchical relationships which vary with current environmental ambiance – lower ranks do just fine when there is plenty to eat – a similar situation in the first humans in New Zealand who arrived about 1000 AD – no conflict as long as food was plentiful, then when the resource ceiling was exceeded came warfare between tribes, hacking at each other with superhard jade and adze weapons

hunting behavior in mammalian predators is taught by mother – young baboons and young kittens are taught how to capture and kill – a mother otter grabs young by the neck and initiates the first swimming lesson – then the young otter dreams about mother's tutorial and greet the next day eager for the a repeat swimming lesson

there are no dream reports from non-human mammals, but a huge body of research links sleeping, especially dreaming, to learning – the richer the stimuli in the mise-en-scene provided by human observers, the more decisions are made during the waking state – there are thousands

of reports in the science journals – a typical research shows that an enriched environment, causing more waking decisions, is followed by increased REM time in the next sleep - a 30-second video clip of a baby Japanese macaque during sleep looks like it is punctuated by smiling – the pleasure of learning during dreams in the unspoiled world of nature (as I rhapsodize about REM in early life)

many dog lovers have wondered if the uncoordinated running motions of a dog sleeping in front of the fireplace are associated with the dog dreaming about chasing a rabbit or a cat, which I think is correct

the time since the first monkeys is 1% of time since the birth of the earth – 50 million years is 1% of 5 billion years, so the story of brains and Perceptual Learning is just the last 1% of the story of earth

the time since the first monkeys is the time in which the evolution of brains became more significant, more novel, than the evolution of bodies – while the brain was quickly evolving, in some species the vertebral column of the body skeleton became simpler in its architecture rather than more complex – vestigial hind legs are still present in whales – this encouraged me to separate the evolution of the vertebrate body from the evolution of the primate brain, as distinctive eras in Human History in a Hurry – that the largest dino is twice as big as the second in size suggests that the evolution of dinos is more about bodies than about brains

20th – I used to believe that there is not much learning in non-mammalian vertebrates

21st – now I am amazed at the learning abilities of crows and monitor lizards - also the octopus and cuttlefish – but in general, like the elaborate pre-coital dancing/displaying rituals in lizards, this is genetic and rule-based rather than learned – the songs of many birds are a mix of genetics and learning – the smartest birds can solve mechanical access to rewards quickly -I now think that the brains of non-mammalian vertebrates that have strong learning capabilities have brains organized quite differently than the circadian system central to this document

20th – in formulating the Circadian Theory of Learning, I was biased in thinking that a bimodal system of learning was better, not only for living mammals, but also for AI – Geoffrey Hinton, 25 years ago, built neural net systems which had a waking phase & a sleeping phase, to study the possibility that a biphasic waking/sleeping system might improve overall performance

21st – Geoff now builds AI models with Google, and his “Deep Learning” has no longer has waking/sleeping bimodal operation - it now has many more layers than his first neural nets– a powerful digital computer can now simulate anything – it can simulate an analog computer, it can simulate a bimodal AI system without itself being bimodal in operation - however, I think that a computation-based AI system cannot simulate human intuition – intuition is not and cannot be rule-based – any informational system which is completely rule-based cannot, by definition, be intuitive – a distant possibility for the future of AI: if and when AI can properly simulate dreaming in humans, the cognitive magic of intuition will be in view – I vacillate between thinking

that AI, in theory, can model the Circadian Theory of Learning, and thinking that this is impossible

I have come to picture “Free Will” as something which humans experience, whether or not it is an objective reality (impossible to prove or disprove) – the subjective experience of free will is related to circadian dreaming, because dreams interrupt the linearity of previous waking states – one damn thing after another – if it is true that the experience of Free Will is a consequence of rich dreaming, it follows that creative minds experience more Free Will than rigid minds – the subjective experience of Free Will is not something you have or lack – it is matter of degrees of freedom

20th – I disregarded the major learning differences between chimps & cetacea (dophins & whales) – about 50 million years BP some land-based mammals returned to the sea, no longer being patrolled by aquatic dinos hunting for their next meal

21st – now I can explain what happened – unlike mammals on land, dolphins cannot turn off their movements and sleep at rest – they must continually swim to the surface to breathe – following quote from Maps of the Mind: “At first the trainer rewards the dolphin for specific behavior, such as flipping its tail or doing a back-roll. Then suddenly, the pattern of reinforcement ceases and the dolphin is rewarded only for new behavior, that is, tricks not performed with the trainer before. The investigators were asking, in effect, can the dolphin recognize a class of behaviors called ‘new’? The short answer is yes. The dolphin may be bewildered for as much as half an hour as the repetition of each trick goes unrewarded, but then it appears to understand what is required, and goes into an amazingly rich repertoire of elaborations, constantly producing new variations of behavior.”

note that the dolphin took 30 minutes for eureka to manifest, in contrast with chimps who never solve a novel problem on the first day – the dolphin brain is always in waking mode, does not dream, and has no separate brain phase for seeing the world differently – because they need to swim and breathe at the water’s surface, they cannot turn off the motor/muscular system, a central essence of sleep – as is often the case, a simple distinction has complicated aspects ...it may be that dophins “sleep” with one hemisphere awake and the other hemisphere off-line

studying the sounds of bottle-nose dolphins, and recording their squeaks, whistles, barks and clicks, seems like an orchestra tuning-up – this continues until convergence of sounds attain a single pitch, a unanimous vote, and then the pod swims off together to hunt for fish -there is no “free will” in an individual dolphin - it is a corporate brain – it is groupthink – contrast with lethal hunting amongst chimps – first the adult males groom each other, then the alpha male signals “follow me” and other males proceed in single file, searching for a male isolated from another troop to murder, hoping to increase size of home territory – the alpha male’s decision is his alone – free will on a limited basis

in a lethal hunt the hunters do not eat the murdered male – instead they rip off the face and genitals – total contrast from chimps hunting colobus monkeys for food and sexual bribery

in a lab setting two dolphins need to cooperate to open a box with food inside – computer analysis reveals that their back-and-forth communication contains syntax, a purposeful conversation in real time, which Chomsky believes is a special aspect of human language

underwater videos of dolphins show incessant curiosity

I learned that echidna, an early/primitive/egg-laying mammal, branched off the tree of evolution before the appearance of REM, about 150 million BP – echidna lack the efficiencies of parsing Output Learning (Decisional Learning) in the waking state, and Input Learning (Perceptual Learning) during sleep – because of this, the frontal cortex of Echidna is quite large, even though their behavior is primitive compared to a rat or a mouse – the echidna must do two things at once: react to a new environmental stimulus based on previous experience, and at the same time update the input classification system to take note of whatever is new at the same time it is reacting to the danger or opportunity - the egg-laying echidna must tend to “what is it?” and “what to do about it?” at the same time

the brilliant dolphin does not dream; the dullard echidna does not dream - echidna lacks creative skills, dolphins are terrific performers - nature is complicated and there is nearly always an exception. or multiple exceptions, to simple generalities – I submit that cetaceans excel without primate-type dreaming because cetacean family have a cerebral cortex ever bigger, based on body weight, than do humans – both the first monkeys and the first cetaceans appeared ~50 million years ago, marking the brainbranch of evolution

20th – whatever animal I was considering, I assumed that all animals have a single brain

21st – I have since learned that the human gut can be pictured as a second brain – when you suddenly see something scary, or disgusting, the visual signal shoots down to your stomach and intestines, where nerve cells quickly churn with activity – this activity from your gut shoots a message back up to your brain, and you feel sick and your arm hairs stand on end – emotional states are connected to the digestive system, and no AI system, lacking a living body, can mimic your second/emotional brain - call me as soon as an AI system vomits or has loose bowels – AI can simulate feelings in terms of linguistic output, but has no equivalent status for a bona fide gut feeling - an AI system with linguistic capabilities can say “I am scared” but cannot truly feel scared

actual feelings require that a living body is connected to computational headquarters -

poets distinguished between thoughts in the head and feelings in the heart, which are experienced as real pain– Artificial Intelligence is contrasted with Natural Intelligence, which is a composite of thinking/feeling/dreaming

in addition to the centrality of intestinal neurons in the generation of emotions, it has been clearly established that the human heart can be damaged by negative emotions -

this “broken heart syndrome” occurs almost entirely in women

the categorical difference between thinking and feeling is expressed by John Stuart Mill (1806 – 1873) who was kept home and rigorously schooled in Greek, Latin, classical poetry, etc. - when he reached the age of 20 he realized his pervasive depression was caused by “precocious and premature analysis” that was devoid of “the very culture of the feelings”

20th – the 1969 theory posits that the prototype mammal, when awake, is either making a decision or executing a decision

21st – I subsequently learned that many animals, both mammals and non-mammals, may simply “sit at rest” while awake – this trait varies widely in percentage – some hang out/chill a lot while others are nearly always busy

it is also true that higher vertebrates can perform behaviors that cannot be justified in terms of survival and reproduction – the cockatoo Snowball dances to rock music with 14 different moves – rats love to play hide-and-seek in cages built for this game – both Snowball & the playful rats are exhibiting behaviors that have no counterpart in nature – it is possible to extract actions from a healthy brain that never occur in the Darwinian world

20th – focusing on the individual creature, I considered that survival and reproduction of that creature is entirely dependent on random genetic improvements – this overlooks mass extinctions, which can have more to do with luck than with the DNA of the survivor or the victim

about 25 years ago I had an extensive email exchange with famous philosopher David Chalmers – David is known for his focus on the “hard problem” of AI – the presence of “qualia” in human consciousness – teach a blind-from-birth scientist everything about the color red – its wave length, its emotional correlates, and the blind scientist still lacks the primal experience of seeing a red rose, a red crayon -I agreed with him about this – David also plumped for the theoretical existence of “zombies” - androids who look like and act like humans but differ from humans in having no inner experience of what they are doing/seeing/thinking – David imagines that if such creatures existed, we humans could not tell that the zombies were non-human - I told David that his zombies do not sleep and dream, and if they did dream, they would be human rather than zombies

a few years later I found the following statement from David Chalmers: “for an account of sleep and wakefulness, an appropriate neurophysiological account for an organism’s contrasting behavior in these states will suffice” - obviously David discounts any possible role for dreams in cybernetic, existential, or philosophical considerations

another major disagreement between me and an often-quoted contention that the purpose of dreaming is to forget/erase trivia of the previous waking state – it is true that computers do not dream and do not forget – in my model routine waking activities, such as an adult monkey peeling a banana, are not recorded at all – there is no sequential decision-making once you know how to tie your shoelaces – studies of human memory show that routinely, it is the “when” and the “where” that becomes

deleted (during dreaming, according to Circadian Theory of Learning) – in class you read and discuss the assassination of Julius Caesar -you remember a snapshot of the scene in the Forum, but exactly where you were when you learned this, and what day of the week it was, is not kept in longterm memory – some idiot savants can accurately name the day and the place in which a simple fact was learned – a very puzzling attribute of the range of human cognition – a perfect photographic memory in an idiot savant is deficient in perceptual learning and abstract thought – there is a British savant who can perfectly translate into 16 languages, but cannot express the meaning of the sentences and paragraphs

in 1983 Francis Crick (of Watson & Crick) proposed that the purpose of dreaming is to intentionally forget non-essential memories of the previous waking state – the Circadian Theory of Learning, instead, proposes that forgetting where and when something occurred is an indirect consequence of Decisional Learning while awake feeding into Perceptual Learning during sleep - a more sophisticated and subtle explanation of the tendency to forget the linear details of memory, rather than a crude dump of daily details

20th – no non-genetic capabilities of parents are passed on to offspring

21st – phenotypic cloning – a mother mouse teaches her pups how to open a difficult nut – more of these young mice survive, have more offspring, and so grandmother's genes are more represented in further generations – a dolphin mother teaches her young to hold a sponge in mouth to prevent injury while hunting on the ocean floor

starting in 1967, I was hour-after-hour, day-after-day deep within the stacks of the new National Library of Medicine (Bethesda) and as I perused the scientific journals it seemed that mammalian learning can be divided into two main categories – stimulus/response learning in rodents, and gestalt learning, best found in chimps – long after publication of the theory I came across this quote from Bertrand Russell: “One may say broadly that all animals that have been carefully observed have behaved so as to confirm the philosophy in which the observer believed before his observation began. Nay, more, they have displayed the national characteristics of the observer. Animals studied by Americans rush about frantically, with an incredible display of bustle and pep, and at last achieve the desired result by chance. Animals observed by Germans sit still and think, and at last evolve the solution out of their inner consciousness”

Russell is not quite right – rats getting shocked often display “one trial learning” - no need to sleep for a single case of important Decisional Learning to take hold – a 2 year old toddler touches a red hot stove, and does not need to do it again to associate the hot stove with sudden pain – evolution has baked into the mammalian brain one-trial learning so that dangerous and painful events are unlikely to be repeated

working with chimps, the data is Kohler's reports revealed that it took more than one day to solve the problem - bananas outside the cage could not be reached with arm length, but could if a nearby stick was used as an extension of the arm – bananas hanging from the top of the cage

could not be reached, but could if boxes inside the cage were stacked up – in studying these Gestalt solutions, Kohler did not consider intervening sleep and key to success, even though the chimps were stymied on the first day – not a single chimp solved the problem when it was first presented

REM (Rapid Eye Movements) was discovered by watching newborns in a Chicago hospital - beneath closed eyelids both eyes had episodes of pronounced flickering – shortly after this REM was associated with dreaming in adults – EEGs showed that most mammals had REM periods during sleep – so why didn't some cognitive scientist ponder that REM could be a part of learning? Skinnerian Learning during the waking state (decisions are made, the result is recorded, no sleep required to get the reward multiple times the first day) – Gestalt Learning during sleep – (the solution is dreamed up, and a new perceptual category is formed or modified before waking)

two reasons why I was the first to lay out a comprehensive theory in which stimulus-response learning is correct but not comprehensive - first, because during sleep the individual decisional clusters from the previous waking state are laid out on a mental blackboard and examined for possible similarities or differences, leading to improvements in perceptual categories during sleep – if a professor of psychology were to entertain this thought he/she would quickly dismiss it, because he or she is armed with inductive logic and in general does not need sleep to solve a problem of logic or inference – and to welcome the Circadian Theory of Learning into the professor's mind would require a complete makeover of his/her models of cognition and learning – to change from a waking-world-only model of cognition to a model which integrates waking with sleeping, thinking with dreaming, requires a profound paradigm shift – a good example is that of continental drift, as first proposed by Alfred Wegener in 1912 -

it was many decades before this obviously true theory made it into geology textbooks

a second reason is conjectural –devotees of Freud hijacked dreams away from science and into the human bedroom and familial disputes

the work of Jean Piaget solved for me the puzzling difference between learning in mammals and learning in adult humans – my hypothetical professor of psychology thinks... “Bryson sent me a reprint of his theory in which a footnote at the beginning removes human learning from the discussion, confining the theory to non-human mammals – he says nothing about learning in my professorial brain -I certainly don't need to sleep to prepare my lecture on Plato vs Aristotle, so I'll just put Bryson's paper in my big stack of science stuff” - Piaget studied learning in his children, from newborn to school age – he formulated the difference between “concrete operations” (roughly age 4 to 8) and “formal operations (age 10 onwards – sooner for genius children) – the mind of my imagined professor has formal operations, and does not realize that a chimp or a human toddler lacks inductive logic and so requires dreaming to see things differently – I contacted Professor Howard Gruber, writing about Piaget in the NYTimes, and we became friends – Howie had written a book about scientific creativity in Darwin, based on depth study of his journals, and to my happy surprise, Howie

had also worked in Piaget's lab in Geneva – so he was an expert on both Darwin & Piaget – without the stages of cognitive development from Piaget, the theory about sleep and learning would have remained incomplete and unfinished – (when I last saw Howie, in Geneva, he told me why no university would hire me – because my scientific and political inclinations cannot fit any academic category, and I am constantly stimulated to respond to blockbuster headlines)

repeated for emphasis: to swallow and metabolize the 1969 theory necessitates rejecting a waking-world-only stance, and instead requires building hypotheses and experiments based on a circadian interplay between what takes place every waking state and every sleep

a Zen idea: you cannot be made aware of what you are not now aware of – an academic in psychology or computer science cannot suddenly shift from a waking-world-only model to a waking-and-sleeping model, which is a paradigm shift in how the brain and the mind are contemplated

some humans with cortical injuries reveal that categorical information is divided into “bins” - there was a case in which the individual could still name small household objects, such as scissors and tableware, but could no longer name large household objects, such as a refrigerator or a stove – one can imagine the “bins” of a grandmaster in chess, slowly built up over years of thinking and dreaming – such a stance about cognitive classifications flies in the face of Chomsky's contention that “deep structures” are inherited

my favorite example of Perceptual Learning comes from Sue Savage-Rumbaugh, studying bonobos (very smart and sexy evolutionary relatives of chimps): “its morning, and about 100 bonobos climb down from their tree nests and split into four or five groups to spread out and search for their morning grub. They all want to met up later in the day, and there are too many existing trails in the jungle for an explicit map to guide their way. So at every trail crossing, they stop and crush plants, branches and twigs to indicate which way they went. If the trail is muddy footprints will do the job and thus no post-it notes are left.” Perfect! some bonobo dreamed up this technique, and taught it by example to his or her companions –

bonobos resolve conflicts by sexual acts both same-sex and male-female, and in general are much more cooperative with each other than are chimps

Sue read the theory, and in an email to me “this is to let you know I have read your theory and find it interesting and worthy of research effort” - (from 1972 onwards my day job was as a clinical physician, and in no position to do active research)

another example – chimps sharpen a stick, and then thrust it into a hollow log, hoping to stab and withdraw a tiny bushbaby baby to tear apart and eat – gruesome intelligence

both a dino's brain and a dino's body are “off” during night – a modern mammals body is off, either day (nocturnal mammals) or night (diurnal mammals) yet the mammals brain is always on - “nature abhors a

vacuum” - it is a cybernetic waste not to give a brain, with a cerebral cortex, work to do while the mammal sleeps

contrast learning in chimps with learning in bees – the chimp brain is oriented to examine novelties, and perhaps learn something useful, to be dreamed about – bees avoid novelty, and prefer a steady source of reward than a chancy paradigm with higher risk/higher reward – if the bee chooses high risk it may not meet its daily quota of pollen – chimps are extremely curious – Tinbergen kept a pet chimp and a pet lemur at home – both very friendly and active, jumping around gleefully, but only the chimp would gravitate to and closely examine a new object in the playroom

if bees are presented with artificial flowers containing pollen, and adequate/satisfactory yields come from yellow flowers, they will not sample flowers of another color, which may contain a bonanza of pollen – bees are conservative; chimps are curious

virtually all learning in mammals is related to body movements, whether during play or serious time in the wild – contrast with Rodin’s sculpture “The Thinker”, sitting still and pondering the universe, or some aspect of it – a study of play in bears is all about movement – solitary play, play fighting, playing with some object like a rock or a stick (I have noted the exception of mirror neurons in primates, which facilitates learning by observation rather than by doing something)

both chimps and cetacea learn by strengthening the synapses of neurons, or forming new synapses; birds learn by growing new cells on a seasonal basis, learning new songs & local variations

during the Eocene period soon after the exit of the dinos, global temperature jumped about 12 degrees Centigrade, and new plants and trees appeared, with new kinds of fruit – Perceptual Learning enabled the monkeys to combine size, shape, and color in a single perception of desirability - this non-genetic/learned advance was coupled with the inherited advance of color vision – dream-driven & gene-driven

spider monkeys favor fruit, howler monkeys eat leaves – these two species are of the same body weight, yet the spider monkeys brain is twice that of a howler – fruit provides more energy than leaves, and it takes more intelligence to seek and find fruits compared with leaves – more intelligence from more elaborate perceptual learning

around 1990 I read about case-by-case trouble shooting – software built into new Compaq copiers – if a problem arises, the owner is presented with a built-in decision tree, and a chain of yes/no choices leads the owner to a most probable fix for the unsatisfactory operation of the copier at present– both chimps and these copiers register mistakes on a case-by-case basis – only chimps, not copiers, learn from successful novel opportunities – only chimps do inductive analysis offline during sleep – only chimps operate in a multiplex dynamic evolutionary environment

ON TO THE NEXT CATEGORY – $5 \times 10^6 = 5$ billion years BP and the first humans

understanding the origins of the first humans combines geology & evolutionary biology – the Great Rift Valley running south and north in East Africa provided an ideal bifurcation for the ancestors of chimps to evolve in the western zone and the first humans in the eastern zone – geological happenstance brought us here

the first humans were more prey than predators – small and without weapons and still adapted for climbing trees to escape danger and to sleep

a reason a kind of ape, bigger than monkeys, came down from tree life into waking life at ground level is because the more agile and lighter monkeys were better than these apes at reaching fruit in trees – the losers in the contest for fruits became human – a time when species of apes outnumbered monkeys was replaced by the reverse – a defeat for apes became a victory for the first humans

humans evolved in a constant battle with predators – who will control this carcass or this source of water – constant competition between offense and defense drove evolution in Africa

bipedalism had to precede massive brain expansion – with an erect posture, solar radiation was greatly reduced, striking the top of the head but much less sun on the torso - overheating the brain is lethal – standing upright with less solar radiation was a prerequisite for evolutionary expansion of the cerebral cortex and becoming a big brain biped

water buffalo, with a huge black torso heated by the sun, keep brain temperature in range with a massive cooling apparatus in the enormous snout and oral cavity

of the various advantages of bipedalism, I am drawn to more efficient locomotion as the most important – less energy required for humans to walk on two limbs than on four – climate change had produced clumping of trees in open savanna, a change from dense forests – the first humans ambulated from one tree clump to another, could see better standing up, and could carry edibles in their upper limbs and hands

the posterior sulcus is a side-to-side groove in the cortex – it evolves further to the back of the brain in humans – jumping and landing between trees and branches requires instant complex computation of speed, distance, and contours of landing sites in tree dwellers – when the first humans started walking on flat land, this computational skill was no longer required, and more brain power could be devoted to perceptual categories and associations, which takes place in the central and frontal regions of the brain

there was another major cooling event a few million years later and now a much more human takes the stage...homo habilis, the inventors of stone tools, an idea which probably came from dreaming and then spread by observation of the tool user(s) from others in the group

some anthropologists have speculated that a major factor in human evolution was periodic changes in the environment – what was a lake became dry land, and later became a lake again – this variability

engendered human adaptability as an evolutionary hallmark, as distinguished from extreme specialization in so many other species

following homo habilis is homo erectus, looking still more human, and lacking sexual dimorphism in which a male is a lot bigger than a female

primates in which the male is much bigger than the female usually have an alpha male, the boss – if an alpha male is attacked, other male wannabes join in the attack – if an alpha female is attacked, other females rush in to preserve and protect her – male aggression vs female solidarity - what a powerful metaphor for human females who tend to cooperate rather than compete

this reminds me of the doctrine of Social Darwinism, a false attempt to relate Darwinian Dynamics to human societies - “the rich man in his castle, the poor man at his gate, God made them high and lowly, and ordered their estate” - Social Darwinism implies Survival of the Fittest, typically thought of as more fit to compete – but there can also be Survival of the Fittest to cooperate, which is plentiful in the world of nature – I found a great quote from anthropologist Ruth Benedict – studying indigenous tribes, she could parse them into “nice” and “not nice” - in the pleasant tribes “societies where non-aggression is conspicuous have social orders in which the individual by the same act and at the same time serves his own advantage and that of the group...not because people are unselfish and put social obligations above personal desires, but when social arrangements made these identical”

the pioneer anthropologist Franz Boas, in his monograph about the Eskimos, speculated about “the near infinite complexities of human cultures”

catchment scavenging, in which there is water here, a large carcass there, and shelter over there, advances to territory scavenging, where is a semi-permanent home base to return to every at the end of the day

sometime between a million years BP and 500,000 BP (our next chapter), humans began to control fire – a stupendous advantage: light at night, frighten predators, warmth in winter, and above all, the cooking of meat which makes the meat six times more digestible – by eating cooked meat mothers gained tremendous metabolic energy for nursing throughout the day and night

THE NEXT CHAPTER - $5 \times 10^5 = 500,000$ YEARS BP

the human brain increases in size from homo habilis onwards – this requires that the opening in the pelvic bones of the mother keeps enlarging, and about 500,000 BP a new problem appears...if the opening were to enlarge even further, to allow passage of the newborn’s head, the pelvis & hips of the mother would become so wide that there would become a bio-mechanical disadvantage for walking and running – really wide hips would result in an inefficient “waddling” gait – difficult to walk and impossible to run - so “goal-oriented evolution” (there is no such intelligent force, I ‘ll imply that there is just here and nowhere else) comes up with an entirely new solution... massive brain grown continues in the human newborn – a monkey’s brain is about 80% adult size at

birth, and the 1 year old monkey is quite independent in the waking state, climbing trees and playing – the human newborn's brain is less than 50% adult size, making the first two years of life a situation of profound dependence on mother while the business of the brain is to grow in size rather than attain motor skills like a young monkey - most mothers would agree if told that in the first few month of life are more about the brain growing size than about new behaviors and abilities – compare the weekly changes in utterances and behaviors in the first three months to the weekly changes in utterances and behaviors from age 9 months to 12 months – much more learning and changing in the latter, which makes sense by realizing that the number one task of the newborn's brain is to grow rather than to learn – increase in brain size is due to cell division and thus the total number of brain cells; learning is due to increase and modification of connections (axons and dendrites) between brain cells

the evolutionary payoff is a huge brain in the adolescent and adult human

the brain size of early chimps is not much smaller than the brains of chimps more recent in evolution – in the chimp/human split, only the human line continues with massive increase in brain size

about 500,000 years BP the human evolutionary tree splits further into future Neanderthals and future Homo Sapiens

I have a speculation about the origin of human language which links together the first humans (~5 million years BP) - the origin of major post-natal brain growth (~500,000 years BP) and first language (guesstimate 50,000 years BP)...the first humans walked on two legs rather than four; by 500,000 years BP female hips could get no bigger for the newborn's head to fit through the pelvic outlet without compromising bio-mechanical mobility, as described above –mothers about 50,000 years ago were gathering together every morning to work while all children, from newborns to age 5 or 6, gather in a prehistoric nursery school to play with sticks and stones – as a novel game these children made up sounds for “throw it” “give it to me” “it's behind her back” “hide the stick instead of the stone” etc. etc. and thus naming things and actions began with children at play and soon spread to adults – my younger brother, about age 2, would walk into the water at a beach on Long Island Sound, and raise a large stone above his head and thrust the stone into the water and exclaim “Gerspenz!” - an entirely made-up word that we might translate as “Splash!” - the headline here is that it is young children who create spoken language, and adults quickly attend to this new skill and carry it forward – prolonged dependency of infants and toddlers caused an ad hoc nursery school where language was invented

thus walking 5 million years ago may have resulted in talking, more than 4 million years later – before language, I imagine that humans communicated with a lot of hand gestures: come here/look there/stand still/more meat/save this for breakfast tomorrow – human grunts and musical noises can also convey much information – I think language spread so quickly, once it began, because humans were already so good at gestural and guttural communication

walking the walk, 5 million years ago, may have led to talking the talk, 50,000 years ago – this explanatory leap may be too much – I think that young children would have invented language even if they did not gather in a group every morning, but not as quickly as my scenario suggests

there are now about 7000 languages in the world, and there is no known human group without a language, so the propensity for a spoken language is universal

some scientists studying the domestication of dogs suggest that it was children who made friends with wolfish puppies before adults made dogs permanent companions about 15,000 years ago

I think language could have appeared ~10,000 years before it actually did, or 10,000 years later – it was a happenstance in a field of opportunity – same with the controlled use of fire – it could have happened 100,000 years sooner or later than it did -

for human speech to emerge in linguistic richness, the larynx had to evolve downwards and away from the tongue, to make a better voicebox with a wider range of sounds – this also made choking on a piece of meat more likely, so we can see how advantageous the capability for speech really is, if it outweighs a critical danger

Helen Keller, both blind and deaf from meningitis at age 2, describes how at age 10 the concept of words and names came to her in a flash – her teacher placed one of Helen’s hands in a stream of water, while placing her other hand on the teacher’s throat to feel the vibration from the word “water” - in her book Helen reveals how she suddenly realized that everything has a name, and it felt to her like the sudden warmth of the sun – her vocabulary took off like a rocket - “Suddenly, everything had a name, and each name gave birth to a new thought. As we returned into the house, every object which I touched seemed to quiver with life. That was because I saw everything which the strange, new sight that had come to me.”

highly instructive about the origin of language is Williams syndrome, a chromosomal defect which interferes with normal cognitive development - affected children are highly verbal and extremely friendly, and very deficient in drawing and math skills – this suggests that the most recent feature of cognitive evolution is auditory, underlying social behaviors by voice - visual evolution is well in place before the appearance of humans – the voice, the singing/chanting around the campfire of the hunter-gathers, is orchestrated by what vocalizations are in the air, including the dark of night when vision away from the campfire is compromised

4 major events about 50,000 years ago – the integration of the auditory cortex with social traits, the migration of the voice-box downwards to provide a sound chamber for a full range of vocalizations, the appearance in the cerebellum of an area related to thinking and speaking, not just to balance and equilibrium as the cerebellum is in other primates, and the lateralization of cortical activity into left brain/right brain specializations all contribute to the capability for language

for me Chomsky made a huge mistake in arguing for inborn “deep

structures” in language because of what he said was a “poverty of stimuli” in the environment of the child – there is in fact much more categorical richness in children’s language than available stimuli suggest, so Chomsky is right about arguing that the daily environment of the child does not provide enough information for the rapid expansion of vocabulary and syntax, but if the business of dreams is as I say, available stimuli can offer adequate grist for the mill of sleep every night and every nap – Chomsky: Language in Inherited – this opus: Language is Invented – I have never read speculation that the richness and rapidity of language development in toddlers is a consequence of REM/sleep, yet infants and toddlers often babble to themselves before falling asleep

some time after the first human language came the spectacular cave paintings, mainly in what is now France and Spain – no one has proposed that there is a “brain module” for art, comparable to Chomsky’s (magical) module for language – both language and cave art were invented and flowed into the “bag of tricks” of prehistoric homo sapiens

improvements in arrowhead design, around 30,000 BP, were marked by technical details as opposed to the exuberance of art – arrowhead design is a matter of improved survival, and is exempt from the creative urge in the caves – the improvements in arrowhead design are subtle and occurred at intervals of several thousand years, at a far slower pace than variations in art based on creative imagination

THE URBAN REVOLUTION ~5000 YEARS BP = 5×10^3

by 12,000 years BP, humans had migrated from Africa to the Middle East and Europe, to Asia & Australia, and to North and South America – all were hunter/gatherers, no agriculture – then the last Ice Age finally retreated, and agriculture appeared in at least 5 different locations

in the caves of Cro-Magnon humans in Europe there were curvaceous icons of pregnant females with huge breasts, bellies, and butts – female-leadership was in operation until masculine-domination with the Urban Revolution – for cave-dwelling sapiens it is easy to imagine why females are worshiped, because of the miracle of birth

in my first exponential formulation, based on centuries, I had ~10,000 years BP as a major milestone because agriculture really changed daily life - Human History in a Hurry skips over the onset of agriculture to focus on the Urban Revolution, ~5,000 years BP – during the 5,000 years between the first agriculture and the first urban locations, it remained true that life could still be rationalized in terms of survival and reproduction, and what it was that benefited the inventor, such as the wheel and the plow, benefited all – there were no kings, no armies, no slaves – but there was beer and later, wine, and plenty of it – am I stretching “survival and reproduction” too far to use it to explain celebrations with drums and dancing at harvest time as agriculture took hold?

A major caveat – at the Gobekli site in Turkey there is a complex temple dated about 10,000 BC – this is millennia before year-round villages and later, grain-based agriculture – Gobekli is a mind-blowing one-off to the mainstream anthropological sequence placing the first temples

and monumental architecture ~5000 years BP - there is evidence of beer being made at Gobekli, to lubricate the ceremonial celebration (and of course there may have been other Gobekli-like structures now lost or undiscovered by archeology – a new mapping technique – LIDAR – Light Detection and Ranging – can detect variations in surface depth from above and thereby reveal ancient archeological structures such as burial sites in Egypt – this is an exciting development for a new generation of scientists once described as diggers of “bones and stones”)

also the Catal Huyuk complex on a river in Turkey, dated ~7500 BC – the dwellings are interconnected, and there is evidence of some inhabitants being of higher status than others, but nothing compared to city-states in the Urban Revolution which extend from the ruler on top to slaves at the bottom - I see Catal Huyuk as mid-way between the first agricultural villages and the Urban Revolution 5,000 years later – a society which is 100% Civilization becomes a brutal mix of Civilization and Militization – (I’ve invented the word Militization as a syllabic parallel to Civilization – Mili-ti-zation Civili-zation)

I invented the term Circadialog – the daily exchange of goods and information – the Urban Revolution changed that, with information (commands) flowing from top down, and goods flowing from bottom up

one of the earliest settlements was Jericho, before farming was established – digging through the layers at Jericho reveals tools and artifacts which progress, layer to layer, towards the surface - progress in both quantity and artistry

ostentatious display of personal possessions began with the Urban Revolution – I am reminded of London in the 1950’s, where television antenna were placed for neighbors to see even when the owners did not yet have a TV in their flat

staying in one location year-round led to increasing objectivity of that particular place – that tree, that bend in the river – I speculate that there was a triangulation of time, place, and activity...I will meet person X at the bend in the river tomorrow at high noon, where we will trade wool for dried fish – the last trade was decorative beads for arrowheads - sunrise, morning, noon, sunset, night are objectified as circadian constants of daily life – a saber-tooth predator may sneak towards the water source near sundown to hunt and kill, but this animal has no sense of circadian time as a solar clock running independently – humans have a unique awareness of the passage of time, both objective time and subjective time

agriculture allowed many more humans to live together – there is an inherent resource ceiling with hunter/gatherers, requiring the group to move on because local resources, especially edible fruits, nuts, and roots, are eaten with none left within easy walking distance– agriculture yields much more food in an equivalent area of land, and accounts for the first form of organized warfare, coordinated theft aimed at the first farmers with stored grain and livestock

I speculate that agriculture had multiple onsets because it gives the first farmers a sense of mastery...what to plant? where to plant? when to plant? Increasing yields of wheat or rice or barley, year-to-year, give shared satisfaction and ongoing curiosity – current science indicates that the mechanical effort and unnatural positioning for grinding, and the huge task of tilling the fields, make agriculture a mixed blessing – more grain harvested, more mouths to feed, more painful backs and arthritic wrists and strain of the big toe joint, when kneeling to grind grain – early farmers were not as fit as other humans, especially those who lived near water (seashore, lake, river) where easy-to-get seafood made daily life almost a picnic – while the first farmers suffered compared to their immediate ancestors, the first farmers were much better off than the first slaves in the Urban Revolution, toiling away in the fields or the mines and treated more as property than as individual humans, with no respect for individual lives or parent-child priorities

agriculture increased the quantity of human life, and decreased the quality of human life

reading “Against the Grain” by Yale professor James C. Scott (published 2017) completely changed my understanding of the chronology of basic events in Mesopotamia – permanent settlements came first, and it was not until several millennia later that grain (wheat and barley) was cultivated – grain harvests are both highly visible and highly predictable in the time of seasonal harvest – thus there could be a tax collector, who sees the grain in its entirety and demands annual payment based on the size of the current crop – it was this surplus that allowed for a ruler to exist, a ruler who builds palaces and temples and conscripts some of the farmers into military or other urban activities – so the existence of human populations away from the urban complex was often deliberate, to escape taxation and conscription -what textbooks name as barbarians may in fact be humans who are smart enough and bold enough to move away and escape the snare of civilization and militization -Professor Scott’s book is a milestone of radical clarification

in the pre-urban period of agriculture, it was better to enjoy the blessings of a fully humanized life, than to toil as a slave in constant severe monotonous circumstances, which appeared with the Urban Revolution

pottery was not invented until several thousand years after agriculture – learning this surprised me – why was weaving invented long before pots? - more happenstance - I propose that it was women in both hemispheres having a dream about molding a container to hold cooked gruel/porridge to feed infants too young for solid food – this allowed mothers to wean their young a few years earlier, which increased fertility because nursing has a (partial) inhibitory effect on ovulation – ceramic containers carried water to the home base – creative curiosity created pottery, and pottery changed the daily lifeways – recent archeological digs have found “sippies” which are molded forms with a shaped nozzle/nipple to feed the infant milk from cows, sheep, or goats – so both bowls for gruel and sippies for milk reduced the age for weaning and increased childbirths

the Urban Revolution had a self-accelerating factor – there were enough humans in one place to facilitate specialization – so if you were a good fence builder you became a fence-builder as a daily activity

human history went on to 4 different types of existence: small scale farming, pastoralism, foraging, and large scale mega-farming – for the first humans in Australia, daily life became 100% foraging because none of the land was suitable for primitive farming, and there were no native animals suitable to become livestock for pastoralism

a particular kind of arrangement migrated away from the city-states in Mesopotamia – the “leche culture” was based on milk and cheese, and this spread to the west and north, into what is now Germany– it was extremely successful – don’t kill and eat your female cows – keep them and they will keep you in quality nutrition – the advantage of leche culture was enhanced by a mutation which allowed adults to digest the sugar lactose just like their children

I need to face up to a paradox in this report – if dreaming is central to learning in primates, in children, and in some scientists and artists, why do you and me not have an introspective/personal understanding of this?

because dreaming does its work without a necessary awareness of the dream – the memory function of the waking state is turned off during sleep – this explains why it is the dreams occurring just before awakening are the most likely to slip into conscious awareness – if one remains in bed and reviews this morning dream, it has a chance of being remembered, but will soon fade if not written in a notepad or quickly told to someone nearby – if an audible alarm interrupts sleep, and the person quickly exits the bed and starts the daily routine, dream life is exiled to a mental Siberia, and this person often says that s/he never dreams

because in the modern world our waking mentations have little to do with survival and reproduction, and so the famous concept of GIGO (garbage in, garbage out) may corrupt our dreams compared with what dreams did for prehistoric humans, for whom daily thoughts and actions were regularly and routinely aimed at survival and reproduction – hardly the situation in ancient Rome or current Las Vegas – modern humans daily thoughts are often motivated by greed for money and net worth, nothing equivalent in prehistoric humans – I imagine a typical dream of a prehistoric hunter might be about whether or not to take “my youngest son on our hunt tomorrow, for the first time” (if the weather is good) - practical thoughts and actions in the waking state today lead to practical dreams tonight - erratic thoughts, excessive thoughts, peculiar thoughts in the modern world lead to bizarre dreams -

before the Urban Revolution the purpose of adult copulation was to produce children; now it is often for pleasure and performed with deliberate avoidance of pregnancy – I highly recommend “The Natural History of Love” by Morton M. Hunt which presents a richly diverse history starting with the Greeks, then Rome, then barbaric tribes in Germany, then feudalism, then knights and amor courtois, then the Puritans, and on to man-woman relationships in the last few centuries

I have been unable to untangle what I have imagined to be straightforward sex in hunter-gatherers, and the robust celebratory sex in native tribes, such as those living in the Trobriand Islands in the Western Pacific,

described by another pioneer anthropologist, Bronislaw Malinowski, in “The Sexual Lives of Savages...” - it may be that humans whose habitat is an island with rich shoreline resources have so much free time than sexual fun and games is a feature of general playfulness for men and women – a possible explanation is that daily life on a tropical island is so resource-rich that the urge to party and the urge to merge take center stage

rather than a night of continuous sleep, it has been shown that if humans placed in an environment of total darkness, after a few weeks sleep changes to a pattern of 2 hours resting quietly, 4 hours sleep, 2 hours awake in the middle of the night, then another 4 hours sleep, and finally 2 hours lying still in the morning – a 2-4-2-4-2 pattern – I think that the in the first 2 hours, the events of the day are reviewed, in the middle two hours adults speak softly about the dreams just experienced and other chitchat, in the morning 2 hours the plan for the day ahead are reviewed based on the dreams which just happened – in the Middle Ages the French coined a term for the two separate sleep periods – “first sleep” and “second sleep” – this research was done by Thomas Weir who concluded by writing “it is tempting to speculate that in prehistoric times this arrangement provided a channel of communication between dreaming and waking that has gradually been closed off as humans have compressed and consolidated sleep”

adult humans have about 5 REM periods per night – sleep starts with a non-REM (slow wave) sleep period, and naturally ends with a REM period (unless the normal awakening in REM is interrupted by an alarm clock in non-REM) – the 1969 theory posits that sleep may be an A/B/A/B/A/B phenomenon in which the A period prepares the brain for the following dream period, like a machine being loaded before its nitty-gritty function is performed

I read *The Island* by Aldous Huxley, also the author *Brave New World* – Huxley depicts a fictitious island, Pala, in the South Pacific where human society is perfected... Buddha-like relationships eliminate arguments and violence, and appropriate technology with solar, windmills, and greenhouse veggies keep the environment nice – Huxley was a great thinker, and wrote this book without a single reference to human dreams – *The Island* is a richly conceived utopia, and is logically coherent without putting dreams in the presentation – *The Island* makes obvious that a believable alternative fiction, involving facts, with human behavior being both logical and emotional, can be elaborated without any role or discussion of human dreaming -mammals and humans evolved on a planet with alternating darkness and light, and the Circadian Theory of Learning can be considered a happenstance based on the rotational motion every night and every day – as I write this I am aware of a contradiction in this opus... Huxley could fictionalize a coherent utopia without a role for dreaming, and yet I give dreaming a central role in the experience of free will, artistic creativity, and some scientific theoretical advances – perhaps a resolution is to suggest that a lifetime of dreaming made Huxley’s mind flexible enough to write *The Island* – this is analogous to my idea that a modern AI system can simulate a biphasic waking/sleeping system of cognition without itself being biphasical in design

Huxley also wrote *The Doors of Perception*, largely about him and others experimenting with hallucinogenic drugs – so Huxley uses the word “perception” in a way unrelated to evolution-based “perceptual learning” and does not consider how a black-box AI model constructed on circadian realities can build from primate cognition to modern humans – the word “perception” has a ton of meanings - *Brave New World* was written in 1932 and anticipated the brainless pleasures which contaminate our world – *The Island* was written 30 years later, and Huxley presents a programmed utopia with few complaints – a brilliant feature of *Brave New World* is that the time system is AF – After (Henry) Ford, the dominant industrial magician when Huxley wrote his book - Henry Ford himself funded a total town called Fordlandia, deep in the Amazon jungle, to harvest rubber for Ford autos – the diet he presented to the workers consisted of oatmeal, brown rice, and canned peaches, very unpopular – the project was soon abandoned, with the dormitories and factories now rusting and rotting– Henry Ford did not want any input from experts...”History is bunk. What difference does it make how many times the ancient Greeks flew their kites?” I imagine that Ford was like Edison – pushing their waking hours to the max and utterly disregarding dreams – more than innovative inventions, Edison was patenting improvements by tinkering trial after trial as he pioneered assembly-line production of his automobiles

I have learned that in most native tribes dreams are central to daily life - when Western Conglomerate Culture steps in, often beginning with the first missionaries, the significance of dreams is suppressed and disappears

in a tribe in South America it is believed that the waking world is an illusion behind which lies the luminous reality of dreams – contrast with the 21st Century present where dreams are for the most part exiled to a mental Siberia

in 1945, Gertrude Stein said “evolution is no longer interesting. It is historical now and no longer actual.” in her aphoristic style this woman of few words and much meaning was saying what I have been putting forth here – that human circumstances are now far more non-Darwinian than Darwinian - when the pharaohs of Egypt had dozens of slaves buried alive in their tombs, and when boats were built for the pharaohs to sail beyond the sun after their death, making the afterlife of a pharaoh more important than the life of a slave, no Darwinian system can make sense of this - nor can Darwinian evolution explain how a human can be killed for being too smart (and too rebellious) rather than not smart enough - instead of Natural Selection, this is Unnatural Selection operating to eliminate non-elite who think and act outside the box

in chimps, there is rare innovation...in the various separated bands of chimps in Africa, one band has invented hammer-and-anvil stones for opening nuts; another band has invented the use of a stick to extract termites for food, still another band has invented a sharp probe to stab into hollow logs to withdraw and eat bushbabies – such innovations are spread and shared equally by that group but do not spread to other chimp bands elsewhere in Africa, because the bands of chimps are so geographically dispersed

when the Urban Revolution appears, innovations such as writing

and permanent armies occur frequently and rather than benefiting all humans, only benefit those in charge in a top down/top dog hierarchy

in the eastern hemisphere there were 3 major civilizations, all along rivers: Egyptian along the Nile, Mesopotamian in the land between the Tigris & Euphrates, and Harrapan along the Indus, which now separates Pakistan from India – (in the western hemisphere none of the major civilizations – Aztec, Maya, Inca – survived the Spanish and Portuguese Conquistadors)

actually the Mayan did themselves in...chopping down forests, to heat kilns to produce liquid stucco to coat their buildings – aesthetic values resulted in lethal soil erosion, and the Mayan civilization collapsed – also contributing to Mayan self-destruction – constant warfare amongst the 200 cities, and too many elites with too many demands

when Pizarro strangled the Inca (the supreme ruler) in 1533, Inca civilization was spread along 3000 miles of coastline just west of the Andes – it had attained roads, bridges, messengers, goldsmiths, coppersmiths, potters, farmers, and soldiers

Aztec civilization was just hitting full stride when rudely interrupted by Cortes in 1519 – Aztec midwives were more advanced, both scientifically and spiritually, than were midwives and physicians in the 19th Century – hygiene was excellent, the woman about to delivery was massaged underwater, and the umbilical cord was buried near the fireplace “to make the home what the heart is to the body”

the Aztecs conducted warfare with no interest in territory – they were seeking human bodies, some for labor, and some for elaborate sacrifice

the Harappan had 4 major cities along the Indus, starting about 2300 BC– they had no enemies perhaps explaining the absence of an army – Harappan traded with Mesopotamia, 2000 miles to the west, and these outposts became the way stations of the Silk Road -the Harappan Culture disappeared when the Indus river changed its course, about 1900 BC

Harappan trade was also by sea via the Persian Gulf – that such an effort was made to acquire lapis lazuli and other gems for ostentatious display of the privileged shows the priority of adornment - surely the royal women in Mesopotamia dreamed of their fancy dress, jewels, and make-up

the Harappan script remains undeciphered

both Harappan and Egyptians invented, probably in a dream, cubic weights to measure gold, gems, spices, and perfumes – there is no evidence of cultural contact, and so I suggest that the human mind often invents similar tools – the Aztecs also invented the wheel, but it was confined to toys, and never used in adult tasks – isn't this hard to believe? that there were wheels on toys but no wheels for transport and agriculture - also absent from New World cultures: metal tools, animals for traction, the plow

my readings about the first historical civilizations have been focused

on Mesopotamia more than on Egypt because it is possible to draw a historical line through Mesopotamia and then onwards to ancient Greece & Rome right up to the Anthropocene in the 21st Century – it is not possible to draw the same sort of line from the land of the Pharaohs to the Mediterranean world

soon after the BC/AD juncture, the Roman world had extended to surround the entire Mediterranean, north shore and south shore, east to west – history developed from Roman domination of the known world – Christians can celebrate that Jesus was born near the very time that the Roman Empire finally surrounded and completely enveloped the Mediterranean world of people and places, and the Roman roads made it safe for travel to the next city – the Roman road system made it possible for the apostle Paul to travel about efficiently and safely – the origin of the word Mediterranean, from the Latin, means the middle of the earth, which is how the Romans thought of it

both Mesopotamia & Egypt have, to modern eyes, exotic features – Egypt is the more exotic of the two – with unlimited exaltation of the reigning pharaoh while alive, that exaltation is dwarfed by concern and preparation for the pharaoh in death, who, if properly instructed and properly carried out, ascends for an eternity in the stars

a comment from The Art of Ancient Cities...”every cultural transformation is unique. There are no general laws directing the process of history. The mutation of agriculture, no less than the rise and fall of a civilization remains an enduring puzzle with multiple solutions.”

I have looked for and found some constants in early urban civilizations, such as the lusting after and control of youthful feminine beauty, the me-first/me-all-time rank of a single, usually male figure and the passing of this rank to a usually male child, the elaborate burials with the best in grave goods, both quantity & quality – these features were in both hemispheres, and because there was no communication before Columbus, it is apparent that selfishness and pride are potentials in the human species, brought into daily manifestation in urban settings by the most privileged males

it took several thousand years to progress from the first villages between the Tigris & Euphrates rivers to the first empire – first from villages to city-states, made possible by improved irrigation and planting, which made taxation possible – annual yields of grain are predictable in seasonal time and quite visible to the tax collector as he makes his pre-harvest assessments, and taxation of crops became the wealth required to build temples and palaces – but the widespread cultivation of corn by the Anasazi (Ancient Ones) in the North American Southwest did not lead to an elite class as it did in Mesopotamia

the taxation of grain in the “Fertile Crescent” was severe but nothing at all compared with Stalin’s collectivization of grain in the Ukraine in the early 1930’s – successful farmers were robbed even of their seeds for the next year, and shot if they disagreed or sometimes for no reason whatsoever – the mass murder was intentional

then another interval in Mesopotamia before the first Emperor/King Sargon (~2300 BC) consolidated the city-states into a single domain under his complete authority – his reign lasted over fifty years

the villages had populations of 3-4,000, the city-states about 10 times bigger

each city-state had its own gods and rituals – for me a remarkable independence since they were only separated by about 50 miles – this reminds me of pre-Columbian west coast (California) where each native tribe, separated by less than 100 miles, had its own language

Voltaire - “writing is painting with words”

writing on clay tablets in Mesopotamia first began with numbers – of shipments, of inventories – before writing of messages and ideas – it took 700 years to progress from mundane record-keeping to discursive writing

Egypt also had a script for inventories and messages, much different from the famous hieroglyphic writing in the tombs - Egypt was top-to-bottom a theocratic state, and so the script of accounting and transactions came later than sacred hieroglyphics – Mesopotamia had a strong commercial component, explaining why the first script was aimed at inventories and trade – the Egyptian script is called Demotic, and appeared several millennia after hieroglyphics

at first traders had hollow containers filled with small figurines which represented the shipment – units of oil, of cloth, number of sheep, etc. - then they invented script which was stamped on the container to indicate quantity and classification of contents – for several hundred years after this external labeling, figurines were still enclosed, an unnecessary repetition of information – a fine example of the inertia of cognitive advance – concrete cognitions tend to remain in place

–enter Nidaba, the Goddess of Writing - it surprises me that the invention of writing only appears in a single story from thousands of translated tablets (about 1750 BC) -the rulers of Uruk & Arrata are having a battle of wits and riddles– the king of Uruk intends to send a message with his messenger standing by – but on that day the messenger has thick/garbled speech, so the king takes some clay and puts words on it – when delivered the king of Arrata immediately recognizes the power of this new invention and so yields to Uruk and submits to its rule – voila! the birth of writing

this fable reminds me of my Darwin/Freud dream, in which dreaming has a profound evolutionary purpose never before considered – I imagine that someone dreamed about the momentous origin of writing, and on awakening transferred the dream to cuneiform tablets to tell others...my dream was about the utilitarian function of dreaming to enhance mammalian learning, and the Mesopotamian writer was focused on writing and its expansive potential for human imaginations – I am proposing that the originality of the Circadian Theory of Learning is like the originality of the first writing

Mesopotamian writing was often in the form of lists, such as naming the resident Leaders - Leader of the Law, the Leader of the Plough, the Leader of the Barley, and other Leaders – many other lists, such as lists of vegetables, lists of tools – lists were an expression of concrete thinking, absent abstract thinking, and were also the main element of a new scribe's education

20 years ago I believed that warfare is a toxic attribute of civilizations – I wrote that civilizations begat militizations with the Urban Revolution – it is now apparent that there were lethal battles in prehistory – anthropological evidence of skulls and limbs fractured with heavy weapons – hostilities between groups increases cooperation within a group, like a pack of wolves who are supremely loyal to those who stay together every day, and supremely hostile to non-member wolves – the REM period in wolves is concerned with bonding and ranking other members of that particular pack

the first warfare in prehistory was probably more spontaneous than planned – a sudden battle over turf and exclusion of strangers– then the warfare after agriculture began as planned theft

in Iroquois tribes the decision to declare war is left to the wisdom of the adult females – in Papua New Guinea there is a definite stage before blows – the two sides line up and shout insults and this may alone settle the dispute – they call it a “shouting war” - the Cherokee government had a Peace Chief and a War Chief, with decisions by consensus – the history of native tribes in North America is rich and fascinating, and also sad because of the virtual genocide conducted by invaders from Europe and England – all the native tribes gave great importance to nightly dreams

the Hopis had elaborate ceremonies and rituals, timed to the circannual cycle – when finished with his seasonal duties, a Hopi elder with high ceremonial rank would leave his ceremonial status behind and become an ordinary farmer in the field – contrast with the Knights of the Round Table in early England, where the legend of King Arthur, Lancelot and Galahad show that these stars never stepped away from their duties and privileges, a full-time 24/7 status of privilege and obligations

Plains Indians become much more warlike when they acquired horses and guns, first stolen from the Spanish in New Mexico – this is a cultural acquisition of aggressive behavior, latent in homo sapiens – hostile acts of indigenous tribes became praised and rewarded with emblems of a heroic category, much like the awarding of medals in the militaries of caucasian nations – the military, the masculine, and the medals become aspirational – the warlike tribes in the American West kept track of “counting coups” -the number of times a brave touched an enemy – and after returning home from battle, the women surrounded and adored the best fighters

in the Pacific Northwest there was an enormous bounty of food and timber to build artistic dwellings – the “potlatch” was a ceremony in which the local leader attempted to overwhelm guests with gifts – the richest leader was also the most competitive – the purpose of potlatch was “to make my name good” - each item given had a detailed history and provenance – the status of each clan was based on heredity, like

the potentates in Europe and Russia – much of daily life in the Pacific Northwest was rich with ceremonies linked to a variety of Totem Poles

in ancient Mexico there were 80 villages in the Oaxaca Valley by 4500 BP – as the population increased there was intense warfare 2500-2000 BP, culminating in the victory and domination of the Zapotec empire – I mention this to emphasize that cultures in the New World had their own history of replacement – the Incas triumphed and trampled a civilization which they replaced, and destroyed all the pre-Inca artifacts they could find

in Hawaii there were institutional inequalities and selfishness without the technology and battles of war – with Sumner, Hittites, and Egyptian Dynasties, and many others, there were real wars with real weapons – with cities in the Indus Valley, life was generally peaceful without a central army and top down/top dog behaviors

the first settlers in Hawaii had an invention which I imagine came in a dream – sticks were arranged in a circle near the shore, small fish were placed inside and fed daily, and soon became too large to escape between the sticks

in a typical Mesopotamian stele (a large carving in stone to be placed for prominent display) the ruler is depicted as the largest figure, about twice as big compared with his soldiers and his captives – the ruler is regarded as the best warrior, the best hunter, the leading priest, the three most important categories of male dominance – at first, on one side of the stele, you see the king in battle and triumphant aftermath – on the other side of the same stele, you see the Gods winning the same battle with the same captured enemy– later, only one side of a stele is carved, and the King merges with the Gods

a novel invention of showing rulers in steles – an individual stele depicts the king both shooting an arrow at a lion, and next to that the king thrusting a spear at another beast – 2 scenes separate in time are in the same picture – this had a major influence on subsequent art – like adjacent panels in modern cartoons

a change occurs with high-ranking females – at first near equals of the king; later demoted to subservient status – in the prehistory of humans, the evolutionary pathway is to change from sexual dimorphism (males much bigger) to more equivalent body size– with the onset of civilizations the reverse happens – males change from near-equality to dominance – in classical Greece female goddesses had high status – Athena, Aphrodite, Demeter, while in the home the woman was not allowed any freedom whatsoever- Hesiod described women as a special species, and Aristotle classified women as a sub-species - in the French Revolution the status of male commoners was elevated, the status of female commoners was reduced – a partial explanation is that newly-liberated male citizens did not want competition from women with workplace and artistic skills

in both Egypt & Mesopotamia, temples were built for the Gods, separated from the palaces of the rulers - every morning delicious food was brought to feed the Gods, and since the Gods never showed up for

breakfast, that food was then eaten by the rulers

in my imagination so much of these customs and these displays first appear in a dream – people in Uruk (the first city state) gave intense attention to their dreams, but in a way which extracts the personal nature of the dream and instead gives a formulaic interpretation... “if your dream is about your sister’s thirst, then some of your sheep will be stolen” - a concrete cookbook lacking both logic and personal relevance

quite the opposite in indigenous cultures – native tribes in Newfoundland gathered every morning to share and discuss their dreams – the men hope to have a “Big Dream” - with the force of “Manitou” which tells the dreamer where the caribou or the bear can be found that day – if his dream is correct, he rises to the status of a Big Dreamer – this dream is utilitarian, effectively pointed towards survival

when a dream is given meaning by some expert based on arbitrary lists, it is useless, though also beneficial from the placebo effect– in contrast, the Manitou dream comes from the dreamer, and his tribal mates give high status to its personal content – in many indigenous cultures it is true that no waking words have precedence over the voice of dreams

30 years ago anthropology books described a particular common dream amongst the Senoi tribe in Malaysia – the child tells of a frightening dream in which s/he is being chased and attacked by a tiger – the child is told that the next time, instead of running away from the tiger, s/he should turn around and face the tiger with a smile and friendly vibes – the tiger will morph from killer to powerful companion

as mentioned above the first empire was that of Sargon, about 2300 BC – he consolidated all the city-states under his rule – so there was a coherent march from isolated villages which grew into city-states each with its panoply of gods, and then the dozen or so were united under a single ruler – it took several millennia for the isolated villages, living very well by hunting and gathering, to invent grain agriculture and then suffer the consequences of taxation and conscription, as crops were hauled away for the benefit of the rulers in their temples and to feed their military

the main God of Sargon was Enki, known as the God of order and useful technologies – to place a God of daily activities at the top tells us that practical values outweighed spiritual values – to have elaborate ceremonies about the sun, moon, and stars requires that a reliable infrastructure is in place – worshiping Enki was about taking care of business, first and foremost every day

another God was Shamush, the God of the Sun – he is depicted with a serrated sword, so he can saw out a gap in the eastern mountains and facilitate sunrise – at night Shamush is carried across an ocean by a bull to make ready for the next morning – here is another image which may have arisen in a dream – there were no books to stimulate the waking brain, no cinema or theater, and the God of the Sun with the serrated sword seems to me like a classic dream – I know that this cannot be proven or disproven, but I suggest that ideas have to come from somewhere, and dreaming seems a powerful possibility

in the pantheon of Gods, the first Gods were major – these Gods then brought forth lesser Gods, to serve them dawn to dusk– the Lesser Gods did not like this, so they brought forth humans to do the work – humans were highly fertile and overpopulated the area, so the Lesser Gods made a massive flood to kill off excessive and noisy humanity – but humans built an enclosed boat to survive the flood – obviously this story became the story of Noah, and likewise, the Garden of Eden, the Tower of Babel, and the Great Flood are anticipated in Mesopotamian legends

Quiz Question – what did the Mesopotamians do with elaborate gold statues and jewelry? They buried them with the rulers – what did the Spanish Conquistadors do with gold objects stolen from the cities in the New World? They melted many of them down and shipped the former gorgeous creations back to Spain – but some gold and silver objects were not melted – sent by Cortes from Mexico, the artistic treasures were seen by the great artist Durer who said they “were much more beautiful to me than miracles”

the steles often listed familial names...XYZ the daughter-in-law of the king, XYZ the children of the king, etc – a who’s who of major individuals – in Stalinist Russia there were the “nomenklatura,” the “named ones” – the elite with A-list Kremlin connections - so it was with the steles, placed for daily viewing, proclaiming the rank and relationships of current royalty, also specific victories in battle - the small clay tablets might depict myths and stories, but not current events and current news of victories and other news glorifying the royalty, visually broadcast via steles on the walls of the palace and temple in full view for daily awe and admiration, like the electronic billboards in Times Square

“named ones” has been a constant of history – think of John Hancock, a famous name as the first signer of the American Declaration of Independence

Mayan pictographs show captured scribes having their nails pulled from their hands, dripping blood – to destroy the capability of scribes to promote the virtues and achievements of their ruler, now defeated, was a form of cerebral castration

steles often displayed major warnings to potential rivals ... “a thousand curses, etc” - like crucifixions in Rome, which were placed on hillsides to frighten the masses

scribes in Mesopotamia each had a personal seal to individuate their writings – being a scribe was high status

from a tablet series: “in remote days it was...” or “in remote nights it was...” or “in remote years it was”... many myths began with these descriptions- the rotation of earth around its axis, and the revolution of earth around the sun, are embedded in mind of the mythmaker with no knowledge of the earth’s revolution or rotation – day and night, and seasonal cycles are so central to human existence that they predominate over everything else -this is especially true amongst bards and storytellers

at the end of every year a tally was made of all transactions – so the annual report is embedded in the earliest civilization – the Two Motions

described by Galileo go far back in recorded history – if another high tech civilization exists elsewhere in the universe, it is quite unlikely that they would arrange their myths according to short-term “night and day”

To-Day & To-Night & To-Morrow is transformed into Yesterday & Last Night & Today -

the constant cognitive background for bards and storytellers, continuing on to poets & philosophers – the world of earth-based time

excavations of royal burials had concubines, retainers, court musicians and others each holding a cup, to be filled with poison to die with the king – I was amazed to see a “Game of 20” - a beautiful board game with 20 squares, buried with a Mesopotamian royal so that the deceased could play for eternity

the textbook-famous Code of Hammurabi (1792 BC) consisted of 282 “laws” written on a large stone – these “laws” are much better understood as examples for what is appropriate action for the 3 classes of property owners, freed men, and slaves - “an eye for an eye” is not the same for all – the Code is based on concrete thought rather than abstractions – another example of how constrained was the ancient mind, incapable of generalizing even at a level of smart grade schoolers today – rather than a general statement of what is appropriate punishment if something of significant value is stolen, Hammurabi’s Code specifies a particular punishment for stealing a sheep, a goat, a boat, even if the value is about the same – concrete thinking without simple abstractions

my favorite text from Mesopotamian tablets is the “Dialogues of Pessimism and Transcendence” (about 1000 BC) - it tells us of a conversation between Master and Slave with the subjects being: Driving to the Palace, Dining, Hunting, Marriage, Litigation, Leading a Revolution, Sexual Intercourse, Sacrifice, Making Investments, Public Service – in each of these the Master first says he will do it, the Slave responds with affirmation, then the Master changes his mind and says he will not do it, and the Slave seconds the new negative decision – two key aspects for me: every one of the actions is highly civilized and unrelated to the world of prehistory, and the I will/I won’t shows the full freedom of arbitrary choice – it is as if the mind is celebrating the newness of urban life - “I am a man-about-town infinitely superior to savages before our exalted civilization conquered all persons and places” - also, “I have freedom of choice about what outfit I will wear today, where I will go, what I may say to friends about the next festival, etc. - and I can change my mind on a whim”

the steles often depict court scenes which are similar to European royalty – a standing goddess presents a guest to a seated king, just like a posed photo in Victorian Europe

I have assembled a collection of vivid descriptions of humanity...

Kant – “the crooked timber of humanity”

Alexander Pope – “the glory, jest, and riddle of the world”

Pascal – “man is totally incomprehensible to man”

“I have discovered that all human misery comes from a single thing, the inability to sit at peace in a room”

“the glory and slime of the universe”

Borges – “a circular labyrinth without a center” -
“an impossible quest for some ultimate certainty”

Montaigne – “false opinions and ignorance have poured so many strange desires into us that they have chased away almost all the natural ones – what am I to make of a virtue that becomes a crime on the other side of the river?”

Merleau-Ponty - “the philosopher is marked by the distinguishing trait that he proceeds inseparably the taste for evidence and the feeling for ambiguity”

Nietzsche: “The Earth has a skin, and the skin has diseases. One of these diseases is called, for example, ‘humanity.’”

Czeslaw Milosz - “Let a new man arise, one who, instead of submitting to the world, will transform it. Let him create a historical formation, instead of yielding to its bondage. Only thus can he redeem the absurdity of his physiological existence.’

“...thinking in categories of motion seems to be the surest means of seizing reality in the act”

from the Quran: “To Him belongs everything that rests quietly, in the day and in the night.” this quote reminds me of a possible future website – Cybernetic Health & Peace

Ian Tattersall – “accidental tourists” - I add that in the Anthropocene humans have morphed into lethal tourists

Magritte – “the world is a defiance of common sense”

Chekhov - “a dislike of life strangely combined with a fear of death”

Lev Shestov, a Russian philosophical pessimist (1901): “man begins to think, really think, only when he has satisfied himself that there is nothing to do”

Orwell – “H.G. Wells was too sane to understand the modern world”

Eric Fromm – “the freak of the universe”

John Ashbery: “my poetry is disjunct, but then again so is life”

Pynchon – “there is no universal history from sovereignty to human freedom, but there is one leading from a slingshot to the atomic bomb”

Ariel Dorfman – “we live in a time of violence and inequality, greed and stupidity, intolerance and xenophobia, marooned on a planet spinning out of control like lunatics sleepwalking towards the abyss”

Bellow – “the not-yet-stabilized animal”

Henry Miller - “Even the Creator, when he made this perfect universe, had to learn not to care too much. Certainly when he created Man he gave himself a prolonged headache.”

“We refuse to remain anonymous, unlike the men who made the cathedrals.”

William Blake – “to be in error, and to be cast out, is also part of God’s plan”

Charles Fourier – “civilization is the plague of humanity – the present order of the globe is simply a material and social hell”

Henry Bergson – “mankind lies groaning, half-crushed beneath the weight of its own progress”

Voltaire, from *Candide* - “But to what end was the world formed?”
Merlin - “to infuriate us”

Mary Wolstonecraft - “...the world is still the world, and man the same compound of weakness and folly, who must occasionally excite love and disgust, admiration and contempt”

Mark Twain – said by Satan “now we have seen your progress through the ages which is wonderful in its way – we will drink to each other and let civilization go”

Machado de Assis - “Madness, the object of my studies was, until now, considered a mere island in an ocean of reason; I am beginning to suspect that it is a continent”

“a thinking erratum”

Aldous Huxley - “Great is truth, but still greater, from a practical point of view, is silence about the truth.”

John Steinbeck – “we wonder whether in the present pattern the pieces are not straining to fall out of line; whether the paradoxes of our time are not mounting to a conclusion of ridiculousness that will make the whole structure collapse”

Kenneth Rexroth - “against the ruin of the world there is only one defense – the creative act”

Arundhati Roy - “as the ice caps melt, as oceans heat up, as our formidable intelligence leads us to breach the boundaries between humans and machines, and as our even more formidable hubris undermines our ability to connect the survival of our planet with the survival of our species, as we replace art with algorithms and stare into a

future in which most humans may not be needed to participate in (or be remunerated for) economic activity...”

“Jeffrey St. Clair - “we remain strangely impassive in the face of our own extinction”

Alexandra Schwartz - “...how exactly to resist capitalism, when it sinks its teeth so deep into the human condition”

and about war...

Homer: “Men grow tired of sleep, love, singing and dancing sooner than of war”

King James I of Aragon believed that, by conquering lands for God, he and his men were atoning for their sins

Proudhon – “war is the most ancient of all religions, and it will be the last”

Kipling – “if any question why we died, tell them, because our father lied” (his son died at the Battle of Loos, 1915)

D. H. Lawrence - “the violence of the nightmare released now in the general air” (2016)

Trotsky – said after he led the Red Army in defeating the Whites - “War is the locomotive of history” (1922)

Orwell - “The war is not meant to be won. It is meant to be continuous.”

Susan Sontag - “I think it’s my duty to be in as much contact with reality as I can possibly be, and war is a tremendous reality in our world”

from me – “there is global warring anywhere, and global warming everywhere”

WARNING/WARRING/WARMING/HARMING

Camus – describing the two hulking beasts of the Cold War - “two ferocious and mediocre ideologies” - I particularly admire Camus for his rejection of both combatants...USA & USSR

Petra Kelly – “we are trying to figure out if there is a time you don’t have to live with an enemy”

from me, regarding the “War on Terror” - I call it “the War to End all Endings” – as currently presented, the War on Terror cannot end Terror anymore than the War on Crime can end Crime – some diplomat or some embassy will be attacked tomorrow or next week

instead of the “Second World War” (1939-1945) I call it the “Last World War” after the First World War (1914-1918) – it is the Last World War because with a world now full of atomic weapons there can no longer be a “world war” - a total war in which all available weapons are used - “war” implies strategy and tactics over weeks and months of conflict,

which become meaningless as soon as the first thermonuclear bomb is released and explodes

so the 20th Century had the First World War and the Last World War, and brings us what I call the Uncertain Century – regarding the last century, historian Barbara Tuchman called it “the Terrible Twentieth,” and Nobel Laureate Wislawa Szymborska wrote “Our twentieth century was going to improve on the others. A couple of problems weren’t going to come up anymore, hunger for example, and war, and so forth. There was going to be respect for the helpless people’s helplessness, trust, that kind of thing. Anyone who planned to enjoy the world is now faced with a hopeless task.”

in the ancient empires it was often the plan not to crush and kill the victims, but to harness them by extracting and exploiting desired resources – cattle were often confiscated to be used as taxes

sometimes history went in reverse – Alexander the Great, marching about from 334 to 323 BC conquered 15 separate territories – on his death they reverted to former status, and now each continued independently as before but continue with a city renamed Alexandria

this opus presents Human History “in a Hurry” - and because it is so compressed it skips over so many major events, such as the world of Charlemagne, Ghengis Khan, the Crusades, The Black Plague, the Songhai Empire in Africa, and so much more

looking at a world map, it has been a constant that the latest manifestation of plate tectonics, with oceans, mountain ranges, irregular coastlines, etc have continued to define cultures and nations over the last 5000 years – much historical change with little change in geography since the Urban Revolution began, because the last 5000 years is just 1/100,000 as recent as the gathering of all the continents in Pangea – but going back in prehistory, the distribution of dinos is explained by Africa and South America being contiguous and the dinos crossed back and forth before the continents separated

before I describe the origin and history of the 1969 theory I bring in the presence of the theory’s co-author, Steve Schacher – Steve was first in his class at Yale College, majoring in math – in 1967 he was beginning his 2 year “doctor draft” at NIH, just as I was, across the street at the National Naval Medical Center – he invited me to crash at his small apartment, which is where I had the dream about Darwin and Freud – I persuaded Steve to brainstorm with me every evening, as the theory took shape, 50 years ago – in the last few decades Steve has drifted away into a conservative medical practice, and I no longer speak or email with him about the current status of....Behavioral Analysis of Mammalian Sleep and Learning, Perspectives in Biology and Medicine, Autumn Issue, 1969

Steve and I were fairly quick to produce a first draft of our work – several versions, both full-scale cybernetic models and highly compressed summaries were submitted to the journal Science – (I had already published research in cell biology in Science) – the paper was rejected, but I was encouraged by some of the reviewers comments...

“This is a very ingenious and provocative conceptualization but obviously needs to have both its premises and its implications more carefully examined experimentally before it can be taken very seriously”

“The paucity of sophisticated theory in the field of sleep research dictates an automatic welcome to the paper by Bryson and Schacher. This is the kind of thinking that should stimulate research in areas that are largely neglected; and, I believe, the field is now ready for this. The predictions are bold and well stated, but they do not appear to arise directly from cybernetics or from sleep data, although it is possible that if Bryson and Schacher had exposed the reader to all of the data and all of the logic by which their predictions were derived, the predictions would appear more reasonable. Happily, all the predictions are testable, and for this reason, as well as their theoretical genesis, the paper deserves publication as a letter.”

we then submitted the theory to Perspectives in Biology & Medicine, published by the University of Chicago Press – a reviewer asked that we simplify the text – instead of having Perceptual Input, Decision Making, and Decision Execution as fluctuating variables, the revised theory had a digital/on-off format – our prototype mammal was now either in Decision Making mode or in Decision Execution mode while awake

there were several hundred requests for reprints from academics around the world -

(sending science reports by snailmail was the method of communication before the internet and email)

from Professor John Flavell of the Institute of Child Development at the University of Minnesota – it was his book about Piaget’s work that brought widespread attention to Piaget from English-speaking scientists: “Your theory is certainly a bold and striking one, and my intuition tells me that it probably isn’t true. However, almost all novel theories have that effect on people, and I would certainly encourage you to check it out.”

from Professor George Miller of Rockefeller University - “The notion that sleep is a time for perceptual digestion certainly pulls together a lot of apparently unrelated phenomena, and suggests some interesting speculations, as your paper says so well. It at least suggests one possible reason why sleep is necessary, which is one more than I had before. I remember asking Herb Simon back in 1958 why people sleep when computers don’t, and he came back with the suggestive response that maybe sleep is a time when we debug our programs. Computer time spent debugging programs prior to running them would, according to Herb, have to be counted as ‘sleep.’ At the time it seemed pretty implausible to me, but now in the light of your argument, maybe there is something in it.”

in a phone conversation with Professor Joe Weizenbaum of MIT, when I said that if sleep is central to learning it might “double” the totality of learning, waking + sleeping rather than waking only - Joe replied that the theory would produce learning far more than mere doubling – Joe had developed the “Eliza” program which was the first winner of the Turing

Test

from Christopher Cooper of the Department of Psychology, University of Adelaide, in South Australia - “I must admit I have been sampling the literature rather inefficiently when our article in Perspectives in Biology & Medicine (Autumn, 1969), for I have only just come across it. At first, I thought ‘interesting’ but conservatively thought a little bit more evidence may be needed to confirm your ideas about the relevance of sleep. I had an experience on the same day where a problem, insoluble right through that day suddenly found a solution the next morning. Previously I had gone along the usual line of lack of interference but your article has made me aware that there must be more to it than that. The ideas are are not just ‘interesting’ now, they are ‘fascinating.’ “

I sent a reprint of the theory to Arthur Koestler in London. In my covering letter I quoted him from his book “Ghost in the Machine” in which he said ‘To unlearn is more difficult than to learn; and it seems that the task of breaking up rigid cognitive structures and reassembling them in a new synthesis cannot, as a rule, be performed in the full daylight of the conscious rational mind. It can be done by reverting to those more fluid, less committed and specialized forms of thinking which normally operate in the twilight zones of awareness.”

in his letter of reply to me, Mr Koestler wrote “I was much intrigued by your sleep theory. The formulation is of course so compressed that it is difficult to see all the implications. But it seems to fit in with a lot of tentative approaches which are in the air.”

I read an experiment published in Science (Volume 167, pages 86-87) which seemed like a perfect test of the sleep theory. Gordon Gallup’s study showed that mirror-naïve chimps first react to reflected image of self as if what seen in the mirror was a new and unknown member of the group, and on later days begin to explore as if the chimp in the mirror is me! - now viewing the inside of their mouth, never before seen, and watch their movements perfectly matched by the image. I noticed in Gordon’s data that behavior consistent with visual self-image never occurred during the first day of mirror exposure, and did occur for several chimps on the second day. The origination of a visual self-image, where none existed before, seemed to be a chimp’s equivalent of a eureka dream – a brand new perceptual category comes into being via dreaming. I phoned Gordon in New Orleans, and told him my interpretation of his data...during the waking state, executive memory recorded individual episodes of the “stranger” in the mirror, the chimp made standard social movements of threatening, posturing, and grimacing, just as if a strange new chimp is introduced to the group – during the first night of sleep, inductive analysis of the waking state record reveals a perfect correspondence between the motor activities of the chimp and those of its reflected image - “it moves when I move, and in just the same way – maybe that’s me in the mirror! Maybe I am looking at myself!” for the “brightest” chimps, it only took one session of mirror exposure and one episode of subsequent dreaming, but for all the chimps the gestalt switch occurred within a few days

Gordon was mainly interested in the evolutionary status of visual self-image, which he went on to find that this was quite impossible for

monkeys as opposed to chimps and oranges – for monkeys it never occurred even after months of mirror exposure – a monkey often tended to move and look behind the mirror, to see if the creature was back there - Gordon's work was designed to show that visual self-image in chimps is a “Stage One” of primitive self-awareness which is confined to humans and our nearest anthropoid relatives - Gordon was intrigued with the possibility that I presented to him, now using sleep as an explicit variable – the only reason his data came out as it did was because of the circadian world in which both Gordon and his chimps were living – the psychologist goes home for the day to eat and to dream, which is what the chimps had done as well!

The experiment I proposed to Gordon...one group of mirror-naive chimps would have unlimited exposure to a mirror, as many hours as possible, in the first day. Prediction: no chimps would switch from stranger-behavior (threatening etc) to me-behavior (inspecting teeth, looking at back of shoulder, and actively “dancing” as it explores its reflection) in the first day. A second group of chimps would be given just an hour of mirror exposure on the first day, and then, following normal intervening sleep, would start the second hour of mirror exposure on the second day. Prediction: some chimps would make the switch as early as the second hour on the second day, strongly suggesting that the chimp needed to “sleep on it” to invent a self-referential perceptual category, to be explored and validated in the next waking state.

Gordon was enthusiastic, but after a few months of looking for funding I gave up and decided to do a medical internship as a solid prospect for a family of four – and creating another group of mirror-naive chimps, from scratch, would take time, requiring a proposal for a research grant to be reviewed and funded, and then years to raise a group of chimps before the experiments begin

and it has been shown that other animals can develop self-recognition from mirror exposure – an Asiatic elephant, dolphins, orcas, and the European magpie – of this group only an elephant has a brain based on the circadian cycle – dolphins and orcas have to stay awake continuously, and a magpie's brain is organized completely differently than a mammal's

I will never forget my visit to Gordon's lab at the Yerkes National Primate Research Center in New Orleans – in a glass container on the wall, near the chimps, was a loaded revolver and a hammer to break the glass – adult male chimps are much stronger than the strongest human, and if one were to attack a human, the only way to save the human would be to shoot the chimp

even if the proposed experiment yielded perfect results, many academic psychologists would pay no attention – if it is true that understanding of learning and of consciousness requires a fundamental model based on waking and sleeping, both, together, for a comprehensive model, it would require a professor of psychology to ditch his paradigm and virtually start all over with circadian variables - there is an old Zen saying - “you cannot be made aware, right here and right now, of what you are not now aware of”

in contrast with professors of psychology, the community of AI scientists will be quite interested in a biphasic model of cognition, but it will be a curiosity based on the evolution of cognition, and not of any real practical benefit to whatever aspect of AI they are working on, given the enormous power of modern systems - as I wrote above, a powerful digital computer can now simulate anything, including a biphasic model of cognition without itself being biphasic – speed and depth of processing in AI trumps any advantage of having a sleeping function

and for the philosophers – what if consciousness is a circadian interaction of thinking and dreaming? (hat tip to the Surrealists – but they were proposing the merging of waking and sleeping for artistic purposes, whereas I was interested from a scientific perspective)

at the New Yorker E.B. White shared an office with James Thurber – White said “his waking dreams and his sleeping dreams mingled shamelessly and uproariously”

The best book about dreaming as a central factor in creativity is “The Committee of Sleep” by Deirdre Barrett – the title comes from John Steinbeck, who mused that when he was in the middle of writing a book, a friendly committee would convene in his sleep and brainstorm the next text for his writing the following morning – the single best case of this comes from Robert Louis Stevenson, who, as mentioned above, watched and listened as his “little people” gather on stage in his dream, and act out the next chapter of his book

if this is a true report, who could doubt that dreams are part of creative intelligence? - here we have prima facie evidence that sleep and dreaming are of fundamental cognitive importance

Robert Louis Stevenson had chronic tuberculosis causing fitful sleep and nocturnal coughing – I speculate that he awoke frequently, remembered the staging of recent dreaming, and that this accounts for his unusual reliance on dreams for his fictions

I have always believed that if pre-20th Century thinkers had ready access to cybernetics, to experimental psychology, and to investigations of AI, they would have come up with a biphasic (waking/sleeping) model of learning – here are some speculations from other thinkers...

from Heraclitus “even sleepers are workers and collaborators in what goes on in the universe”

King Milinda of India – he is discoursing on dream interpretation and significance – “a person’s own mind does not itself seek the omen, neither does anyone else come to tell him of it. The prognostication comes of its own into his mind.”

from the Talmud - “the dream provides its own interpretation”

Synesius - “sleep is an oracle always ready to be our silent counselor” - “we do not sleep merely to live, but to learn to live as well”

St Augustine - “those things which have occupied a man’s thoughts and

affections while awake recur to his imagination while asleep”

Schopenhauer - “Life and dreams are leaves of the same book – to read them in the proper order is to live, and to browse among them is to dream”

Alexander Pope – “a train of Phantoms in wild Order rose
and joined, the Intellectual Scene
compose” (to this I think “perfecto!”)

Henri Poincare - “ideas rose in clouds; I felt them collide until pairs interlocked, so to speak, making a stable constellation”

Italo Calvino – “he would like to be a Don Quixote who knows very well what dreams are and what reality is, and lives both with open eyes”!

Emerson – in a dream he is floating through space, and from a distance, sees a round object – as he approaches it he sees that it is not an apple, as he first thought, but it was instead, the world - “and I ate the world” - what a perfect case of the transcendental philosopher ingesting the totality of knowledge and mental categories!

(more Emerson) – “In dreams we are true poets; we create the persons of the drama, we give them appropriate figures, faces, costumes...I doubt if the best poet has yet written any five-act play that can compare in thoroughness of invention with this unwritten play of fifty acts, composed by the dullest snorer on the floor of the watchhouse.”

Whitman - “I dream in my dream all the dreams of the other dreamers/ and I become the other dreamers.”

Erwin Schrodinger - “The task is ...not so much to see what no one has yet seen, but to think what nobody has yet thought, about that which everyone sees.”

W.H. Auden: “Man is a product of the refined disintegration of nature by time”

Anais Nin: “the earth is everyday opaque, without dreams”

Nabokov – “sleep is the most moronic fraternity in the world” - I include this to give a voice to dissenters about the importance of sleep to models of learning

Auden – “a professor is one who talks in someone else’s sleep”

William Burroughs, in “My Education- A Book of Dreams” - a compilation from his dream journals - “It’s all a film run backwards...the Atom Bomb through the Manhattan Project to the formula... $E=MC^2$ ” - the temporal structure of dreams often reveals “last in, first out” - LIFO – a managerial concept recalls the experiments of Matt Wilson of MIT showing that rats which learn a maze while awake run the correct left-right steps backwards during sleep

Nelson Mandela, from a letter written in year 8 of 27 years in prison -

“each day brings a fresh stock of experiences and dreams”

Elizabeth Loftus – “memory is born anew every day” - your memory of today tends towards linearity– morning followed by afternoon followed by night – one damn thing after another – suppose you met friends for breakfast and then had a flat tire on the way to work – tonight during dreaming when-based memory tends towards what-based memory, and the flat tire is filed with other mishaps on the road, and the play-by-play of yesterday is degraded

Marvin Mercer, student at PS 155 in NYC (via Carl Sagan)

My heart trembles like a leaf
the planets whirl in my dreams
the stars press against my window
I rotate in my sleep
my bed is a warm planet

novelist Jennifer Egan “often dreams are about finding a door that leads to an unknown room...sometimes the door leads to a garden. They are wonderful dreams. They are dreams about writing.”

several years after publication of the “sleep theory” I came across a paper by Edmond Dewan who proposed his “P Hypothesis”, which was published shortly before the Circadian Theory of Learning - in the sense that the brain has programs analogous to a computer’s programs, Dewan was saying that sleep had an informational purpose – he said nothing at all about what might take place in the waking state, so his approach did not lead to testable paradigms, as did mine, such as the proposed look at “gestalt learning” in chimps a la Gordon Gallup and self-recognition with mirrors – Dewan did not consider complimentary and interactive modes of learning in waking and sleeping, but he did point to an informational purpose of sleep rather than a purely metabolic purpose

Howie Gruber asked me to send the theory to his friend Howard Gardner, Harvard professor famous for his writings about different kinds of intelligence – Gardner then wrote me (9/9/81) – Dear David Bryson – I found your ideas interesting and provocative. The problem, as I see it, is that much of the writing oscillated between being science and science fiction. Each of these genres is fine but they can’t be confounded. I personally think that that the scientific basis for ideas about sleeping and thinking is not sufficiently well established for you to write a popular article based upon the science. On the other hand, I think that something in a more fictive mode - about “what might be the case” - might be an extremely effective journalistic piece for the Darwin centennial. I could see it running in Omni, Geo, or in a more scientific magazine like Psychology Today or Science Digest, provided that it was labelled as speculation rather than fact. For your ideas to attain the label of science you would need, at the very least, to collate and review a lot of literature (as you begin to do in the paper with Schacher), or to go out and do experiments, a la Gallup. That failing, you are still in the realm of promissory notes. I hope this is not discouraging, but I feel it is important not to mislead you about the current scientific status of your intriguing speculations”.

On the 20th anniversary of Psychology Today (1987) the editors asked 15 professors to write about progress in psychology since the magazine began. Not a word about sleep and dreaming. Psychology Today without Psychology Tonight!

I will now return to Human History in a Hurry - having dipped into ancient Mesopotamia 5000 years ago, we move ahead to ancient Greece and imperial Rome – as civilization progressed, daily dreaming is sequestered to private matters and not a keen focus except for poets, novelists, painters, musicians, scientists, and children

a summary of essential contentions...from the first language about 50,000 BP, to the Urban Revolution, about 5000 BP, has homo sapiens living in prehistoric time – 95% of sapiens history is before the first cities, and sapiens excelled in every possible way, spreading to every continent – daily activities were related to survival & reproduction, and nightly dreams improved mental activity in the next waking state – after the Urban Revolution, daily activities might include lusting after temple concubines or ruling in or out a color of clothing, style of clothing and jewelry, planning an elaborate burial - much of daily activity in the first cities made no Darwinian sense, and resulted in dreams which also are garbled reflections of that individual's portfolio of peculiarities

I imagine something comparable to “I think, therefore I am” related to dreaming “I dream, therefore my mind is working night and day” -suppose some prehistoric mother wakes before her mate and their children, with a morning dream still fresh in her mind – she looks at her family, still sleeping, and realizes that for them right now there is an internal reality, a dream, like which just a moment ago for her was “a movie in my mind” - the pictorial reality of dreams is separate from waking reality with eyes and ears open to reality – we dream, therefore the world exists both inside and outside our heads

there are two more cognitive advance which occurs well after the Urban Revolution – first, in the Golden Age of Greece about 500 BC, heavy thinking finally produces inductive logic, and Euclid writes a magnum opus of diagrammatic examples – then, after the Renaissance about 500 years BP Galileo performs actual experiments on bodies in motion, and the Scientific Revolution is born

while abstract thinking and inductive logic are widespread in the modern world, there has been a reversion to concrete mentations in current Communist China – creative abstractions from artists and writers are severely crushed – hardcore Marxists also suppress individual creativity, since it is often drawn to scathing or humorous criticism of those in power

in the Iliad Homer describes the values of the warrior...defeat his opponent in fair combat, and then strip the defeated of his armor as a trophy to display proudly – without the material presence of the armor, honor is incomplete and non-existent

the Urban Revolution does not impact all human societies – a class called “First People” still exists – in areas which at first had no humans, then the first human migrated there and all subsequent humans in

that location are descended from the first arrivals – currently there are about 20 such cultures, such as Eskimos and remote tribes in the Amazon basin – sociology had taught that there are 3 classes in the 20th Century – conventional political discussions divide the world into Capitalist, Communist, and Developing Countries, which diplomats and newspapers referred to as “the Third World” – in all three the ruling perspective is that “the land belongs to the people” – giving First People a separate status, as they deserve, for them “the people belong to the land,” and so First People are a fourth category

First People tend to produce a mature culture which remains the same for many generations – in modern world the last ~500 years) and even faster in the Anthropocene/Great Acceleration (the last ~50 years), cultures continue to morph and struggle, what Philip Roth calls “radical impermanence”

First People often prefer to maintain traditional lifeways, and reject the offer of technical assistance – the Lapps in northern Sweden and Siberia continue with wooden sleds, drinking reindeer blood, and have no interest in shortwave radios

up until about 20,000 years ago, the Bushmen/Khoisan of the Kalahari Desert were the most populous humans on the planet – when studied by anthropologists, it was apparent that they needed only about 15 hours of work/week as hunter/gatherers to meet their needs – they are radically egalitarian, and suppress any indications of bragging or superiority – they would probably go on almost indefinitely in a dynamic status quo if there was no encroachment from capitalistic civilization

my approach to cognitive development is almost the opposite of “evolutionary psychology” which attempts to map modern behaviors onto those of prehistoric humans – if asked to demonstrate my position, I would use a timeline...consider the changes per 10,000 years since the origin of human language – not much change from 40,000 to 30,000 – nor from 30,000 to 20,000, or from 20,000 to 10,000 – over this time span cave art became more elaborate, as did tools and clothing – but not much changed, when compared with 10,000 BP to the present – agriculture and then the Urban Revolution completely changed daily behaviors, indicating an external explanation rather than a genetic explanation, which is what evolutionary psychology is based on

Human History in a Hurry is studded with reversals – in 2000 BC the King in Ur is frantic and texts, via tablets, “Where is my grain?!” - the Norse in Greenland arrived 800 AD and died out around 1500 AD – living in the same space the Inuits did just fine – the Hohokan in central Arizona collapsed around 1400 AD, having destroyed agriculture with salinization and deforestation – we can observe a full house of cultural casualties

the “Dark Ages” existed from AD 600 to 1100 – world population barely rose from 1 AD to 1000 AD, remaining about 300 million – then in the second millennium number of living humans jumped to nearly 7 billion in 2000/2001 – obviously this cannot continue – in my lifetime human population has tripled, from ~2.3 billion in 1938 to ~7.8 billion in 2020 – before the 20th Century, population had never even doubled in a single

lifespan

I learned a lot from two documentaries from Robert Flaherty - “Nanook of the North” and “Moana with Sound” both from the 1920’s – watching Inuits in northern Canada, and Polynesians in Samoa, shows how happy and how skilled life could be, unaffected by the Urban Revolution

THE MODERN WORLD BEGINS, ABOUT 500 YEARS AGO

many historians mark the year 1500 as a new era – said by the major humanist philosopher Erasmus in 1518 - “Immortal God, what a world I see dawning. Why cannot I be young again?” - in 1513 appeared Machiavelli’s “The Prince,” of colossal political significance – in 1516 came Thomas More’s “Utopia,” of colossal intellectual significance – then in 1517 Martin Luther nailed his diatribes against the Pope and established Catholic Christianity on a local church door, a colossal religious event – at the same time the first treasure ships were arriving in Spain, overflowing with silver and gold from the New World – of colossal mercenary significance

suddenly minds shifted from the Mediterranean and the Far East to the New World – maps were drawn on facing pages, a map of World One (the old world) on the right page, and World Two on the left– the New World had land masses equivalent in size, not just a new big island, but enormous continents open for exploration and exploitation – once the New World was discovered, for Spain, Portugal and England, facing the Atlantic, location/location/location was destiny

a happenstance of history curtailed potential Chinese access to a similar voyage of discovery – the eunuch commander Zheng He, sailing 1405 to 1433, had 60 big ships exploring the east coast of Africa, and probably would have continued into the Atlantic if his command had not been axed by the Ming Dynasty

Luther was particularly peeved by the sale of indulgences by John Tetzel, which helped the funding for St Peter’s Basilica – Tetzel had an onerous ditty: “As soon as pennies in the money chest ring, the souls out of their Purgatory spring”

as the printing of books rocketed the spread of science, a metaphor developed amongst the aristocrats – the hunt – hunting for game, hunting for the secrets of science

1500 marked a turning point for a goods-based economy to a money-based economy, which was a big blow to the poor – they had to scrape up coins for daily necessities instead of bartering which had worked quite well

the creation of a modern monetary system needed a powerful central government with control of laws and courts

inequalities within states preceded inequalities between states

THE ANTHROPOCENE – THE LAST 50 YEARS

the first connection of Human History in a Hurry was to the subject of “Big History,” championed by Professor David Christian – in an email to me David wrote “That’s very neat! My instinct is that it is perhaps too neat, but I’m a historian and historians are trained to be very suspicious of neat conclusions. And when I look closely I must admit that each of the turning points looks plausible to me.”

David gave a TED talk on his Big History which was watched by Bill Gates on his treadmill in Seattle - Gates contacted David and has funded an extensive high school curriculum now available online

the key turning point for me was eliminating the last element of the series – 5×10^0 = the last 5 years, which made sense in the time frame of AD 2000-2005, but as the years have marched ahead since then it is increasingly misplaced – I suddenly realized that if I made the last element the last 50 years instead of the last 5 years, I now had a perfect formula for Human History in a Hurry – the birth of the earth through the appearance and events of the modern world 500 years ago, as a backstory to the Anthropocene – this clicked with Jan Zalasiewicz, Chairman of the Anthropocene Working Group, in the email quoted above

“Anthropocene” is now a global buzzword beyond measure – listed #1 as the best non-fiction book “The Sixth Extinction – An Unnatural History” by Elizabeth Kolbert (2017)– after 5 massive extinctions, all occurring well before civilization began, the current 6th extinction is due to human action

I like what Benoit Mandelbrot said about his discovery of fractals – once he coined the term “fractal” it spread like a brush fire - “to have a name is to be” -so also with the Anthropocene

the Anthropocene is not a crisis – a crisis carries the potential of reversal – much of the biospheric damage has been done already, and will continue in significant ways regardless of sensible remediation – I read the online Guardian every morning and usually there are two or three reports of major ecological or military damages – increasing acidity in the oceans produces major harmful effects which magnify the harms of oceanic warming

a Guardian report (October 2020) reveals that bubbles of methane are now increasing in the Arctic- methane has 40x more heat-trapping than CO2 – a positive feedback loop now appearing and no where to go but to more and more

humans suffer, both the animal and plant kingdoms are damaged daily – a bitter example of the irreversible essence of the Anthropocene is the extinction of a large number of species, now occurring at a rate far faster than a few hundred years ago – most of global warming has been absorbed by the oceans, now approaching a tipping point

Earth Overshoot Day is that day, now calculated to be in early August, in which humans use up resources at a rate that cannot be sustained by natural systems and cycles – almost 50 years ago, in 1970, Earth Overshoot day was December 2 – the earlier and earlier date for

Earth Overshoot Day is a component of the Great Acceleration in the Anthropocene

the Holocene – the geological era of the last 12,000 years (now shifting into the Anthropocene) was remarkable for its climatic stability – humanity benefited from non-human induced climate control, and now suffers from human-induced climate non-control – the opinion of climate scientists is that the Holocene is over, replaced by the Anthropocene – the only way I can imagine that the Anthropocene would be replaced by a new global reality is the use of atomic weapons – Nuclearocene?

Reversing the first two letters of nuclear yields unclear – Unclearocene?

Correction October 2020 – the Coronavirus Pandemic has certainly created a new global reality – some journalists have revised BC to mean Before Covid

A chaotic convulsive use of nukes would make a definite before and after...a lot of science fiction is based on before nukes/after nukes - my favorite SF post-apocalyptic novel is “A Canticle for Liebowitz” - instead of the massive disruption from nukes, can we bring about Disarmageddon?

the total biomass of animal life is now 32% human bodies, and 65% domestic livestock – only 3% of the weight is creatures in the wild

nearly all discussions of the Anthropocene are void of military considerations – from the perspective of a refugee in Africa or the Middle East this is false and harmful – lack of food and clean water, injury, disease, and fear of bullets and bombs, are the pervasive daily disaster, mixed together - the men controlling the militaries are more concerned with daily headline events connected to power and prestige, rather than with the health of humanity and the biosphere, pushed offstage

WARNING
WARRING
WARMING
HARMING

instead of the Military-Industrial Complex, I speak of the Military-Political Complex – the relentless machinations of politicians for whom “national security” is for me “political security”

without firing a weapon or dropping any bombs, the military is the greatest single consumer of fossil fuels

about half-way between 1500 and the present there were 3 revolutions which shook the status quo – the Industrial Revolution in England about 1750, then the American Revolution of 1776, the French Revolution off 1789

in his Wealth of Nations (1776) Adam Smith brought about an intellectual revolution – instead of considering economics as based on unbending logic, Smith presented economics as a historical

phenomenon, based on happenstances in the marketplace within and between nations

the improvement of the steam engine by James Watt in 1781 was crucial to the Industrial Revolution – whether or not Watt’s dreams were involved, the role of inventive dreams had been long declining – French engineers came over to England to purchase Watt’s machines, but they really were motivated to steal the technology – scheming theft rather than individual creativity

in the early decades of the Industrial Revolution the entrepreneurs thought that coal supplies were inexhaustible – an extractive view of nature now needs replacement with an ecological view

there is now PTSD behavior in gorillas and elephants, where human activities disrupt intense social bonds – whales and dolphins suffer from oceanic acoustic blasts for geo-prospecting – some species of whales are suffering and declining from a combination of decreased aquatic food due to ocean heating with disruption of the flow of the oceanic currents, and noise pollution disrupting communications for hunting and mating – the whales are now underfed and lack sufficient stores of fat for the females to have normal gestations

New Delhi had horrible air pollution 25 years ago – the Anthropocene was approaching high gear – a recent daily pollution report shows outside air to be as bad as smoking 50 cigarettes a day – hotels in Beijing now offer pollution-free rooms with hi-tech monitors and airflow – more damaging than the increasing income gap between and within states is the increasing pollution gap – the air breathed by the poor is typically awful, both from cooking inside and from multiple sources outside

more carbon has been consumed in the last 25 years than in the ~5000 years since the onset of urban civilizations – the word “acceleration” seems inadequate here – perhaps “exponential escalation” instead

May, 2019 – in a report in *Frontiers in Ecology and Evolution*, there is a call for “international communications strategy” to increase public awareness and concern about the loss of biodiversity in the biosphere – this opus aims at that goal as central to the environmental emergenc

another report (May, 2019) shows that melting of Antarctic is occurring six times faster than in the 1980’s – Professor Andy Shepard says “the speed of drawing down of ice used to be spoken of in geological time-scales, but that is now being replaced by people’s lifetimes” - such is the acceleration in the Anthropocene

the Anthropocene has produced rapid evolutionary changes – diurnal mammals (active during daylight) are becoming more nocturnal to avoid human contact – more female elephants are being born without tusks (a sex-linked trait) to avoid being targeted by poachers

for Darwinian evolution to proceed as usual, a relatively constant environment must exist so that speciation can proceed in a stable niche – the Anthropocene wipes this out

this work has the Anthropocene commencing about 50 years ago – also about 50 years ago was the dream which changed my life - so in writing this I am hoping for a wake-up of global intellectual impact – a new way to look at human existence – a science-based narrative for intellectual digestion in the first part of the 21st Century – it will probably be of marginal significance rather than mainstream – at best, a “relative utopia” (Camus)

another event ~50 years ago (1969) was the first human landing on the moon -this provides a powerful before-and-after as a cosmic correlation with the initiation of the Anthropocene in 5x10⁹,8,7,6,5,4,3,2,1

several astronauts experienced awe – a cognitive shift in awareness now called the Overview Effect - the feeling of complete awe as they looked at their planet as a bright spherical entity with the surface of the moon in the foreground – this Overview Effect was based on space – this opus is an Overview Effect based on time – in an email to me Yale professor Jim Scott wrote “Your warp speed history takes my breath away.”

May, 2019 – the United Nations has issued a 1,500 page report, representing hundreds of scientific studies about the current crash in global biodiversity – it chooses the time frame of the last 50 years to document how clearing forests for farmland, the expansion of roads and cities, hunting, overfishing, water pollution, the transport of invasive species, and global heating have reduced the current count of species at a rate at least 100 times faster than before the Anthropocene

global militarism and global damage to the biosphere have been called “the Apocalyptic Twins”

the super-rich get richer and the poor remain poor

an analogy from an old friend who suggested how to respond to a critic who says things are so bad as to be beyond repair - “think of yourself as a clown sliding into second base” (rather than watching from the sidelines) - a dose of humor is often appropriate

75 years ago my grandfather Lyman Bryson was a Columbia professor, Director of Education for CBS, and host of the weekly radio program “Invitation to Learning”

I present Human History in a Hurry as a Backstory to the Anthropocene as “Invitation to Learning 2.0”

I hope that this opus provides an architecture of understanding -not for why us, but for how us

Tenth Anniversary of the IBHA Founding

In August of 2010, Alessandro Montanari and Walter Alvarez hosted a workshop at the Osservatorio Geologico de Coldigioco, Italy with geological fieldtrips for a group of scholars from various disciplines and continents.

Coldigioco was a fitting place to meet for people who all conduct inquiries in their own ways about development over time. The motto of the observatory there is “Ex Libro Lapidum



Historia Mundi” (Out of the book of rocks comes the history of the world). Sandro and Walter brought the group to a number of nearby locations where they explained how the rocks we viewed told a history of the cosmos, Earth, and life. It was

near the beautiful city of Gubbio, in the Apennine Mountains, where Walter first discovered the evidence of a catastrophic impact of an asteroid about 65 million years ago. Later work showed the collision caused the Chicxulub crater on the Yucatán Peninsula in Mexico and global effects that brought the age of dinosaurs to an end. This event opened up space for the evolution of mammals, eventually leading to humanity.



Boundary between the Cretaceous and Tertiary periods, near Gubbio. Back: Craig Benjamin; Left to Right: David Christian, Walter Alvarez, Barry Rodrigue, Cynthia Brown, Fred Spier, Louis Spier, Lowell Gustafson

A thin layer of iridium near Gubbio Italy told skillful geologists about how the stories of the cosmos, Earth, life, and humanity are intertwined. Artist Paula Metallo helped the group at Coldigioco visualize some of the meanings for us of a past that is layered in ancient sea beds that are now mountains. Geology and astronomy, painting and narrative, the sciences and the humanities, intertwined in a dynamic, expanding universe of knowledge. Together, they told a story that does run through Rome to be sure, but also much further back than its ancient empire, through the Apennine Mountains.



Alessandro Montanari

The experience at Coldigioco clarified for everyone there that the past is not restricted to the time since humans developed writing. That more recent past is best understood by its being placed within the entire known past as told to us by stones, as well as by fossilized bones, blood, and light. Big history carries us on a most improbable journey from the big bang through stars, Earth, life, and eventually humanity. The realities it presents are a marvel.

Everyone at Coldigioco knew that many others shared their passion for this large sense of how the past has brought us to the present, and catapults us towards the future. So the group sat around Sandro and Paula's patio table on a number of warm Italian summer afternoons and hammered out the founding of an International Big History Association (IBHA). The vision was for an association in which people from all disciplinary backgrounds and life conditions could contribute

to an evidence-based narrative of the natural record of the entire known past and reasoned projections of the future. And in the evenings, after wonderful meals of pasta and wine, Walter and other participants played music on the piano, gently strummed guitars, and sang under a hazy moon. Rigorous science, creative artistry, measurable evidence, beauty, and the delight of sharing interests all entwined.

Since then, the small group has grown to an association with hundreds of members who have held conferences in the United States, Italy, the Netherlands, and next summer in India. A Journal of Big History publishes peer reviewed scholarship and Origins, the group's bulletin, shares IBHA members' reflections and expressions. Each unique IBHA member has their own story of how they fit into – and contribute to – a cosmic story of 13.82 billion years, an Earth story of 4.567 billion years, and a human story of 300,000 years. And the IBHA has its own story whose origin took place at the Coldigioco Geological Observatory where we learned the history of the world from the library of the rocks.



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