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Cosmology Culture And Religion

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There is no way to describe scientifically the origin of the universe without treading upon territory held for millennia to be sacred. Beliefs about the origin of the universe are at the root of our consciousness as human beings. This is a place where science, willingly or unwillingly, encounters concerns traditionally associated with a spiritual dimension.

For thousands of years people have wondered, speculated, and argued about the origin of the universe without actually knowing anything about it. In the closing years of the twentieth century, we're learning enough to begin to peer across the gulf that separates our universe from its source at the beginning of-or perhaps before-the Big Bang. A story is emerging in modern cosmology that will, if it follows the pattern of earlier shifts in cosmology, change our culture in ways no one can yet predict. It is important to start now to speculate on the possible meanings for our time of this emerging cosmological story. Rather than assuming that science and spirit are separate jurisdictions, I assume that reality is one, and that truth grows and evolves with the universe of which it speaks.

Why is this important? In a speech given in July 1994, on the state of the world and its prospects, the Czech poet-president Vaclav Havel said that the planet is in transition. As vastly different cultures collide, all consistent value systems are collapsing. We cannot foresee the results. Science, which has been the bedrock of industrial civilization for so long, he said, "fails to connect with the most intrinsic nature of reality and with natural human experience. It is now more a source of disintegration and doubt than a source of integration and meaning.... We may know immeasurably more about the universe than our ancestors did, and yet it increasingly seems they knew something more essential about it than we do, something that escapes us.... Paradoxically, inspiration for the renewal of this lost integrity can once again be found in science...a science producing ideas that in a certain sense allow it to transcend its own limits.... Transcendence is the only real alternative to extinction." [1]

Modern cosmology is now undergoing a foundation-building revolution as it seeks a verifiable description of the nature and origin of the universe. This revolution may require that we transcend previous notions of space, time, and even reality. This seems to me the kind of science Havel is hoping for-a science whose metaphors may illuminate not only the subject matter of its own field but possibly also problems of humanity and the earth from a cosmic perspective.

Every religion is a metaphor system, and like scientific theories, every religious myth is limited. Perhaps progress in religion can occur as it does in science: without invalidating a theory, a greater myth may encompass it respectfully, the way General Relativity encompasses Newtonian Mechanics. In the next few decades, powerful ideas of modern cosmology could inspire a spiritual renaissance, but they could also be totally ignored by almost everyone as irrelevant and elitist. In the worst of circumstances, they could be abusively interpreted and turned into a tool of exploitation-as some would contend that the medieval hierarchical cosmology was interpreted as a justification for a hierarchical organization of society in which the vast majority of people were oppressed. How well our cosmology is interpreted in language meaningful to ordinary people will determine how well its elemental stories are understood, which may in turn affect how positive the consequences for society turn out to be. There is a moral responsibility involved in tampering with the underpinnings of reality.

Anthropologists tell us that in virtually all traditional cultures, a cosmology is what gives its members their fundamental sense of where they come from, who they are, and what their personal role in life's larger picture might be. Cosmology is whatever picture of the universe a culture agrees on. Together with the picture-upholding the picture-is a story that is understood to explain the sacred relationship between the way the world is and the way human beings should behave. Other cultures' stories may not have been correct by modern scientific standards, but they were valid by their own standards, and they had the power to ground people's codes of behavior and their sense of identity within a larger picture. This sense of identity may be part of what Havel feels has been lost.

What is the current popular picture of the universe?

If you ask a modern audience of people fascinated by cosmology but untrained in it to close their eyes and visualize the universe, some will report seeing endless space with stars scattered unimaginably far apart, others will see great spiral galaxies, and others will see an exotic scene such as the rising of an ember-red moon over an unknown planet. They do not realize that these are merely snapshots on a given scale of the universe-no more representative of the universe as a whole than is a single molecule of DNA or a moonrise over your own backyard. The strange fact is that in modern Western culture people have only the foggiest idea how to picture the universe, and certainly no consensus on it.

The lack of social consensus on cosmology in the modern world has caused many people to close off their thinking to large issues and long time scales, so that small matters dominate their consciousness. Of course, modern people do know much more about many things than members of isolated, traditional cultures, but we are not so different in our basic needs from people millennia ago. We have to get our sense of context somewhere. It is worth looking at earlier cosmologies and the cultures in which they held sway in order to understand how deep and in fact inextricable the connection is.

Earlier Cosmologies

In Biblical times when people looked up at a clear, blue sky, they saw a transparent dome that covered the entire flat earth [2]. It was an awesome object, created by God himself on the second day to hold back the endless quantities of blue water clearly visible above it. There was water above and water beyond the horizon; doubtless there was also water below. God had divided the waters "above" from the waters "below" by constructing this immense dome that held open the space for dry land. In ancient Egypt the dome had been the goddess Nut, who arched her back over the earth so that only her hands and feet touched the ground. She was the night sky, and the sun, the god Ra, was born from her every morning [3]. In the Hebrew Bible the dome is called "raqi'a," meaning

a firm substance, and rendered in the King James translation as "the firmament"-a concept that cannot be understood independently of the flat earth cosmology in which it made sense. The firmament in Biblical times was understood to be firm only by the will of God. If God were angered, as everyone believed had actually happened in the time of Noah, "the windows of heaven" and "the fountains of the deep" could burst open once again and those lovely blue waters would destroy the earth. God was said to have promised not to do it a second time and to have sealed this covenant with the rainbow, but who could predict the behavior of God? A watery Sword of Damocles hung over every creature on the flat earth, and God held the threads.

At more or less the same time that the Hebrew Bible as we know it was being compiled-about the 5th century BCE-Greek philosophers lived in a different universe. Their earth was not flat and domed but a round celestial object. Aristotle honed the picture so that the lunar sphere-a sphere the size of the orbit of the moon-was defined as the border between the earthly world of change and decay inside and the perfect, unchanging heavens outside. With modifications by the 2d century CE Alexandrian astronomer Ptolemy, who added details to account for careful astronomical observations, Aristotle's image of concentric spheres, and not the Bible's flat domed earth, had become by the Middle Ages the universe for Jews, Moslems, and Christians alike.

Thus on a clear night in Medieval Europe, a person looking up into the cathedral of the sky would have seen huge, transparent spheres nested inside each other, encircling the center of the universe, the earth [4]. In an uneasy alliance with Christian theology the planets were still identified with the Ancient Roman gods Mercury, Venus, Mars, Jupiter, and Saturn, and were still believed by many to be divine enough to influence people's lives. Immediately outside the sphere of the fixed stars lay Heaven. This was the monotheistic compromise with Aristotle and Ptolemy. God was physically right out there. Everything between heaven and earth had its eternal place, chosen by God. A worm in the soil, the lowliest serf, and the king himself had been placed by God exactly where they belonged in the great chain of being, and there was no questioning the divine hierarchy. The hierarchies of church, nobility, and the family were divinely sanctioned-they mirrored the cosmos itself. We may scoff that they saw such a cosmos, but not that they took the cosmos as the sacred model for society. They understood that humans can only be content by seeking to be in harmony with the universe. This is a lesson our culture could do well to learn.

A new cosmology is subversive in the deepest sense of the word. The stable center was torn out of the Medieval universe at the beginning of the 17th century, when Galileo's observations showed that the Aristotelian-Ptolemaic earth-centered picture was wrong, and Kepler's geometric interpretations of Tycho Brahe's data were built upon the sun-centered model that Copernicus had put forward more than sixty years earlier [5]. Europe's conceptual universe was shaken. Like unreinforced buildings in an earthquake, the power structures of society were irreparably cracked and undermined, and this was soon obvious to all thinking people. As John Donne wrote in 1611 upon learning about Galileo's telescopic observations:

If earth was not the cosmic foundation, then nothing supported these human hierarchies any more. They could only continue by force of habit or by force of arms, and the church recognized this. When Galileo ridiculed the 1500-year old Ptolemaic cosmology in his Dialogue Concerning the Two Chief World Systems, the Church forced him to recant and held him under house arrest for the rest of his life.

This was a frightening and sobering event for scientists all over Europe. It was perhaps only Galileo's status as the best known scientist of his time that saved him from being burned at the stake as Giordano Bruno had been. Eventually, following the lead of Bacon and Descartes, science protected itself by entering into a de facto pact of noninterference with religion: science would restrict its authority to the material world, and religion would hold unchallenged authority over matters of human meaning and the spirit. By the time Isaac Newton was born in 1642, the year of Galileo's death, the spoils of reality had been divided. The physical world and the world of human meaning were now two separate universes.

With the rise of modern science, standards of explanation became demanding in a way that neither art nor spiritual vision could satisfy, although for millennia these had been the sacred pair that together created the human-centered universes of all earlier societies. For more than 300 years, since the time of Isaac Newton, science has been understood by most educated people to imply an image of the universe as infinite, or at least incomprehensibly vast, almost empty space, with stars scattered at great distances from each other but no center, no purpose, no location for God, and no obvious implications for human behavior. Blaise Pascal wrote, "engulfed in the infinite immensity of spaces whereof I know nothing and which know nothing of me, I am terrified.... The eternal silence of these infinite spaces alarms me."[6] With an image of a cold universe in which humans play no necessary role whatsoever, and no serious explanation of how things got this way, a society suffers from a kind of rootlessness that prevents a sense of connection with the universe.

The disorienting impact upon Western culture of losing any agreed-upon sense of the universe may well be responsible for some of the social chaos of the last centuries, but in a world that values science there may have been no way to avoid this. It may have been necessary to wait for science to run its course while people contented themselves with what fragmentary philosophical or religious insights could be found. But scientific cosmology today has entered a golden age of discovery because of a combination of extraordinary new instruments and telescopes on the one hand and daring theoretical breakthroughs on the other. Data is flooding in, and cosmological theories are being honed to levels of precision unimaginable even a generation ago. We may see in the first decades of the 21st century the emergence of a new universe picture that can be globally acceptable, and with this and the contributions of image-making writers, artists, and spiritual visionaries, it is possible that the painful centuries-long hiatus in human connection with the universe will end. Many people will mentally remain in earlier universes, as they do today, but for those who continue to seek truth, whether through science or spirituality, there will be a universe for our time. This universe could become the most inspiring source of new ways of interpreting and addressing the problems of our planet. It is not Utopian to imagine that this could happen, since some variant of "as above, so below" is the way humans have functioned for most of our species' history, excluding only the last few centuries. The challenge will be to use for the first time a complicated and counter-intuitive cosmos as a model-ironically, one in which we return to that phrase knowing there is no above or below.

Since it is important not only to say what is needed but to attempt to provide it, I will present one possible example of a way of looking at the universe that is consistent, as far as it goes, with what we understand of the universe today yet is simple, graphic, highly suggestive, and carries the mythic undertones essential to an appreciation of the power of a cosmology. This representation is not a picture of the universe but a symbol.

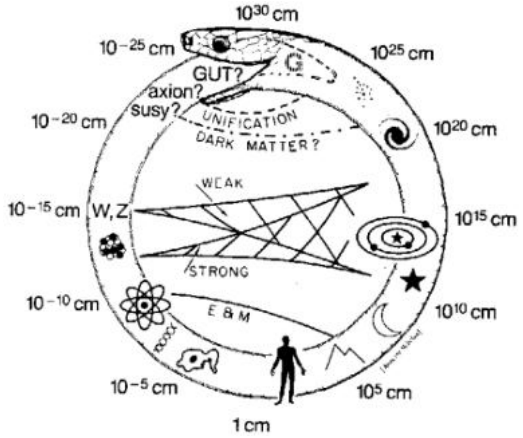
The Cosmic Uroboros

In daily speech "the universe" is essentially used as a basket term, a word invented to contain everything people can imagine, defined or undefined. In modern cosmology, however, the universe is something it itself, something evolving, something mysterious. But it cannot be pictured the way a galaxy, for example, can be pictured in a photograph or painting for at least three reasons: First, a photograph is of something outside the eye, and the universe is not outside us, and we are never outside it. We are it on our scale. Second, a photograph captures a moment in time, but the universe encompasses

time itself and no slice of time can even suggest that. And third, the universe cannot be imagined as a picture because it's almost all invisible dark matter. Moreover, all the radiation in the universe is also invisible to us, except for the tiny band of frequencies between red and blue. It is essential to give up trying to imagine the universe through the eyes, yet people need something visual.

The best solution I have found is to represent the universe using one of the oldest symbols for it known to humankind, a symbol found in countless cultures around the globe. It is the snake swallowing its tail-an "uroboros" as the Greeks called it. Earlier peoples used it to represent eternal life, partly because snakes were often believed to live forever, since the sloughing of their skin was seen as a rebirth; and partly because the circle of its body was a cycle without end. The uroboros had different meanings in different cultures, but it tended to represent whatever was seen as fundamental in a culture. Now it might carry a new interpretation.

From the Planck scale to the cosmic horizon, the visible universe encompasses about 60 orders of magnitude. The size scales of the universe can thus be arrayed around the serpent like minutes around the face of a clock. Sheldon Glashow originally suggested this symbol, with the swallowing of the tail expressing his hope for a unification of the theories governing the largest and smallest scales [7]. I noticed [8] that there are many connections across the diagram: electromagnetism dominates the bottom; the strong and weak interactions not only dominate on nuclear scales but also describe energy generation in stars and deermine the composition of planetary systems; and dark matter, which is gravitationally dominant on galactic and larger scales, may be associated with the physics of still smaller scales.



The Cosmic Uroboros represents the universe as a continuity of vastly different size scales, of which the largest and smallest may be linked by gravity. Sixty orders of magnitude separate the very smallest from the very largest. Traveling around the serpent from head to tail, we move from the scale of the cosmic horizon to that of a galaxy supercluster, a single galaxy, the solar system, the sun, the moon, a mountain, a human, a single-celled creature, a strand of DNA, an atom, a nucleus, the scale of the weak interactions, and approaching the tail the extremely small size scales on which physicists hope to find evidence for Supersymmetry (SUSY), dark matter particles such as the axion, and a Grand Unified Theory. There are other connections between large and small: electromagnetic forces are most important from the scale of atoms to that of mountains; strong and weak forces govern both atomic nuclei and stars; cosmic inflation may have created the large-scale of the universe out of quantum-scale fluctuations.

Why is this symbol useful? People asked to visualize "the universe" will far more often think of the largest thing they know of than the smallest. Few realize that the universe exists on all scales, everywhere, all the time. This is a truly extravagant thought. Largeness is by no means the most important characteristic of the universe. Focusing on it makes people feel small, not because they are, but because they are simply ignoring all scales smaller than themselves in thinking about the universe. On the Cosmic Uroboros, as I call it, if the mouth swallowing the tail is drawn at the top, humans (at one meter or so) fall more or less at the bottom-i.e., at the center of all the size scales in the visible universe. Many students are so stunned by this apparently special place that they refuse to believe it and insist it must be a result of some tricky choice of units. I don't know if the center of the Cosmic Uroboros is in fact special, but finding themselves there certainly strikes a chord with most people. Perhaps it hearkens back to the soul-satisfying cosmology of the Middle Ages, where earth was truly the center of the universe.

At different scales, different laws of physics tend to control events. The Cosmic Uroboros thus becomes not only a way of realizing that the universe exists on all scales but also a map of emergent properties, with new properties appearing as you move a few orders of magnitude in either direction along the body of the serpent.

What the Uroboros does not represent is evolution. Modern cosmology will never be fully represented by a single idea. It contains several ideas that are each powerful enough to change people's thinking, if they can be communicated. Another example is Cosmic Inflation, which, of course, may or may not be true, but is the best explanation we have today for the initial conditions that led to the Big Bang and the relatively slow but stable expansion of the universe that has followed. In the tradition of "as above, so below," here is a suggestion [9] of how present-day issues could be seen in a new way through the metaphor of Cosmic Inflation.

It is well known that modern technological nations are addicted to overconsumption at the expense of poorer peoples and the global environment, yet our nations seem powerless to change course. While the global population increased about four-fold from 1860 to 1991, energy use increased by nearly two orders of magnitude. We have been told by experts for decades that the human species is heading for disaster on a potentially monstrous scale unless we change our ways, but most of us remain addicted to consumerism. The single most important question of this generation may be,[10] how can global civilization make the transition gracefully from inflationary consumption to a sustainable level? No answer has been be found in normal political processes. I think it was Einstein who said that no fundamental problem is ever solved at the same level at which it is posed. On what level then might a solution be found? Mathematically meaningful patterns of the universe-for example, the transition from cosmic inflation to expansion-may exist on a human scale too. Applying them to large-scale human problems could burst us out of the narrow perspective within which these problems have seemed intractable. This narrow perspective justifies its failures with a trendy cynicism that threatens to doom us. In the larger perspective may lie Einstein's kind of solution.

In "Cosmology and Culture," Probably more than any particular knowledge or material goods, our society needs inspiration. This may be the only thing capable of drastically changing enough minds so that the human species does not, in Einstein's phrase, "drift toward unparalled catastrophes." Scientific research to me is not only an intellectual passion, therefore, but with luck will also make a social contribution-of inspiration, which is about as spiritual a concept as one can imagine. In this way, practicing science has a spiritual goal. In fact, it can be itself a spiritual practice.

Scientific Research as a Spiritual Practice

It is often said that science is the religion of the modern world. This may be true for many members of the modern world who see only the impressive results of science and do not understand the processes by which these results come to be. Worship is always possible in the face of mystery. But science is not a religion for a research scientist like me. Without attempting to define religion, I will say that for me, science as a spiritual practice involves no dogmas or creeds, no human

authority, no sacred text, and no divine being. There are aspects of science that involve all these factors except the last, but they are not the spiritual aspects.

These are four ways in which science is for me a spiritual practice.

I. I try to follow certain principles religiously, so to speak.
A. Rigorous honesty. I am scrupulous with others about my data, logic, procedures. In some sense, when I venture into predictions of how the universe will one day be found to behave, I am representing humanity, and that is a moral obligation I take seriously but with elation. The more difficult but equally crucial form of honesty is with myself, regarding the limitations of my, or anyone's, knowledge. Humility is an essential ingredient in honesty. I am always humble before the data, aware that theorists like myself can at best suggest interesting hypotheses and determine what conclusions follow from given hypotheses, while only observations can tell which hypotheses might be true.

B. Give credit where credit is due. My place in the universe is largely a place in other people's minds, and I want it to be accurate. By the same token, the role of each of my competitors and collaborators is a fact of nature, and to misrepresent that is an insult to the idea of science. At a spiritual level, gratitude is fundamentally a giving of credit where credit is due.

C. Value imagination; be original. This is a vote of confidence in the universe and in God.

II. Commitment.
Nature does not reveal her secrets easily, and to value those secrets requires a long-term commitment. It takes many years of schooling and constant study of the literature in one's field, not to mention teaching and service, to be able to continue research long enough and get enough support to penetrate even the smallest aspect of nature successfully. Science is a kind of calling very much like the priesthood, and of course the Medieval physicists were priests.

III. The ultimate goal is to be consciously in tune with the universe.
Much of modern physics and cosmology is counter-intuitive, but after years of working in the field, we scientists learn to expand our intuition. We have shifted our personal frame of reference from the common-sense world to the larger universe by believing that what we work on is real. To believe a theory is a leap of faith. Our theories may be wrong. Under the best of circumstances, they will be revised or encompassed some day. Nevertheless, they are the best truth of our time. This shift in emotional frame of reference not only increases our chances of being right by being original-it can be a path to spiritual fulfillment. The modern cosmologists' quest for the initial conditions, the composition, and the evolutionary history of the universe is the profoundly spiritual endeavor to know the universe as it truly is. We certainly don't do it for the money.

IV. I have a constantly reinforced faith in the ability of human beings, including myself, to dip into a bottomless well of ideas and enthusiasm in order to find what is needed to take the next step. There are moments when the right idea cascades into the prepared mind from no obvious source, and when that happens, there is a sense of grace. The search for scientific truth can be subject to guidance as divine as any other.

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REFERENCES

1. Vaclav Havel, "The need for transcendence in the postmodern world," Futurist, v29, n4 (July-August, 1995), pp. 46ff. | 2. Richard Elliott Friedman, The Disappearance of God (Little, Brown, 1995), pp. 230-235. | 3. See, e.g., Jeremy Naydler, Temple of the Cosmos (Inner Traditions, 1996). | 4. C. S. Lewis, "The Heavens," The Discarded Image (Cambridge University Press, 1967). | 5. T. S. Kuhn, The Copernican Revolution (Vintage Books, 1959), esp. pp. 193ff. | 6. Joel R. Primack and George. R. Blumenthal, "What is the Dark Matter? Implications for Galaxy Formation and Particle Physics," in Formation and Evolution of Galaxies and Large Structures in the Universe, J. Audouze and J. Tran Thanh Van, eds. (Reidel, Dordrecht, 1983), pp. 163-183.