Descriptive Metaphysics: On Science, Religion, and Wisdom

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Abstract

Using the Descriptive Psychology concepts of Totalities, Ultimates, and Boundary Conditions, I will briefly survey modern scientific cosmology and physics. I will show that science does provide ultimate explanations for the totality of the physical universe that may seem to compete with the explanations of religion. But I will also review the Descriptive application of these concepts to theology and metaphysics to argue that nonetheless science cannot displace religion in a complete account of the world.

"Since we are seeking this knowledge, we must inquire of what kind are the causes and the principles, the knowledge of which is Wisdom."

- Aristotle (350 BCE)

In his Metaphysics, Aristotle concerns himself with First Causes, Being qua Being, and the Unmoved Mover. From today's point of view these concepts may seem archaic, speaking as they do to a more ancient time, and building on the ideas of yet more ancient Pythagorean and Platonic predecessors. Nonetheless, the quest for Wisdom is as pertinent now as it ever was.

Following Aristotle, I take it that wisdom is not to be found in detailed knowledge of particular domains, but in mastery of the "causes and principles" that give access to all domains of knowledge. Where Aristotle is concerned with causes and principles, a Descriptive Psychologist is concerned with concepts, and following Shideler (1975, 1983) and Ossorio (1996), I find the most relevant concepts to be the transcendental concepts of Totalities, Ultimates, and Boundary Conditions (Putman, 1998).

Using these concepts I will briefly survey modern scientific cosmology and physics. I will show that science does provide ultimate explanations for the totality of the physical universe that may seem to compete with the explanations of religion. But I will also review the Descriptive application of these concepts to theology and metaphysics to argue that nonetheless science cannot displace religion in a complete account of the world.

I

First let me note that the transcendental concepts of Totalities, Ultimates, and Boundary Conditions are not just Descriptive Psychology jargon. As a check, I made the following search on the Google internet search engine: (totality OR totalities)(ultimate OR ultimates)("boundary condition" OR "boundary conditions"). Google found 347 pages, most all of them relevant to metaphysics, cosmology, or religion. Here are some of the titles that Google ranked as best matching my query:

Theology Today - The Mystic and the Theologian
Spiritual Experiences
The Soul
Quantum Metaphysics?
The Psychology of God
Religion and Science: History, Method, Dialogue
The Absolute Beneath the Relative
Immediate Experience and Existence
Christian Theism and Scientific Cosmology
Quantum mechanics: an Aristotelian interpretation
Multiscale Modeling of Plasticity and Fracture in Metals

The first title is a Descriptive paper by Mary Shideler (1975), and the second and third titles are talks given by Peter Ossorio at Descriptive Psychology conferences (1996, 1997). Most of the remainder are clearly metaphysical in content, and make no reference to the literature of Descriptive Psychology. I take the last title above (Miller, 2003) to be an exception that proves the rule, as it has nothing metaphysical about it. But even so its contents turn out to be a good example of the use of the transcendental concepts in the domain of materials science:

> "One can adopt the point of view that the 'exact' representation of material behaviour comes from the atomistic description insofar as the interatomic force laws accurately describe a real engineering material. Multi-scale approaches start from this viewpoint, eliminating any unnecessary atomistic degrees of freedom to the point that the model becomes computationally feasible. The ultimate reduction in atomistic degrees of freedom is a fully continuum approach, replacing the totality of the atomic degrees of freedom by a handful of continuous field variables. For general model geometry and boundary conditions, solution of the continuum equations must be achieved numerically using approaches like the finite element method."

Note the logic here: we have a totality of entities, a process for describing and re-describing the entities, an ultimate limit on that process, and boundary conditions at the limit. For materials science, the totality under investigation is the individual atoms composing a sample of material. That totality is made amenable to analysis by a process of reduction, the ultimate limit of which is a continuum. The direction of the applied forces and the shape of the material set boundary conditions on the solution of the field equations that describe the continuum. Note that the boundary conditions are specified from outside of the analytic model - that is to say, they transcend the model. Also note that the field equations make no reference to individual atoms: from the atomistic point of view they are a transcendental description. The logic of scientific cosmology is the same, except that the totality to be described is the entire Universe.

II

"For it is owing to their wonder that men both now begin and at first began to philosophize; they wondered originally at the obvious difficulties, then advanced little by little and stated difficulties about the greater matters, e.g. about the phenomena of the moon and those of the sun and of the stars, and about the genesis of the universe".

- Aristotle (350 BCE)

Traditionally, cosmology includes: Cosmography - the structure of the universe; cosmogony - the ultimate origin of the universe; and eschatology - the ultimate fate of the universe. And traditionally, cosmology has been as much a branch of theology as a branch of science. For example, orthodox Christian theology describes a totality of Immortal Souls on Earth, in Heaven and in Hell; Earth having been created *ex nihilo* by the Divine Creator, and prophesied to end on a future Day of Judgment. Many Christians still believe that Scripture reveals when the Creation occurred, and even when the Judgment will come. But, at least since the time of Copernicus and Galileo, scientific cosmology has challenged this particular theological view. The telescope has revealed a universe of planets and suns beyond this Earth, geology has pushed back the age of the Earth to long before the days of Genesis, and paleontology argues that Homo Sapiens, like all other species, evolved gradually from previous species, with no definite moment of creation. And at least since the invention of the atomic bomb the Final Battle at Armageddon has seemed more likely to arrive by human than divine agency.

All of these facts of science can be, and have been, reconciled to modern theology, but many people still believe that religion and science are at odds. And not just at odds over the facts - some contend that science provides a complete deterministic and materialistic account of the world: a world driven by impersonal forces; a world devoid of divine or even human agency; a world with no place for immortal souls. For myself, I do not believe that science requires or even supports such a view. The physical sciences choose to work, as much as possible, without explicit use of the concept of a person - it is in part that very choice that distinguishes them as physical sciences. But that choice is not at all binding on us as persons with needs and interests beyond the material, and making that choice does not in itself invalidate the choice to use other concepts. Moreover, we will see that even on its own terms physics has failed to give a fully deterministic account of the world.

III

"I want to know how God created the universe. I want to know His thoughts. Everything else is just details."

– Albert Einstein (Quoted in Clark, 1984)

Scientific cosmology describes the universe as a totality of material objects, ranging in scale from the smallest subatomic particles, though the molecules of cosmic dust, to comets, planets, stars, galaxies, and beyond. So, at one end we have the ultimately small, the world of subatomic particles and quantum mechanics, and at the other end we have the ultimately large, the entire universe. At large scales cosmologists model the universe as a four-dimensional space-time continuum, using Einstein's (1916) field equations of general relativity. Current theories describe space-time as expanding from a singularity, and depending on the geometry of space-time it will either continue expanding forever, or collapse back into a singularity.

In talking of singularities and geometry we are talking of boundary conditions. Einstein's equations have infinitely many solutions, and only by specifying boundary conditions can we derive particular solutions that can describe the actual universe. We start with Hubble's (1929) observation that at the largest scales everything in the universe is moving away from everything else. Given the observed rate of expansion we can calculate that some billions of years ago everything must have been in the same place. That place, that point, is the singularity from which began the expansion called the Big Bang. It is singular in the sense that there is only one such point, and more importantly, in the sense that is a point like no other: a point at which the equations of space-time break down, just as the equations of ordinary arithmetic break down when you try to divide by zero. So the original singularity is not so much a point **in** space or time as it is the point **at which**, from our side of the boundary, space and time began.

In the cosmologists' description space is finite, but boundless. In three dimensions, you can imagine space-time as the surface of an expanding balloon. The area of the surface is finite, but being a closed curve it has no boundary. Extend the analogy to four dimensions and you can try to imagine the finite but boundless volume of the universe. The direction and degree of curvature is still unknown, but not unknowable. If the curvature is positive then Einstein's equations predict that the universe will eventually implode in a Big Crunch, collapsing into another singularity. We have already observed such singularities in the form of black holes, which are collapsing stars whose density is so great that not even light can escape their gravity. If the total mass of the universe is great enough, then it too may end as a black hole. If not, the curvature will be flat or negative, and the universe may expand forever. We cannot directly measure the mass of the universe, but we continue to refine Hubble's observations of galactic motion. Recent observations indicate that the expansion of the universe may even be accelerating, indicating that the curvature is not positive.

IV

"Had I known that we were not going to get rid of this damned quantum jumping, I never would have involved myself in this business."
– Erwin Schrödinger (1926a).

"Anyone who is not shocked by quantum theory has not understood it."
– Niels Bohr (as cited in Gribbin, 1984, p. 5).

"God does not play at dice with the world"
– Albert Einstein (1927).

"Einstein, stop telling God what to do."
– Niels Bohr (1927a)

Heisenberg's Uncertainty Principle (1927) states that the more precisely we measure one property of a physical system, such as the position of a particle, the less precisely we can measure a complementary property, such as its momentum, where Planck's constant quantifies the ultimate limits to precision. Planck-time is about 10^{-43} seconds, and Planck-length is about 10^{-35} meters: this is the smallest scale. At the smallest scale - the scale of subatomic particles and of the time just after the original singularity - physicists describe the universe with Schrödinger's (1926b) wave equation. When bounded by the conditions of a particular measurement this equation predicts the probability of observing a particular state of a particle of matter. Furthermore, until a measurement is made quantum theory denies that a particle has any particular position or state - or more accurately, the wave equation describes the particle as being in a superposition of all possible states. These superposed states are not just hypothetical: quantum computers can explicitly manipulate the superposed states of individual atoms to perform some calculations far more efficiently than classical computers can.

The quantum description of the world is fundamentally different than the classical description. Consider a device that emits a single particle. Schrödinger's equation, unlike Newton's, does not describe a precise trajectory for that particle. Rather, it describes a superposition of possible trajectories, expressed as a wave function that predicts the probability of observing an emitted particle at any particular time and place. An act of measurement is said to randomly "collapse the wave function" of the particle to one of its possible states. It is this notion of random collapse that so vexed Schrödinger and Einstein. They understood quantum theory, indeed they helped invent it, and they were shocked.

The problem of explaining - or explaining away - the collapse of the wave function is the problem of interpretation for quantum mechanics: the experimental predictions of the wave equation are clear, but it is not clear just what physical reality the equation describes. For classical mechanics there was no such problem. The universe was described as being made of distinct particles of the ordinary matter that we see, at precisely observable positions, moving via the ordinary forces that we feel. Newton's laws of motion provided a precise, deterministic description of these forces. But quantum mechanics argues that precise measurement is impossible, and that the very notion of distinct particles may be incoherent. Thus the solid, deterministic world of Newton has been superceded by the vacuous, irreducibly probabilistic world of Bohr (1927b) and Schrödinger (1926).

V

"I don't want to be immortal through my work. I want to be immortal through not dying." - Woody Allen (Quoted in Lax, 2000, p. 183)

One way to avoid the vexing collapse of the wave function is the "many-worlds" interpretation proposed by Everett (1957). Rather than postulate a collapse of the wave function that gives a definite outcome to a quantum measurement, Everett denies that there is any definite outcome. Instead, he postulates that all isolated systems evolve according to the Schrödinger equation. Since the universe as a whole is by definition an isolated system it follows that all possible outcomes of any quantum measurement in fact occur, with the probabilities given by the Schrödinger equation, even though only one of the possibilities can be measured at a time.

How can this be? At each apparent collapse the universe is postulated to split into superposed parallel universes: one in which that particular quantum event occurred, and another where it did not. Which parallel branch our observations happen to take is completely random. A phenomenon called "decoherence" insures that we can usually observe only one of these parallel universes, as a multitude of random particle interactions cause initially coherent quantum states to rapidly diverge after each branch, but in carefully crafted devices such as interferometers and ion traps we can reduce the decoherence enough to observe the apparent effects of this quantum branching. Nonetheless, the description of the universe as an evolving multiverse of constantly branching timelines is distasteful to many physicists.

To overcome this distaste a simple experiment can be done as an empirical test (Tegmark 1998). Consider a device that connects a small piece of radioactive material, a radiation detector, a switch, and a loaded gun. The sensitivity of the detector can be adjusted so that if the switch is pressed there is a fifty percent probability of the gun firing, and the radioactive element assures that the outcome is truly random. An experimenter can then place their head in the device and press the switch. What will happen?

Before pressing the switch, the wave equation for the experiment describes a gun that may or may not go off and a live experimenter. After pressing the switch, the wave equation describes a superposition of two possibilities: a fired gun and a dead experimenter, or an unfired gun and a live experimenter. The dead experimenter, being dead, cannot perceive the result of the experiment, but the live experimenter can, and so by the Everett postulate will. A sufficiently motivated experimenter can repeat the experiment as often as desired, with each repetition doubling the odds that the Everett postulate is correct. But only a surviving experimenter is likely to be convinced, as on the vast majority of timelines the experimenter will be found dead.

Whether the Everett postulate actually promises immortality is vigorously debated. Some object that our ordinary ways of dying are too unlike the experimental setup, but although the probabilities are different the principle still holds -- if there is any physically possible way not to die you will experience not dying. However this debate is resolved, the physical immortality implied by the quantum suicide experiment seems unlike the afterlife promised by any religion, although the indestructible quantum observer does resemble the immortal soul of theology.

VI

"Menu, choose one:

• Your consciousness affects the behavior of subatomic particles

• Particles move backwards as well as forwards in time and appear in all possible places at once

• The universe is splitting every Planck-time into billions of parallel universes

• The universe is interconnected with faster-than-light transfers of information"

- James Higgo (1999)

If, contra Everett, we insist on a single universe, then what? Einstein, Podolsky, and Rosen (1935) proposed an experiment that illustrates the difficulties. Consider a device that produces pairs of identical particles moving away from each other in opposite directions. Heisenberg's uncertainty principle tells us that we cannot simultaneously ascribe a definite position and a definite momentum to any particle. But what if we measure the position of particle A and the momentum of particle B? Since the particles were produced with equal but opposite momentum Einstein argued that we can deduce that if particle A is at position x when particle B has momentum y , then particle A must have momentum -y and particle B must be at position -x. This contradicts the uncertainty principle, so we have a paradox.

When variations on this experiment are actually performed, we find that measuring an attribute of particle A in fact makes the complementary attribute of particle B less certain, as Heisenberg would predict. This is true no matter how far apart the particles are, even if we delay the choice of which attribute to measure until after the particles are produced. The implication is that either Everett is right, or somehow the choice of which attribute to measure, or the fact of which attribute was measured, is transferred instantaneously between the two particles. But instantaneous transfer of information violates Einstein's (1905) special theory of relativity, so again we have a paradox.

The orthodox approach to these paradoxes, as championed by Bohr, is to refuse to resolve them, to just "shut up and calculate." Since the calculations have so far proven exceptionally accurate there is some pragmatic justification for this approach. Those who find this orthodoxy ontologically wanting can choose some variation on the above interpretations. Strange as they may seem, Higgo's menu items are in fact reasonable summaries of the views of some very reputable physicists. With choices like these it is little wonder that some of these physicists have retired to write frankly mystical books like *The Tao of Physics* (Capra, 1975), *The Dancing Wu Li Masters* (Zukav, 1979), and *Wholeness and the Implicate Order* (Bohm, 1980). It is as if the paradoxes of physics can serve as Zen koans, inducing a state of enlightenment in those who grapple with them.

What these enlightened physicists go on to say about metaphysics may well have value, despite the scorn of their less mystical peers, but what is more interesting to me is the following lesson: That science has failed, despite the best efforts of some of our best minds, to give a completely deterministic account of the physical world. Further, this failure appears in physics not just as a limit on our abilities to measure, but as a consequence of the irreducibly probabilistic nature of the physical world. So whatever other arguments may be made for and against determinism, it is simply not the case that physics has shown the world to be deterministic.

VII

"Nisi quatenus corporis essentiam sub specie aeternitatis concipit" (1)
– Benedict de Spinoza (1674, p. 214)

"Pluralitas non est ponenda sine neccesitate" (2)
– William of Ockham (1317, p. 247)

From the above it may seem that in modern times science has displaced theology in providing an account of the world "under the aspect of eternity." In scientific cosmology we find a consistent account of the ultimate origins, boundaries and fate of the universe, from the smallest particles and most subtle energies to the largest galaxies, from the most ancient beginnings to the end of time. But the semblance is deceiving, for physics asks different questions than theology.

For physics, the questions and answers take the form of object and process composition and decomposition. We ask, “What is matter made of?” and answer “Smaller pieces of matter” until we reach the limit of Planck-length. We ask, “How does motion happen?” and answer “Through a sequence of smaller motions” until we reach the limit of Planck-time. And having arrived at the ultimately small we can ask “How does it all fit together?” and build up from quarks to atoms to molecules, through people and planets to the stars and beyond, until we reach the limits of all of space-time. The result is a consistent but incomplete description of the world, treating only of matter and energy, and not at all of loving kindness or the life of the spirit.

To say that scientific explanations are incomplete is not a criticism, but simply the recognition of a choice. Science has been guided at least since the fourteenth century by the principle of parsimony expressed above as Ockham’s razor. Following this principle, scientists attempt to answer the questions that interest them with as few concepts as possible. Physical scientists, including cosmologists, have chosen not to use such concepts as motivation or consciousness in their descriptions of the physical world. So it is no surprise that there is no place for persons as such in the world of physics, and thus no way to ask or answer psychological or spiritual questions. For answers to such questions we must look elsewhere.

VIII

“What does it all mean, Mr. Natural?”

- Flakey Foont (cover of Crumb, 1971)

For theologians, and indeed for all of us as persons, the important questions are not the physicist’s “What is it made of?” but rather such questions as “Who am I?” and “What does my life mean?” Whatever we do - for instance, “Moving a piece of marble on a wooden board” - we can ask, "What am I doing by doing that?" And given an answer - like, "Moving a pawn one row forward" - we can ask the same question again, through answers like "Putting my nephew's king in check" and "Playing a game of chess with my nephew" to "Celebrating Christmas with my family" and, perhaps, beyond. Each question and answer is a move up the significance series, bringing in more context and higher significance until we reach the limit of ultimate significance. What we may find at that limit Shideler (1975, pp. 257-258) expresses well:

> When, in generating such a series, we have exhausted all the possibilities and so come to an end, which is a boundary condition, there remains the question: "What is the significance of all this - the ultimate significance beyond what we can assign to it?" That is a question we cannot answer, because on the hypothesis we have already gone as far as we can. And we cannot simply say that there is a super Person who assigns ultimate significance when we have run out of significances to assign. Something of the sort can indeed be said, and logically justified, but not simply.
>
> We can do so by pointing out that when we reach the boundary condition of our significance series - not stopping at some arbitrarily chosen place dictated by our circumstances or a priori commitments - what we have is our ultimate. Yet we want, and logically need, not so to be left dangling. For our significance series to make sense, we must have the notion of an ultimate significance, and this must be assigned by a person although it cannot be assigned by any limited person such as ourselves, or by all of us together.
>
> At a boundary such as this, we must make not simply a new move, but a new kind of move, from assigning significance to confessing our limitations. It is then a legitimate methodological move to introduce the concept of a Person who has enough of the characteristics of a human person to serve as an assigner of ultimate significance, but is not subject to our limitations, and who therefore can make significance assignments which are not arbi-

> trary, and are ultimately valid. Thus we achieve the conceptual and systematic closure we need. And it is fitting that we should name the Person who assigns ultimate significance to the ultimate totality, "God," describing this Person as "Judge."

This is not a proof of the existence of God, as not everyone will be so dissatisfied as Shideler was at being "left dangling" with no significance to life beyond what we persons can give it. All Shideler does is show a possible transcendental move to those who choose to make it.

IX

"Tat satyam. Sa Atma. Tat tvam asi." (3)
- Chandogya (600 BCE, p. 257)

In asking and answering the question "What am I doing by doing that?" we generate a series of questions, ultimately reaching a limit. At the limit we must transcend the domain of the question if we are to give an answer. As Ossorio (1997) articulated in his talk on The Soul, by asking and answering the question "Who am I?" we can reach a similar limit.

I can answer the question in terms of my appearance - balding hair, graying beard, myopic eyes, and so on. I can answer in terms of my skills - playing guitar, programming computers, breeding horses, and so on. I can answer in terms of my history - born in the fifties, survivor of the sixties, college student in the seventies, entrepreneur in the eighties, and so on. But most of all I answer in terms of my relationships. I am an uncle to my nephews, a brother to my siblings, a son to my parents, a parent to my sons. I am a student to my teachers, a teacher to my students, a peer to my colleagues. I am a resister of war, a seeker of truth, a wanderer in wilderness, a worshiper in silence.

Each additional answer places me in a larger network of relationships: relationships to other people, to the events of history, to the web of nature, and so on. But, in this finite world, I run out of answers eventually, asking "But who am I ultimately, beyond whatever place I have in this world?" As with ultimate significance, we need not answer this question, but if we do it again makes sense to give a transcendent answer, to identify my ultimate self as Soul.

Note that this is no proof of the existence of Soul, just as Shideler's (1975) exposition is no proof of the existence of God. Neither do these expositions say what God and Soul are, beyond their place as transcendental answers to questions about ultimate significance and identity. The most we can do as Descriptive Psychologists is to offer an articulation of the sense these concepts make as boundary conditions on the Sacred. To those who recognize the Sacred asking for proof may be to miss the point entirely.

X

"Gate gate paragate parasam gate" (4)

- Siddhartha Gautama (500 BCE)

God and Soul serve as transcendental Ultimates to bound a domain of questions. Since each additional answer brings in more context, we also have a non-transcendental ultimate in the total context of "everything that is." But that still leaves a further boundary condition, as Ossorio (2001) explains:

> If you ask what is the source of everything that is, then it has to be a void, since if it is the source of everything then there is nothing left over. But it can't just be a void, since everything came out of it.

This realization, like so many others, is ancient. Circa 500 BCE Siddhartha Gautama, the Buddha, had "gone completely beyond" (parasam gate) the concepts of God and Soul to the Ultimate of *Sunyata*, translated as Void or Emptiness. As his Heart Sutra expresses it "Apart from form there is no emptiness; apart from emptiness there is no form."

For those who cannot see an account of the world that forsakes God and Soul for the Void as relevant to the life of the spirit, I can do no better than to further quote the Heart Sutra:

> Therefore, O Sariputra, in emptiness there is no form, no feeling, no volition, no consciousness; ... no ignorance, nor extinction of ignorance, no decay and death, nor extinction of decay and death. There is no suffering, no origination, no cessation, no path; there is no knowledge, no attainment, no nonattainment.
>
> Therefore, O Sariputra, by reason of his nonattainment, the bodhisattva, having relied on the Perfection of Wisdom, dwells serenely with perfect mental freedom. In the absence of impediments he is without fear, having overcome all illusions, and attains the unattainable bliss of nirvana.

Or as Jesus of Nazareth said to Didymos Judas Thomas (130, pp. 20,21) "…empty they have come into the world, and empty they seek to go out of the world again".

Unsurprisingly, quantum physics has hit a similar limit. Heisenberg's uncertainty principle allows for subatomic particles to appear spontaneously out of a vacuum so long as they disappear within a unit of Plank-time, and thus do not exist long enough to be observed. So the vacuum can be described not as empty, but as seething with particles and antiparticles, appearing out of nowhere and rapidly annihilating each other. But these virtual particles are not just hypothetical, as their existence explains the details of real particle interactions, and gives rise to a measurable vacuum energy. Some physicists even speculate that the entire universe is a single vacuum fluctuation. Aristotle might well have been horrified at this violation of the ancient Greek axiom that "Out of nothing, nothing comes."

XI

The magisterium of science covers the empirical realm: what is the universe made of? and why does it work this way?. The magisterium of religion extends over questions of ultimate meaning and moral value... Science and religion are not in conflict, for their teachings occupy distinctively different domains... I believe, with all my heart, in a respectful, even loving concordat."

- Stephen Jay Gould (1999, pp 6, 9)

It is a characteristic of all questions that we eventually run out of answers, and that the ultimate answer, if we give one at all, transcends the domain that gave rise to the questions. And so it is with the questions and answers of science and religion. It is not a failing of science that it cannot answer our questions about the life of the spirit. And neither is it a failing of religion that the answers it gives are not scientific. Each domain is properly limited in the kind of questions it can ask, and in the status of the answers it gives. Ultimately, it is each one of us who must choose what questions to ask, and what answers to accept. Speaking for myself, the person of Wisdom is one who respects these limits: who renders unto science what belongs to science, and to the Ultimate what belongs to the Ultimate.

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(Footnotes)

(1) "Nothing is contingent under the aspect of eternity."

(2) "Plurality should not be posited without necessity."

(3) "That is reality. That is Self. Thou art that."

(4) "Gone, gone, gone beyond, gone completely beyond."