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How the Naturalistic and Biblical Worldviews Affect How We Do Science

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Abstract

The naturalistic paradigm rules out all supernatural explanations and leads to a particular type of science now widely considered the only possible approach. However, this limitation imposed upon science is shown to be invalid by the fact that modern science was developed primarily by theists working within a Biblical worldview and that it functioned well in that context. This article compares the practice of science based on naturalistic (and atheistic) presuppositions with that of science developed from a Biblical worldview, a comparison that includes a consideration of the presuppositions, objectives, methodology, results and implications of these two approaches. Historical examples and current trends illustrate the differences between these ways of doing science, and allow us not only to distinguish between naturalistic and Biblically based science, but also to evaluate the past successes, current potential, and probable future performance of these approaches.

Key Words: Science, religion, naturalistic worldview, biblical worldview, closed system, open system, presuppositions, methodology, implications, fine-tuning

True Science

I recently asked a colleague who teaches physics at a Christian university the question, "In what ways does a scientist who embraces a Christian worldview practice science differently than one who subscribes to an atheistic worldview?" After several hours, an interval whose length indicated to me not only how busy my colleague was but also the careful consideration devoted to formulating the answer, the response given was: "None."

No difference! But is it actually true that "science is science is science," the same no matter who is performing it, unchanged by and insensitive to the presuppositions and worldviews of its practitioners? Do scientists treat the exploration and attempted explanation of the universe in the same way, checking their beliefs and prejudices at the door? Should they do so?

Of course, scientists are humans with human foibles, and no one is able to approach any question entirely without previous bias or preconception. But perhaps as an ideal, all scientists *should* do science in exactly the same way: observing the real world, developing theories to explain it, and comparing the predictions of a theory to the results of the experiments. This sounds good – in theory – and I think this is what my colleague had in mind, but let us examine some of the underlying assumptions of the idea.

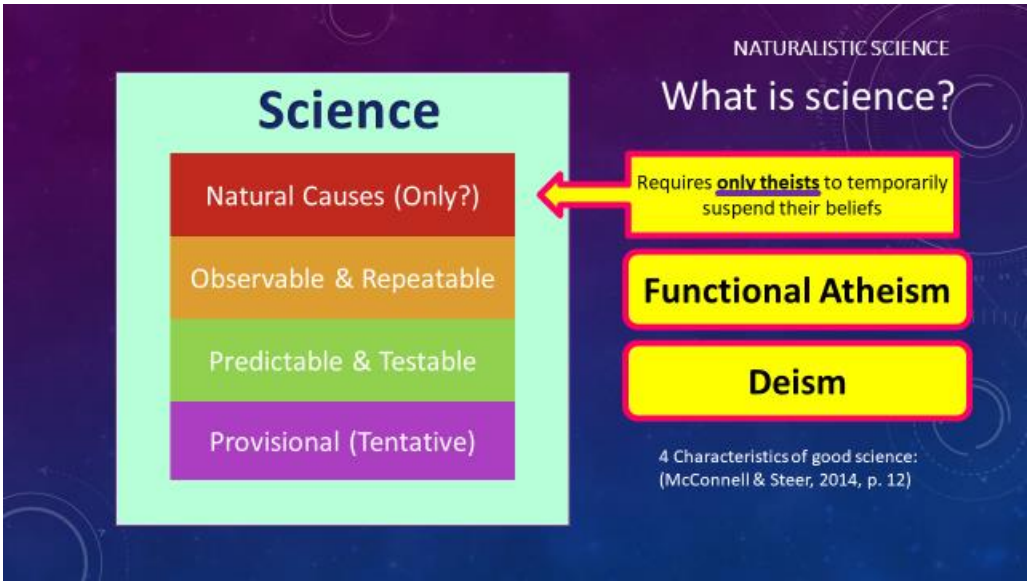
Naturalistic Science

Much has been written about what science is and what it is not. Introductory textbooks in various fields often use examples and case studies to describe what science is and how it functions. One such textbook lists four characteristics or principles of good science (McConnell & Steer, 2014, p. 12):

1. Scientific explanations are provisional (tentative) and can and do change.
2. Scientific explanations should be predictable and testable.
3. Scientific explanations are based on observations or experiments and are reproducible.
4. A valid scientific hypothesis offers a well-defined natural cause or mechanism to explain a natural event.

I completely concur with the first three points, but the final one would effectively require all scientists to act as *functional atheists*, or perhaps deists: either denying the existence of God, or banning Him from any interference in the material world. This is nothing less than a conscious decision to discount any supernatural explanation. It follows that science performed on this basis corresponds very closely to the worldview and presuppositions of the atheist, requiring only the Christian to exercise a temporary suspension of belief in looking for *only* natural causes for natural effects. This particular type of science is now widely considered the only possible approach, an idea at odds with the historical facts, since modern science was developed primarily by theists working within a Biblical worldview. For a selection of references supporting this statement, see "The Biblical Basis of Science" (Caviness, 2017).

In the following sections we will compare the practice of science based on naturalistic (and atheistic) presuppositions with that of science developed from a Biblical worldview. This comparison includes a careful consideration of the assumptions, objectives, methodology, results and implications of the two approaches, illustrated by historical examples and current trends. It is hoped that this study will allow us not only to distinguish between naturalistic and Biblically based science, but also to evaluate the past successes, current potential, and probable future performance of these approaches.



Results of Science

The easiest of these tasks is to consider the results of science. In a sense, modern civilization is a "proof by example" that science works. The huge advances in technology, medicine, and all areas of practical knowledge can, to a great degree, be credited to science. But these effects cannot be separately credited to naturalistic science or Biblically-based science.

Presuppositions of Naturalistic and Biblically based Science

Expectation of order

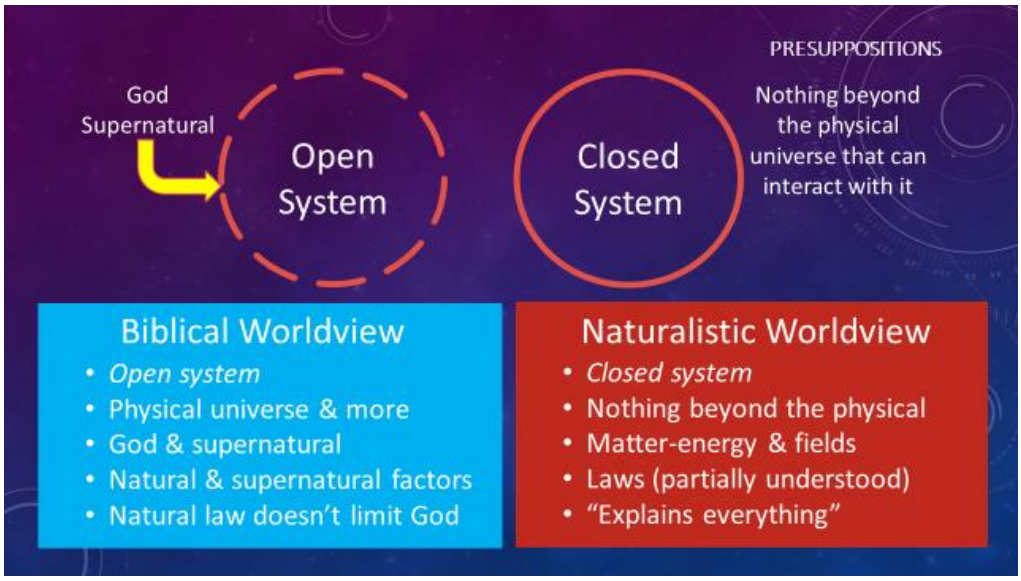
Both theistic and atheistic scientists see order in the universe. We are surrounded by repeating patterns and reproducible situations, giving credence to the view that the universe is logical and that causation is a reality. But the naturalistic worldview goes far beyond, excluding any supernatural intervention *a priori*, and insisting that natural causes are all that exist. This is not a result of science, but is a worldview-based choice to continue to seek natural causes for any natural effect: a miracle cannot be accepted and no supernatural explanation will ever be believed: it is an article of faith that eventually a natural explanation will be found. Despite the huge advances of science, mysteries abound in the universe, and all scientists are aware of the gaps in their knowledge, cases where accepted explanations are inadequate, but the naturalistic scientist has an extremely strong faith in the existence of a natural cause that will someday be discovered, a faith based on the chosen worldview.

As already mentioned, the Biblical worldview also includes an expectation of order in the universe, and consequently scientists working from this foundation also look for cause and effect in nature, but not due to any claim that the natural world is all there is. Following in the footsteps of the early scientists who saw evidence of design in nature, today's theistic scientists expect to find natural explanations for most natural phenomena, and see this as confirmation of Divine planning in the creation of the universe and its physical laws, but direct supernatural causation is not ruled out. The absence of a current explanation may merely indicate our current lack of understanding, but could also indicate supernatural intervention.

The fundamental difference here is that of a *closed system* versus an *open system*. The materialist asserts that there is nothing beyond the physical universe that can interact with it, treating the universe as a closed system comprised of matter-energy and fields, whose behavior is described by a set of laws, some of which we have been able to deduce. The theist, by definition, believes in God and the supernatural, and therefore regards the universe as an open system, whose origin, current state, and future depend on natural and supernatural factors. The so-called "laws of nature" represent natural causation and are evidence of design, but they are

descriptive and not proscriptive: they do not limit the Designer or prevent Him from direct interaction with His creation.

An additional consideration here is the *source* of the scientist's expectation of order: The Christian has a reason to expect that the universe will make sense, being the creation of an omnipotent, personal, eternal God.

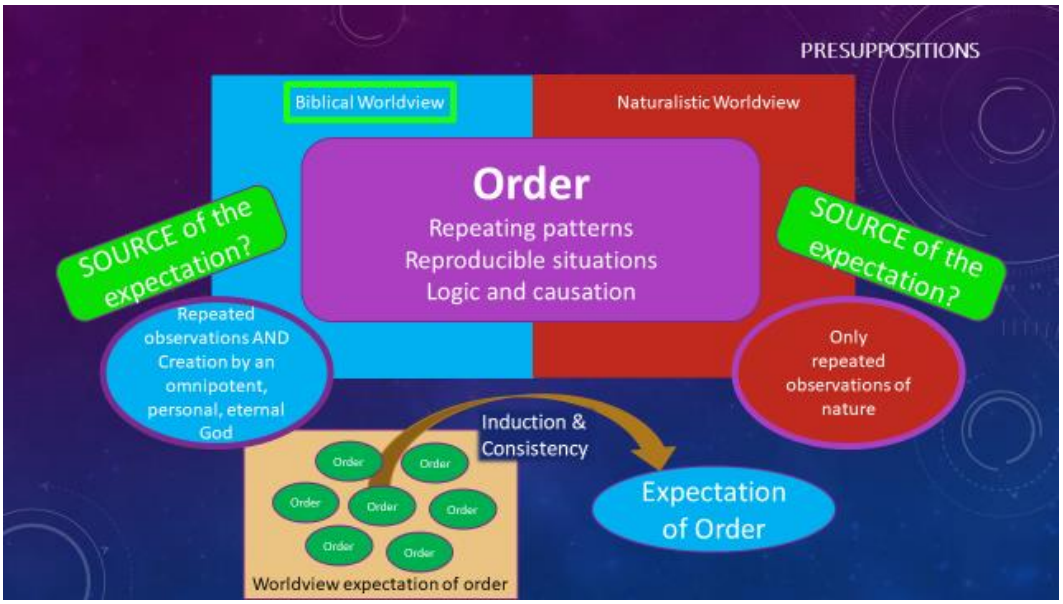


The materialist may also expect the universe to make sense, but has no reason or foundation for that expectation, other than the apparent order and repeatability observed in nature. The inductive argument certainly carries some weight, but it fundamentally resolves to the statement "things seem to work that way", or more precisely, "things have worked that way in the past, so I assume they will continue to do so in the future." The atheist is thus left with the expectation of order without any *prima facie* reason for it.

Purpose and Objectives of Science

All scientists agree that the purpose of science is to explain the universe, to figure out how things work, and then to apply that knowledge to uncover new connections and insights, ultimately leading to an ever deeper understanding of the principles guiding all things. The philosophy of materialism, however, denies the existence of anything but the physical (even when extended from matter alone to mass-energy, fields of the known forces, spacetime curvature, dark matter, dark energy, etc.). This also removes any possible meaning or purpose for the universe and indeed for human thought, which is now seen as only the electrical and chemical currents in the brain, quite unrelated to any external reality. But if the universe has no purpose and human thought need have no connection to truth about the universe, then science also becomes a meaningless and futile activity. If the materialistic worldview is consistently applied, it removes meaning from science and from everything else. This is all the more ironic, since wonder and awe are a natural part of science. Who is not moved by the elegance of a simple explanation that ties together concepts that previously seemed unrelated? Over and over throughout the history of scientific inquiry, huge leaps in our understanding have signaled to the researcher that she is on the track of a deeper comprehension of the universe and its laws. Yet to remain consistent to her presuppositions, the materialist cannot treat any of this as meaningful.

For the Christian, the picture is quite different. Scripture declares that the purpose of God's creation is to honor the Creator. In the words of the old hymn, "All Thy works shall praise Thy Name" (Heber, 1861). God provided created beings with a space-time in which to exist and limitless opportunities for discovery and joy as we study His creation. Our task is not merely to study the universe, but to see the hand of the Author in its design, and to praise and honor Him for what we learn. Awe and wonder, praise and worship, are intrinsic to true science. The materialist loses all this. As we seek to understand God's creation, we are to make use of this knowledge to honor Him, to become better stewards of this world, and to benefit others and humanity as a whole. We ourselves will also be benefited by this endeavor.



Methodology of Naturalistic and Biblically based Science

Although not every scientist is involved in every part of the process, the methodology of science as a whole can be summarized as follows:

- Make careful observations and perform experiments, where possible selectively adjusting conditions to study the resulting variation in the effects.
- Formulate testable hypotheses to explain the data, creating simple models (explanations) with predictive power, and then use the predictions to test the models.
- Link tested explanations/models to form overarching theories – coherent explanations of a set of related phenomena, which then allow further predictions, insights and ideas for further experimentation and study.
- When well-attested new data conflict with the current theory, attempt to resolve the discrepancy by (a) performing more careful experiments, (b) modifying or generalizing the theory, or (c) finding a new explanation for all currently known related phenomena.
- In case of competing theories that work equally well, invoke Occam's Razor a.k.a. the Principle of Parsimony: choose the simplest adequate explanation.

In light of this, I must agree with my friend mentioned in the introduction: all science should be done this way, although individual scientists may work only on particular parts of the process, focusing on experiment or on theory, for example. But for the theistic scientist, the Biblical worldview provides what the materialist lacks: the motivation, meaning and purpose for the enterprise. Knowledge acquired is accompanied by awe and praise to the Creator, adding a dimension to the scientific enterprise missing for the atheist. The materialist may marvel,

although probably not enough, and gains no further insights. It might be said that materialistic science is therefore incomplete, lacking not only the motivation but also the logical completing step of awe and praise.

In addition, the types of experiments and the explanations considered may differ based on the scientist's worldview. The atheist's choice of theory often reflects an almost frantic effort to avoid the implications of design visible all around us, preferring to accept ridiculous improbabilities. Some examples will be considered in the following sections, which deal with the implications of these competing worldviews in the context of the scientific enterprise.

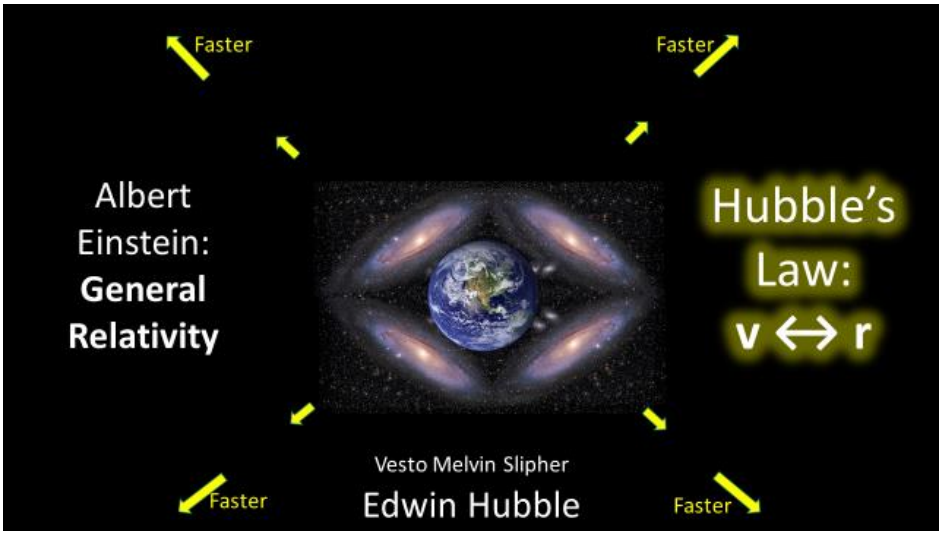
Implications of Naturalistic Science

The success of many scientific explanations and theories, taking into account only naturalistic factors, can be viewed as support for naturalistic science. This is an example of induction, a generalization that can and should be relied on in the absence of controverting evidence, but it is not proof. Much of the data currently has no satisfactory naturalistic explanation, and the expectation of finding one someday is a tenet of faith. One might argue that the supernatural is being progressively ruled out by science (the "God of the Gaps" syndrome) (Coulson, 1955, p. 20), but this assumes a strawman argument of a God who is only allowed to act outside of the laws of nature. The God who created the universe and set in place the laws of nature governing its operation is not threatened by His own laws. The Christian recognizes God's action through physical law and also acknowledges His power to bypass physical law at will. Ever more fantastic hypotheses have been proposed and ever more extravagant efforts made to avoid the evidences for design in the universe or to preserve a formal determinism. We now turn to a few of the more striking examples.

Steady-state Model vs. the Big Bang

The well-known "first cause" argument for the existence of God has a long history (Craig, 1980) with famous versions appearing in Aristotle's *Metaphysics* and St. Thomas Aquinas' *Summa Theologica*. In essence, because we now see all current events as caused by previous events, either there must have been a never-beginning chain of previous causes throughout all eternity past, or everything must ultimately depend on a first cause, usually identified as God. Given these philosophical options, atheists tended to gravitate toward the "no beginning" view because of its consistency with their intellectual commitment to uniformitarianism and a rejection of the supernatural.

The basic story of how the idea of an eternal material universe was eventually abandoned can be found in any introductory cosmology text, such as Evans (2015). When solutions to Einstein's equations of General Relativity governing the behavior of the universe on the cosmic scale were shown to fit an expanding universe, Einstein himself introduced an additional term, the cosmological constant, to allow for the existence of a stable universe that most physicists of the day believed in. But he later removed the extra term after Edwin Hubble, building on the observations of Vesto Slipher and others, developed the relationship now called Hubble's Law to describe the behavior of all but the very nearest galaxies: all are moving away at speeds proportional to their distance from us.



By the early 1950s physicists Robert Dicke, George Gamow, Ralph Alpher and Robert Herman had all speculated that if the universe were expanding, the remnants of early radiation stretched to microwave lengths should still be detectable today. In 1964 Arno Penzias and Robert Wilson made the serendipitous discovery of what is now known as the cosmic microwave background radiation, fitting the Big Bang model predictions remarkably well. However, Fred Hoyle and a generation of astronomers and astrophysicists struggled to retain the "steady state model", despite the growing body of evidence for the expanding universe and big bang model. The term "big bang" itself, coined by Hoyle, was initially derogatory and dismissive. The idea that the universe had a beginning was anathema to naturalistic scientists, who rightly judged it only a small step from conceding a beginning of the universe to being forced to consider that there must have been a Creator who began it.

The effort to save the steady state model included such remarkable grasping at straws as the idea that a small amount of spontaneous creation of matter, approximately one hydrogen atom per cubic meter every three hundred thousand years, would result in maintaining the average density of matter in the universe despite the continual expansion of space (O'Hanlon, 2016). Of course, the only impetus for this unsupported notion was to avoid accepting that the universe had a beginning. When the steady state model was finally laid to rest, another idea that gained popularity was that the current expansion of the universe might be a phase of a never-ending cycle of expansions and contractions, each cycle starting with a big bang and ending with a "big crunch". No reason for the shift to contraction could be found, and no explanation for why a rebirth (new big bang) might follow, but such was the philosophical commitment to the idea of the eternal pre-existence of mass-energy and the laws of physics – anything but a Creator God – that such unsupported speculation was viewed with great favor by naturalistic scientists. Such was the tenacity of adherents of the naturalistic worldview that this philosophical choice remained current for a half century, despite a complete lack of any evidence for a re-contraction or a model suggesting how it might happen. The whole idea has only recently been abandoned when evidence for the acceleration of the expansion of the universe came to light. Again, the underlying idea was that if some explanation could be found that did not explicitly include God, it must be the true one, a view reminiscent of Laplace's famous dictum, "I had no need of that hypothesis." ("Pierre-Simon Laplace") Somehow, an eternal universe was considered preferable to an eternal Deity who created the universe, despite a preponderance of growing evidential support for a beginning of the physical universe. Clearly this was not an unbiased, evidence-based evaluation of competing scientific theories.

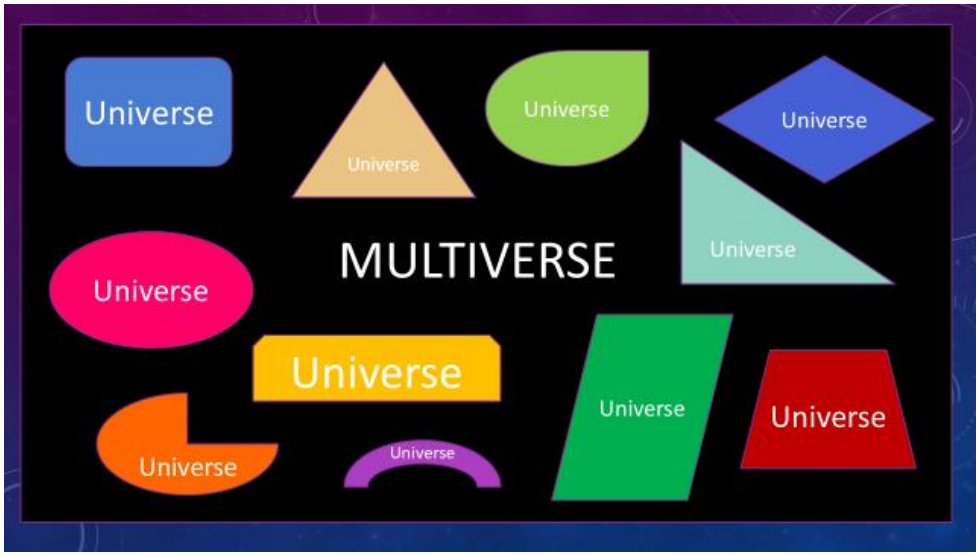
The Fine-tuning of the Universe

The Earth is truly "The Privileged Planet", as underlined in the book (Gonzalez & Richards, 2004) of that name, which explores some of the extremely sensitive factors that make life possible on Earth. Small changes in Earth's orbital distance from the sun and its distance to the moon, Earth's mass, the tilt of its axis, the composition

of its atmosphere, its average temperature and the strength of its magnetic field would all make the planet inimical to life if the variation exceeded quite small limits. Theists, and more recently, proponents of Intelligent Design, have pointed to these factors and many others as evidence that Earth was designed for life, and Christians see in this the hand of a loving and bountiful Creator God. The materialist's response is that among the billions of stars in each of the billions of galaxies in the universe, *somewhere* the conditions for life would occur as a simple matter of probabilities, and that Earth's "privileged" status is merely a cosmic accident: some planet(s) had to hit the jackpot, and it just happened to be Earth. An estimate of these probabilities depends heavily on how many factors are considered and how unlikely each is, so the argument is unlikely to be resolved to everyone's satisfaction any time soon.

However, a deeper question relates to the fine-tuning of large-scale properties of the universe and of the physical constants themselves. There are perhaps a dozen identified physical constants upon which the present state and continued existence of the entire universe depend, and even a tiny change to their actual values would make not merely human life, but the entire universe impossible. For example, if the ratios of the strengths of the four fundamental forces (strong nuclear, electromagnetic, weak nuclear, and gravitational) were varied slightly, either atoms (and all matter) could not form or would immediately collapse, stars would fail to form or would burn out in short order, galaxies would either not coalesce or would collapse to form black holes, and the universe itself would either expand too rapidly for any collections of matter to form or immediately contract back to a singularity. The existence of the universe also depends critically on other constants of nature, such as the speed of light, the ratio of proton and electron masses, the electron's charge-to-mass ratio, and related constants such as decay rates for various small nuclei and subatomic particles, and absorption cross-sections for particle interactions. In addition to fine-tuned physical parameters, there are physical properties that could theoretically take on any value, but if changed even slightly from current values would make the universe impossible or unstable. Among these are the mass-energy density of the universe, the amount of dark matter, and the almost vanishingly small (but not zero!) amount of dark energy in it. Referring to dark energy, theoretical physicist Leonard Susskind says, "The great mystery is why there is so little of it [10^{-122}]... we are just on the knife edge of existence, if dark energy were very much bigger we wouldn't be here, that's the mystery." Even a slightly larger value of dark energy would have caused space-time to expand so fast that galaxies wouldn't have formed (Ananthaswamy, 2012).

Responses to these challenging ideas have included attributing the coincidences to pure chance, to as yet unknown physical principles (Weinberg, 1999), Divine creation (Plantinga, 2007), design by aliens (Gribbin, 2010, p. 195), and (according to Stephen Hawking) quantum selection of only those past histories that allow for the present existence of the universe (Ball, 2010). But the most interesting common "explanation" highlights the incredible lengths to which the dyed-in-the-wool materialist will go to avoid the implication of design in the nature: the idea of the *multiverse*, an extension to the *weak anthropic principle*.



This states that we would not be around to observe a universe in which we could not exist. In the multiverse hypothesis, our universe is just one of an uncountable number of alternative universes, each having different values for the basic physical constants. The vast majority of these cases could not and did not result in viable universes in which galaxies could form, habitable planets orbit stars and endure long enough (whatever one might consider that to be) for intelligent life to evolve. According to multiverse proponents, we must necessarily find ourselves in one of the universes in which life is possible, because we are here, but any fine-tuning of this particular universe is not significant. It should be noted that there is no evidence for the multiverse hypothesis, and most physicists agree that there is no way to test the idea even in principle. Its only function is to avoid the logical implication of design at the fundamental level of physical law. A truly classic example of the literally unimaginable lengths – in this case, uncountable universes! – to which the materialist is willing to go to avoid admitting the existence of God. This attitude is explicitly confirmed by biologist and geneticist (and materialist) Richard Lewontin:

> Our willingness to accept scientific claims that are against common sense is the key to an understanding of the real struggle between science and the supernatural. We take the side of science in spite of the patent absurdity of some of its constructs, in spite of its failure to fulfill many of its extravagant promises of health and life, in spite of the tolerance of the scientific community for unsubstantiated just-so stories, because we have a prior commitment, a commitment to materialism. It is not that the methods and institutions of science somehow compel us to accept a material explanation of the phenomenal world, but, on the contrary, that we are forced by our a priori adherence to material causes to create an apparatus of investigation and a set of concepts that produce material explanations, no matter how counter-intuitive, no matter how mystifying to the uninitiated. Moreover, that materialism is absolute, for we cannot allow a Divine Foot in the door. The eminent Kant scholar Lewis Beck used to say that anyone who could believe in God could believe in anything. To appeal to an omnipotent deity is to allow that at any moment the regularities of nature may be ruptured, that miracles may happen. (1997)

An alternative to the multiverse hypothesis is the *multi-domain* hypothesis. In this version, our own universe has regions or domains where the laws of physics and the fundamental constants of nature are different. Again we find ourselves in a domain where life is possible, not in one of the majority where it is not. This version at least has the saving grace of not assuming untold numbers of undetectable universes, but it remains untestable, unsupported, and unmotivated, except as a ploy to avoid admitting design.

An idea suggested by Lee Smolin (1997), called the *fecund universes* hypothesis, posits that each universe can bring forth many "child universes", each starting with a big bang triggered by something in the parent

universe. He then takes the idea a step further: in some unspecified manner, the physical constants and laws of nature in the child universes are allowed to vary somewhat from those of the parent, thus introducing reproduction with mutation, effectively giving a theory of cosmic evolution – evolution of universes. We find ourselves now in a universe that evolved from a long line of progenitor universes, gradually acquiring the characteristics that, in our universe, appear to us to be "fine-tuned". For the materialist this speculation has the added attraction of reducing the big bang from a universal beginning to one of a myriad "natural" (albeit not yet explained) events, obviating the need for a Creator by assuming a never-beginning causal tree of fecund universes. Once again, the magnitude of the fine-tuning problem is underlined by the extreme lengths scientists will go to find a naturalistic explanation. The tyranny of the philosophy of naturalism should be apparent to anyone who can even momentarily distance himself from that mindset.

Interestingly enough, there is precedent for a cosmology theory being designed and largely accepted almost wholly on the basis of fine-tuning arguments. In the early 1980s Alan Guth and others proposed *inflationary* models of cosmology, in an attempt to solve the *magnetic monopole problem* (their apparent absence in our universe), the *flatness problem* (i.e., why the early universe's mass-energy density was apparently unbelievably close to the critical value required for a *flat* spacetime), and the *horizon problem* (why regions of the universe previously out of causal contact, unreachable even by light signals, turn out to have the same average temperature and mass distribution as our part of the universe). Inflationary models sidestep these problems by invoking a short period of exponential growth of the universe, before which all regions were in contact and in thermodynamic equilibrium with each other (Guth, 1997). The inflation itself is then credited with introducing vast distances between different regions, making detection of a magnetic monopole highly unlikely, and reducing space curvature in a way similar to the straightening of the surface of a balloon. Various ideas for turning on and off the inflation have been suggested, but a favorite is not an explanation at all, but an analogy to phase changes in matter: when heat is added to a solid, its properties gradually change until the sudden change at melting, and again at the boiling point. Thus it is argued that space itself might exhibit sudden behavioral changes. It is interesting to note that the majority of astrophysicists and astronomers accept inflationary cosmology, although a sizeable minority criticizes the paradigm as untestable and lacking empirical support, and point to the remaining need for fine-tuning in the pre-inflationary universe (Steinhardt, 2011). In a recent sequel to the saga, after 35 years evidence to support the inflationary scenario may have finally been found (Swidey, 2014), but the interesting point is that the majority of cosmologists felt no need to await evidence.

Clinging to Determinism

The multiverse musings are reminiscent of another speculation motivated entirely by worldview-related prejudices: the "many-worlds" interpretation of quantum physics, first proposed by Hugh Everett in 1957 (DeWitt & Graham, 1973). Classical physics models were all in principle deterministic, so all future and all past events might conceivably be predictable if the current state of the universe were sufficiently well-known (Marij, 2014). Quantum theory set limits on this predictability, first by limiting our simultaneous knowledge of canonical pairs of variables (e.g., position and momentum, time and energy) as spelled out in Heisenberg's Uncertainty Principle, but also by insisting that probabilities are more fundamental than physical variables, and an "expectation value" is the best that theory can provide to compare with experimental measurement. An extreme position, that nothing exists unless or until it is measured, came to be known as the Copenhagen interpretation, so-named for its origin at the Niels Bohr Institute in Copenhagen. Bohr himself, one of the principal architects of quantum theory, insisted on the meaninglessness of discussing the properties of any physical system between measurements, an idea popularized in the well-known dictum that "the moon doesn't exist if no-one happens to be observing it." The predictions of quantum physics are extremely precise, but only specify probabilities. It is the actual measurement that collapses the wave function (describing some superposition of possibilities) and puts the system in a well-defined state (selecting one possibility). Although philosophically disturbing to many thinkers, others welcomed quantum theory as easing the iron grip of determinism and possibly giving room for human free will. Other attempts to regain determinism in physics include the *hidden variables* championed by Einstein and later by David Bohm, which has ironically been shown to be possible only if explicitly including non-local influences, connections between events

separated in spacetime such that no signal sent by one could be received by the other. Clearly quantum physics changed our view of reality, no matter which interpretation is accepted!

The many-worlds interpretation also restores determinism, but at the price of constantly doubling and redoubling the entire universe *ad infinitum*. In this model, all possible results associated with quantum probabilities actually *do* occur, but each in a new branch of a many-branched tree, each bifurcation multiplying the entire universe. Each measurement reveals which branch I am on, but the presumption is that there is another "me" on each of the other mutually inaccessible branches whose measurements gave the other possible results allowed by quantum theory. Of course, there is no way to test the model, no way to interact with these newly-budded parallel universes, and above all, no explanation for the exponential increase in the total amount of mass-energy in the growing set of universes. Nevertheless, because the model is mathematically indistinguishable from standard quantum theory and fulfills a perceived need to return to a deterministic paradigm, it is now considered one of the mainstream interpretations of quantum physics.

Although quantum physics is the most successful and accurate theory of matter ever developed, the history of its interpretations shows the seemingly ridiculous lengths scientists will go to in an attempt to protect a facet of their worldview they deem essential. The irony is that proponents of naturalism often ridicule theists for clinging to the "god hypothesis".

Materialism, Determinism, Behaviorism

Critically, the materialistic worldview removes all meaning and purpose for science—and life, and renders our ability to understand the world around us inexplicable. Determinism as applied to individual organisms becomes behaviorism (Graham, 2016). The behaviorist believes that his behavior is determined, programmed by heredity and environment, and in the radical behaviorist model, even our "internal state", feelings and thoughts, are explained in terms of electrical currents and chemical reactions in the brain, therefore not necessarily having any connection to the correctness of the ideas themselves. Indeed, this paradoxical worldview provides no reason to rely on it, and even removes the meaning of its adherents' acceptance.

Implications of Biblically-based Science

We now turn to a consideration of the implications of the Biblical worldview as applied to doing science. As already noted, this worldview brings with it a different set of premises, although sharing much of the methodology of naturalistic science. The differences, however, are fundamental and have far-reaching implications.

An Ordered Universe and the Success of Science

For the scientist who accepts the possibility of Divine revelation and the reality of God's self-revelation in the Bible, the success of science, including our own ability to understand the universe, is <u>expected</u>. This is the first and fundamental implication of Biblically-based science; indeed, this expectation played a significant role in the development of modern science (Schaeffer, 1968, p. 41). Nature is viewed as the creation of a single, omniscient, omnipotent Deity, and because of Divine design of the universe, simple, coherent and consistent explanations of the universe can reasonably be expected. Because of Divine design of humanity, it can also reasonably be expected that humans will be able to understand at least some of what we observe of His creation.

Fine-tuning by Design

The theist sees the negligible probability that the universe could have "just happened" to have the precise conditions to permit life as evidence of Divine design. There is no need to invent ever more fanciful, empirically unmotivated hypotheses to explain away the "apparent design" in the physical universe and in the underlying laws of nature: it looks designed because it was designed. The theist also recognizes that God could choose to reveal Himself in His design and in special revelation to humans, although finite creatures' ability to understand is necessarily limited.

Miracles and the Open System Hypothesis

The theist credits the original creation of the universe to God, and recognizes the order and general patterns of cause and effect in the way nature usually behaves, but admits that God Himself is not limited by natural law: He can work within it or may choose to overrule it. The Christian accepts the Bible as Divine revelation and therefore true. A Biblical worldview includes taking this belief seriously, recognizing in the Bible a record of God's interactions with humans, including cases when He occasionally overrode physical law: miracles. The claim quoted previously, "that anyone who could believe in God could believe in anything" (Lewontin, 1997), is simply not true. The Christian's view of the universe, as reflected in how she performs science, comprises both the expectation of order – including a reason for that expectation – and the recognition of God's discretionary ability to intervene. There need be no frantic effort to protect the sacred cow of naturalism, since according to the Biblical worldview the universe is an open system. Christian apologist C.S. Lewis explains this with an analogy: "Suppose you put sixpence into a drawer today, and sixpence into the same drawer tomorrow…. The laws of arithmetic can tell you what you'll find [12 pence], with absolute certainty, provided that there's no interference. If a thief has been at the drawer of course you'll get a different result. But the thief won't have broken the laws of arithmetic -- only the laws of England." (1970, pp.67-68). The laws of arithmetic describe how numbers function, but they cannot prevent outside intervention: the action of thief is not prevented by the laws of arithmetic. The laws of nature describe regular patterns visible in the universe, but they do not prevent God's intervention in the universe. Confusion only results from the mistaken assumption that my desk drawer and the universe are closed systems. To use another analogy, the Divine artist cannot Himself be bound by the constraints governing His "painting".

The Christian performing science based on the Biblical worldview tries to explain the patterns in nature, to carefully "reason from cause to effect" (White, 2008, p. 53), but will not waste too much time attempting to find a natural cause for individual apparently unexplainable occurrences, keeping an open mind on whether it is one data point in a larger pattern that will eventually become apparent, or will remain unexplainable within the system.

Overlooked Data and Unconsidered Answers

Just as the possibility that the universe is an open system is dismissed by materialists on philosophical rather than scientific grounds, anti-Biblical preconceptions can lead to overlooking logical and consistent explanations of the data or even the data itself, which lie in what might be termed an intellectual blind spot. One such example is found in the geology of the Yellowstone layered fossil forests, each of which were assumed by geologists to have successively formed, died and been buried, followed by the growth of a new forest on top of the previous one. This is a process that would undoubtedly require long periods of time under today's conditions. It was left to scientists operating within the Christian worldview to (1) consider possible alternative short-age explanations for the data, and (2) observe the data more carefully, leading to the discovery of evidence that the trees most likely grew elsewhere and were transported by water to their current location, where the layers were deposited in rapid succession (Chadwick & Yamamoto, 1984). Further investigation has upheld this previously overlooked explanation (Brand, 2015). On the large geologic scale, the amazingly high degree of uniformity of strata, a most unlikely situation if each layer were exposed to surface conditions for long eons, is normally not noticed or remarked upon, perhaps because it fits too well with a flood scenario, and thus automatically discounted by those who assume the Bible to be myth. It is difficult to see how such a widespread situation could occur unless strata formation took place under water in a short time period.

Anomalous examples are by no means limited to geology, but occur in genetics, biology, ornithology, and other fields (Brand, 2015). We repeatedly see that *not* ruling out the Biblical account may well provide the researcher a broader perspective that facilitates doing science. The elimination of all open-system explanations involving non-materialistic factors is an artificial limitation not justified by science, but imposed upon science by a materialistic philosophy. Abandoning this presupposition frees science, returning it to the vision of its founders, who saw the order in nature, not as proof that the supernatural does not exist, but as the result of divine planning.

Incomplete Knowledge, the Onion Effect and an Eternity of Learning

As finite creatures, we should take seriously the possibility that we will never completely understand the universe, nor successfully construct a "theory of everything." Let us put aside our hubris, our expectation that we will soon develop a "final theory", and instead embrace the joy of the unfolding discovery. The creation of the infinite and eternal God may itself be infinite or finite, but even if finite in extent, it may contain features that continue to challenge and interest us throughout eternity to come.

But this is not simply learning additional details. As Christians, we are not surprised by the "onion effect", i.e., that underneath one level of understanding there may be another, deeper level, a more accurate and more general explanation for the phenomena under consideration, resting on completely different assumptions about the nature of reality. A universe carefully crafted by the infinite, personal, loving God can easily have infinite "layers", with consistent and significant behavior at all levels. In marked contrast to claims that a "theory of everything" is just around the corner, were we to hazard a generalization based on the history of scientific discovery, it would be that there *always* will be more to learn, and there will *forever* be new realms to study.

For those who accept Christ's offer of salvation and eternal life, the prospect of eternity ensures that our study of the wonders of God's creation will not be limited to the paltry few decades of our earthly existence, but will quite literally never end. Ellen White describes this as

> an education that is as high as heaven and as broad as the universe; an education that cannot be completed in this life, but that will be continued in the life to come; an education that secures to the successful student his passport from the preparatory school of earth to the higher grade, the school above (White, 1952, p. 19).

With this perspective in mind, our current knowledge should be accompanied by a healthy dose of humility: we almost certainly have only scratched the surface of any subject we study.

Awe and Praise

For the Christian practicing science, both the miraculous and the beauty, order and pattern of the natural world provoke a response of wonder, awe and heartfelt praise. This natural progression is expressed by the psalmist: "I will meditate on your wonderful works. … All your works praise you, Lord; your faithful people extol you" (Psalm 145:5,10).

True Science

When based on the Biblical worldview, science sheds its materialistic blinders and can admit that the natural world is not all there is. Science then also regains its internal consistency, its meaning and purpose, and becomes *true science*. In the words of Ellen White,

> All true science is but an interpretation of the handwriting of God in the material world. Science brings from her research only fresh evidences of the wisdom and power of God. Rightly understood, both the book of nature and the written word make us acquainted with God by teaching us something of the wise and beneficent laws through which he works (1968, p. 66).

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