Ultimate Priorities for Space and Space Science

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1. Introduction

What does serious philosophy have to tell us about the ultimate goals we should be pursuing in space and in space science? That depends of course on what school of philosophy one belongs to.

Personally, I do not believe that any of the well-known traditional schools of philosophy are robust and coherent enough to engage fully with the difficult concrete choices we are facing either in science or with space, short of some extension. It is easy for a mouse, without using any words or philosophy at all, to make sane and rational decisions about the small things he/she sees in everyday life – but there are levels of technology and large-scale reality that are beyond the abilities of the mouse. We humans, with ordinary philosophies and rules of thumb, can use words to do better than the mouse, but the full possibilities and challenges of space and science require that we expand our full awareness much more than what the everyday tools offer. In Heidegger's term, we need to expand our "Being."

This paper begins by reviewing a new synthesis of philosophy, which does not violate what we already knew even before we started using words, but which provides a foundation for understanding the important choices before us with space and science, in connection with each other. It will begin with what should be a universal kind of new synthesis, which may be called "the philosophy of sanity and integrity." But then, it is unavoidable that different life experience legitimately leads different people to different specifics. Section 3 reviews more specific concepts about the soul and the concrete nature of life, with which I would not expect all sane people to agree, but which many of us believe are an essential aspect of the challenges we are facing. To give this a name, I hereby call it the "symbiotic noosphere hypothesis" (SNH). Because I derive my views about the goals for space and science in space from these first principles, I will discuss them in two steps – first, a simple discussion in section 2, which should be universally acceptable, and then a more detailed discussion in section 3, for those who are prepared to go further.

Because I am analyzing these issues from first principles, I will not adhere to any of the ideological groupings popular today; thus at points in section 3, some will

find me a bit too mystical for their taste, while at other points many will find me to be an extreme realist to an extent that violates today's mainstream. I just call it the way I see it.

2. The Philosophy of Sanity and Integrity

This section is a simplified and compressed version of a much more rigorous and complete treatment published earlier in 2012.[2]

Society and nature impose many constraints on our actions and choices. Nevertheless, ethical philosophy begins with the big questions: "What should each of us, as a free person, do to make choices, to what end, in the face of whatever realities we must cope with? What is really, ultimately most important? What is the purpose of life?" (Of course, many bureaucratic decision making processes end up putting money and time into things that are of no ultimate importance whatsoever and they badly need people to keep asking these kinds of questions.)

It is impossible for valid logic to deduce a sentence of the form "I should do X" or "X is good," starting from axioms that do not already say what is good or what should be done. But logic and science can, in principle, give us answers to the questions: *"What would I do if I were wise? What strategy and values would fully satisfy ME if I considered all aspects of what I am facing?"* It is possible because the word "I" appears in the question. At some level, it is a question about the self, about our own ultimate feelings.

The existentialists are certainly right that when we are confronted with formalistic systems of ethical logic and ideology, we should always feel free to laugh and say "I will do whatever I feel like." But what DO we feel like? What kinds of consequences would we want to avoid and what would we want to achieve?

Our minds began with a substantial degree of consciousness and intelligence, even before we started using words. Like von Neumann and Aristotle (but with far more recent development and detail), I would argue that we are born with an innate sense of "utility" or "*telos*," a nonverbal feeling about what we like and what we don't like, including even some sense of the gradient of what we like.

Some schools of philosophy argue that we should base our actions on an objective effort to maximize some kind of value or utility measure over time in a completely objective and scientific manner. Others argue that we should go by our feelings in various ways, which may range anywhere from existential

wildness to strict Confucian piety. The philosophy of sanity and integrity says that we should strive to do both, by unifying the two approaches and developing the most effective possible "partnership" or unity of the nonverbal and verbal self and that mathematical thinking is even more important than words in doing full justice to the objective side. A truly sane person will never say things in words that look really silly when you translate them into a concrete image of what they mean in direct reality.

As an example, some formalistic policy analysts have asked: *"Why should we have humans in space, in the long term? Isn't the environment of space cleaner and neater without humans anyway? What is their value to the world economy?"* In exactly the same way, similar thinkers could ask: *"Who needs humans on earth either? Isn't it cleaner and neater to just eliminate them?*" But a sane human would remember that we really do ultimately care about life itself, for its own sake. (I do regret that the term "prolife" has been so badly abused and distorted by folks with political agendas, but the original concept is pretty fundamental.)

A sane human might well enjoy the episode of Star Trek where the Borg princess displays her strange brown and ugly world to the human she has captured, and says: "Don't you appreciate the beauty of my world?" In the end, the human was true to his own inner nature and made an esthetic judgment that it wasn't quite so beautiful after all. That kind of very fundamental esthetic judgment is basically all we have to fall back on and it does take a major effort to calibrate our esthetic judgments through imagination and analysis as we think about possibilities so far removed from our past experience.

This year, I have posted a simplified blog version of some of the key aspects of the full cultivation of sanity.[3]

Of course, science can help us understand our feelings of what we like and what we don't like, and we can easily see that survival of life is very central to what is inborn in our brains. A sane policy towards space would certainly include a strong focus on two overriding value measures:

(1) The future of human life in space, for its own sake. This can be operationalized as maximizing the probability of humans achieving the economically sustainable settlement of space. That is a very tricky optimization problem [4-6].

(2) The net value activities in space can yield to human life and happiness on earth.

In a way, (1) represents the top core mission of NASA, while (2) reflects the fact that all agencies should try to leverage the unique capabilities that result from their core mission to benefit the world in other ways, so long as they do not dilute their core mission or reach beyond what they are especially competent to do.

3. The Symbiotic Noosphere Hypothesis (SNH)

Bernard Shaw once said (in his *Revolutionist's Handbook)*: "*A man who is not ever a socialist before the age of 26 lacks a heart. A man who remains one after 26 lacks a brain."* There are different organs involved, but I have similar feelings about the issue of the soul.

Most of us remember Carl Sagan's words: *"Extraordinary claims require extraordinary justification.*" This is basically just a popularized version of what we can learn from Ockham's Razor, a fundamental principle of epistemology, learning, and inference which has grown in importance over time even in hard-core engineering [7-9]. When I was young, I agreed with Hebb that all claims about the existence of a "soul" apart from the body, and about the paranormal, fail to pass Sagan's test. It seems that we live in a completely four-dimensional universe, without any real room for such things. The logic of that view is quite strong, and quite respectable. Up to a point.

But in my own life, direct experience compelled me quite forcibly to reconsider that viewpoint. It reached a crucial mass in 1967,[10] when an overwhelming "veridical" event forced me to admit that "there is at least a 50% probability that something really weird is going on here, and that I need to reconsider my assumptions." Years later, I was relieved to learn that about 70% of PhDs in their most productive years had also felt compelled,[11] by personal experience, to reconsider their assumptions about what is going on here. An honest dialogue about space and the future requires that we make room both for the 70%, and for the 30%. It is interesting that Heisenberg, Schrodinger, and de Broglie showed strong interest in outright mysticism; some folks I know would say "Oh, they just kept believing what their parents believed," but is that a realistic way of describing how those three people formed their views, even compared with folks like Sagan?

In my own case, it was particularly unpleasant to have to adjust to a new viewpoint in 1967, since I had worked hard to develop a sufficient model of

intelligence in the brain which I felt would be enough to fully explain "consciousness" and human emotions without any need for the concept of "soul."[12] And I certainly would not be crazy enough to spin the bottle randomly across all the thousands of contradictory religious scriptures to be found all over the earth and randomly pick one to believe on faith. Above all, I felt I needed more empirical evidence to understand better what is going on and I also felt I needed to go back to physics, to understand better what kinds of phenomena might help make sense of what seemed quite weird. I made an effort to scour through cultures from all over the earth, from yoga to the Sufis to China to Western mysticism, to look for specific experiments or exercises I could do in my own life, to help me form my own more scientifically-grounded understanding; for example, for a few years, I followed the Rosicrucian stream of exercises,[13] which I found quite useful.

At the end of the day, I am still overwhelmed by my ignorance of what is really out there, beyond the real horizon of what any human really knows. But with >90% probability, I conclude that the "invisible connections" between people and other creatures on earth are far too strong to be ephemeral things or byproducts of things like pineal glands and electromagnetic connection or even quantum mechanical resonance. I would view us humans as kinds of symbiotic life, part "body" and part "soul," where our "soul" is our local piece of a large living system, evolved as part of the ecology of the larger universe or cosmos, involving fields and forces (like dark energy?) with which human science has yet to cope. This living system essentially corresponds to what some have called the "noosphere" or "Gaia" or even "pi." The basic reality here was captured reasonably well by Teilhard de Chardin, who stressed that our noosphere here on earth is basically an immature state of a consciousness with much greater future potential than most of us can fathom as yet. Only an immature state could have such a strange combination of incredible power and incredible awkwardness and confusion at the same time.

In my view, full sanity opens us up to the full range of human experience and feeling and does impel us to make this kind of adjustment. As Jesus once said, we let "the scales fall from our eyes," and we do develop our full talents as best we can. After this adjustment, sanity impels us to pay equal attention to "utility inputs" or primal feelings both from body and from soul. We work for a kind of Parteo optimal balance between satisfying feelings from our body (which already include things like concern for our children and such) and feelings from our soul, as given in the old concept of "the Alchemical marriage." Since our soul is essentially an immature organism, its primary imperative is to learn and to grow,

not only locally ("our own individual soul") but in conjunction with the larger system to which it is connected. Both the Rosicrucian school and the "mindfulness" school of Tibetan Buddhism have asserted that "this world is essentially just a school." The vivid concrete details in [14] and [15] give an interesting picture of how this works.

A year ago I asked Whitton: "*If you say the world is a school, what is the curriculum? What do we have to learn, and what should we be preparing for?*" He allowed me to peek at his new book, which goes into that question in some detail, based on his empirical work in psychiatry. Much of his story, like that of Roberts, stresses the need to pay deeper attention to specific people around us, people to whom we have invisible connections, and engage our whole selves in improving those relations. But it seems to me that our souls, like neurons in a large network, have both short-range and long-range connections. The ratio between these varies from person to person. The natural path is to maintain a balance over time between four kinds of inner work:

(1) Direct work on the understanding within our own individual soul, ranging from the kind of exercises the serious mystics use to expand their understanding, to hard core mathematical science, integrating the two when possible but not forcing unification-by-sheer-guesswork;

(2) Work on direct personal relations, as stressed by Roberts and (to some extent) Whitton;

(3) Building and exercising our spiritual connection to the earth and nature as a whole, ranging from the world economy to the global natural environment, transcending and connecting the "lobes within the noosphere" like the worlds of Islam, Christendom, modern science, Marxism and so on. (I find the Quakers to be especially useful as a venue for this kind of spiritual work.)

(4) Work on strengthening our connection and understanding to the larger cosmos from which we come.

What about the differences between different people along these four spiritual dimensions, all valid? Here I would like to make an analogy to another collection of "three imperatives," which I find important in my daily work. All knowledge workers have a fundamental need to be productive in three areas – to input (to get data and information and views of others), to process (to think and analyze for themselves, to arrive at new insights), and to output (to communicate). If any

of these is zero, the person contributes nothing to society as a knowledge worker. (This is true for soul as well as for body.) Yet some people are better at communication than at generating new ideas. Some people, like myself, are far better at the processing stage than at the communications level. The proper, rational strategy is for people to build connections to other people with complementary strengths and weaknesses; even though I am not as good at communication, I can at least explain some basic ideas to people who are better at communicating (like you?), and the network as a whole can work well that way. It is essential that people with strengths in one area have full respect for people with strengths in other areas, to make this work.

In a similar way, people in the noosphere, like neurons in a brain, will have a mix of connections, but together we should all respect the need to maintain a balance overall between all four primary imperatives of the soul.

The first imperative of the soul clearly calls for more work really to understand the universe we live in. Better understanding of the real laws of physics of the greater cosmos is a key part of that. Nothing I have said here contradicts the key position of Albert Einstein that we can explain everything that has ever been seen in life or in physics as the emergent result of hard core mathematical laws operating on objective reality [16-18]. However, we have a whole lot more work to do to get there. If we reduce the cost of access to space, as we would need to do to make human settlement feasible or to make energy from space potentially competitive in the energy markets of earth in any case, we also open the door to doing whole new types of physics experiments in space as well. As we start to explore ever more serious possibilities of new larger-scale sources of nuclear energy, experiments in space become ever more important to assuring the safety of probing that realm. Of course, astrophysics and physics are closely connected; both offer many possibilities of breakthroughs of enormous importance, if we take a bolder approach to admitting and exploring how much we do not yet know, and developing the infrastructure necessary to perform a richer variety of experiments. Perhaps in time we will even develop the kind of understanding which also helps us better understand the soul itself.

The first imperative also supports certain aspects of astrobiology, which are very fundamental and mathematical in nature. Humans have just begun to explore a few alternatives to traditional DNA, but we are very very far from understanding the full range of possibilities for life in a wide variety of possible environments. I am also hoping that Planetary Resources will pick up on a technology that NASA lost during the period of Griffiths' new deal, the technology for constellation

imaging of the universe exploiting quantum Twiss interferometry to let us "see" signs of life on continents of planets within 1,000 light years of earth.

The second imperative of the soul says more about how we approach space than about the specifics. For example, when politicians choose to fund programs that create dumb jobs, using people like trolls to reproduce ancient designs from the Apollo days, this is not healthy. A more productive corporate culture[19] is important and it needs to be enhanced to recognize how people in this system are spiritual beings themselves whose full development and expression as intelligent humans is an important value in itself. Values like free speech, dialogue, and diversity need to be strengthened as they apply to individual human beings and not just corporations.

The third imperative really works its way back to the second imperative of section 2. For example, the third imperative provides greater weight to something economists have been telling us already, that global education (with just as much support for female intellectual spiritual development as male) is one of the very highest overall priorities here. If space technology can be used as part of a new international effort to lower the kind of Internet access required for the poorest billion on earth to enhance their education and connect with humanity as a whole, this could be enormously important both for world economy and for the spirit. Some have argued that Internet tools like twitter degrade the level of intelligence and spiritual connection; however, it is clear that tools like video Skype enable people in different continents to attune more deeply with each other, even at a spiritual level, in a way which is hugely important to the third imperative.

And of course, the fourth imperative points squarely out to the larger universe from which we came, on the deepest spiritual level.

Notes

[1] The views herein represent no one's official views, but the chapter was written on US government time.

[2] P. Werbos, "Neural Networks and the Experience and Cultivation of Mind," *Neural Networks* 32 (August 2012).

[3] drpauljohn.blogspot.com/2012/07/kung-fu-style-mind-discipline.html

[4] P. Werbos, “Strategic Thinking for Space Settlements,” in R. Krone (ed.), *Beyond Earth* (Apogee Books, 2006).

[5] P. Werbos, “Reminiscences on the End of the Hope for Primates in Space,” *Actual Problems of Aviation and Aerospace Systems* (an International Russian-American scientific Journal) 1, no. 34 (2012). The paper is available in open access, by clicking on the title in English or in Russian at www.kcn.ru/tat_en/science/ans/journals/rasj.html.

[6] P. Werbos, “Towards a Rational Strategy for the Human Settlement of Space,” *Futures* 41, no. 8 (October 2009).

[7] Donald O. Hebb, *Organization of Behavior* (New York: Wiley, 1949).

[8] P. Werbos, *Mathematical foundations of prediction under complexity*, Erdos Lecture series, 2011, www.werbos.com/Neural/Erdos_talk_Werbos_final.pdf.

[9] P. Werbos, “An approach to the realistic explanation of quantum mechanics,” *Nuovo Cimento Letters* 8, no. 2 (1973): 105-09.

[10] P. Werbos, “Space, Ideology and the Soul: A Personal Journey,” in R. Krone (ed.), *Beyond Earth*.

[11] Andrew M. Greeley and William C. McCready, “Are we a nation of mystics?” *New York Times Magazine*, Jan. 26, 1975. Reprinted in *Consciousness, Brain, States of Awareness and Mysticism*, ed. D. Goleman and R. J. Davidson (New York: Harper and Row, 1975), 175-83.

[12] P. Werbos, “Intelligence in the Brain: A theory of how it works and how to build it,” *Neural Networks* 22, no. 3 (April 2009): 200-12. Related material is posted at www.werbos.com/Mind.htm.

[13] P. Werbos, “Rebuilding the Bridge between Science and Mysticism,” *Rose-Croix* 9 (2012), www.rosecroixjournal.org.

[14] Jane Roberts, *The Oversoul Seven Trilogy: The Education of Oversoul Seven, The Further Education of Oversoul Seven, Oversoul Seven and the Museum of Time* (San Rafael, CA: Amber-Allen, 2011).

[15] Joel Whitton and Joe Fisher, *Life between Life* (New York: Warner Books, 1989).

[16] P. Werbos "A Three Step Program for Return to Reality," *Problems of Nonlinear Analysis in Engineering Systems*, an International IFNA-ANS Journal. 18 (2012): 1-23.

[17] Paul J. Werbos, "Solitons for Describing 3-D Physical Reality: The Current Frontier," in *Chaos, CNN, Memristors and Beyond*, ed. Andrew Adamatzky and Guanrong Chen (Hackensack, NJ: World Scientific, 2012). See also www.scribd.com/doc/95547363/How-to-Quantize-June2012.

[18] P. Werbos, "Bell's Theorem, Many Worlds and Backwards-Time Physics: Not Just a Matter of Interpretation," *International Journal of Theoretical Physics* 47, no. 11 (2008): 2862-74, arxiv.org/abs/0801.1234.

[19] Neal M. Ashkanasy, Celeste P. M. Wilderom and Mark F. Peterson, *The Handbook of Organizational Culture and Climate* (Washington DC: Sage, 2011).

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About the Author: Paul Werbos, PhD, has had major program responsibilities in the U.S. Government, scientific and engineering research organizations, and the National Science Foundation (NSF) since his graduation from Harvard University with a PhD in 1974. His NSF responsibilities, beginning in 1988, have been in Domestic Nuclear Detection, Energy, Power, Adaptive Systems, Robotics, and Science-Engineering and Society. His broad background in science, technology, and engineering has propelled him into a leading professional role as a Fellow in IEEE and an award winner within the International Neural Network Society (INNS). His research and writings have made important contributions to energy, to learning, to sustainability and to study of the Universe and Space.

Editor's Notes: One of the benefits of membership in the Lifeboat Foundation, a major international forum for scientists and scholars, is that Paul Werbos continually shares his wisdom, logic, and experience. He has two valuable chapters in *Beyond Earth: The Future of Humans in Space* (Apogee Space Press, 2006) and gives us here his thoughts on Space Philosophy, using the human soul as a major metaphor. We look forward to Dr. Werbos's future articles as The Journal of Space Philosophy progresses and are honored to have him as a member of the Journal of Space Philosophy Board of Editors. *Bob Krone, PhD.*

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