

# The Apologetic Argument

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*Where do we start when arguing for the existence of God? Is there a proper order of topics in the discussion? This paper draws together many of the varied threads of evidential apologetics into a single argument in the form of a debate between an atheist and a Christian. I argue that our belief in God starts with the direct perception of His being, and that further evidences come in to play primarily as responses to atheist attacks on the validity of that sense of God's existence. This argument ends up in several issues of quantum mechanics and cosmology presently at the forefront of scientific research.*

# 1 Introduction

The question of the existence of God is the primary question of human existence. All other deep questions revolve around this one. The questions of ethics and government come down to, “Is there a God who has given eternal moral laws, or not?” The question of the meaning of life comes down to, “Is there a God who cares about what I do and say?” The question of freedom comes down to, “Is the thing that fundamentally controls everything in the universe friendly to me, or unaware of me?”

In this question, the believer who argues in favor of the existence of God expresses an “apologetic.” No Christian is free to ignore the topic of apologetics, who wants to follow the command of Peter, “Always be ready to give an answer to everyone who asks you to give the reason for the hope that you have.” (1 Pt 3:15) Of course, Christians often disagree about *how* we should give that reason.

I have previously [1, 2] outlined the basis of an *evidential* apologetic. In essence, in that work I simply argued that the critiques which reject evidential reasoning because it does not provide absolute, axiomatic certainty do not hold up, because the idea of absolute certainty is nonsense. Any use of language automatically requires some vagueness. Nevertheless, we can become “very” certain of things via empirical reasoning.

Much evidential apologetic, however, seems unsatisfactory because the discussion focuses too narrowly on certain issues. One can get the false impression that those issues are *the* issues of apologetics, and that resolving them will prove the existence of God. For example, much apologetic discussion has revolved around the evidence for design in the universe. While this evidence does hold a crucial place in the apologetic discourse, nevertheless, apologetics does not start and does not end with the argument for design!

In this essay, I wish to make a case for the proper *order* of topics of discussion in the apologetic argument. Science enters naturally into this discussion, but science is only part of the discussion.

I see the philosophical discussion of the past two centuries as very much taking the form of a debate. At times, one side has scored points, and then the other side has responded. Although this to and fro has not occurred strictly in sequence, I will cast the discussion here in terms of a debate.

## 2 The Starting Point: Perception

What is the starting point of the debate? To put it another way, what is our common ground? In order to have a debate, there must be agreement about *something*. We simply

cannot have a debate if there is *nothing* both sides agree on!

On this question I find near-universal agreement in the Bible, the historical writings and creeds of the Reformers (e.g., the Westminster Confession), and common sense and experience. We believe in God because we *perceive* God directly.

From the Bible:

“The heavens declare the glory of God, the skies proclaim the work of His hands..There is no speech or language where their voice is not heard.” (Psalm 19:1,3)

“For since the creation of the world God’s invisible qualities– his eternal power and divine nature– have been clearly seen being understood from what has been made, so that men are without excuse.” (Romans 1:20)

“His sheep follow him because they know his voice.” (John 10:4)

From the Westminster Confession:

“We may be moved and induced by the testimony of the Church to an high and reverend esteem of the holy Scripture,... yet notwithstanding, our full persuasion and assurance of the infallible truth, and the divine authority thereof, is from the inward work of the Holy Spirit, bearing witness by and with the word in our hearts.” (I.5)

Our sense of justice demands that this be true as well. If knowledge of God is not universal, then how could God condemn people for rebelling against someone they never knew? Yet God claims, in the Bible, to be the judge of all humanity (e.g. Romans 1:19). Suppose, for instance, that knowledge of God depended on a *deduction* based on abstract philosophical reasoning. Then only intelligent people could believe in God. Dumb people would all stand condemned! Alternatively, suppose that belief in God depended on a *choice*. Then if someone did not happen to make that choice, they could claim, legitimately, that they had no knowledge of God! [3]

This argument for perception on the basis of justice is crucial because the debate about God is primarily about whether there is a God who is the universal *Judge*. One can imagine all kinds of other gods who hide themselves and whom most people can not perceive, but one can not demand universal ethical absolutes from such gods. If I can not perceive the lawgiver, I can not be held accountable to his law. Paul implicitly recognizes this in his opening treatise in chapter 1 of the letter to the Romans. No one feels threatened by remote, clockmaker gods. People rebel when we tell them our God demands that they obey Him!

A “perception” in this context is any knowledge which is written directly into our consciousness (by God, but we may not think so) without our fabrication. Perception therefore includes not only our five “external” senses but also our “internal” feelings, such as guilt, fear and love [4]. It does *not* include propositional statements of language, nor theories and ideas from our imagination. (As discussed earlier [2, 5], all languages are theories, i.e., simplifications which have their source in our imagination.) Francis Schaeffer’s analogy [6] holds here: we are like travelers lost in the Swiss Alps. We hear a voice in the dark saying, “I can help you if you do as I tell you.” We do not know where the voice comes from, in any absolute sense. We must merely decide how to act in response to it. To do so, we must formulate a theory about the source of the voice. We may change that theory, but we cannot change the fact that we have heard a voice.

Christian presuppositionalists such as Cornelius Van Til [7] and John Frame [8] seem to make the same point, although they get things a bit muddled. They insist, correctly, that God must be the starting point, that we do not “deduce” our way to God from abstract principles, but rather, we “know” God already. If we deny that knowledge, it is because we hate God and His laws, so that we tune Him out, in which case we are not approaching the argument “neutrally.” The presuppositionalists muddle things, however, by referring to this prior knowledge of God as a “presupposition,” i.e., a proposition formulated in a language. They then wish to justify sense experience as a logical deduction from this proposition [9]. As I have previously discussed, however, a language relies on prior sense-experience [10]. Words in a language come from repeated association of sense experiences. With no sense experience to attach to the words, a proposition like “God exists” becomes empty sounds in the air. Therefore we must trust our sense experience before we can trust any proposition of language. “Justifying” our sense experience on the basis of logical deduction from a presupposition is not necessary. As Jonathan Edwards said, we trust our perceptions because we must. We have no other source of knowledge.

What exactly do we mean, when we say that we perceive God? Do we mean that from birth we understand the intricacies of the theology of a triune, omnipresent, omnipotent, self-existent, infinite, holy God? Not quite! I think that for most people the perception of God is found in our ascribing meaning to words like “beauty,” “justice,” “guilt,” and “design” [11]. When we use such words we mean that these things exist in the real world, independent of ourselves. We feel that a thing possesses beauty, not merely that it provokes beauty-thoughts in us.

This, then, is the “common ground” and the source of the debate with the nonbeliever. We agree that such perceptions exist. The believer says that such things are *intrinsic* to the universe, that they are basic to the fabric of the universe, independent of us, while the unbeliever says that they are illusions, things projected forth from ourselves, that the

universe knows nothing of these things apart from us. In other words, the believer says that the universe reflects a *personal* touch, while the unbeliever says it is *impersonal*. To the believer, all these things which we uniquely appreciate as persons do not have us as their *source*, but rather as their *receptacle*. In C.S. Lewis' terms [12], the believer says that the Absolute of the universe is *higher* than us (having greater personality,) while the unbeliever says in effect that it is *less* than us (having less personality.)

Almost all believers I know talk of coming to faith because they “knew in their hearts” that God was there. Few believers are familiar with axiomatic deductions *or* with axiomatic presuppositions! Their confidence is the confidence of perception. In the same way, you are confident that the chair on which you are sitting exists. You need no axiomatic arguments, nor would they do any good— you simply feel the chair. The person with faith in God has the same kind of rest.

Why should we go any further, then? Can we not be satisfied with perception and forget about apologetic arguments? We must go further because the issue is pressed on us by others. Let us go back to the chair on which you are sitting, which you think really exists. A person comes into the room and begins to make very persuasive arguments that the chair is not, in fact, real. Then one of two things must be true. Either (1) the you are seriously deluded and, in addition, in danger of falling on the floor, or (2) the person denying the existence of the chair is a poor fool who deserves pity. Both of these possibilities deserve some attention. If you are confident that (1) is not true, you must still feel some compassion for the poor deluded fool in the case of (2).

As John Frame [13] has noted, you would not adopt the “presuppositions” (beliefs) of the fool in trying to help him. Frame might want to appeal to axiomatic Christian presuppositions, but a more normal approach would be to appeal to the “common ground” between us: sense perception [14]. An appeal to axiomatic logic (e.g. presuppositions) would not help. What might help would be a jaunt around the room, including an attempt to walk through the supposedly imaginary chair. The person might deny perceiving the chair, but he could not walk through it. His reactions would force reality on him. Even if this did not change his delusion, at least the perception of his reaction would provide a healthy safecheck for *you* that (1) is not true.

On the other hand, if we did *not* perceive God, then apologetic argument would be of little use. Suppose a person tried to persuade you of the existence of an imperceptible, invisible chair, one which people can walk through and which they cannot sit on. What difference would it make? The argument might be self consistent, but without any perception of the chair it would mean little. In other words, it would violate Occam's razor [15].

Since this essay will make repeated use of Occam's razor, let me restate this principle here. Occam's razor is one of the most powerful tools of inductive reasoning. In modern

formulation, this principle says that given two theories about something, if one requires a substantially greater number of imperceptible entities, it is less likely to be true. Note that *all* theories require *some* imaginary, or imperceptible, entities. In order to simplify the vast and complex world of our perception, we must imagine some imperceptible connection between different things we perceive. Thus we may postulate a causal relationship, or composition from the same kind of elementary particles, or some other unifying relationship. This process of hypothesizing imperceptible entities is essential for the scientific method. But our experience leads us to expect that when someone multiplies imperceptible entities *endlessly*, that person likely has a particular goal in mind that no amount of experience will overturn— theory will be ever altered to conform the facts to the preconceived goal.

We would misuse Occam’s razor, however, if we said that we should prefer all simple theories to complex ones. Certain forms of astrology may be simpler than modern general relativity, and the theory of five elements— air, water, fire, earth, and ether— seems far simpler than the modern periodic table! These “oversimplified” theories actually violate Occam’s razor, however, because they require us to ignore vast amounts of observational data. Whenever a new experiment violates the “simple” rules of the theory, the “simple” theory requires us to make an “exception.” Such an exception is, in effect, a hypothesis of some new, unknown entity that allows this particular data to violate the “simple” rules. The modern theories of astronomy and the periodic table historically grew out of old theories of astrology and alchemy for this very reason. Too many observations failed to find explanation in those simple schemes, so that the list of exceptions became an endless list of inexplicable entities.

The debate between the believer and the unbeliever essentially becomes a debate about who makes a greater violation of Occam’s razor. The unbeliever argues that the idea of God is an unnecessary hypothesis of an imperceptible entity. The believer returns that, on the contrary, the unbeliever must “explain away” too much experience.

Christian theology may sometimes seem complex and full of imperceptible entities. As I have argued previously [1, 2], however, theology acts as a theory to explain spiritual “data” in the same way that physical theories explain physical data. We do not expect to directly perceive things like infinity and tri-unity any more than we expect to directly perceive relativistic field equations and hyper-dimensional symmetries. Yet just as physical theories attempt to explain real experiments, so theology is tied to real experience. This experience of God does not consist of esoteric subtleties, but of the things that scream out at all of us— beauty, guilt, justice, design, etc., and the power of the Bible itself [16]. The Christian argues that the theology of God is the *simplest* way to understand all these things. As C.S. Lewis said [12]

“Theology is in a sense experimental knowledge. It is the simple religions that are the made-up ones.... If Christianity was something we were making up, of course we could make it easier. But it is not. We cannot compete, in simplicity, with people who are inventing religions. How could we? We are dealing with Fact. Of course anyone can be simple if he has no facts to bother about.”

### 3 The Counter Argument: Self-Deception

The unbeliever must have an explanation for these “religious” perceptions. Even if the unbeliever denies perceiving such things himself, no one can deny that some people perceive such things. The existence of blind people, or people who keep their eyes shut tight, does not remove the need to discuss the existence of light. People with sight can describe their perceptions, communicating them to the blind person via the available senses, e.g., by talking. Unless a person has no external senses at all, and therefore no communication, that person must deal with the evidence of sense perceptions by others.

The most successful explanation by the atheist for religious perceptions came in the last century from scholars like Freud, Marx, and Feuerbach, but atheists in previous centuries used this argument as well. These men, and many after them, pointed out that our perceptions are inextricably tied to human *needs*, both physical and social. For humanity to survive, people must procreate, and in order to procreate, they must have a desire to do so. For humans that desire often takes the form of seeing beauty. If we all looked disgusting to each other, the human race would cease to procreate and would die off. In the same way, for society to survive, it must have limits on individual behavior. If people felt no guilt, honor, or shame, then society could not enforce its rules, and society would cease to exist. Furthermore, it is possible for people to manipulate these feelings for personal ends. Rich people can use religion as an “opiate” of the masses. Men can use love to manipulate women; parents can use shame to manipulate their children.

This argument gains strength by comparison with animals. They, too, have needs and senses that match those needs. People appear more complicated, but not completely different.

The Christian does not deny any of these physical, psychological or social needs. In the economy of God, people tend to feel good about things that are good for them, either as individuals or as a society. If God had not set things up this way, we would indeed have a short existence on this planet! Human society would not remain stable for even a few years. The Christian also does not deny the existence of manipulation. Because of sin, sometimes those perceptions become warped and we perceive things as good which are actually bad, or

things as shameful which are actually honorable. Evil people can deceive us— no one denies Marx’ charge that rich people have used religion as an “opiate” for their own ends. Yet, as Calvin responded [17] to similar teachings in his day,

“It is utterly in vain for some men to say that religion was invented by the subtlety and craft of a few to hold the simple folk in thrall by this device and that those very persons who originated the worship of God for others did not in the least believe that any God existed. I confess, indeed, that in order to hold men’s minds in subjection, clever men have devised very many things in religion by which to inspire the common folk with reverence and to strike them with terror. But they would never have achieved this if men’s minds had not already been imbued with a firm conviction toward God, from which the inclination of religion springs as a seed.”

In other words, all of the manipulation and wish fulfilment has an explanation in the Christian world view. In fact, the Christian world view even has a good explanation for the existence of atheists [18]. This doesn’t settle the issue, however. Occam’s razor comes back into play. If all our perceptions of God, honor, shame, etc. are explained *simply* by psychological need, then why postulate God? This is a strong argument. How can I tell the difference between perceptions of properties which are inherent in something outside of me, and perceptions which are really false projections of my own internal need? Since every act of perception involves both a source and an observer, I cannot decouple my perceptions from myself, to see the “real universe” apart from my needs and desires.

## 4 Response: The Complexity of the Self

The Christian addresses this problem by noting that it ignores a larger question. Given the existence of humans they way they are, the atheist can perhaps easily find a way to attribute all of our deep, religious perceptions to internal, psychological needs. But whence such complicated things as people, that can project such sublime feelings onto the impersonal universe? As pointed out by C.S. Lewis, if all these perceptions by persons come from properties found entirely within themselves, then does that not make humans *superior* to everything else in the universe? How could an essentially impersonal universe generate humans which see personality in it?

It is difficult to express in exact terms this “superiority” of humans to everything else. As far back as Augustine, scholars have “ranked” various creations and creatures, putting humans at the top. Is this mere self-centered pride?

Our “common sense” tells us that something must be unique about humans in order for them to have such subtle thoughts. Several modern scholars have made the argument more precise. Roger Penrose [19], building on Göedel’s revolutionary theorem [20], has shown that human thought can not be reduced to any computational process, and therefore he has argued that it can not be reduced to any known physical process. We can “understand” things that no computer ever will. In fact, the concept of “understanding” is extremely subtle and a unique attribute of humans.

Walker Percy [21], using modern language theory, has illustrated how humans react differently from everything else in the universe. Rather than responding to stimuli, we respond to *symbols* of the stimuli, which we ourselves have generated. This ability to create fictions in our minds gives us both the ability to create literature and the ability to lie. This ability forms the basis of language, which lumps the universe into vague categories and therefore makes absolute certainty of anything impossible.

Both Penrose’s and Percy’s arguments center around exactly those properties of humans which allow them to conceive of things like “beauty,” “guilt,” “justice,” “design,” etc. These kinds of perceptions deal not with the direct stimuli from objects, but with estimations of the overall nature of systems. This systematic, “big picture” perception is difficult to reduce to mathematical terms, but no one can deny its existence.

On basic philosophical grounds, then, the Christian argues that personality certainly exists, in us, and that it is inconceivable for a fundamentally impersonal universe to spawn personality. Finding the same attributes of language, etc., to some degree in animals would not affect this argument. Instead of only one fantastically complex and subtle creature, perhaps we find several!

## 5 Counter-Argument: Chance Evolution

The atheist response is well known, going generally under the name of “evolution.” The argument is as follows: in an infinite, infinitely varied, but essentially impersonal universe, all manner of improbable things will occur, including the existence of very subtle and complicated people. The picture is frequently given of millions of monkeys typing randomly at typewriters for millions of years. Given enough time, the laws of probability say that eventually one of them will generate all of the works of Shakespeare. Not only that, but in an infinite time span, they would generate all the works of Shakespeare an infinite number of times!

This argument is essentially correct in its treatment of probability. It is certainly true that many things happen that seem magical, yet which follow directly from simple laws

of chance. I and three of my friends may accidentally meet in a shopping mall after not seeing each other for years. Should we conclude the meeting was the result of some unseen, purposeful cause? No. This is known as “statistical clumping,” or the “nonpareil” effect. You can see this at home. Put two different kinds of small candies (“nonpareils”) in a jar, and mix them up. You will not see an even mix of candies throughout the jar. Instead, you will see “clumps” of one kind of candy or the other in different places, no matter how much you mix the candy.

In another example, suppose you throw a single six-sided die repeatedly. If you threw it just a few times, you would be surprised if it came up “one” five times in a row. If you continued throwing it for hours, however, it would become *probable* to see five “ones” in a row. Not only that, but if you continued for an *infinite* time, there is *no limit* on the number of “ones” that you might see in a row. You could easily see runs of 100 “ones,” 1000 “ones”—if you sat around throwing dice for years!

Note that this argument assumes that *the range of possibilities spans the set of desired outcomes*. It is useless to ask the probability of getting a run of ones, if the dice are labeled “two” through “seven”! Or, in the previous example, if the millions of monkeys all sit at typewriters that do not have the letter “e,” no matter how long they type they will not reproduce Shakespeare!

Why belabor this obvious point? The reason is that, as R.C. Sproul has emphasized [22], randomness is not a causal force, but merely another word for ignorance of causes. What the atheist really says, in the above argument based on probability, is that many uncorrelated, simple causes can lead to arbitrarily complex coincidences. This is true, but it leaves out an important consideration, which is that the “system” must be constructed properly to allow the right kind of coincidences. A “randomly” constructed system will not necessarily allow the kind of coincidences we want to see.

For instance, in an example often used today, it is possible to write computer programs that generate “cellular automata” which reproduce themselves, mutate, and show numerous other characteristics of evolving life, using simple equations. What often remains unstated, however, is the fact that these programs themselves are the products of intricate design. Not all simple equations generate cellular automata. Not even a significant fraction do—most equations generate boring solutions. Without instruction based on previous decades of mathematical research by thousands of brilliant mathematicians, few of us could write a computer program to generate cellular automata. The computer itself must also possess a high level of design. Getting equations to generate the brilliant graphics displayed in these programs requires a complicated code of thousands of lines. “Random” generation of computer code would hardly ever produce cellular automata.

Since the atheist aims to show that intelligent life could arise without prior purpose or

design, the evidence must therefore support *both* of the following contentions: (1) that there is no connection between the construction of the system and the existence of persons (the system is “impersonal”), and (2) that, nevertheless, random correlations in the system have led to the complex patterns of life. In terms of the statistical arguments above, this means that (1) the range of possibilities in the system includes the desired outcome but is not specially related to it (the dice are not “loaded”), and (2) adequate time has passed for the full range of possibilities to be spanned in actuality (there have been enough throws of the dice.)

The atheist therefore needs no explanation for the existence of life, and for the existence of humans with subtle feelings, as long as, (1) life can be shown to involve only natural processes consistent with impersonal, simple laws, and (2) the universe can be shown to have existed long enough for these laws to actually make intelligent life probable by coincidence. Few people doubt the first premise these days, because of the great success of modern science in showing that all kinds of biological processes obey known physical laws. As Penrose [19] and Demski [23] have argued, however, it is far from proven that brains follow known physical law [24]. A more serious challenge, addressed below, is to what degree known physical laws can be viewed as simple and impersonal and unrelated to life. From the time of Newton, physical laws have been assumed to have utterly simple form, but as discussed below, many hidden complexities are swept into the values of the physical constants that appear in these laws.

In regard to the second premise, the age of the universe of billions and billions of years, indicated by numerous astronomical measurements, has long been assumed adequate for life to evolve not only the earth but on countless other planets as well.

In the first half of this century, therefore, the atheist argument of evolution based on probability nearly destroyed Christian philosophy. Almost all Christian theologians accepted the above premises, which imply that belief in God fails in inductive argument because it violates Occam’s razor. In response, three Christian schools arose, all of which jettisoned inductive argument and with it, argument on the basis of evidence [25]. The “neo-orthodox” school, represented by Karl Barth, conceded that evolution made belief in God dispensable, but argued for belief in God on the basis of a personal value choice. The “presuppositionalist” school, led by Cornelius van Til, maintained orthodoxy as an axiomatic assumption not open to argument, holding out for a complete reinterpretation of science; the “fundamentalists” held to the Bible axiomatically and rejected science altogether. While these schools differed radically in many ways, they all accepted the idea that the atheist could *consistently* reject God in a scientific world view, that nothing rationally “compells” a person to belief. In contrast, previous Christian thinkers had held that the atheist must “turn a blind eye” toward certain things, i.e., that the *atheist* violates Occam’s razor. Only a few scholars like

C.S. Lewis [12] and E.J. Carnell [26] maintained an evidential approach, mostly concentrating on the larger philosophical issues and ignoring the details of evolution.

## 6 Response: Probability in a Finite Universe

The best Christian response amounts to saying, essentially, “Okay, let’s roll up our sleeves and calculate the probabilities.” [27] Using the non-Christian model of evolution, do the numbers work out to make life probable? It is important here to recognize that this approach does not imply acceptance of the non-Christian model, either in its age of the universe or in its definition of natural law. On the contrary, the purpose for working within the non-Christian evolutionary model is to determine whether it is consistent with experimental and observational evidence and is self consistent. As with any theory, one of the strongest means of refutation is to show that a self contradiction arises while working entirely within the framework of the theory.

Many Christians have shied away from the Big Bang theory because they have assumed that the billions of years involved would provide ample time for chance evolution to produce life. By and large, Christian philosophers have missed the tremendous import of the paradigm shift involved in the Big Bang theory, which requires acceptance of a *finite universe*. As Hugh Ross [28] and others have pointed out, atheists historically have opposed the idea of a finite universe; the Big Bang theory, which implies a universe bounded both in age and extent, received acceptance in this century only after the weight of evidence overwhelmed years of philosophical opposition. In an infinite universe, the second criterion for the probability argument, above, is manifestly satisfied. As soon as the universe becomes finite, the probability for life is no longer automatically satisfied, and can, in principle, be very small.

Although the details of astrophysics provided the impetus for this paradigm shift in atheist philosophy, strong proofs of the finiteness of the universe are available for all to see. These typically were expressed as “paradoxes” prior to the formulation of the Big Bang theory, since they find their resolution only in the finite-universe model of the Big Bang.

The first is Olber’s paradox, or, “Why is the night sky dark?” Simple geometrical considerations, plus the assumption of the conservation of energy, show that if the universe were infinitely large and infinitely old, then the night sky would glow with the intensity of the surface of the sun [29, 30]. Although the intensity of stars very far away falls as the square of the distance, the *number* of stars *increases* as the square of the distance. Thus, on average, stars at all distances contribute the same amount of light to the sky. Therefore in an infinite universe, the infinite number of stars remotely far away would contribute an

infinite amount of light to the sky. Although various scholars attempted solutions through the years [31], the only satisfactory solution came with the Big Bang theory, which says that there are not an infinite number of stars, and furthermore, that the light from very remote stars has not had time to get here, since the universe has finite age.

A second indication of the finiteness of the universe is the paradox of the Arrow of Time [32, 33], or “why does time only run forward and not backward?” Aquinas touched on this paradox with his argument from Change. The assumption of the conservation of energy implies that the laws of motion must run equally well backwards as forwards. Why then do we experience time running only one direction? The answer comes from the Second Law of Thermodynamics, which states the entropy always increases. The Second Law, in turn, follows directly from the fact that the universe is not in equilibrium, but is expanding. In a static, random universe, a highly ordered state (which could occur due to “statistical clumping”) will evolve *toward* a disordered state, but it will also necessarily evolve *from* a disordered state, if the laws of motion are time reversible. In other words, nothing should ever change, on average. In order to have a *continuous* increase of entropy, the universe must have had an overall entropy minimum at some time in the past, i.e., a beginning.

Both these arguments rely on the assumption of the conservation of energy. This could be doubted, but this would amount to doubting the entire structure of all modern science. Occam’s razor comes in to play once again!

Given ample evidence of the finiteness of the universe, one can attempt to calculate the probability of life based on known processes. This “probability of life” involves several different arenas. First, one can ask how intelligent life could evolve from primordial bacteria or other simple life forms (“biological evolution”). Second, one can ask how celled life forms could arise from DNA and other complex chemicals (“abiogenesis.”) Third, once can ask how DNA and other complex chemicals necessary for life could arise from simple chemicals (“chemical evolution.”) Fourth, once can ask how the simple chemicals came to exist, i.e. how stars and planets formed (“stellar evolution.”) Fifth, once can ask how the universe came to have the energy and matter characteristics necessary for stars and planets (“cosmology.”)

It is beyond the scope of this essay to review all of the work on these topics. Instead, it suffices to say that (1) that there is growing perception among non-Christian scientists of a “crisis” in the probability arguments, and (2) these calculations ought to be taken seriously by Christian apologists.

Although the view that life appeared spontaneously in primordial pools of slime still appears in many textbooks, recent data on the early-earth environment gives a picture of a much more hostile climate than still pools. The experiments of Stanley Miller are largely discredited as unrealistic [34]. Chemical evolution is presently questioned to such a degree by both Christian and non-Christian biologists (see, e.g., [35, 36]), that “panspermia,” the idea

that previously-evolved spores fell to earth from outer space, now merits serious attention [34]. In the area of stellar evolution, despite the stories in textbooks of clouds collapsing into stars via gravitational attraction, there is still no satisfactory picture of star formation. Although the inward force of gravitational attraction increases as  $1/r^2$ , conservation of angular momentum implies that the outward centrifugal force increases as  $1/r^3$ , so that stars can never form unless some exotic mechanism carries away angular momentum [37]. In the area of cosmology, recent discoveries of large-scale structure in the universe, with sizes that light would take one-tenth of the age of the universe to cross, have severely constrained models of galactic formation [38].

The probability problem does not end with the above, however. As discussed in the previous section, an argument on the basis of “odds” must analyze two things: the probability of the desired outcome given the rules of the system, and the probability of the “system” having rules which allow the desired outcome. In regard to the latter, numerous well-known physicists have drawn attention to the problem of “large number coincidences” in the laws of nature [39, 40, 41, 42]. These arise when various constants of nature, e.g. the mass of the electron and the speed of light, are combined into unitless ratios to make pure numbers. The numbers so formed typically are large, of the order of  $10^{60}$  to  $10^{100}$ . Furthermore, if these numbers differed by some tiny fraction from their actual values, then life would be impossible. Christian authors Hugh Ross [28] and John Templeton and Robert Hermann [43] have drawn attention to these coincidences; New Age authors like Louise Young [44] have also discussed them at length.

In the scientific method, things that are fantastically improbable are considered impossible. This follows from Occam’s razor. If you walk into a room with 100 six-sided dice, all showing “one,” you “know” that someone has placed them that way. Why? Effectively, to suppose that they had fallen that way randomly would amount to supposing  $6^{100}$  “unseen entities”— i.e., roughly  $6^{100}$  unobserved previous throws of the dice. Note that this argument supposes some connection of the pattern of the dice to you, personally. Any throw of the dice is just as improbable as any other, but most of the possibilities would have no meaning to you— they would be “equivalent” states [45]. Only certain states, e.g. all “ones,” connect directly to your experience. Occam’s razor insists that if you find an extreme improbability related to yourself, then it is in fact related to you [46].

The point of calculating the long odds involved in evolutionary theory is therefore not to argue that there are “gaps” in the physical laws, as though the physical universe really has flaws that God must fill *ad hoc*, so to speak. In the scientific method, finding inconsistencies in a theory leads one to look for a new theory. Pointing out the long odds involved in evolutionary cosmology theory does not imply a belief that the real, physical universe has “gaps,” or unregulated parts. Rather, it says that a description of the physical universe which

relies entirely on *simple, impersonal* laws fails Occam’s razor, because the real universe has the indelible imprint of a Person.

## 7 Counter-Argument: Many Worlds

It may surprise some Christians to learn that modern philosophy of science has largely begun to accept the fantastic improbabilities discussed above and the implication that the laws of nature are, in fact, related to us. The atheist arguments today have changed direction, in response.

The new atheist argument allows that the laws of nature and the structure of the universe are related to us on the basis of the “anthropic principle” [39]. This argument goes as follows: suppose I ask, “Of all the billions of places on earth, why was I born in Teaneck, New Jersey?” This place is specially related to me— my birthplace— and yet on the face of it, very improbable. We all understand, however, that I had to be born *somewhere*. My individual experience picks out a certain set of parameters that are special only because I am looking at them, a so-called “observer effect.” In the same way, the atheist cosmological argument supposes an infinity of different possible universes. The one universe in which we live has physical laws and structure related to us, only because if it did not, we could not exist to observe it.

This argument is sound, but relies critically on the evidence for multiple experiences. I am not surprised that I was born in a certain place because I see many people born in many places, covering the globe. In a sense, it is the evolutionary probability argument all over again, except that instead of many random occurrences within a system, one assumes the existence of many, random systems. Given an *infinity* of possible universes of infinite diversity, all manner of coincidences become possible. One has simply embedded our finite universe in an infinite, eternal “macro-universe.” The atheist has recovered the eternal, impersonal universe that the Big Bang theory seemed to destroy.

The problem for this kind of theory, of course, is that unlike the example of being born in Teaneck, in which I can easily see many examples of other people being born, we have no examples of even one other universe. The atheist apparently violates Occam’s razor to an infinite degree by supposing an infinite number of imperceptible entities, each of which is an entire universe!

Non-Christian scientists have attempted to find evidence for other universes in at least two different ways. The first hypothesis relies on a non-standard interpretation of quantum-mechanics, called the “many-worlds” hypothesis. In order to resolve certain paradoxes in quantum mechanics, Everitt and Wheeler [47] proposed a view in which at every quantum

event (trillions of which occur in a single second, at a single point in space) the entire universe splits into a number of “alternate universes” covering every possible outcome of the quantum events. While this view has received a lot of popularity in the science fiction literature, very few physicists take it seriously. In short, it creates more paradoxes than it solves [48]. How can the entire macroscopic universe light years away “split” at each microscopic event here on earth? Doesn’t this violate conservation of energy to an infinite degree? Why does it only split going “forward” in time, and not backward— what gives the arrow of time?

A more serious proposal revolves around the “inflationary” model of cosmology. This theory, first proposed by Alan Guth [49], starts with the standard Big Bang theory and inserts, at a very early stage, an epoch of extremely fast expansion of the universe, or “inflation.” This epoch then conveniently disguises itself so that the universe looks like it evolved from a simple Big Bang. Only a few trace evidences would remain from the Inflationary era.

The Inflationary model allows two critical changes from the standard Big Bang theory. First, it allows many of the large number coincidences to be combined into one large number coincidence. Second, it allows our universe to be a recently-spawned part of a larger, eternal “macro-universe” [50], so that the remaining coincidences can be viewed as a probable event in an infinite series of random sub-universes.

Most Christian philosophers have missed the import of the Inflationary Theory for cosmology. If proved, it would go a long way toward establishing a “cosmic Darwinism” that yielded persons in an impersonal universe, just as hoped for the original Darwinism. This aspect explains a lot of the excitement among non-Christian physicists about the Inflationary model in recent years.

The inflationary model gives very specific predictions for certain observations. The primary parameter is the total mass density of the universe, usually written  $\Omega$ . The Inflationary model implies that  $\Omega=1$ , i.e., that the total density is exactly equal to the amount needed to make the universe eternal in the future. The density must be neither too little, in which case the universe would evaporate (i.e., expand to zero mass density in the far future), nor too much, in which case the universe would collapse in on itself due to gravitational attraction.

Astronomical observations, however, indicate that the actual mass density is closer to  $\Omega = 0.2$ . Since observations of the visible universe (light-emitting stars) indicate a mass density too low for the Inflationary theory, many physicists have proposed a search for “Dark Matter,” which would make up the remaining 80-90% of the mass needed for the theory [51]. The constraints of nuclear theory imply that this “Dark Matter” can not be mere chunks of rock or other normal matter. Instead, it must be an entirely new kind of particle which passes through us nearly imperceptibly [52]. Despite the entirely hypothetical nature of “Dark Matter,” many atheists are so convinced of its existence on the basis of the

above philosophical considerations, that one frequently reads in the popular literature that “90% of the universe is made of an entirely different kind of matter from us.”

The Inflationary theory seems to have received a death blow from recent observations, specifically the Cosmic Background radiation (COBE) study [53] and the observations of large-scale structure in the universe [54], clusters of galaxies so large that to cross one, light would take a tenth of the age of the universe. These observations, put together, strongly indicate a value of  $\Omega = 0.2$ , and do not allow Dark Matter to be hidden. Proponents of the Inflationary theory have not given up yet, however, and continue to attempt new variations of the theory that agree with the observations [55].

## 8 Concluding Remarks

We have ended up in several issues at the forefront of scientific research today. This is proper, because much of science today dwells on ultimate questions. Yet we must not put the cart before the horse and dive into scientific issues without addressing the fundamental basis of perception that drives all belief in God. We talk about science in *response* to arguments by atheists which attempt to “explain away” our perceptions of God. I have heard numerous apologetic debates end with the Christian showing strong evidence of something or other, and the atheist finally responding, “But if God exists, why is He so silent?”

If a person feels no guilt, no sense of Absolute Justice, if a person has no sense of the dignity of mankind, no appreciation of the beauty and design in nature, and if that person remains unmoved by the words of Holy Scripture, then what good is astronomy? As Francis Schaeffer said, “He is there, and He is not silent.” [56] To shut Him out, a person must stop up his eyes and ears. Yet to those with eyes and ears to hear, the Christian can present credible evidence that the things we perceive do indeed come from God and not from our own self deception.

In the last section I outlined a scientific theory that aims to overthrow the Christian concept of a beginning of the universe. What if it succeeds? In the first half of this century, science seemed to provide a perfectly airtight, Godless view of the world, and Christians mostly retreated into liberalism, presuppositionalism, or anti-science fundamentalism, all of which had the effect of cutting off Christians from meaningful discussion of science. In the latter half of this century, Christianity has seen an intellectual rebirth, even while the number of nominal church attendees in Europe and North America has decreased. Non-Christian scientists and authors have questioned the paradigm of evolution. The disaster of the “new morality” both in the U.S. and in the communist nations has led many to look for moral absolutes. Numerous Christians now claim impressive academic credentials and hold their

own in debate with atheists. In a way, it is easy to be an evidentialist. But what if the Inflationary theory suddenly jumps into the public eye with strong evidences of multiple universes? Should evidentialists all say, “You’re right, the Bible is wrong”?

There are two things every person should do when faced with challenging evidence. First, one should have a healthy doubt about new claims which takes into account the presuppositions of the person bringing the message. If a salesman with an interest in selling me a product shows me an impressive array of statistics, I should still hold out some doubt. Similarly, if people with an interest in becoming a new elite or with an interest in discarding “old fashioned” claims of morality tell me “science has proven...,” I should take it with a grain of salt.

Second, one should hold on to “internal” evidence, i.e., “gut feelings.” This is valid evidence! For instance, suppose someone tells me my wife has committed adultery, and presents an impressive list of corroborating facts and witnesses. Still, I may say, “I know her, and I know she would not do that!” No Christian should feel ashamed to say, “I know God, and I know His Word!”

Still, once has to leave open the possibility that one has been deceived. As Francis Schaeffer said, “The Christian must have the integrity to live open to the question as to the possibility of his being ‘taken in’ by his Christian commitment.”[57] One must ask, “What level of evidence ought to convince a Mormon to forsake his faith? Am I honest enough to admit error on the basis of the same type of evidence?” This is an uncomfortable idea for many Christians. Yet a person who has looked doubt in the eye, who has examined all the facts and found them to hold up, has a certainty that surpasses all forms of “protected” belief. A man who knows his wife would not commit adultery has no fear of the facts. The man who loudly rejects any examination of the facts is usually the one that fears that they may in fact point to a truth he does not want to know!

One thing Christians ought not to do is to take hold of a few scientists of dubious credentials who claimed to have “disproven” all Inflationary theory, trumpet their findings as the final word, and mock all scientists who disagree as members of an international conspiracy to hide evidence. In fact, much “creation science” in this century has taken exactly this form. Evidentialism has taken a beating when numerous apologists had to retract dramatic “evidence” after loudly proclaiming it the definitive proof of Christianity. In doing so, they ignored good rules of “lawcourt” reasoning. A person who says what you want to hear is not necessarily a trustworthy witness! Sometimes we must simply admit certain things appear contradictory and leave it at that. This is not irrational if we have other strong evidences for believing something.

In this essay I have only discussed the atheist position. Christian apologetics must deal not only with the atheist, but also with the pagan. The above discussion of large number

coincidences has led not only to support of the Christian position, but also of many other religious but non-Christian views, especially New Age views that make Man into God, such as the works of Tipler and Young. In dealing with such views we must dive into the specific evidences we have for God-to-man communication. Apologetics is never-ending, because it must always respond to new challenges to what seems to us obvious: our experience of God.

## References

- [1] D. Snoke, "Toward the Unity of Theology and Science," *Perspectives on Science and Christian Faith* **43**, (American Scientific Affiliation, Ipswich, MA, September 1991).
- [2] D. Snoke, "The Problem of the Absolute in Evidentialist Epistemology," *Perspectives on Science and Christian Faith* **47**, (American Scientific Affiliation, Ipswich, MA, September 1995).
- [3] As I have argued previously [2], a survey of Scripture passages indicates that belief in God is essentially *passive*, based on being convinced, not an active choice. Choice in the Bible is always associated with obedience to what we already know.
- [4] This distinction between "internal" and "external" senses goes all the way back to Roger Bacon (*Opus Majus* VI, i) but has unfortunately often been lost in subsequent discussion. Restriction to the five external senses artificially excludes a whole realm of our experience. As professional counselors often say, "feelings are facts," though in Western culture we often would like to deny their reality or validity. See, e.g., \*A. R. Damasio, *Descartes' Error*, (G.P. Putnam, New York, 1994).
- [5] \*B. Gregory, *Inventing Reality: Physics as Language*, (John Wiley and Sons, New York, 1988).
- [6] F. Schaeffer, *The God Who is There*, in *The Complete Works of Francis A. Schaeffer*, (Crossway, Wheaton, 1985).
- [7] C. van Til, *The Defense of the Faith*, (Presbyterian and Reformed, Philadelphia, 1955).
- [8] John M. Frame, *The Doctrine of the Knowledge of God*, (Presbyterian and Reformed, Phillipsburg, 1987).
- [9] Alvin Plantinga, another modern presuppositionalist from the Calvinist school of Cornelius van Til, takes the same approach to "justifying" the senses, e.g. in *Faith and*

*Rationality* (University of Notre Dame Press, Notre Dame, Indiana, 1983). He affirms belief in God on the basis of direct perception, as I do:

Upon reading the Bible, one may be impressed with a deep sense that God is speaking to him. Upon having done what I know is cheap, or wrong, or wicked, I may feel guilty in God's sight and form the belief, "God disapproves of what I have done." Upon confession and repentance I may feel forgiven, forming the belief "God forgives me for what I have done." A person in grave danger may turn to God asking for His protection and help; of course he or she then has the belief that God is indeed able to hear and help if He sees fit. When life is sweet and satisfying, a spontaneous sense of gratitude may well up within the soul; someone in this condition may thank and praise the Lord for His goodness, and will of course have the accompanying belief that indeed the Lord is to be thanked and praised.

For Plantinga, however, such perceptions are not *sufficient* for belief, and he would supplement them with "properly basic beliefs," i.e. axiomatic presuppositions, which allow organization of these perceptions into meaningful frameworks. Arguing from experience alone would constitute what he calls the error of "foundationalism," the view that beliefs are rational only if based on such sense experience, or on self-evident or otherwise undoubtable propositions (if such exist.)

Plantinga, like all presuppositionalists, says that evidentialists are not self consistent since they must "assume" the foundation principle. As I have discussed at length [2], this objection does not stand up since evidentialists do not have to make their "foundation principle" an axiomatic assumption. It simply makes sense as a proper inductive theory based on sense experience. Although our ability to generate theories inductively may involve an irrational leap of the imagination, belief in such conclusions is not irrational because they can be tested by further experience.

Plantinga sounds almost as if he would agree with me in advocating an inductive approach to formulating "properly basic beliefs":

We must assemble examples of beliefs and conditions such that the former are obviously basic in the latter, and examples of beliefs and conditions such that the former are obviously *not* properly basic in the latter. We must then form hypotheses as to the necessary and sufficient conditions of proper basicity and test these hypotheses by reference to those examples.

In allowing numerous *propositions* to stand alongside experience as “obviously properly basic,” however, Plantinga opens the door to all kinds of wishful thinking. We need only apply the test of self consistency to our set of basic beliefs, we do not need to actually test them against experience. It is hard to imagine why *any* religion could not follow the same program.

As I have argued earlier [1, 2], such an approach “protects” Christianity from attack, but leaves it without an argument why Mormons or, for that matter, believers in the Great Pumpkin should not make their claims into “properly basic beliefs.” K. Parsons, in *God and the Burden of Proof*, (Prometheus, Buffalo, New York, 1989) has argued the same, that Plantinga’s views mean the end of rational debate, the end of a common ground for discussion, and open season for all manner of nonsensical beliefs seen in bookstores today.

- [10] One objection to the idea that all language relies on sense experience is that of Polanyi, that “values” must come from somewhere else. As I have discussed previously [2], all real values come from experience. Of course, one must include “internal” sense experience, which many would like to ignore (see note [4].)
- [11] Can we perceive God via the five external senses? Although the Bible makes clear that we can not perceive the “fullness” (or “face”) of God via the five external senses– “No one has seen God” (John 1:18), God does not rule out communicating via the external senses. “External” sense experience with God forms the basis for “special revelation;” the prophets heard His voice or saw the pillar of fire; Jesus, who has “made God known” (John 1:18, Col. 1:15, Heb 1:3), was perceived via the same senses (1 John 1:1-4), even after His resurrection (John 20:27). As discussed previously [2], we obtain this special revelation today via testimonies and messengers which come to us via the five senses, e.g. reading. Reformed theologians have always argued, however, that without a confirming “internal” testimony, these messages of special revelation remain meaningless to us. Without prior reason to believe in God, belief in miracles would violate Occam’s razor, i.e., Hume’s objection.
- [12] C.S. Lewis, *Mere Christianity*, (Macmillan, New York, 1943).
- [13] J.M. Frame, *Apologetics to the Glory of God: An Introduction*, (Presbyterian and Reformed, Phillipsburg, 1994).
- [14] Some presuppositionalists seem guilty of a logical fallacy. Since the Christian presupposition (the existence of God) implies the reliability of the senses, then they would say

that any use of the senses implies reliance on the truth that God exists. But that does not follow. If A implies B, it does *not* follow that the truth of B implies the truth of A!

- [15] The failure to address Occam's razor is the reason why presuppositionalist Christian argument remains so unsatisfying. Presuppositionalists may be correct that starting with their presuppositions they can remain perfectly logically consistent, but a person who hypothesizes a room full of invisible, imperceptible chairs could do the same. Self consistency alone never suffices to convince anyone of anything.
- [16] As C.S. Lewis has argued [12], we do not have to agree on exactly what is just, or what ought to cause guilt, in order to agree that the justice and guilt are real things. We also do not need to agree on the interpretation of the Bible to agree that it is God's Word.
- [17] J. Calvin, *Institutes of the Christian Religion*, J.T. Macneil, ed., F.L. Battles, trans., (Westminster Press, Philadelphia, 1960).
- [18] R.C. Sproul, *The Psychology of Atheism (If There is a God, Why are there Atheists?)*, (Tyndale, Wheaton, 1988).
- [19] \*R. Penrose, *Shadows of the Mind: On Consciousness, Computation, and the New Physics of the Mind*, (Oxford University Press, Oxford, 1994).
- [20] Gödel, *Monatshefte f. Math. u. Physik* **38**, 173 (1931) in *From Frege to Gödel*, J. van Heijenoort, ed. (Harvard Press, Cambridge, 1967).
- [21] \*W. Percy, *Lost in the Cosmos: The Last Self-Help Book*, ( Farrar, Straus and Giroux, New York, 1983).
- [22] R.C. Sproul, *Not a Chance: The Myth of Chance in Modern Science and Cosmology*, (Baker, Grand Rapids, 1994).
- [23] W.A. Dembski, "Converting Matter into Mind: Alchemy and the Philosopher's Stone in Cognitive Science," *Perspectives on Science and Christian Faith* **42**, (American Scientific Affiliation, Ipswich, MA, September 1991).
- [24] Penrose has argued that brains could get their unusual properties from quantum mechanical wave function coherence, as seen in things like Bose-Einstein condensation and lasers. He makes no claims about how this could work, but invokes hypothetical, completely unknown aspects of these phenomena. As an expert in wave function coherence (see, e.g., *Bose-Einstein Condensation*, A. Griffin, D.W. Snoke, and S. Stringari, eds.

[Cambridge University Press, Cambridge, 1995]) I can attest that these ideas are merely wild speculation, and serious students of wave coherence would all agree.

- [25] It is only a slight overstatement to say that evolution was *the* fatal blow. Other evidences that weakened evidential apologetics included higher criticism and archeological attacks on the Bible. Nevertheless these had limited impact before evolution became widely accepted in western culture.
- [26] E.J. Carnell, *Introduction to Christian Apologetics*, (Eerdmans, Grand Rapids, 1955).
- [27] It may seem nearly impossible to calculate odds like this, without having complete knowledge of every law of nature in the universe. On the contrary, scientists do this kind of calculation all the time. “Bayesian” probability theory, favored by most practicing scientists, allows the calculation of conditional probabilities based on partial knowledge. In a sense, Bayesian probability is just the codification of inductive logic. John Earman has written a useful introduction to Bayesian probability, in which he also shows that the Bayesian probability methods being developed during the lifetime of David Hume have subsequently rendered Hume’s arguments against miracles invalid, in “Hume’s Abject Failure: The Argument Against Miracles,” (Dept. of History and Philosophy of Science, University of Pittsburgh, 1997).
- [28] \*H. Ross, *The Fingerprint of God*, 2nd ed., (Promise, Orange, California, 1991).
- [29] \*P.C.W. Davies, *The Physics of Time Asymmetry*, (University of California Press, Berkeley, 1974); see also S.L. Jaki, *The Paradox of Olbers’ Paradox; a Case History of Scientific Thought*, (Herder and Herder, New York, 1969).
- [30] E. Harrison, in *\*Bang: the Evolving Cosmos* (Nobel Conference XXVII), Richard Fuller, ed., (University Press of America, Lanham, 1994).
- [31] The idea that immediately comes to mind, intervening clouds, is one proposed solution that does *not* work— given enough time, these clouds would absorb so much heat that they, too, would glow like the surface of a star.
- [32] \*P.C.W. Davies, *Space and Time in the Modern Universe*, (Cambridge University Press, Cambridge, 1977); *\*The Physics of Time Asymmetry*, (University of California Press, Berkeley, 1974).
- [33] M.C. Mackey, *Time’s Arrow: Origins of Thermodynamic Behavior*, (Springer-Verlag, New York, 1993).

- [34] \*J. Horgan, *Scientific American*, 100 (February 1991).
- [35] \*R. Shapiro, *Origins— A Skeptic’s Guide to the Creation of Life on Earth*, (Summit Books, New Jersey, 1986).
- [36] \*M.J. Behe, *Darwin’s Black Box: The Biochemical Challenge to Evolution*, (Free Press, New York, 1996).
- [37] See, e.g., W.M. Tscharnuter, in *The Birth and Infancy of Stars*, R. Lucas, A. Omont, and R. Stora, ed., (North Holland, Amsterdam, 1985); and T.Ch. Mouschovias, in *Protostars and Planets*, T. Gehrels, ed. (University of Arizona Press, Tucson, 1978).
- [38] *Physics Today* **43**, 20, (June 1990); *Nature* **348**, 14 (3 January, 1991).
- [39] \*J.D. Barrow and F. Tipler, *The Anthropic Cosmological Principle*, (Oxford University Press, Oxford, 1987).
- [40] \*P.C.W. Davies, *The Accidental Universe*, (Cambridge University Press, Cambridge, 1982).
- [41] \*A.J. Leggett, *The Problems of Physics*, (Oxford University Press, Oxford, 1987).
- [42] P.A.M. Dirac, in *The Physicist’s Concept of Nature*, J. Mehra, ed., (D. Reidel, Dordrecht-Holland, 1973).
- [43] J.L. Templeton and R.L. Hermann, *The God Who Would be Known*, (Harper and Row, San Francisco, 1989).
- [44] \*L. Young, *The Unfinished Universe*, (Simon and Schuster, New York, 1986).
- [45] This concept of “equivalent states” formed the basis of the theory of statistical mechanics in the last century. All possible configurations of the atoms in the gas in a room are equally likely, but only a few have special properties discernible to “macroscopic” people, who see things with “coarse grained” perception. For example, to all intents and purposes it is “impossible,” according to statistical mechanics, for all the atoms in a room to line up at one wall, causing you to suffocate, although this configuration is just as likely as any other, according to Newton’s laws. The reason is that out of all the possible states of the atoms, only a tiny fraction yield this special result, while the vast majority are essentially equivalent regarding your breathing ability.

- [46] This is quite different from “cabalism,” which finds *a posteriori* meaning in random sequences by applying a large number of trials, e.g. birth dates, Hebrew values of letters, etc., until some match is found. The odds are no longer low, in most cases, because of the large number of possible meanings that have been attempted.
- [47] H. Everitt, *Reviews of Modern Physics* **29**, 454 (1957); J.A. Wheeler, *Reviews of Modern Physics* **29**, 463 (1957).
- [48] See, e.g., J.G. Cramer, *Reviews of Modern Physics* **58**, 684 (1986); see also P.C.W. Davies, *The Accidental Universe*, Cambridge University Press, Cambridge, 1982), pp. 122-130.
- [49] A.H. Guth, *Physical Review D* **23**, 347 (1981).
- [50] \*A. Linde, *Physics Today* **40**, 61 (September 1987).
- [51] There exists some confusion about the evidence for “Dark Matter.” The total of observable, i.e. light-emitting, matter in galaxies gives  $\Omega = 0.1$ . Estimations based on the rotations of the galaxies indicate a higher number, however, due to non-light-emitting mass. When this extra (normal, but not light-emitting) mass is accounted for, one gets  $\Omega = 0.2$ . “Dark matter” must be something entirely new in addition to this.
- [52] One may write  $\Omega = \Omega_b + \Omega_e$ , where  $\Omega_b$  is the total of all “normal” (baryonic) matter and  $\Omega_e$  is the total of all “exotic” matter, e.g. “weakly interacting massive particles” (WIMP’s), or heavy neutrinos (there is presently no evidence that neutrinos have mass.) Nuclear theory combined with astronomical observations gives a constraint of  $\Omega_b = 0.1 \pm 0.05$ . See E. Rolfs and W.S. Rodney, *Cauldrons in the Cosmos*, (University of Chicago Press, Chicago, 1988), pp. 86-89. R.A. Malaney and W.A. Fowler, in *American Scientist* **76**, 472 (1988), presented a model based on Inflation which would allow  $\Omega_b = 1$ , using what they call the “luxury of a large a parameter space,” i.e. tweaking of the many unknown parameters in the new Inflation theory, not unlike the tweaking of epicycle theory. Since their model has remained unconvincing to most scientists, Inflation theorists continue to hold out hope for observation of exotic Dark Matter. Cosmological theory requires that these particles have neither too much nor too little mass within tight constraints, or they will not help the Inflation scenario.
- [53] *Nature* **356**, 741 (30 April 1992); *Nature* **356**, 489 (9 April 1992); *Physics Today* **45**, 17 (June 1992).

- [54] M. Geller, in *\*Bang: the Evolving Cosmos* (Nobel Conference XXVII), R. Fuller, ed. (University Press of America, Lanham, 1994).
- [55] Although the data now seemed stacked against it, Inflation theory has become a cottage industry with thousands of adherents, mainly out of philosophical commitments, and new versions which allow  $\Omega = 0.2$  have been proposed. A useful modern critique of Inflation theory has been written by J. Earman and J. Mosterin, in “A Deflationary Analysis of Inflationary Cosmology,” (Dept. of History and Philosophy of Science, University of Pittsburgh, 1997).
- [56] F. Schaeffer, *He is There and He is not Silent*, in *The Complete Works of Francis A. Schaeffer*, (Crossway, Wheaton, 1985).
- [57] As quoted by R. Reymond, in *The Justification of Knowledge*, (Presbyterian and Reformed, Philadelphia, 1976).

(Note: a ‘\*’ indicates references that are recommended as useful reviews of science for non-experts. Copies of most of the articles referenced are available from the author.)