The Scientific Worldview and the Demise of Cosmogony

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The absurd idea that the universe exploded out of nothing is a common-place among today's mathematicians, cosmologists, astronomers, and physicists. Cosmology has become *cosmogony*, the dubious study of the "origin" of the universe. The entire universe is being treated conceptually as a "system;" a finite, isolated entity. We have reached an intellectual dead end. How do we get out of it? My new book, *The Scientific Worldview: Beyond Newton and Einstein,* shows the direction we must take. Mere calculation and additional rose-colored observation will be to no avail, for the persistence of the Big Bang Theory (BBT) is rooted in the perpetual philosophical struggle that underlies our understanding of the universe and our place in it. In philosophy, as in science, it is necessary to begin with assumptions. One cannot travel to the end of the universe to prove whether it is infinite or finite. To begin with the assumption of *finity*, as mathematics and the BBT demand, is to end with *finity*. However, if one chooses the philosophical alternative, *infinity*, then the irrationality perpetrated by the BBT disappears and cosmology becomes legitimate. We are left with an eternal, infinite universe that, as David Bohm maintained exactly 50 years ago, can never yield complete equations for even one phenomenon. The Scientific Worldview describes how this universe works via the universal mechanism of evolution, "univironmental determinism." Univironmental determinism is the simple proposition that what happens to a portion of the universe is determined by the relationship between the infinite matter in motion within (the microcosm) and the infinite matter in motion without (the macrocosm). In the scheme of things, the BBT is pre-Copernican and symptomatic of the myopic worldview held by society at large. The BBT cannot be rejected without rejecting *finity*.

Introduction

The goal of *The Scientific Worldview* [1] is to provide the philosophical framework for science in the 21st century. It is an outgrowth of *The Ten Assumptions of Science: Toward a New Scientific Worldview* [2] , which was the prelude and logical foundation of the work. There were two previous scientific worldviews: Newton's classical mechanics and today's systems philosophy. Classical mechanics tended to overemphasize the outsides of its model; systems philosophy tends to overemphasize the insides of its model. *The Scientific Worldview* (TSW) maintains that the correct approach must combine the two views in the form of "univironmental determinism," the proposition that whatever happens to a portion of the universe depends on the infinite matter in motion within (the microcosm) and the infinite matter in motion without (the macrocosm). The "univironment" (pronounced yew'-nee-vironment) is a word I coined to describe this basic reality. Univironmental determinism is both the universal mechanism of evolution and the correct philosophy. Following this logical train, we can assess previous theories involving any portion of the universe.

Perpetual Philosophical Struggle

We are born seeking the causes for all effects, but in an infinite universe we are unable to discover the causes for all effects. Thus we are part of an unavoidable and perpetual philosophical struggle: Determinists believe that there really are material causes for all effects; indeterminists believe that there may not be material causes for all effects, with "free will" being the best example. Scientists tend to adopt some form of determinism, while those subject to various religious teachings tend to adopt some form of indeterminism. The history of philosophy can be described as a series of sophisticated vacillations between the two belief systems. The beginning and ending point for TSW, however, is the denial of free will. TSW is a rendering of "natural philosophy," as opposed to "supernatural philosophy." In it, I demonstrate why scientists, generally believing that they have no underlying philosophical position, often disagree on fundamental questions. For example, in our own society, the Natural Philosophy Alliance, we have been debating many of the same questions over and over again. Is there an ether? Is gravity a push or a pull? Did the universe explode out of nothing? The answers vary because investigators begin, often subconsciously, with varying assumptions. TSW claims that these assumptions exist and must be brought into the light of day. Although the fundamental assumptions are not completely provable, we can select the proper ones and thereafter treat them as true.

The Ten Assumptions of Science

The methodology for selecting these assumptions was the subject of the 2004 book. Most of that discussion has been included as Chapter 3 in TSW. The assumptions are repeated here as a refresher:

1. MATERIALISM: The external world exists after the observer does not.
2. CAUSALITY: All effects have an infinite number of material causes.
3. UNCERTAINTY: It is impossible to know everything about anything, but it is possible to know more about anything.

4. INSEPARABILITY: Just as there is no motion without matter, so there is no matter without motion.
5. CONSERVATION: Matter and the motion of matter neither can be created nor destroyed.
6. COMPLEMENTARITY: All things are subject to divergence and convergence from other things.
7. IRREVERSIBILITY: All processes are irreversible.
8. INFINITY: The universe is infinite, both in the microcosmic and macrocosmic directions.
9. RELATIVISM: All things have characteristics that make them similar to all other things as well as characteristics that make them dissimilar to all other things.
10. INTERCONNECTION: All things are interconnected, that is, between any two objects exist other objects that transmit matter and motion.

Unlike previous attempts to provide a philosophical foundation for science, these assumptions are consupponible, that is, if one can assume one of them, one can assume all the others without significant contradiction. This is because of the inclusion of both microcosmic and macrocosmic infinity. This is an advance on mechanism, which occasionally used macrocosmic infinity along with microcosmic finity, and systems philosophy, which occasionally uses microcosmic infinity along with macrocosmic finity.

Causality and Chance in Physics

This is the Fiftieth Anniversary of David Bohm's elegant classic, *Causality and Chance in Modern Physics* [3]. In this wonderful, ground-breaking exposition Bohm proposed what I call "infinite universal causality." It was the first formal break with classical mechanism, adamantly proclaiming that mathematical descriptions of nature never could be complete. Quantum mechanics had led to the death of Laplace's Demon along with classical determinism, both of which also required the finite form of universal causality. Bohm's presupposition of infinity meant that the Demon would be so busy considering an infinite number of causes that it would be unable to predict even one event with complete precision.

Bohm's analysis of causality implied that nature was not capricious; it was simply infinite. Uncertainty was subjective, not objective, as the Copenhagen School insisted. Every actual analysis of the real world would have a plus and minus that might be reduced, but never removed. None of this sat well with the mathematicians that have continued to dominate modern physics to this day. Bohm was either denigrated or ignored. The result is the intellectual mess we are confronted with under the imprimatur of the Big Bang Theory. We can't advance without following Bohm.

The Three Scientific Worldviews

In the main, there were two previous worldviews that could be called scientific: mechanism and systems philosophy. Mechanism tended to overemphasize the outsides of it model; systems philosophy tends to overemphasize the insides of its model.

1. ***Mechanism.*** Newton's model has been construed variously as a mathematical "point source" or object containing inert matter. Theories based on the model followed the same pattern. Thus, Darwin's "natural selection" overemphasized the environment in the survival of the fittest. Later, the discovery of genes supplied a portion of the needed attention to the insides of the model.
2. ***Systems Philosophy.*** Today's systems philosophy tends to isolate a portion of the universe by pointedly ignoring its environment. All of the causes for the effects observed within a particular system are considered to have originated within the system itself. The Big Bang Theory is the archetype of systems philosophy. The theory assumes that the entire universe, like other systems, is finite, had an origin, and will have an end.
3. ***Univironmental Determinism.*** According to TSW, the correct scientific worldview is a combination of these two previous worldviews. Univironmental determinism (UD) states that whatever happens to a portion of the universe is dependent on the infinite matter in motion within (the microcosm) and the infinite matter in motion without (the macrocosm). It is the universal mechanism of evolution. The goal of univironmental theory is to achieve proper emphasis on both the microcosm and the macrocosm. It denies the possibility of a microcosm without a macrocosm. Hence, the logical beginning and ending assumption must be that the universe is infinite. It also attempts to avoid the two possible errors of overemphasis in general philosophy: solipsism and fatalism.

Neomechanics

Newton's great reduction of all phenomena to matter in motion will stand, as Einstein himself admitted, for all time as the greatest of scientific achievements. Had Newton used the assumption of *infinity*, he would have discovered neomechanics as well. What is *neomechanics*? As explained in TSW, it is the application of classical mechanics to the interactions of microcosms and macrocosms. In this abstraction Newton's inertial object becomes a microcosm, a portion of the universe containing an infinite number of submicrocosms within. It is neither a "point source" having nothing within, nor an inert body filled with solid matter. Similarly, Newton's "absolute space" that envelopes the inertial object is considered by UD to be a macrocosm filled with an infinite number of supermicrocosms. As shown in TSW, any microcosm may have any of six possible neomechanical interactions with the macrocosm: 1. An increase in motion as a whole, 2. A decrease in motion as a whole, 3. Absorption of matter, 4. Emission of matter, 5. Absorption of motion, and/or 6. Emission of motion. Any actual reaction is likely to involve several of these interactions. Neomechanics is the simplest reduction consupponible with infinity. It is the skeleton on which UD is based.

Application of Univironmental Theory

Neomechanics, like classical mechanics, nevertheless is inadequate for an analysis of the infinite variety found in the universe. An expansion is necessary. At the same time, there is no reason to abandon the univironmental focus. Our analysis will continue to divide the universe into two parts: microcosm and

macrocosm. TSW contains numerous illustrations of this univironmental theory, starting with the law of the universe, Newton's First Law of Motion. In addition to substituting a microcosm for Newton's "object," UD changes the word "unless" to "until," as befits an infinite universe.

Similarly, UD begins and ends with a change in the interpretation of the Second Law of Thermodynamics (SLT), which is basically a restatement of the First Law of Motion. The conventional, idealistic view is that a "system" in "isolation" can only run down, becoming more disordered as its entropy increases. True to systems philosophy and microcosmic thinking in general, the imagined perfect isolation assumes the absence of the macrocosm. With UD, however, the possibility of complete isolation is denied and the SLT becomes a law of departure, while its complement becomes a law of arrival. The assumption of *complementarity* assures the essential connection between microcosm and macrocosm. In an infinite universe, matter in motion resulting in destruction in one place leads to the convergence of matter in motion and construction in another place.

With respect to gravitation, UD eschews the concepts of attraction and curved space-time common to systems philosophy. There are no true "pulls" in nature. Newton's laws of motion, as well as their derivatives in thermodynamics and other disciplines, describe only pushes, never pulls. Newton himself was careful not to ascribe any kind of "puller" as the physical mechanism for his law of gravitation. Today, true physicists are no better off with Einstein's idea of "empty space," which logically has no properties, but nevertheless supposedly is "curved." Thus we still await an explanation of the physical mechanism for gravitation. UD, like many others [4] predicts that it will be a push, not a pull.

Systems philosophy characteristically produces innumerable analyses that are overtly microcosmic. Thus by definition, any theory that uses the word "self" must ignore macrocosmic contributions to some extent. Claims for "self assembly" occur typically when crucial factors common to the macrocosm are missing. The gene, for instance, can only be seen as "selfish" when it is erroneously viewed as acting alone, without any contribution from the macrocosm. UD claims that all interactions are univironmental. Asking whether nature or nurture is more important is like asking which is more important in determining the area of a rectangle, the width or the length?

Univironmental thinking adds many valuable insights to various aspects of the world. Biopoesis (the origin of life from inorganic chemicals) appears as a natural, inevitable process occurring as a result of univironmental determinism as the universal mechanism of evolution. Neo-Darwinism, defined conventionally as the mechanism of *biological* evolution, never could get past this transition from the inorganic to the organic. UD thus is at once simple and infinitely complex. What could be simpler than the claim that what happens to a portion of the universe is determined by the interaction of what is inside it and what is outside it? What could be more complex than the infinity that awaits us within and without?

Other microcosmic errors akin to systems philosophy are: the claim that declines in "morality" were responsible for the decline of civilizations (Civilization requires macrocosmic pressures that force people together. Remove the people or the pressure [both macrocosmic influences] and civilization will decline); that "overspecialization" could be the cause of extinction (Specialization is an adaptation to a particular macrocosm. It is of no concern until the macrocosm changes—the inevitable primary cause of nearly all extinctions.) Thus our own extinction as a species is likely to be due to some macrocosmic natural disaster such as an asteroid impact. It won't be due to a decline in morality or an increase in "overspecialization."

Systems Philosophy and Myopism

Actually, today's dominant scientific worldview, systems philosophy, was more influential during pre-Newtonian times than I have so far portrayed it. We are born myopic. Our first "universe" extends only centimeters from our face. It is only with *ex*perience that we learn its true extent. As a species we have progressed from the two-sphere universe to the Big Bang. But we have yet to take the last step—the infinite universe. Each of the previous cosmologies had supporting evidence: the heavens really do appear to spin about Polaris; the sun really does appear to travel across the sky; the galaxies really do appear to be redder as a function of distance. But, of course, all these data were interpreted from the myopic point of view, as might be expected for a juvenile species.

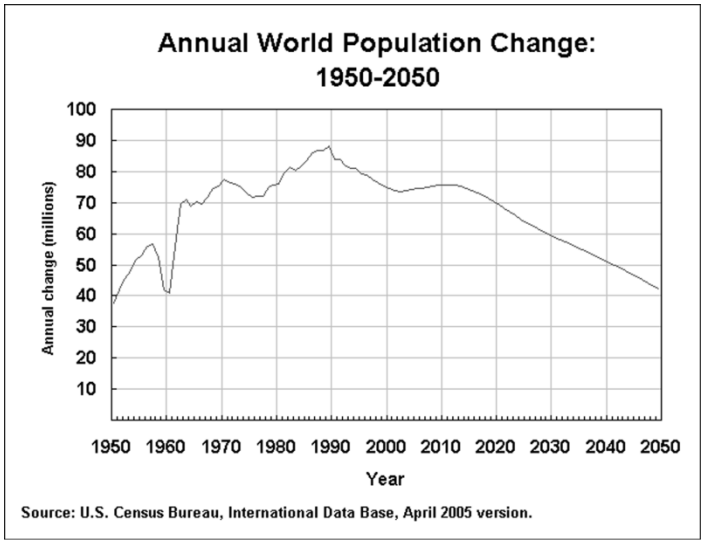

Figure 1. Global population change showing that the maximum, 88 million, occurred in 1989. It is now less than 75 million. Note that the niche opened by the losses suffered during the 1958-61 famine was quickly filled during the subsequent decade (Borchardt, 2007, p. 289).

What are the prospects for breaking away from this "non-self-induced" myopism, this intellectual dead end? When will *Homo sapiens* reach the maturity to view the infinite universe and ourselves as we really are? TSW gives the details, but two relatively unpublicized illustrations (Figs. 1 and 2) give the jist of what is about to happen. TSW claims that the progress of the Industrial Revolution, upon which the scientific worldview is predicated, parallels global population trends. Of greatest significance is the fact that the increase in global population growth began to decrease in 1989 (Fig. 1). Earth's population increased by 88 million that year. The annual population increase has been declining every year since. This "Inflection Point" for global population growth is unprecedented, and if the UD hypothesis is correct, will never be repeated again. According to UD, the UN, and the US Census Bureau, the resulting global demographic

transition will be a sine curve centered at 1989 (Fig. 2). The mirror image predicts that the ultimate "carrying capacity" of Earth will be about 10 billion—about twice what it was in 1989. Like all microcosms, our own species responds in the univironmental way: we are controlled completely by the natural interaction of the infinite matter in motion within and without. No amount of imagined "free will" could change this demographic.

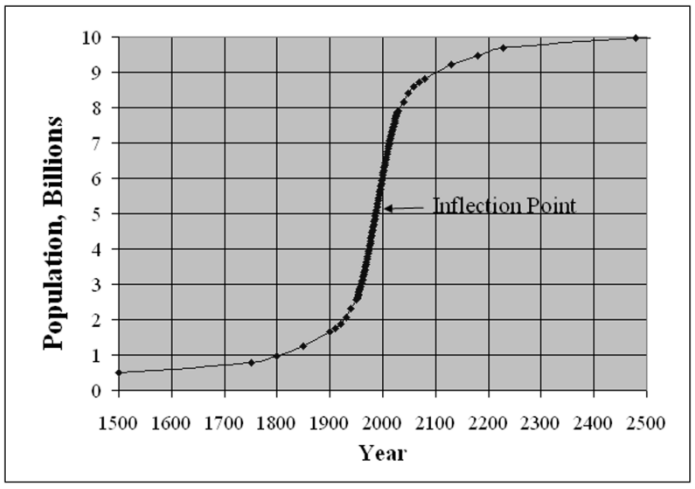

Figure 2. Sigmoidal growth curve for global population assuming perfect symmetry about the 1989 Inflection Point (Borchardt, 1907, p. 290).

Predictions

Maturation of *Homo sapiens* during the 21st century will produce:

1. A slowly growing population of 9 billion
2. Slowing of global economic growth
3. Global urbanization and the decline of nationalism, religion, and warfare
4. Replacement of systems philosophy by univironmental determinism, *the* scientific worldview
5. Replacement of the Big Bang Theory by the Infinite Universe Theory

Was it a mere coincidence that the idea of universal expansion was popular just as Earth's population and economy also were undergoing their greatest expansion? I don't think so. A primary assertion of TSW is that worldviews also are products of UD. We tend to see only what we want to see. We may wish for infinite growth, but its realization is impossible. Our modification of Newton's First Law of Motion from "unless" to "until" will see to that. The macrocosm is always present, helping to control the microcosm. We ignore the macrocosm to our detriment. Thus, belatedly we have the "environmental movement," virtually unheard of before 1970. Ignorance of the macrocosm threatened to poison all of us, but somehow we came to our senses just in the nick of time—in tune with the Principle of Least Effort, the sociological extension of Newton's First Law.

Conclusions

The Scientific Worldview explains the persistence of Einstein's relativity and the Big Bang Theory and what we need to do to produce the scientific and philosophical revolution that will overthrow them. As implied in the discussion of The Ten Assumptions of Science, the reason that relativity and the BBT are so popular is that they use assumptions that are popular with the greater society. Most people, for instance, profess a belief in matterless motion nearly every day. When Einstein assumed that matter could be converted into matterless motion to be radiated through perfectly empty space, society was ready to believe. When Hawking and others assumed the creation of the universe out of nothing, society was ready to believe. Most had heard about that idea before. To those of us following contrary assumptions that appear to us as mere common sense, the whole thing appears to be illogical, and yet, it persists.

Thus, because of this societal underpinning, the BBT will not fall soon. There are very good evolutionary reasons for the popularity of mystical views. These were extremely successful in instilling and enforcing tribal loyalties necessary for defense against other tribes seeking scarce resources. Nonetheless, discarding the last remnant of the pre-Copernican worldview will be a momentous, one-time occasion for humanity. How long will this last fundamental scientific revolution take? This could be anyone's guess. And, as we have seen, a few contrary bits of data will make little difference. Other, relatively minor scientific revolutions took decades to occur. The plate tectonics revolution in earth science, for instance, began with meteorologist Wegener's book on continental drift in 1915 [5], but did not achieve general acceptance for 50 years. On the other hand, one look at Fig. 2 shows that humanity will experience significant, unprecedented changes in the next 30-50 years. I doubt that the BBT could survive that transition from rapid growth to slow growth and all the societal changes that will come with it. The myopic thinking of systems philosophy will be abandoned under the pressures of globalization. Society will be forced to look outward, experimenting with the external world as never before. A global increase in population by 50%, mostly urban, surely will continue to put heavy strains on worldviews suited to past, rural conditions. The contradictions between religions and nations are sure to become more obvious, with global rather than national solutions being the result. The fall of the Big Bang Theory will accompany a new global consciousness based on the scientific worldview.

References

[1] G. Borchardt, **The Scientific Worldview: Beyond Newton and Einstein** (Lincoln, NE, iUniverse; 411 p., 2007).

[2] G. Borchardt, **The Ten Assumptions of Science: Toward a New Scientific Worldview** (Lincoln, NE, iUniverse, 125 p., 2004). Also summarized in: G. Borchardt, "Ten assumptions of science and the demise of 'cosmogony'": Proceedings of the Natural Philosophy Alliance, v. 1, no. 1, p. 3-6, 2004.

[3] D. Bohm, **Causality and Chance in Modern Physics** (New York, Harper and Brothers, 170 p., 1957).

[4] M.R. Edwards, ed., **Pushing gravity: New perspectives on Le Sage's theory of gravitation** (Montreal, Canada, Apeiron, 316 p., 2002).

[5] A. Wegener, **The Origin of Continents and Oceans** (New York, Dover, 246 p., 1915 [1966]).