

Charles L. Harper, Jr. ed., *Spiritual Information*.  
Philadelphia: Templeton Foundation Press, 2006  
Pages 330-336.

PLANETARY 56  
SPIRITUAL (IN)FORMATION

---

FROM BIOLOGICAL TO RELIGIOUS EVOLUTION

*Holmes Rolston III*

**D**ECODING the human genome accentuated the cybernetic turn in biology—but, somewhat surprisingly, revealed fewer genes than we thought we had. The focus immediately shifted to cognitive psychology, to the cybernetic brain, with its neural genius for mental (or “spirited”) experience. The ideational powers of the human mind, which has accumulated knowledge over the millennia of human culture, have vigorously intensified in, and been documented by, these recent, spectacular discoveries in the biomolecular and neural sciences. We earthy, embodied humans are better informed about our world and ourselves—and are more searchingly, more spiritedly self-conscious than ever before.

What next? The newspaper headlines confirm that, politically and ethically, we confront value questions as sharp and as painful as ever, advances in the sciences notwithstanding. Those who rejoice in (or fear) these advances in scientific information about where on Earth we came from, how we evolved, and who we are must also look ahead to what we will be.

We grow increasingly competent scientifically and technologically and simultaneously decreasingly confident about keeping life human/humane. The sciences may also claim to be value free and warn that there is no scientific guidance of life. Looming worries about ever-returning wars and ever-elusive peace, escalating populations, massive consumption of Earth’s resources, poverty, unsustainable development, deteriorating environments, climate changes—these cut to the quick. Alternatively put, the planetary crisis for this new century—if not the millennium—calls for accelerated acquisition of spiritual (in)formation.

### *Earth and Its Information Explosion*

Earth as seen from space was the stirring picture of the last century. But the simple global photograph belies a pervasive spectrum of escalating, increasingly complex information at multiple scales—from the global through the ecological and the organic to the molecular levels. We are now confronted with the escalating advances in information that first occurred in evolutionary natural history and are now exploding in cultural history.

Once it was thought that, in nature, there were two metaphysical fundamentals: matter and energy. The physicists reduced these two to one: matter-energy. The biologists afterward discovered that there were still two metaphysical fundamentals: matter-energy and information. At the start of the cybernetic age, Norbert

Wiener insisted, "Information is information, not matter or energy" (Wiener 1948, 155). George C. Williams cautions, "Evolutionary biologists have failed to realize that they work with two more or less incommensurable domains: that of information and that of matter. . . . The gene is a package of information" (in Brockman 1995, 43).

John Maynard Smith, dean of British theoretical biologists, says, "Heredity is about the transmission, not of matter or energy, but of information" (Maynard Smith 1995). The most spectacular thing about Earth, says Richard Dawkins, is this "information explosion," even more remarkable than a supernova among the stars (Dawkins 1995 145). The astronomical universe—so cosmologists have been noticing with their Anthropic Principle—must be *there*, about as it is, if we are to be *here*, about as we are. At a minimalist level, the surface of the moon, for example, contains information from which a geologist can passively read moon history.

Biological information, by contrast, is actively agential, self-actualizing. Only on Earth (so far as we yet know) can anything be learned. The first secret of animated life—genetic coding that enables coping in an environment—was revealed when we unlocked the genome. The essential characteristic of a biological molecule, contrasted with a merely physicochemical one, is that it contains vital information. In this light, genetic natural history is actually a search program for increasing information, transmitted from one generation to the next, reticulated and variegated sexually, increasing adaptive fit. This is a most impressive result: If the DNA in the myriad cells of the human body were uncoiled and stretched out end to end, that microscopically slender thread would reach to the sun and back over a half dozen times.

### *The Mind and Its Information Explosion*

Yes, but we just found out that we humans don't have as many genes as we thought. That doesn't mean, however, that we have less intelligence than we once believed; rather, it means that the secret of our capacity for processing advanced information lies somewhere else, made possible by genetic flexibility that opened up our cerebral capacity.

Generally, in body structures such as the blood or liver, humans and chimpanzees are 95 percent to 98 percent identical in their genomic DNA sequences and the resulting proteins. But this is not true in their brains. "Changes in protein and gene expression have been particularly pronounced in the human brain. Striking differences exist in morphology and cognitive abilities between humans and their closest evolutionary relatives, the chimpanzees." So concluded a team of molecular biologists and evolutionary anthropologists from the Max-Planck Institutes in Germany (Enard et al. 2002).

Cognitive development has come to a striking expression point in the hominid line(s) leading to *Homo sapiens*, growing from about three hundred to about fourteen hundred cubic centimeters of cranial capacity in a few million years. E. O. Wilson, Harvard sociobiologist, emphasizes, "No organ in the history of life has grown faster" (E.O. Wilson 1978, 87). This line seems "headed for more head," so to speak.

An information explosion gets pinpointed in humans, an event otherwise unknown, but undoubtedly present in the human brain.

Animal brains are already impressive. In a cubic millimeter (about a pinhead) of mouse cortex are an estimated 450 meters of dendrites and one to two kilometers of axons; each neuron can synapse on thousands of others. The human brain, with a cortex three thousand times larger than that of the mouse, is of such complexity that descriptive numbers are astronomical and difficult to fathom. A typical estimate is  $10^{12}$  neurons, each with several thousand synapses (possibly tens of thousands), in a flexible neural network that is more complex by far than anything else known in the universe. This network can be formed and re-formed, making possible virtually endless mental activity (Braitenberg and Schüz 1998). The result of such combinatorial explosion is that we have more possible thoughts than there are atoms in the universe. Compare how many sentences can be composed rearranging the twenty-six letters of the English alphabet.

What is really “exciting”—using that word in both the “agitated” and “provocative” senses—is that human consciousness is now “spirited,” an ego with felt, psychological inwardness. Molecules, trillions of them, spin round in this astronomically complex webwork and generate the unified, centrally focused experience of mind, a process for which we can as yet scarcely imagine a theory. The self-actualizing, self-organizing process (autopoiesis) doubles back on itself in this reflexive animal, with the qualitative emergence of what the Germans call “Geist” and existentialists call “Existenz.” “Conscious” has the root meaning: “I know.” An object, the brain-controlled body, becomes a spirited subject.

This brain is as open as it is wired up. The self we become is registered by its synaptic configurations, which is to say that the information from personal experience, both explicit and implicit, goes to pattern the brain. Informed mind, or spirited experience, reconfigures brain processes, and there are no known limits to this flexibility and interactivity (LeDoux 2002).

### *Culturally (In)forming the Human Spirit*

Earth seen from space reveals no apparent culture, but on the ground, culture is as evident as nature. Animals can undoubtedly intend to alter or imitate other animals’ behaviors, but there is little evidence that they have “a concept of mind” or that they can recognize the presence or absence of ideas in other animals from whom they may learn or whom they might teach. Dorothy L. Cheney and Robert M. Seyfarth conclude, “It is far from clear whether any nonhuman primates ever communicate with the intent to inform in the sense that they recognize that they have information that others do not possess” (Cheney and Seyfarth 1990, 209). If a monkey doesn’t see it (or smell or hear it), a monkey doesn’t know it.

What is missing is precisely what makes human cumulative transmissible culture possible. The central idea is that acquired knowledge and behavior are learned and transmitted from person to person by one generation teaching another, ideas passing from mind to mind, existential human spirits forming and reforming each other with their shared notions.

Humans come into the world by nature unfinished, if also with unlimited possibilities for education. A newborn is information waiting to happen. Persons live, move, and have their being in their communities, and this generates language, conversation, cooperation, conflict, negotiation, criticism, evaluation. The determinants of events are anthropological, political, economic, technological, scientific, philosophical, ethical, religious. Ideas are as determinative as forces or fields or metabolisms or genetics.

The *Homo sapien* is the only part of the world free to orient itself with a view of the whole. That makes us, if you like, free spirits; it also makes us social spirits. Spirits interact with fellow spirits, person-to-person; these “political animals” (Aristotle) build their historically ongoing cultures. Richard Lewontin, another Harvard biologist, emphasizes the social over the biological: “The genes, in making possible the development of human consciousness . . . have been replaced by an entirely new level of causation, that of social interaction with its own laws and its own nature” (Lewontin 1991, 123).

This information explosion, says Richard Dawkins (1989), is powered by social “memes” rather than by biological genes. Information transfer in culture can be several orders of magnitude faster and overleap genetic lines. The informing is deliberate, critical. This recompounds again the combinatorial cybernetic explosion.

### *Forming and Informing Ethics*

Cooperators need ethics—at least cultured free spirits in critically reflective communities do. The self-conscious need conscience. Yet reflection about charity, justice, and honesty are not virtues found in wild nature. No natural decalogue endorses the Ten Commandments.

It is not difficult to see how a first-level “ethics” is generated: Reciprocators can help each other out to their mutual benefit. This already exists in animal societies. Political scientists, psychologists, and biologists have discovered that reciprocity can arise and be maintained within communities of those who seek their enlightened self-interest, with the caution that such cooperation has to be protected against “free riders” or “cheaters.” Scientists have created computer models of this, such as the “tit-for-tat” strategy and its variants (Axelrod and Hamilton 1981). But have we yet found or formed actual ethics?

Tribes with more cooperators do well against tribes with fewer cooperators. Lately, group selection, long disfavored in biology, has reappeared, especially in human affairs. Those communities prosper where the members have “motivational pluralism”: “Natural selection is unlikely to have given us purely egoistic motives” (Sober and Wilson 1998, 12, 323). This produces altruism blended with enlightened self-interest—the patriot going into battle to save others, the Rotarians building their community spirit, the Presbyterians loving both self and neighbor. But, except for international reciprocity, we still have nothing informing a global picture of ethical cooperation.

In the global village, tribalism, even if altruistic, is the problem rather than the answer because we have not surpassed group competition. Sober and Wilson can

find no “universal benevolence. Group selection does provide a setting in which helping behavior directed at members of one’s own group can evolve; however, it equally provides a context in which hurting individuals in other groups can be selectively advantageous. Group selection favors within group niceness *and* between group nastiness” (Sober and Wilson 1998, 9). Can we find a more inclusively spirited ethic?

### *The Promise of Spiritual (In)formation*

Donald T. Campbell offers a more promising account. Animals are selected to conserve values under the regimes of nature, where genetic inheritance is virtually the sole means of transmitting information across generations. The requirements of humans in their transmissible cultures differ. To elevate prehumans to humans, morality arose, almost always religion-based. Morality moves humans away from their merely genetic instincts toward more appropriate cultural behavior. “Social evolution has had to counter individual selfish tendencies which biological evolution has continued to select as a result of the genetic competition among the cooperators” (Campbell 1975).

Those religions best succeed that most help humans pull away from their genetic instincts toward the biosocial optimum in culture, although this too often remains in-group—the gods are for us and our children (D. S. Wilson 2002). Even the best religions are not so successful as would be ideal because of the counterproductive tugging of the animal legacy of self-interests. But major world faiths nevertheless are globally inclusive. They preach not just tribal, but universal, altruism.

The religions, preaching altruism, (in)form us spiritually and make culture possible. Without them, we are beasts. There is nothing shameful about a beast being a beast; but a human “spirit” ought to be something more. In the behavior that religions exhort, stretching humans away from our lingering ancestral genetic dispositions, the world religions are right. What begins as the beast in us becomes also the brokenness in us. The information preached needs to inform our personal regeneration, as well as enable us to regenerate offspring. Redemption and salvation empower this ethics, although the saints have often been wary about thinking of this as human achievement; it is also the gift of grace.

Such religiously inspired altruism is progressively less tightly coupled to the genes, whether individually or tribally. Disciples need not have the genes of the prophets, seers, and saviors who launched these teachings. In successful world religions, they seldom have. Nor need they be in the same tribe or local group. People do better with genes plastic enough to follow the best religion, whether their kith or kin launched it or not. In faith universalized, there is no longer any differential survival benefit to me or my tribe; the benefit is open to all.

Spiritual formation may once have been tribal, but today it must be increasingly planetary, ecumenical—becoming spiritual “in-formation.” Religions will be tested for their capacity to educate us, and the best ones will survive. So much for the complaint that religion is of no earthly use. Or for the fear that theology will be more and more displaced by science. Or economics. Or politics. Quite the contrary.

On Earth, we humans increasingly need increased spiritual “in-formation” if we are globally to survive as a species, if (as biologists might put it) we are able to adapt as “fits” on the planet.

Christians can plausibly make the claim that no harmony between humans in their nation-states, or between humans and their landscapes (or planet), can be gained until persons learn to use the Earth both justly and charitably. Those twin concepts are not found either in wild nature or in any science that studies nature. They must be grounded in some ethical authority, and this has classically been religious. The Hebrews, for instance, were convinced that they were given a blessing with a mandate. The land flows with milk and honey, if and only if there is obedience to Torah.

We are living on Earth; the spiritual formation required must be of earthly use and globally inclusive. Religions must think globally while they act locally. Beyond that, it does not follow that nothing universally true can appear in human morality because it emerges while humans are in residence on Earth. Keep promises. Tell the truth. Do not steal. Respect property. There is nothing particularly “earth-bound” about: Do to others as you would have them do to you. Love your enemies. Do good to those who hate you. Such commandments may be imperatives wherever there are moral agents living in a culture that has been elevated above natural selection. We humans can therefore also hope that there is extraterrestrial love, justice, and freedom.

Perhaps, after all, this primate rising from the dust of the Earth, on becoming so remarkably spiritually informed, bears the image of God.



HOLMES ROLSTON III, PH.D., is University Distinguished Professor and Professor of Philosophy at Colorado State University. He is Past and Founding President of the International Society for Environmental Ethics and a founding editor of the journal *Environmental Ethics*. He has served on the editorial board of *Zygon* for two decades. Professor Rolston also is a founding member of the International Society for Science and Religion. He has written seven books and is featured in *Fifty Key Thinkers on the Environment* (2000). A distinguished international lecturer, Professor Rolston spoke at the World Congress of Philosophy, Moscow, 1993, and again in Boston, 1998. He participated by invitation in pre-conferences and the United Nations Conference on Environment and Development in Rio de Janeiro, 1992, where he was an official observer. Professor Rolston was the recipient of the 2003 Templeton Prize.

#### REFERENCES

- Axelrod, Robert, and William D. Hamilton, “The Evolution of Cooperation,” *Science* 211 (27 March 1981): 1390–96.

- Braitenberg, Valentino, and Almut Schüz, 1998. *Cortex: Statistics and Geometry of Neuronal Connectivity*, New York: Springer.
- Brockman, John, 1995. *The Third Culture*, New York: Simon and Schuster.
- Campbell, Donald T., 1975. "On the Conflicts Between Biological and Social Evolution and Between Psychology and Moral Tradition," *American Psychologist* 30: 1103–26.
- Cheney, Dorothy L., and Robert M. Seyfarth, 1990. *How Monkeys See the World*, Chicago: University of Chicago Press.
- Dawkins, Richard, 1989. *The Selfish Gene*, Oxford: Oxford University Press.
- . 1995. *River out of Eden*, New York: Basic Books, 1995.
- Enard, Wolfgang, et al., 2002. "Intra- and Interspecific Variation in Primate Gene Expression Patterns," *Science* 296 (12 April): 340–43.
- LeDoux, Joseph, 2002. *Synaptic Self: How Our Brains Become Who We Are*, New York: Viking.
- Lewontin, Richard, 1991. *Biology as Ideology*, San Francisco: HarperCollins.
- Maynard Smith, John, 1995. "Life at the Edge of Chaos?" *New York Review of Books*, March 2.
- Sober, Elliott, and David Sloan Wilson, 1998. *Unto Others*, Cambridge, MA: Harvard University Press.
- Wiener, Norbert, 1948. *Cybernetics*, New York: John Wiley.
- Wilson, David Sloan, 2002. *Darwin's Cathedral*, Chicago: University of Chicago Press.
- Wilson, E. O., 1978. *On Human Nature*, Cambridge, MA: Harvard University Press.