THE CASE FOR WONDER

A MEDITATION

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Perhaps it had no beginning. Perhaps, being spacetime itself, it is neither where nor when. Like the scarlet ribbons of song, it came "I will never know from where." Yet here I am, awake in this vast improbability for a nanosecond of cosmic time, a mote of life on a fleck of rock afloat in the cosmic ocean. What better way to pass that waking moment than to probe its mysteries? What better ends than love and wonder, the two great gifts of consciousness? A true sense of wonder ignites an open quest for knowledge, not the idolatry born of an egocentric metaphysics — of our Paleolithic brains, our parental programming, or the need to restore childhood innocence — but a curiosity rooted in true humility, one guided by the highest of human endeavors, the enterprise of science.

Beyond all the practical benefits, science is a spiritual quest in the broadest and deepest sense. At its heart is the need to perfect a grand internal model of reality, to find the center by completing the edge. If science is a belief, it is simply a faith in the inherent potential of humanity. As the only reliable road to any accessible reality, scientific knowledge is the result of open inquiry and debate, accepted only when a range of compelling evidence is corroborated and replicated by a community of inquirers. Science is

structured like a web, its facts bound tightly in place by many supportive threads. When they enable us to make accurate predictions and build powerful devices, we know we have tapped into some form of reality. "It is not the 'true' story," said the philosopher Paul Kurtz, "but it is certainly the truest."

Yet there is a great wall dividing what we know from what we feel. We are a species still in childhood, only now becoming aware of the true immensity and complexity of the cosmos, a universe turbulent and mysterious beyond anything our forebears conceived. "Mystery surrounds us," wrote the naturalist Chet Raymo; "it laps at our shores. It permeates the land. Scratch the surface of knowledge and mystery bubbles up like a spring." And "the larger the island of knowledge, the longer the shore of wonder."

Wonder reflects the *mysterium tremendum,* the aura of unfathomable majesty, utterly humbling and wholly other, surrounding the sublime and terrifying unknowns that have bordered our models of reality – the dark forest, the sacred mountain, the boundless sea, the black silence of cosmic infinity. The proclivity of otherwise educated people to believe in Adam's rib and Noah's Ark suggests that some of us have an inability to confront the abyss. A mature sense of wonder occurs when we no longer perceive the world and the cosmos in a provincially personal context. Entering mental adulthood, we see the larger reality as neither parental nor primarily threatening, but as impersonal and indifferent. There is resignation, if not romance, in our isolation, and a higher tolerance for ambiguity, for our insignificance, and for the high probability that there is no personal meaning out there, no divine parent watching over each of us. The chasm between innocence and maturity is that the one sees the cosmos as familiarly personal, while the other sees the personal as inscrutably cosmic.

Perhaps it is more than coincidence that Sigmund Freud and Edwin Hubble shared the same moment in history, Freud exposing the rational mind as a tiny clearing in the dark forest of the psyche, Hubble revealing that our galaxy is only one among billions, that the heavens are immense beyond imagination. To gaze into the night sky and feel the vastness and passion of creation is to glimpse an equally vast interior. We are aware of the stars only because we have evolved a corresponding inner space. And the

deeper the interiority projected onto the world, the more profound the field of wonder.

Like Hubble's discovery of the expanding universe, the expansion of inner space — our leap in self-awareness — is a relatively recent development. It is this rise in self-reflection — engendering the need to see ourselves in some larger context of meaning — that makes us unique among animals. Other animals share a form of love but not of wonder. Dogs experience an unconditional love but not in the self-reflexive sense of human awareness, which takes love to a new dimension. A similar but intraspecies leap has occurred in the case of wonder. Science has given wonder a new dimension beyond the innocence not only of our primitive forbears but of modern religious dogma as well, and done so to no less degree than the evolution of love from canine to human. While the comparison may seem an exaggeration, both are profound leaps in self-awareness. We are now conscious not only of the Paleolithic programming of belief but also of its incongruence with all that cosmology, evolutionary biology, and cognitive science have revealed in recent history.

Surveys suggest that 80 to 95 percent of Americans are scientifically illiterate. One reason is that a vast number are simply uncurious about anything they don't perceive directly. Since the universe of modern science violates the archetypes we call common sense, many choose simply to ignore it. Fifty percent of American adults do not know that the earth goes around the sun and takes a year to do it. Sixty-three percent are unaware that the last dinosaur preceded the first human. There are larger sections in bookstores devoted to astrology than to astronomy. Science is counterintuitive, as unnatural to the human mind as religion is natural. "We live in a society absolutely dependent on science and technology," said Carl Sagan, "and yet have cleverly arranged things so that almost no one understands science and technology. Our history is in part a battle to the death of inadequate myths. There is a worldwide closed-mindedness that imperils the species." We have wars on terrorism, crime, and hunger, but any victory lies in winning a war that few realize we are in — the war on ignorance. H. G. Wells said it best: "The future is a race between education and catastrophe."

Science education — the public understanding of science — is

requisite to the survival of civilization, if not of our species. Ignorance is the prime medium for every war, act of terror, and myopic "ism." "It is only through science that we have been able to pierce the infantile, dysfunctional need to be the center of the universe," noted *Cosmos* producer Ann Druyan. "That we even *do* science is a hopeful sign for our mental health." In some far future, when all our conceits are revealed to be but a product of our history and inborn imperatives, science will still be ratcheting ahead, finding bits of reality. No single bit is sacred. But the quest is.

At the core of both science and religion is a longing for the whole over the part, the *why* over the *how*. It is the hope that we are more than chance anomalies, that our essence somehow reflects that of the cosmos, and that we are not alone in the universe. Like religion, science is a quest for stories that give our lives meaning, a search for roots, for something fixed and eternal. The old stories, now hollow and ossified, once told who we were, where we came from, and where we were going. But we cannot recapture the innocence, the cozy cosmos of our species childhood. The New Story becomes the scientific odyssey itself, probing the micro- and macroscopic frontiers, where attempts to account for black holes or particles that defy time and space begin to sound like the ancient mystics. As classic paradigms crumble, merging inner and outer unknowns, the old mysteries trickle back, the old enchantments return to the world. But they return with new depth and complexity, revealing a fathomless cosmos, both infinite and infinitesimal. "I believe," wrote Isaac Asimov, "that scientific knowledge has fractal properties, that no matter how much we learn, whatever is left, however small it may seem, is just as infinitely complex as the whole was to start with. That, I think, is the secret of the Universe."

Science is often accused of "scientism," of attempting to explain away all art, beauty, and human feeling. But knowing that my perception of "red" is actually a colorless wave length transmuted by my eyes and brain in no way compromises my enjoyment of red. Red remains *my* reality. To discover its origin is fascinating. I can live in either world, science or art, separately or together; a sense of self transcends both. Science does not "explain away" red, it simply adds a new dimension to it. Far from narrowing, the revelations of science profoundly broaden and deepen the beauty and mystery of human experience.

Science is a process, not a perfectible task. It is a continuing spiritual encounter with the mystery of being. In that endless journey, the treasure is the voyage itself, the unfolding of human awareness. "Learning more and more," wrote Lewis Thomas, "we separate our mere ignorance from genuine mystery." The new story of science has important advantages: it works, it is universal, it reveals the connectedness of all things, and it affirms our responsibility for ourselves and the future of the planet.

Liberation

Human needs lie on three ascending levels: (1) comfort and security: the safety and well-being of self and family; (2) relations with others: love and belonging; and (3) the need to understand the world: the quest for some final context of meaning. The first two are personal and universal; the third is abstract, transcendent, and not common to all people. Historically, the human collective has progressed through similar stages, from life in a primitive state of nature to a civilizing process that imposed order as societies grew larger and less personal, to the ultimate success of that process, which allowed the luxury of individual freedom and rational reflection – a heightened awareness, able to discern those strictures and values that have outlived their function. Just as the child must develop an ego before the adult can transcend it, it was necessary for humanity to pass through an unreflective stage, viewing life in a narrow, personal context, with broader identification lying at best in tribal nationalism or regression to archaic superstitions. The third-stage awakening from the tyranny of outmoded traditions and values is aided by the fact that the technological society has not only bred multicultural perspectives; it has increased privacy and anonymity, leaving the pressures of group consensus more impersonal and less compelling.

In truth, most people remain at the second stage, where thinking is more intuitive than reflective – rapid and automatic rather than slower, more effortful cognition. That the sun rises and sets is intuitive; that the earth is a rotating sphere is analytic. Though few still believe in an earth-centered universe, the everyday perceptions of the second-stage mind remain highly self-referential, a

cozy cosmos that sees everything of any significance in personal terms – other people and events revolving about the self in concentric orbits, from close friends and affiliations to vague notions of a personal deity. In the mental world of the third stage, however, emotion is more often tempered by reasoned analysis, abstraction is less daunting, and detachment more natural. "It's quite clear to me," wrote Albert Einstein,

> that the religious paradise of my youth, which was thus lost, was a first attempt to free myself from the chains of the merely personal, from an existence dominated by wishes, hopes, and primitive feelings. Out yonder there was this huge world which exists independently of us human beings and which stands before us like a great eternal riddle, at least partially accessible to our inspection and thinking. The contemplation of this world beckoned like a liberation.

This is not to denigrate the first two levels of need. Of the three – survival, love, and wonder – the first two would seem prerequisite to the third, which may appear a luxury. But unlike jewelry or fast cars, it is a luxury with profound benefits. The desire to understand the nature of our experience can break the bonds of tribal emotions and the matrix of group pressures, allowing the freedom to compartmentalize and think outside the box. Nurturing curiosity and a critical capacity not only promotes escape from primitive fantasies about the nature of existence (the majority of scientists reject organized religion); it can also raise the quest for understanding to a life purpose.

A Leap of Faith

How does one justify the suggestion that understanding the nature of existence qualifies as a life purpose – that wonder is no less essential than love to a meaningful life? To ask the purpose of human life is to ask the meaning of meaning, a bootstrap question. One can't define a concept using a term that lies within it, a term that depends for its meaning on the context of the concept itself. I can suggest a primary aim for my own life, but I can't define a universal purpose for all human lives. Religious attempts only pull

again at the bootstraps. Imagine a sentient chess piece that knows nothing beyond the rules and the board asking what deeper purpose lies beneath the imperative to capture the king.

But perhaps seeing our primary purpose as the quest to understand the world derives from what the Harvard paleontologist Stephen J. Gould called a "spandrel," accidents of evolution in the physical and behavioral features of organisms — features that evolve not as adaptive necessities but as byproducts that have no clear benefit for survival. Originating in Roman times, a spandrel was the roughly triangular space between the tops of two adjacent arches, a nonfunctional result of the architecture until artists realized that they could fill these small areas with painted designs. Adopting the term to neural evolution, Gould suggested that mental spandrels produce secondary behaviors that may have occasional benefits but more often create conceptual confusion, religion being one manifestation. But perhaps some spandrels can direct our programming in new directions, toward an awareness that transcends innate imperatives and group consensus, similar to the fate of inbred cultural traditions in cosmopolitan centers.

A disproportionate number of scientists, innovators, and original thinkers display some of the milder attributes found on the autism spectrum. Problems common to that spectrum include difficulty with social interaction and weak bonding with others. But on the positive side, they can show an intense single-minded focus on detail, a proclivity for abstract rational structure over the intuitively personal, and an ability to compartmentalize — to isolate and evaluate events and circumstances apart from their embedment in social and psychological contexts. Taken to extreme, these traits can be a serious problem. But lesser manifestations can become Einstein's "liberation."

We might speculate wildly that the apparent rise in autism may also herald an increased incidence of its less inimical forms, favoring third-stage evolution. Autism has been called the male mind taken to extreme. In *The Essential Difference: Men, Women, and the Extreme Male Brain,* Simon Baron-Cohen characterizes masculine and feminine proclivities as systemizing versus empathizing, the former leaning toward the autistic spectrum, the latter more amenable to religion — overlapping bell curves that cannot define individuals, most of whom incorporate both with degrees of

emphasis. The ideal, of course, is an ever more androgynous balance in an ever greater proportion of humanity, allowing critical reflection more constraints on unexamined feeling.

In his recent book, *Homo Deus*, Yuval Harari suggests that the primary reason for the planetary success of our species has been its ability, once the Sumerians invented writing and money, to organize flexibly on a scale vastly beyond immediate personal contacts. Cooperation on that scale has worked only through the mass acceptance of common stories – group myths, religious, tribal, or national. As these stories now begin to evaporate in the face of scientific and global realities, the question arises as to what kind of new story might serve to maintain the requisite hive mentality among the mass of humanity. Harari's second question asks what will become of people's identities – of the human need to "matter," as philosopher Rebecca Goldstein puts it – once the digital and robotic revolutions render almost all work obsolescent. An answer to both questions would seem to lie in a personal and collective mission to endlessly expand the shores of wonder. Since the knowledge and technologies that now erode our stories also raise material well-being, one can hope that the mean level of human awareness, as chronicled in Steven Pinker 's *The Better Angels of Our Nature*, might continue to evolve, and do so at a pace that escapes the potentials for disaster inherent in those same technologies.

It is the nature of evolution to move toward greater complexity, greater awareness. Our destiny, it seems, is not merely to abide in this world but to understand it. It is our unique gift, one that separates us from animals who are otherwise stronger, faster, and better adapted. Dogs are better at bonding, and ants are better at mere survival. The ants may bury us. Meanwhile, the scientifically illiterate and politically myopic deny both evolution, the only thing that can save us, and climate change, the one thing that might destroy us. There is a worldwide political, economic, and spiritual polarization. While the developed world statistically outgrows religion, religious cults regress into Iron Age mythology. And while glaciers melt, sea levels rise, and weather events become ever more extreme, subconscious fears, hive politics, and antiquated individualism feed a suicidal denial. (Particularly revealing was Senator James Inhofe's climate change comment: "I

thought it must be true until I found out what it would cost.") In both crises, America teeters in the balance.

Which will it be, evolution or global disaster? My generation will depart never knowing the answer. But we go out with a faith in humanism, in the continued awaking of humanity to the nature of their mission. The telos is the eternal quest, the cosmos coming to know itself. To believe less – or to believe more – is to live in the shallows of what it means to be human.