CRITIQUE OF PUERILE REASON: A PRAGMATIC LOOK AT ARGUMENTATION IN J.P. MORELAND'S *THE CREATION HYPOTHESIS*¹

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Abstract

Key arguments in J.P. Moreland's *The Creation Hypothesis* that purport to provide a scientific basis for creationism as an alternative to evolutionary theory are examined. Arguments based on Bayes' theorem, the existence of intracable mathematical problems, the close correspondence between the actual values of basic physical constants and those required for the existence of life, the second law of thermodynamics, the nature of infinity, the specified complexity of DNA, and the human-specificity of language are analyzed and found wanting. In general, the arguments are seen to fail as a result of confusions in word usage or meaning, sometimes of a very elementary nature. The scientific, philosophical, and ethical implications of the overall argument's failure and the reasons for it are discussed.

Keywords: Creationism, Evolution, Argumentation, Scientific method, Fundamentalist theology.

1. Background

In 1965, having just turned seventeen, I spent some time, quite by accident (some might say it was God's plan), at the Summer Institute of Linguistics (SIL), an arm of the evangelical Christian Wycliffe Bible Translating Society. I had become aware of linguistics through a course I took the preceding summer taught by then MIT graduate student Barbara Hall (now Partee) across the Charles River from my home in Dorchester, Massachusetts. When an opportunity to learn more about the subject unexpectedly presented itself, I willingly acquiesced.

I had a grant from the National Science Foundation to study philosophy of science and mathematics at the University of North Dakota in Grand Forks. The first edition of Thomas Kuhn's *The Structure of Scientific Revolutions* had recently appeared and was on my reading list for the summer. Also on my agenda was the study of non-Euclidean geometries, mathematical systems that provide internally consistent, but mutually incompatible axiomatizations, and thus wildly different conceptualizations, of what

¹ I would like to thank Sheldon Gottlieb for bringing *The Creation Hypothesis* to my attention, through a notice in the *Reports of the National Center for Science Education* suggesting that something be done about it. The world needs more such vigilant initiatives.

I would also like to thank evolutionary ichthyologist and contra dancer Kathryn Kavanagh for occasional discussions that have helped me keep pace with the latest developments in evolutionary theory.

otherwise appears to be a single subject matter. I had read about such geometries, but had not yet taken the time to study them. To round out my program for the summer, Prof. Benjamin Ring asked me to help one of his graduate students work through the logic of the arguments in Isaac Newton's *Principia*. The student, whose name I'm embarrassed to admit I don't remember, was researching the philosophical aspects of Newton's work. He thought he saw gaps in Newton's reasoning, but he didn't feel confident enough in his own mathematical competence to be sure if those gaps were genuine. I carefully walked him through the arguments, helping him see that he was right, that Newton had indeed used his deep intuition for physical phenomena to bridge logical gaps in the mathematics.

I found this work satisfying and substantive enough to maintain my interest, but, despite all that, I still found myself with time on my hands. When I learned of the existence of an SIL branch on campus, I decided to sit in on some of its classes. As it happens, I became very good friends with one of the professors, Austin Hale, a surprisingly scholarly guy who was trying to introduce the new explanatory approach to linguistics developed by Noam Chomsky into the SIL curriculum. Linguistics in general had been dominated previously by taxonomic descriptive concerns and the SIL was no exception. Austin was trying to change all that. As we got to know each other, he asked me to guide him through some of the more abstruse mathematical notions that accompanied the new linguistics -- formal automata, computability, recursive function theory, and the like -- and he taught me what he knew about the linguistic notions themselves. His experience as a working field linguist helped to complement the more heavily theoretical perspective I had been exposed to in Barbara's course the previous summer. More important, however, were the far-reaching general discussions we had about philosophy, theology, scientific method, the nature of religious experience, and the like, topics in which we both had an intense interest but which we approached from wildly incompatible perspectives.

We corresponded briefly after that summer, but I've had no subsequent communication with Austin Hale for over thirty years. I have no idea what he's been doing with his life, other than the fact that he's still listed in the Member Directory of the Linguistic Society of America as being associated with the SIL and living in Switzerland, where I know his wife is from. However, that six-week friendship between a devout Christian missionary of the Wycliffe school and a determined secular humanist agnostic strongly inclined towards Ethical Culture (I had just barely missed being elected national president of the National Ethical Youth Organization in a closely contested election and I was just about to be elected by the Boston group to represent it on the national executive council) left me with a deep respect for genuinely religious people for which I had had no basis in any of my prior experience. They are in touch with an essential aspect of their own being that I interpret very differently, but that I can still relate to.

I waste none of that respect on any of the authors in J. P. Moreland's, *The Creation Hypothesis*. Throughout all of our wide-ranging discussions, Austin Hale was always forthright and confident in stating his views, but he never pretended to prove his faith with transparently bogus arguments. Moreland's book, in contrast, is nothing but bogus from beginning to end.

The Creation Hypothesis has been widely touted as the first serious attempt to provide a real scientific foundation for creationism. In reality, it is exactly the opposite: An attempt to erect a scientific facade on a creationist foundation. In his introduction, Moreland states flat out that his aim is to develop "a total strategy for science-theology integration" (p. 12). I'm not making this up. That's what he says. Science and theology are to be merged.

He is developing a “strategy” to do that. In particular, this “integration” includes a total rejection of all notions of evolution, even the theistic variety that many other Christians accept, because “many Christian intellectuals, including Old Testament scholars, do not believe that Genesis is consistent with theistic evolution as it is usually presented” (p. 14). Remember, this is decided even before any *biological* facts are examined. Evolution in any form must be rejected for the sole reason that it conflicts with a book that Moreland likes.

Picture Albert Einstein in 1920 calling for a *strategy* to convert people to the unified field theory. Picture every detail of that theory having already been worked out before even a single experiment had been done. Einstein spent the major part of his adult life looking for such a theory, ultimately with no success. His confidence that there must be one never wavered, but he never pretended to have found it just because he wanted to. If he had taken Moreland’s approach, we would be justified in being wary of any claims of success he might have made, no matter what kind of case he might have presented. People who decide ahead of time what they are going to “discover” manage to see only what they want to. Other facts just get in their way and are brushed aside. For Moreland and his contributors, the answers to all *scientific* questions are already provided in the Bible. All that needs to be worked out is a strategy to convert people to those answers.

Later, in his chapter, Moreland suggests that theology can contribute positively to science “by providing extrinsic goals for science” (p. 56), in particular, “to glorify God, to show that our Scriptures are not in conflict with what it is reasonable to believe from sources outside them” (p. 56). In other words, science is to *begin* with the notion that the scriptures are correct and then proceed to show that that’s the case. That’s the kind of perversion of logic that the phrase *begging the question* was coined for. What if the scriptures really are in conflict with what it is reasonable to believe from sources outside them? Shouldn’t we want to know that, not just as scientists, but as honest human beings? Don’t we need to look and see, before we can feel justified that we know the answer? It would make more sense for Moreland to advocate disbanding science altogether, since that’s what his proposal amounts to. He’s already decided what the “truth” is. What does he need science for? Of course, he’d never get taken seriously with an outright call to kill science, so he retreats instead to the fallback position of disemboweling it. Perhaps he’d also settle for stoning. The result is the same. As he told us in his introduction, his aim is to work out an effective “strategy” for achieving that result.

Quite aside from the question-begging logical perversion of requiring science to rubber-stamp Moreland’s scriptures, what are we to make of his notion that science should be required “to glorify God”? Why would a Being powerful enough to create the entire universe need or want to be glorified by creatures as puny as humans? In a human, that need or desire would be considered a personality disorder or a character flaw. We all know people who are like that. There are lots of examples in history and literature. Saddam Hussein comes to mind as a well-known real contemporary case. The Q character on “Star Trek” is a convincingly depicted fictional one. Like God, but unlike Hussein, he even has superhuman stature. However, he’s not the sort of person that you’d invite over for dinner or that you’d want to have a “personal relationship” with, as fundamentalists are fond of saying they have with God.

Taking a cue from the Ferengi, let me take a stab at codifying the obvious:

The First Rule of Common Sense:

1. Any Being that would want to be glorified wouldn't deserve it.
2. Any Being that would deserve to be glorified wouldn't want it.

Does Moreland think that God needs a psychiatrist or, perhaps, a pastoral counselor? We'll see, as we progress through their book, that it's not God, but Moreland and his crew, that are the more likely candidates for needing that kind of assistance.

Quite aside from what any deity might need or want, humans who feel a need to glorify one are already free to do so whenever and wherever they choose (yes, even in the public schools, as long as they don't force anyone else to do it). Football players do that all the time these days, it seems, whenever they score a touchdown. However, no one has been silly enough to propose that the rules of football should be rewritten to require a team to glorify God as an "extrinsic goal" of the game. The evangelical track star in the reality-based movie, "Chariots of Fire," makes no bones about the fact that he runs for the glory of God, but he never suggests redefining the word *run* to include the "extrinsic goal" of glorifying God *as part of its meaning*.

That's what Moreland wants to do to science. His suggestion makes sense only as a step in a "total strategy" for changing the meaning of the word *science* from a reliable method for acquiring genuine knowledge about the world to a device for converting people to his pet dogma. To borrow a phrase from Nietzsche, he aims to recast science as an expression of *the will to believe*, rather than *the will to inquire*. Subsumed entirely under religion, the usefulness of "science," once a reliable source of knowledge, as Marx might have put it, rapidly withers away. But God is glorified, the Christian scriptures are "confirmed," and Moreland gets into heaven.

Moreland and his collaborators are not stupid people. He assures us that they are "qualified scholars" (p. 37) and the biographies that are given for them confirm that claim. Stephen Meyer's chapter, for example, is very carefully reasoned. He is correct in his claim that design and descent are *methodologically* equivalent, in the ways he spells out. The difference is in whether or not you insist on "extrinsic goals." If you want science "to glorify God" and confirm the literal truth of the Christian scriptures, then you will decide, for example, that the mathematical quantity π equals 3, because that's what the Bible says. If you want science to provide accurate knowledge about how the world actually works - knowledge that you can then use to build machines that work and bridges that don't collapse - , then you will take the trouble to measure and calculate π and find that it doesn't equal 3, but a little bit more. It's really that simple. One can only hope that both Moreland and Meyer are standing on any bridge that they manage to convince anyone to build on the basis that π equals 3. Maybe that's what's meant by a "leap of faith."

Meyer's is the only chapter in the book in which the logic actually works. To borrow a phrase from a Romulan starship captain, in a different reality I could have called him friend. But not in this reality. The problem is not that these people lack intelligence - they don't -, but that they have no honor. They have coveted the respect that honest scientists have earned in our society and they have conspired to steal that respect by bearing false witness against what those scientists have said or written. They probably honor their fathers and their mothers, perhaps even their neighbors' wives, and I have no evidence that they have murdered anyone, other than Truth and their own integrity, but they have taken the name of the Lord, their God, in vain, by using it as a smokescreen for unprincipled

apologetics in defense of one book that they just happen to like. I would bet that they keep the Sabbath holy, but, for people who insist that the Bible must be taken literally word for word in every way with no allowance whatsoever for interpretation of any kind, surely on the wrong day.

These are not people of whom it can be said to forgive them for they know not what they do. To borrow a phrase from Moreland, they are, indeed, qualified scholars. However, in contrast to Newton in his *Principia*, they willfully leap the unbridgeable gaps in the logic of their arguments not by deep intuition but by wishful thinking and sectarian dogmatism. They know full well what they do, yet they do it anyway. There is no forgiveness for such as they.²

To borrow a phrase from Rabbi Hillel, all the rest is commentary. My commentary will focus on the logic of the arguments in *The Creation Hypothesis* and, especially, on the mathematical arguments involving probability and infinity. I feel most comfortable in that realm and there are others more qualified to deal with the non-linguistic empirical issues. I will also say a few words about the second law of thermodynamics, because it bears on logical issues of general scientific method of which creationists appear to be blissfully oblivious. I will also make some observations relating to linguistics, the topic with which I started, because that is also the topic of the final chapter of Moreland's book.

2. Bayes' theorem

The most striking feature of *The Creation Hypothesis* is its dishonesty. Just look at what Moreland does with Bayes' Theorem, a basic principle of probability. First, I'll explain Bayes' Theorem. Then, I'll show what Moreland does with it.

Probability theory is the branch of mathematics that enables us to calculate meaningfully about the likelihood of the occurrence of an event. Probability values range from 0, for events that definitely do not occur, to 1, for events that are certain to occur. Other events have fractional probabilities somewhere between 0 and 1. We can ask about the probability of an event either in absolute terms or relative to the occurrence of other events.

For example, if you pick a card at random from a thoroughly shuffled standard deck of 52 playing cards, the probability that you pick an ace is $4/52 = 1/13$, because there are 4 aces among the 52 cards. In other words, you have four chances to get an ace out of fifty-two items to pick. To ask meaningfully about the probability of picking a second ace, after reshuffling the deck, you have to specify whether or not the first card you picked is put back into the deck or not. If you replace the first card, then the deck (after reshuffling) is as it was before, so the probability of picking another ace is again $1/13$. However, if you put the first card aside, there are one fewer cards to choose from the second time, since only

² The best short account that I know of the proper attitude to take toward such people is expressed in an editorial by Barry Lynn in the December 1997 issue of the magazine, *Church and State*. Lynn is the executive director of Americans United for Separation of Church and State and a Congregationalist minister. To make a not-so-long story even shorter, there can be no "common ground" with people whose "core values" comprise a full frontal assault on reason, common sense, and basic human decency. You might just as well try to reason with the Taliban.

fifty-one cards remain. Furthermore, the number of aces available to be chosen depends on whether the first card was an ace or not, because you put that card aside. If the first card was an ace, then there are now three aces available among the remaining fifty-one cards; if the first card was not an ace, then there are still four aces available. Instead of asking for the probability of picking an ace the second time, we have to ask for two things: (i) the probability of picking an ace the second time *given that* an ace was picked the first time and (ii) the probability of picking an ace the second time *given that* an ace was *not picked* the first time.

In symbols, this can be expressed as follows. Let “ A_1 ” denote the event that an ace is picked the first time and let “ A_2 ” denote the event that an ace is picked the second time. The probability that an ace is picked the first time is denoted by “ $P(A_1)$ ” and the probability that an ace is picked the second time is denoted by “ $P(A_2)$ ”. The probability that an ace is picked the second time *given that* an ace was picked the first time is denoted by “ $P(A_2|A_1)$ ” and the probability that an ace is picked the second time *given that* an ace was not picked the first time is denoted by “ $P(A_2|\sim A_1)$ ”. In short, “|” means *given* and “ $\sim$ ” means *not*.

Based on the numbers that were just explained, we get the following values for these probabilities, which serve as numerical measures of the likelihoods of the events:

$$\begin{array}{llll} P(A_1) = & 4/52 = 1/13 & & \\ P(A_2) = & 4/52 = 1/13 & \text{if the first card is replaced} & \\ P(A_2|A_1) = & 3/51 = 1/17 & \text{if the first card is not replaced} & \\ P(A_2|\sim A_1) = & 4/51 = 4/51 & \text{if the first card is not replaced} & \end{array}$$

Each of the first and second equations gives the probability of an event without any reference to other events. Each of the third and fourth equations gives the probability of a *later* event given the occurrence of an *earlier* event. The occurrence of the earlier event affects the likelihood that the second event will occur and thus must be taken into account in calculating its probabilities.

Now, suppose we ask about the probability of an *earlier* event given a *later* event? Can we calculate such a probability? Is it reasonable to expect that the occurrence of a later event will have some effect on the likelihood of occurrence of an earlier event? Does that notion even make sense? As it happens, it does, if we interpret the probabilities in such a case as reflecting *our knowledge* of the events, rather than their actuality. That’s what Bayes’ Theorem deals with.

Here’s how I used to explain this, when I taught probability to undergraduates. Suppose you’re on vacation and your term paper is due on the day you’re expecting to get back. You get stuck in a blizzard and realize that you won’t get back in time, so you call the school to leave word that your term paper will be handed in late. However, no one answers the phone and you wonder why. You think of several possibilities and you wonder what the likelihood is of each one. Maybe no one answers the phone, because the operator has just stepped out for a few minutes. That seems likely. Maybe no one answers the phone because the school is shutdown for the day, as the result of another blizzard, just like the one you’re stuck in. That seems less likely, but still reasonably likely, considering the season. Maybe no one answers the phone because the entire state has just been destroyed in a nuclear attack that you haven’t heard about, because your electricity is out and you can’t use the radio or television. That seems possible but not very likely. Maybe no one

answers the phone because extraterrestrial lizards have abducted everyone from the school to be used in genetic experiments on another planet. That seems hardly possible, let alone likely.

In each case, you are making a judgment about the likelihood of an earlier event that you don't know about - the cause of the telephone not being answered - based on the occurrence of a later event that you do know about — the non-answering itself. Whatever the earlier cause was has already happened. In that sense, its probability is 1 and that of the other alternatives is 0. However, you don't know which one it was, so it makes sense to use probabilities as measures of the likelihoods of the possible events *relative to your lack of knowledge*. In effect, the earlier events have not yet happened, *as far as your knowledge of them is concerned*, even though, presumably, one of them really has.

So it does make sense to talk about the probability of an earlier event given a later event, as long as we don't know whether the earlier event has occurred or not. Bayes' Theorem provides a way of calculating such probabilities. If T and E are events, then the probability that T occurs given that E occurs can be obtained by multiplying the probability that E occurs given that T occurs by the probability that T occurs and dividing the result by the probability that E occurs, as stated in (1).

(1) Bayes' theorem:

$$P(T|E) = \frac{P(E|T) \times P(T)}{P(E)}$$

If T is an earlier event than E, then P(E), P(T), and P(E|T) can all be calculated and their values then plugged into (1) to get P(T|E), the probability of the earlier event given the later one. P(E) and P(T) are absolute probabilities and P(E|T) is a conditional one.

Proving Bayes' theorem is easy and any good probability text will show you how. I always did it on the blackboard when I taught probability to undergraduates. It took about 20 minutes to explain and everyone understood it. However, Moreland still manages to mangle what he calls "Bayse's" theorem. He formulates the theorem in terms of evidence, rather than events, but the two terminologies are interchangeable, so that's okay. However, that point aside, his account is so confused that it could go down as one of the classics of mathematical obfuscation. It deserves to be quoted in full. Remember: It's not from the *Journal of Irreproducible Results* or the *Annals of Improbable Research*. It's from *The Creation Hypothesis*.

Here goes:

If the probability that T is true given E is greater than the probability that T is true without E, that is, if P(T|E) is greater than P(T), then the evidence E offers positive support for T. In the design argument, T is the hypothesis of a theistic Designer and E is the evidence provided by design. The Bayesian form of the design argument says that the probability that a theistic Designer exists given the design in the universe is equal to the probability that design would occur in the universe given that it was designed by God — P(E|T) = 1 on Christian theism because the Christian conception of God implies that if such a God exists, he would make a world of design — times the probability that a theistic Designer exists apart from the evidence of design (say, based on other arguments for God), divided by the likelihood that the universe would bear the type of design it has even if God did not exist.

Advocates of the Bayesian form of the design argument claim that (1) the probability of

theism's being true apart from the evidence of design, i.e., $P(T)$, is not insignificant because of other arguments (religious experience, miracles, the moral argument, the kalam argument, etc.); (2) the likelihood that the type of design we find in the world would occur if God did not exist, i.e., $P(E)$, is quite low. (pp. 27-28)

Moreland's fingers are moving very fast here. Don't let what he's doing slip past you. Having just told us that E is "the evidence provided by design" — i.e., the event that evidence of design occurs in the universe —, he now tells us that $P(E)$ is the probability that the universe would give evidence of design without there having been a designer. In the space of just two paragraphs, in an allegedly logical deduction, *design itself, apart from our knowing whether or not there was a designer*, gets magically transformed into *design without there having been a designer*.

Look closely at those two paragraphs. That's really what he says:

- second sentence of the first paragraph:
"E is the evidence provided by design"
- last sentence of the second paragraph:
"the likelihood that the type of design we find in the world would occur if God did not exist, i.e., $P(E)$ "

Now, it doesn't take a genius to see that if E is the *event* that there's design, then $P(E)$ is the *probability* that there's design, PERIOD! $P(E)$ is *not* the probability that there's design without there having been a designer, i.e., "if God did not exist". That's $P(E|\sim T)$. $P(E)$ includes the case in which there's design with there having been a designer, together with the case in which there's design without there having been a designer, just as E itself does. As Moreland notes in his very next sentence, this particular sleight of hand - i.e., disguising $P(E|\sim T)$ as $P(E)$, when the audience isn't looking - is "important for the rest of this book" (p. 28).

The relevant relationships can be expressed in standard symbols and, more perspicuously, if you're not familiar with the symbols, in words as (2)(a) and (2)(b), respectively.

(2)	(a)	(i)	$E = (E \cap T \cup (E \cap \sim T))$
		(ii)	$P(E) = P((E \cap T) \cup (E \cap \sim T))$
	(b)	(i)	$E = (E \text{ with } T) \text{ or } (E \text{ without } T)$
		(ii)	$P(E) = P((E \text{ with } T) \text{ or } (E \text{ without } T))$

In short, E can occur with T occurring or with T not occurring; either of those counts as E occurring and nothing else does.

Since T and $\sim T$ are both possibilities and since they are the only possibilities (either there is a designer or there isn't and that's that), E can occur with either one and that exhausts the possibilities. Since the two cases are mutually exclusive - i.e, you can't have both E with T and E without T -, it follows that the probability of the $\cup$ event in (2)(a) is the sum of the probabilities of its component events, so the probability equations in (2) become those in (3).

- (3) (a) $P(E) = P(E \cap T) + P(E \cap \sim T)$
 (b) $P(E) = P(E \text{ with } T) + P(E \text{ without } T)$

If two events have no effect on each other, they are said to be *independent* and the probability that they both occur - i.e., the $\cap$ of the events - can be calculated by multiplying their individual probabilities. Essentially, that's because the probability of each event is the proportion of all possibilities that count as the event occurring, so the probability that both occur is their combined proportion of all possibilities. If two events are not independent, then one of them has to be conditionalized to the other before the probabilities are multiplied in order to account for the effect the other event has on it.

In terms of the earlier playing cards example, picking the second card is not affected by what was chosen as the first card, if the first card is replaced, so the two pickings are independent. In that case the probability of picking two aces is found by multiplying the probabilities of picking each ace individually:

$$\begin{aligned} P(A_1 \cap A_2) &= P(A_1) \times P(A_2) \\ &= (1/13) \times (1/13) = 1/169 \end{aligned}$$

If the first card is not replaced, then the likelihood of picking an ace the second time is dependent on what was picked the first time. In that case the probability of picking two aces is still found by multiplying the probabilities of picking each ace individually, but the second picking is conditionalized to account for the effect of the first one having been picked:

$$\begin{aligned} P(A_1 \cap A_2) &= P(A_1) \times P(A_2|A_1) \\ &= (1/13) \times (1/17) = 1/221 \end{aligned}$$

Since one of the aces is gone, the probability of picking two aces goes down.

Since E and T, as well as E and $\sim T$, are not known to be independent, the probabilities of the $\cap$ events in (3) cannot be obtained by simply multiplying the probabilities of their components, as can be done for the $\cap$'s of independent events. Instead, we need to conditionalize T, as well as $\sim T$, to E, before doing the respective multiplications. In symbols, (3) becomes (4).

- (4) (a) $P(E) = (P(E) \times P(T|E)) + (P(E) \times P(\sim T|E))$
 (b) $P(E) = (P(E) \times P(T \text{ occurs given that } E \text{ occurs}))$
 $+ (P(E) \times P(T \text{ doesn't occur given that } E \text{ occurs}))$

If there's no evidence whatsoever of design in the universe, then P(E) is 0, so you get 0 on both sides of the equation. We can grant Moreland that that's not the case: The universe does give *evidence* of design. The question at issue is what significance that has. If P(E) is not 0, you can divide through by it and get (5).

$$(5) \quad 1 = P(T|E) + P(\sim T|E)$$

Not surprisingly, the probability that there's a designer given that there's evidence of design

together with the probability that there's no designer given that there's evidence of design add up to 1. Either there is a designer or there isn't, given that there's evidence of design. There's no other possibility and we already knew that.

You can find all of this in any good probability text. Yet Moreland confuses $P(E)$ with $P(E|\sim T)$ and his use of Bayes' theorem depends entirely on that confusion. He estimates - begging the question - that $P(E|\sim T)$ is "quite low," but he calls it $P(E)$, thereby enabling himself to claim a small denominator in (1). He then points out - correctly, I think - that, on the Christian view, $P(E|T)$ is 1, so that term disappears from the numerator. Finally, he estimates - again begging the question - that $P(T)$ is "not insignificant", thereby justifying the claim that the numerator is large. Since a large numerator divided by a small denominator yields a large result, we have to conclude that $P(T|E)$ is large: As Moreland wants and as he has set things up to turn out, the probability that there's a designer given that there's evidence of design is large.

Be careful not to indulge in the folly of giving Moreland the benefit of the doubt: His "mistake" is not the sort of error that one can make by accident. First, he tells us that E is one thing and, then, he tells us that $P(E)$ is the probability of something else. He's willing to do whatever he has to in order to be able to pretend to have proven the result that he wants. If that's Christian ethics, the world is better off without it.

Fortunately for Christians, Moreland and his gang are not the only game in town. He tells us that his book is intended to provide an alternative to the views of other Christian scholars who have argued for the need to keep science and religion separate, on the grounds that they deal with different domains and that neither one can shed light on the other. As it happens, Bayes' theorem does have implications for that issue, once Moreland's "error" is fixed and the calculations are done correctly. In particular, we need to see that $P(E)$ in (1), far from being "quite low," as Moreland claims it is, actually has the maximal value 1.

Look again at Bayes' theorem and think about $P(E)$. The sun rises in the morning and sets at night. People go to sleep and then get up. People are born, live, and then die. Regular cycles are everywhere. Maybe that just happened by accident and just *looks like* it resulted from a design. Maybe it happened the way it did because it just *couldn't* have happened another way. The mere fact that it looks like design doesn't prove that it is. The controversy is about whether or not there needed to be a designer to get the evidence of design in the universe. There's no one who denies that evidence for design is there.

Furthermore, Moreland has written his book and I have written my review. You are now reading that review. It follows that there are at least three humans in the world: Moreland, me, and you. As Moreland repeatedly and correctly points out, the very existence of humans is evidence for design in the universe (though not necessarily for a designer).

We could argue from that fact that $P(E)$ is 1. The weatherman can tell you today that the probability it will rain tomorrow is 0.6 - he'd probably really say 60 percent -, but, in the middle of a rain storm, he would have to tell you that the probability that it's raining *now, during the storm*, is 1. The probability that an event that is occurring is occurring is 1. $P(E)$ could perhaps have had any strange value at the time of the big bang or at any time thereafter when things were still in something of a mess, but not now that we're here to calculate it. We are very complex beings. The very fact that we can talk about the evidence of design in the universe proves that there's evidence of design in the universe. Our very existence is evidence of design, so, we might argue, $P(E)$ is 1.

Compare this argument with Wittgenstein's critique of Descartes, just to get some

perspective. Descartes claimed that he could doubt any proposition at all except that he himself existed, because he would not have been able even to think about the issue if he didn't exist and he was, in fact, thinking about it. Wittgenstein pointed out, three centuries later, that Descartes would not have even been able to formulate the issue without already having a meaningful language in which to think about it and that having such a language requires feedback from other people in order for the meanings of the words and grammatical constructions to be stable enough to express anything. In Wittgenstein's terms, there can't be a private language, a language only one person knows, so Descartes has to acknowledge that there are people in the world other than himself, since he does have a language in which to formulate his arguments. Similarly, in the present case, we have to acknowledge that there's evidence of design in the universe (from whatever source), because we would not be able to be discussing the issue if there weren't.

That fact is sometimes referred to as the Weak Anthropic Principle. A better name would be common sense:

The Second Rule of Common Sense:

1. An event that is happening is happening.
2. The probability that an event that is happening is happening is 1.

Moreland could respond (though not without Bill Dembski whispering in his ear, I'm sure) that what's referred to in the Second Rule is really $P(E|E)$, not $P(E)$. After all, the probability that it's raining out given that it's raining out is not necessarily the same as the probability that it's raining out. The former is 1, to be sure, but the latter still might not be. That point would be well taken, were Moreland to make it, but there would still be more to say on the anthropic issue generally. That will become quite clear in Section 4.

For now, to show that $P(E)$ is 1, I'll argue, instead, in a different direction, as follows: The universe *wouldn't qualify as a universe*, unless it had evidence of *some* kind of design, even from the very beginning and quite aside from our being here. As Bertrand Russell pointed out, you can always find some kind of pattern in any set of data, no matter how random or arbitrary it might be.

Consider the mathematical joke embodied in (6) and (7).

The Fundamental Theorem of Numerology:

- (6) Theorem: There are no uninteresting positive integers.
- (7) Proof: Assume that there are uninteresting positive integers. Because of the way the positive integers are ordered (what mathematicians call *well-ordered*), any non-empty set of positive integers has a smallest member. So the set of uninteresting positive integers has a smallest member. Just to have a way to refer to it, since we don't know what number it is, let's call that number m . So m is the smallest uninteresting positive integer. Every positive integer that is smaller than m is interesting. There is no uninteresting number smaller than m . Wow! That's really interesting! The number m is the number such that no smaller number is uninteresting. It's

the first number we get to, when we're counting, that's not interesting. How interesting! Gee whiz, m is a really interesting number! But that contradicts the fact that we specifically chose m for the reason that it's uninteresting. It can't be *both* interesting *and* uninteresting. The assumption that there are uninteresting positive integers has led us logically to the conclusion that there's a self-contradictory number, so that assumption must be false. That proves the theorem.

Later we'll see a real theorem and a valid proof, one that really works, that has the same logical structure as (7), namely, assuming the opposite of what you want to prove and then showing that it leads to a contradiction. What makes (6)-(7) a joke, rather than a genuine mathematical result, is the vagueness of the word *uninteresting*. Without a precise definition of just what it takes for a number to be interesting, we can slip and slide in any direction at all to pretend to prove anything we want.

A number is said to be *prime* if it has exactly two distinct factors, itself and 1. 1 itself is not prime, because it doesn't have two distinct factors; it has only itself.³ It's the only positive integer that has that property and that fact makes it interesting. 2 is the only even prime and is interesting for that reason. 3 is the smallest odd prime and is interesting for that reason. 4 is the smallest square of a prime; gee, that's interesting. 5 is the smallest number that's the sum of two distinct primes; how interesting. 6 is the double of the smallest odd prime; interesting again. 7 is the smallest number that's the sum of a prime and the square of a prime; guess what? Right, that's interesting. 8 is the smallest number that's the cube of a prime; interesting. 9 is the smallest odd prime square; interesting. And so on. This could go on forever, because, without a precise demarcation of what is to be considered interesting and what isn't, any characteristic at all can be construed as making a number interesting. We can pretend to be proving things, when we're really just playing word games.

Exactly the same is true for the phrase *evidence of design*. What could there possibly be that could *not* be construed as evidence of design??? Even those aspects of the universe that we know to be chaotic, in the precisely defined technical sense of that term, namely, having the characteristic that the outcome varies wildly with slight changes in the initial conditions, still have the characteristic that each set of initial conditions implies its own unique result. The problem with such phenomena is that we can't predict what will happen, because we can never know all the conditions. However, it still *looks like* a really cool design, quite aside from the persisting question of how something got to be that way.

Given the vagueness of the word *interesting*, it's fair to say that a purported "number" wouldn't qualify as a number, unless it had *some* characteristic that could be used to justify the judgment that it's interesting. It's difficult to imagine what such a thing would

³ Careless formulations of the definition of *prime* typically omit the word *distinct*, leaving students bewildered over why 1 is "not considered" to be prime. The real reason that 1 is not considered to be prime is that to consider it prime would complicate the formulation of the Fundamental Theorem of Arithmetic: Every positive integer other than 1 can be factored uniquely as the product of primes. If 1 were considered to be prime, we would have to tack on the extra phrase "except for 1's" at the end to retain the uniqueness, since any number of 1's can be included in a product. It's simpler, cleaner, and more perspicuous just to require primes to have distinct factors.

be, but it certainly wouldn't be a number. That begs the question of the alleged theorem by depriving it of any real content.

For exactly the same reason, it's fair to say that a purported "universe" wouldn't qualify as a universe, unless it showed *some* evidence of *some* kind of design. I don't know what such a thing would be, but it wouldn't be a universe. In other words, it's not the "anthropic" fact that *we're talking about a universe* that guarantees that $P(E)$ is 1. That fact relates more to $P(E|E)$, which we already know is 1, even without it. It's the quite different fact that *what we're talking about is a universe* that really guarantees that $P(E)$ is 1.

So $P(E)$ is 1. It follows that (1) reduces to (8).

$$(8) \quad P(T|E) = P(E|T) \times P(T)$$

As we have already observed, on the Christian view, $P(E|T)$ is also 1. On that view, as Moreland reminds us, the designer would necessarily have produced a universe with evidence of design. So (8) reduces to (9).

$$(9) \quad P(T|E) = P(T)$$

Wow! Take a close look at (9): (9) says that the probability that there's a designer given that there's evidence of design is the same as the probability that there's a designer. In other words, the existence of evidence that there's design has no bearing whatsoever on whether or not there was or is a designer. Lo and behold, that's exactly the position put forward by those Christian scholars that Moreland says he's providing an alternative to. Playing his game entirely by his rules, with the one exception that we corrected him where we caught him cheating, we discover that his opponents win. Maybe God exists and maybe He doesn't, but the fact that there's evidence of design has nothing to tell us about which of the two it is. Don't blame me for this result. It was Moreland who told us to use Bayes' theorem.

3. Intractable problems

Quite aside from Bayes' theorem, Bill Dembski purports to show that we could discover facts about the world that would make us acknowledge that it had a designer. In a psychological sense, of course, he's right. We COULD discover facts about the world that would convince us to accept his theology, just as we COULD discover facts about the world that would convince us to acknowledge the existence of leprachauns. In the abstract, that's not saying very much. Who knows what would convince us of what, if we actually found it staring us in the face? It's just as true that we COULD discover facts about the world that would convince us to *reject* Dembski's theology, but that symmetry somehow escapes him. Having gotten past these obvious truisms, let's actually look at his argument.

First, Dembski reviews various conditions under which atheists have said over the years that they would become theists. These range from Bertrand Russell's request for "enough evidence" (p. 130) to Woody Allen's request for "a large deposit in my name to a Swiss bank" (p. 116) to Norwood Russell Hanson's request for a particularly flamboyant

(12) Proof: $2^2 = 2 \times 2 = 4$

A problem is said to be *unsolvable* if we can construct a proof that it has *no* solution. The simplest way to do that is to show that any solution it might have is necessarily inconsistent. For example, (13) is an unsolvable problem.

(13) Problem: Find positive integers m and n whose ratio's square is exactly 2:

$$(m/n)^2 = 2$$

Solution: Unsolvable. There are no such integers.

The proof that it's unsolvable is provided in (14).

(14) Proof: Suppose you had such integers. Let's call them m and n , just to have a way to refer to them. The square of their ratio is 2. Consider that ratio: m/n . If m and n have any common factors, divide through the numerator and denominator of m/n by *all* such factors. This gives us another ratio p/q that has the same value as m/n , but for integers p and q that have *no common factors* (other than 1). The square of p/q is also 2, since p/q has the same value as m/n and the square of m/n is 2:

$$(p/q)^2 = 2$$

Now, work out the algebra of that equation. Squaring the fraction, we get

$$p^2/q^2 = 2$$

and, multiplying both sides of the equation by q^2 , we get

(i) $p^2 = 2q^2$

so p^2 turns out to be even. Since its square is even, p itself has to be even, because the square of an odd number is always odd. So there's some integer s such that

$$p = 2s$$

That's what it means for p to be even. It follows that

$$p^2 = (2s)^2$$

so

$$p^2 = (2^2)(s^2)$$

and

$$(ii) \quad p^2 = 4s^2$$

Combining (i) and (ii), we get

$$2q^2 = 4s^2$$

since both sides are equal to p^2 , and, dividing both sides of the equation by 2, we get

$$q^2 = 2s^2$$

so q^2 is even. It follows that q is even for the same reason that we saw p is: Because its square is even. Lo and behold, it turns out that p and q are both even. They thus have 2 as a common factor. We started with two integers p and q that we made sure had no common factors and then, by assuming that their ratio squares to 2, we showed that they have to have a common factor. In other words, there must be something wrong with the assumption that we started with: We can't have integers whose ratio's square is 2.

So problem (13) is unsolvable.

The point here is that there can be problems whose solutions are unknown not just because we haven't found them yet, but because they really don't exist and we can prove that. So far, so good. There are solvable problems and there are unsolvable problems. This much was known even to the ancient Greeks. The proof in (14), in a more geometric formulation, is traditionally said to have been discovered by Pythagoras or one of his followers.

Things get more interesting when we look at intractable problems, a major discovery of the twentieth century in the field of computation theory. First, note that we can show a problem is solvable without actually finding a solution for it. For example, we know that problem (15) is solvable, because we have a multiplication algorithm - a step-by-step procedure - that works for any two integers.

(15) Problem: Find an integer n that is the product of 37873 and 54217:

Solution $n = 37873 \times 54217$

If we'd just take the trouble to carry out the steps, we'd find the solution to the problem. We know that, without having found it, because we have the algorithm that would get it for us.

A problem is said to be *intractable*, if we can both construct a proof that it's solvable - an algorithm that would get the solution for us, if we were to follow its steps - and also construct a proof that finding a solution would take a longer time than anyone would ever have (or more resources than there could ever be). In other words, we know a

problem is intractable, if we can find an algorithm that would give us the result, but for which we'd have to go through so many steps, that we'd all be dead before we finished and so would everyone else who ever gets born after us. To spell out the details of such proofs for an intractable problem, as was done in (14) for an unsolvable problem, would carry us too far afield. The mathematics is just too complex to go into here. You can find it in books and journals on computation theory. Suffice it to say that Dembski is right, when he says that such problems exist. His whole argument is based on that one fact.

Dembski observes that there are problems for which we know there are solutions and for which we could test a solution and show that it works, if we were to stumble across one, but that are intractable in the sense just described. The basic idea is that, for some kinds of problems, it's a lot harder and takes a lot longer to discover a solution than to test one. For example, if you were presented with the numbers in (16) and told to multiply them to find their product, you could do it fairly quickly and get the right answer, shown in (17).

$$(16) \quad 37873$$

$$54217$$

$$(17) \quad 2053360441$$

However, if you were presented with the number shown in (17) and told to find two five-digit numbers that multiply to it as factors, you might have some difficulty finding those numbers and it would certainly take you longer. The former task can be performed by a very simple algorithm that we all learned in third grade (or by pushing a few buttons on a calculator), whereas the latter task requires testing lots of numbers to see which ones divide easily into the given number and discarding those that don't. If the number whose factors you want to find is sufficiently large, then finding those factors could take an inordinately long time and thus be intractable, whereas multiplying the factors, were they given to us, could be simple and straightforward.

Dembski's entire case amounts to pointing out that IF we WERE to present a sufficiently large number to his magical pulsar and get it to give us the factors, then we WOULD have to acknowledge that it speaks for God. If the number itself is so large that we could never factor it in this universe, but the factors are not so large that we could not multiply them in time to see that the answer is correct, then the pulsar speaks for Yahweh. Maybe he's right. Maybe there would be no other way to account for the magical pulsar's abilities. But where's the pulsar? What are the numbers? To borrow a phrase from Clara Peller, where's the beef???

Thought experiments can indeed be a useful tool in physics and other sciences, as Dembski observes. However, in contrast to the thought experiments of physicists like Einstein, who use such mental exercises to suggest potential experiments and get clues for hypotheses to test, Dembski's just sits there. We know no more about the world after doing his mental exercise than we did before. There are no hypotheses to test and no experiments

⁴ Dembski purports to show some of his beef in his newer book, *The Design Inference*, Cambridge University Press, 1998. However, as Wesley Elsberry shows, in a compellingly concise review (*Reports of the National Center for Science Education*, 19.2: 32-35, March/April 1999), it's really soy burger.

to do. Sure, IF his scenario WERE to occur, we WOULD all be very impressed, but he gives absolutely no grounds whatsoever for thinking that the scenario could ever really occur.

Again, as we saw in connection with Moreland's use of Bayes' Theorem, the most striking feature of Dembski's argument is its dishonesty. According to Moreland, "Dembski argues that the world is the kind of place where supernatural design can indeed become perfectly evident on rational and empirical grounds." (pp. 34-35) However, in fact, the opposite is the case. If Dembski has shown anything at all, he's shown that the world is *not* the kind of place where supernatural design can indeed become perfectly evident on rational and empirical grounds. We already know, from physics and other sciences, that the scenario he describes cannot occur in the world, for all the reasons Dembski points to in setting it up, such as superluminal velocities. For Moreland's claim to be true, Dembski would have to have shown *that such a pulsar can be discovered* and he's shown no such thing. He's just described *what he'd like to discover*. In fact, one could argue that the scenario is so bizarre and unlikely, that if *that's* what it would take to prove Dembski's theology, then, based on what we already know about the world and how it works, no sane person would ever choose to believe it. It's a *reductio ad absurdum*.

Dembski's scenario provides no justification for setting up a research program to look for such a pulsar - or, more to the point of *The Creation Hypothesis*, to look for some equivalent expression of a designer in biological systems, for example - or for spending sparse research funds to finance such a program. The most that can honestly be said about the scenario is that it shows that Bill Dembski has a good imagination. He hasn't shown that there's a designer or even given any evidence that there is. Even if we were to encounter some equivalent of Dembski's pulsar, anyone who really wanted to could still keep wondering if perhaps it was all some sort of dream and set about looking for a way to wake up. There are always alternative interpretations for any piece of evidence. That fact should not be surprising, after what we saw in connection with Bayes' theorem.

In fact, you don't have to resort to dreaming to think of an alternative explanation for the imaginary pulsar's magical abilities. Intractability itself may turn out to be tractable. Take a closer look at what makes a problem intractable. An intractable problem is intractable because of two basic features of algorithms. First, the steps in an algorithm need to be performed sequentially and, second, each step in an algorithm takes a finite amount of time to perform. Even if each step takes a miniscule amount of time, the sum of an enormous sequence of even miniscule finite steps eventually yields a gigantic result. However, if either of these features could be weakened or removed, the set of intractable problems could be shrunk substantially and, perhaps, eliminated altogether.

Recent developments in quantum computing promise to make a substantial dent in the first of the two cited features. A *quantum computer* can perform enormous numbers of steps - for example, testing pairs of potential factors of a very large number - simultaneously, in parallel, thereby drastically reducing the amount of time needed to solve a problem. It manages to do this by making use of quantum uncertainty, in which a subatomic physical process can be in any of a number of possible states with varying degrees of probability, until an observer looks to see the result. By looking at the process at just the right moment, the observer can make sure that the result that's revealed is the solution to the desired problem.

The second problematic feature could, perhaps, be eliminated by the development of *infinitesimal computers*. An infinitesimal is a quantity that is infinitely small, that is, smaller than any positive quantity, but still greater than zero. Infinitesimals provided the basis for the intuitive mathematics of Newton's *Principia*, but later mathematicians rejected the notion, because they couldn't figure out how to formulate infinitesimals precisely enough to be consistent with the rest of mathematics. It was only in the 1960's, three centuries after Newton, that a way was found, using twentieth-century methods of mathematical logic, to model infinitesimals in a consistent and manageable way. That led to the development of what is called *non-standard* mathematics, whose principal theorems are the same as those of standard mathematics, but whose proofs are substantially simpler. Adding huge finite numbers of infinitesimals yields a result that is still an infinitesimal. If the infinitesimals being added are time intervals, the result is an infinitesimal time interval. It therefore becomes reasonable to ask whether algorithms might be developed in which each step takes an infinitesimal amount of time, so the time to solve the problem would be infinitesimal as well. That would provide another route to undermining intractability.

Infinitesimal computers are entirely a figment of my imagination, just as Dembski's pulsar is entirely a figment of his. If you ever think of a way to build one, please be sure to let me know. However, primitive quantum computers have already been built and software for more sophisticated ones has already been written. Time will tell just how far that development can go. In the meantime, we can use these examples to learn another important lesson:

The Third Rule of Common Sense:

1. Knowledge advances. Dogma stagnates.
2. Absolute judgments based on current knowledge inevitably grow stale.

4. Anthropic parameters

In contrast to Dembski's vacuous thought experiment, Hugh Ross assaults us with a barrage of data that he claims could not exist without there having been a designer. The thrust of his argument is that the Universe has characteristics that are uniquely suited to the existence of life, in general, and of human life on Earth, in particular. A sample of the facts he cites (pp. 160-169) is given in **Table 1**. As noted, that's just a sample. He actually presents a lot more. Together with glib endorsements of the Bible and snide jabs at non-Christians, that's the content of his chapter.

For this parameter:	If it were <i>larger</i> :	If it were <i>smaller</i> :
the strong nuclear force	There would be no hydrogen.	There would be no elements other than hydrogen.
the gravitational force constant	Stars would be too hot and would burn up quickly and unevenly.	Stars would remain so cool that nuclear fusion would never ignite, hence no heavy element production.
the expansion rate of the universe	There would be no galaxy formation.	Universe would have collapsed prior to star formation.
the velocity of light	Stars would be too luminous.	Stars would be not luminous enough.
the ratio of reflected light to the total amount falling on the surface of the earth	Runaway glaciation would develop.	A runaway greenhouse effect would develop.
the carbon dioxide level in the atmosphere	A runaway greenhouse effect would develop.	Plants would be unable to maintain efficient photosynthesis.

Table 1: Some Facts about the Universe that are Conducive to Human Life

We already know from Bayes' theorem that evidence of design adds nothing to the likelihood of there having been a designer, but there's value in the mental exercise of looking more closely to see just why that is. I have no quarrel with Ross' facts. I'm not an astronomer or a geologist. I can look the facts up and I don't doubt that he'll turn out to be right about them. However, the way Ross uses these facts brings to mind a question that a former colleague once told me his friend's young daughter had asked him: "If there's no God, who makes the next Kleenex pop up?"⁵ The full answer, of course, would be a good science lecture covering the laws of physics and chemistry that explain how solids like Kleenexes hold together. Ross' account reverses cause and effect, in a manner reminiscent of the old joke: "Why are turds tapered?" "So your ass won't slam shut." My, what a clever design *that* was! How compassionate the designer must be to have taken the trouble to design us in just that way. What a pain in the ass it would have been otherwise! Just like J. P. Moreland.

It's perfectly obvious that the Universe has to be well-suited to the existence of life for life to exist in the Universe. It's equally obvious that the Earth has to have been well-suited for the development of life in this time period for life to have developed on the Earth in this time period. In a sense, that's exactly what natural selection is all about. It's also

⁵ I thank Moe Morin for this example.

sometimes formulated as another version of the “anthropic principle.” Again, it’s all best ascribed to common sense:

The Fourth Rule of Common Sense:

1. The universe is well-suited for the existence of anything that exists in it.
2. Anything that is not well-suited for existence in the universe doesn’t exist in it.

Imagine that an eighteen-wheeler rumbles by at just the moment when J. P. Moreland’s parents are engaged in the conjugal act that led to his conception. The extra vibrations are just strong enough to jiggle his mother’s body just enough to enable a different sperm to slip through and meet the waiting egg. As a result, a different embryo gets conceived and a different person gets born. Most likely, that person is still named J. P. Moreland, because the unsuspecting parents have no clue that a substitution has taken place.

In effect, that J. P. Moreland is a fraternal twin of the one we know. That one has many features in common with ours, because the same egg was involved, but also many differences, because the egg merged with a different sperm. Even the gender could be different, since that’s determined by the sperm, and the name J. P. is gender-neutral. In that case, *The Creation Hypothesis* would likely not have been written, because, despite their trendy use of the feminine indefinite pronoun, the eleven contributors to that book apparently couldn’t find even one feminine person they could consider worthy of being on their team. A female J. P. Moreland would not have been able to get them together to write it. Then I could have spent the past month playing music, instead of having to write this review.

No one in the world would know that the J. P. Moreland who was born was different from the one that would have been born, if the truck had taken a different route. Subsequent history would be changed, as determined by that person’s characteristics, such as whether or not *The Creation Hypothesis* would even have come to be written, but no one would ever suspect. In fact, it could be that there really was an eighteen-wheeler and that the J. P. Moreland we know is the alternate one, switched by the truck’s vibrations for the one who was supposed to have been born otherwise. We can never know. And so on.

Exactly the same is true for the universe:

The Fifth Rule of Common Sense:

1. If the universe were different, then it wouldn’t be the way it is.
2. The universe is the way it is, because it isn’t some other way.

If the values of the parameters that Ross lists were other than they are, then we wouldn’t be here, but maybe someone else would. They wouldn’t know that we were supposed to be, because that really wouldn’t be the case. If the values were different in another way, then maybe even life itself wouldn’t have developed, but something else would have.

In a universe with just the right values for the various parameters, you wouldn’t get life, but you would get grepple. Grepple can’t exist in our universe, because the values of the universal constants don’t provide the right conditions for it. The characteristics of

grepple are incomprehensible to us, just as the characteristics of life are incomprehensible to grepple, or would be if there were any. We couldn't exist in grepple's universe, just as it can't exist in ours. J. P. Moreland doesn't know that he got switched for the real one just by the passage of a lucky truck. Maybe the universe would also have been better off with grepple. It would certainly be different, but grepple wouldn't know that it was. Neither do we and we should be willing to admit that.

If you remove the steering wheel from your car, you can't drive it. If you remove the wheels, it won't go anywhere. If you keep the air conditioner turned up high enough, the car is too cold to sit in. If you remove the seats, it's useless for transportation, because you can't drive sitting on the floor. If you stand it on end, you can't do anything with it that you'd normally want to do with a car. And so on. Any one of these changes makes the car useless as a car. However, making all of these changes together, along with several others that would individually make the car useless as a car, transforms the car into a refrigerator, a device that is very useful for storing perishable food items. The collective effect of a whole set of changes that would individually make an item useless can transform that item into a different item that is useful in other ways.

Whether it's refrigerators or grepple, Ross' argument falls apart. It seems to make sense only if we take it for granted that we had to be here. That's a comforting assumption, but, for many centuries, so was the assumption that we're at the center of the universe. We are not at the center of the universe and there's no evidence whatsoever that we had to be here. Just ask grepple. It never heard of us. It couldn't have, because the universe it would have been in never got to exist. Just like J. P. Moreland.

5. The second law of thermodynamics

Our J. P. Moreland takes great pains to show that the universe must have had a beginning. That's a purely empirical question, but he tries to resolve it in entirely abstract terms. One way Moreland makes his case is by appealing to the second law of thermodynamics, one version of which is given in (18).

(18) The Second Law of Thermodynamics:

In a closed system, entropy always increases.

A closed system is one that has no energy exchange with its environment: Nothing goes in and nothing comes out. Entropy is a measure of the internal disorder in a system, the degree to which the arrangements of its components are unpredictable. Maintaining internal order requires keeping entropy from increasing, which means, in turn, adding energy to the system or releasing energy from it. To get a metaphorical sense of what this means, try to go for as long as you can without going to the bathroom. As you make your system more closed, your internal disorder increases, much to your distress. Eventually something has to give, to open up the system, to restore your internal order, much to your relief.

Moreland argues that the universe must have had a beginning, because if it had existed forever, entropy would have been increasing forever, as a result of the effect of (18).

By now it would have achieved an equilibrium state of complete and total disorder, which, putting international politics aside, it clearly has not. He figures that the second law applies, because he assumes that the universe is a closed system. Given his theology, he could just as well maintain that the universe is not a closed system, in which case (18) would not apply. God's repeated interventions and miracles could be adding and removing energy from the universe, enabling it to go on forever without building up an excessive amount of disorder. However, a literal reading of Genesis rules that possibility out. Moreland has already decided, based on scripture, that the universe had a beginning and, by jiminy, he's going to "prove" it no matter what.

Moreland presents the second law of thermodynamics as if it were a holy revelation engraved on stone tablets and handed to an anointed prophet on the top of a sacred mountain. He seems to have difficulty with the scientific notion of law, viz., an empirical generalization that unifies and explains diverse phenomena and that has been tested and shown to be true by experiment and observation. It seems never to have occurred to him that the second law is accepted by scientists only because it's been tested experimentally and has passed the test. A necessary part of such testing is an awareness of the conditions under which the testing takes place. All that can ever be shown about an empirical law is that it's true under such and such conditions, namely, those under which it was tested. The second law of thermodynamics has been tested on lots and lots of closed systems and it always turns out to be true. That's the only reason that anyone with any sense believes it. That's the only reason anyone is justified in believing it so strongly.

But does the second law of thermodynamics apply to the universe as a whole? Has the second law ever been tested on the universe as a whole? Look closely at (18) and focus on the word *closed*. What does that word mean? A closed system is one that has no energy exchange with its environment. What in the world (no pun intended!) is the environment of the universe??? The universe consists of everything there is. When science fiction writers talk about "other universes" or "parallel universes," they're using the word *universe* in a very different sense. All of those "universes" taken together still comprise "the universe" that it is science's task to study.

Granting that the universe is a closed system in that no energy enters or leaves it, it must also be granted that the universe is a very different *kind* of closed system from any other one. Any other system has an inside and an outside and we can study what happens at the interface: Whether energy goes in or out; if it doesn't, the system's closed. The universe has only an inside: There is no outside and thus no interface; that's a horse of quite a different color.

In regard to the second law, we can summarize the situation as follows:

Definition: A closed system is said to be of Type 1, if it has both an inside and an outside.

Definition: A closed system is said to be of Type 2, if it has only an inside.

Fact: There exists only one closed system of Type 2 (namely, the universe as a whole).

Fact: The second law of thermodynamics has been tested only on closed systems of Type 1.

It follows that we don't have a clue whether the second law applies to the universe as a whole. The universe as a whole is such a peculiar entity, as compared with anything in it, that we extrapolate to it only at great risk. Again, it's just common sense:

The Sixth Rule of Common Sense:

1. To know if a claim is true, you have to test it.
2. To know if a claim is true in a particular set of conditions, you have to test it in those conditions.

Suppose you were to postulate the hypothesis in (19) and then test it on every species of bat that you can find.

(19) Mammals can fly.

There are lots of species of bat and you could do an impressive study. You would conclude that (19) is true and you would have an enormous wealth of data to show (and to publish) to back up your claim. Of course, you would be wrong. To verify a hypothesis about mammals, you have to test it on a representative sample of all kinds of mammals, not just on mammals that have wings. To verify a claim about all closed systems, you have to include every kind of closed system in your tests, not just those that have an outside. We know the second law is true for all closed systems *that have an outside*, but we don't know whether it's true for the universe. If Moreland can suggest a good *empirical* test for that hypothesis, I'm sure the world will listen.⁶

6. Infinity

Moreland also tries to prove that the universe had a beginning by playing with the mathematics of infinity. He takes as his starting point the claim, "It is impossible to cross an actual infinite ($\aleph_0$)."⁷ (p. 18)

Now, suppose we represent the events in the history of the universe as follows:

⁶ Of course, if the popular conception of black holes as "places where matter actually leaves the universe," presumably without going anywhere, is at all accurate and if there are black holes, then the universe *isn't* closed. Then all bets are off, including conservation of mass/energy. But that remains to be seen.

⁷ Mathematicians acknowledge different sizes of infinities, standardly referred to as the transfinite cardinal numbers. For historical reasons, those infinities are represented by the Hebrew letter aleph, $\aleph$. The smallest such infinity, the one that represents the number of positive integers, is referred to as $\aleph_0$. The generic non-specific infinity is standardly referred to as ∞ .

- $\mathbf{N}_0$. . . -3 -2 -1 0
Past Present

The present moment is marked zero, and each moment in the past (e.g., yesterday, 1500 B.C.) is a point on the line. Now if the universe never had a beginning, then there is no end on the left side of the line. Rather, it extends infinitely far into the past. If the universe had no beginning, then the number of events crossed to reach the present moment would be actually infinite. It would be like counting to zero from negative infinity. But since one cannot cross an actual infinite (regardless of whether you count to positive infinity from zero or to zero from negative infinity), then the present moment could never have arrived if the universe were beginningless. This means that since the present is real, it was only preceded by a finite past, and there was a beginning or first event!” (p. 19, “!” in the original)

In other words, since we're here and *since we must have gotten here from somewhere*, there must be somewhere where we've gotten here from. He arrives at the conclusion that he wants, because he's already assumed it in the course of his argument. However, just as there's no evidence that we had to be here, there's also no evidence that we had to have gotten here from somewhere.

Infinity, like the universe, is a very strange thing, so let's examine this matter more closely to get a better grip on it. First, observe that Moreland's logic works just as well for the case in which the universe did have a beginning. That's already suspicious. In that case, his argument reduces to a version of Zeno's well-known paradox. Zeno argued that motion is impossible, because to get from one point to another, you must first get halfway there, which requires having already gotten halfway to that halfway point, and so on, for an infinite series that has no way to get started. Since motion obviously is possible - we do it all the time - , there must be something wrong with Zeno's reasoning, even if we cannot quite conceptualize just what that something is. Whatever it is, it carries over to Moreland's argument, which fails on similar grounds.

For the temporal version, assume that the universe had a beginning. To get from the beginning to the present, we would first have had to get to halfway to the present; to get to halfway to the present, we would first have had to get halfway there, i.e., a quarter of the way to the present; to get to a quarter of the way to the present, we would first have had to get halfway there, i.e., an eighth of the way to the present; and so on. Denoting the beginning of the universe by “0” and the present by “1”, we would thus have had to reach each of the successive points in (20), before we could reach the next one.

(20) 0, ..., 1/64, 1/32, 1/16, 1/8, 1/4, 1/2, 1 (has a beginning)
beginning present

However, as in Moreland's sequence, (21), despite the presence of 0 in (20), there is still no way to get the rest of the sequence started.

(21) ..., -5, -4, -3, -2, -1, 0 (has no beginning)
present

Even though the universe itself would have had a beginning on this account, we would still have to have traversed an actual infinity, the “...” between 0 and $1/64$ in (20), to have gotten to the present, without having any way to have gotten that traversal started.

In other words, Moreland’s assumption that we cannot traverse an actual infinity implies that we could not have gotten to where we are, whether the universe had a beginning or not. Since those are the only two possibilities and since we obviously did get to where we are, there must be something wrong with his assumption: We can traverse infinities. In fact, we traverse actual infinities all the time, whenever we move from one place to another. That’s what’s wrong with Zeno’s version of the argument. Granted, it’s difficult to conceptualize how we manage to traverse infinities, but it’s no more difficult to conceptualize that than to conceptualize, say, quantum mechanics or the idea that the all-powerful creator of the universe would care which team wins a football game. The fact is that we do traverse such infinities every time we move, so the crux of Moreland’s argument crumbles into dust, the very substance he thinks that God fashioned Adam from.

Note that the concept of convergence doesn’t help here. Mathematicians call (20) a *convergent* sequence because the interval it spans can be considered to have a finite length. If we begin at 1 and work backwards, the sums we get by taking successively more terms in (20) approach a finite limit, namely, 2, as suggested in (22).

$$\begin{aligned}
 (22) \quad & 1 = 1 \\
 & 1 + 1/2 = 1.5 \\
 & 1 + 1/2 + 1/4 = 1.75 \\
 & 1 + 1/2 + 1/4 + 1/8 = 1.875 \\
 & 1 + 1/2 + 1/4 + 1/8 + 1/16 = 1.9375 \\
 & \dots \\
 & 1 + 1/2 + 1/4 + 1/8 + 1/16 + \dots = 2
 \end{aligned}$$

The interval from 0 to 1 can thus be considered as having length 1. In contrast, (21) is a *divergent* sequence, because the successive sums increase without bound, so the length of the entire interval must be considered to be infinite, as in (23).

$$\begin{aligned}
 (23) \quad & 0 + (-1) = -1 \\
 & 0 + (-1) + (-2) = -3 \\
 & 0 + (-1) + (-2) + (-3) = -6 \\
 & 0 + (-1) + (-2) + (-3) + (-4) = -10 \\
 & 0 + (-1) + (-2) + (-3) + (-4) + (-5) = -15 \\
 & \dots \\
 & 0 + (-1) + (-2) + (-3) + (-4) + (-5) + \dots = -\infty
 \end{aligned}$$

However, as Moreland takes care to point out, the problem with (21) is not its *cardinality*, the “number” of items it contains, but its *order type*, the way those items are arranged. The problem is not that its length is infinite, but that it starts with “...”. That is, there is no way to get the sequence started. The sequence (24), representing the future, rather than the past, has the same infinite cardinality as (21), but it presents no problem, because, though it never ends, we can start traversing it from 0.

(24) 0, 1, 2, 3, 4, 5, ...

The same is true for (25), which, though it never ends, we can start traversing from 1.

(25) 1, 1 1/2, 1 3/4, 1 7/8, 1 15/16, ...

The four sequences (20), (21), (24), and (25) all have the same infinite cardinality, because they can each be put into a one-to-one correspondence with the positive integers. In other words, we can count them item by item through some suitable reordering: Starting at the right and then counting leftward, starting at the left and then counting rightward, or counting 0 as the first point and then continuing from the right and counting leftward. However, as they stand, with the orderings they have, the four sequences exemplify three distinct order types. Sequences (24) and (25) are already in one-to-one correspondence with the positive integers: In each sequence as written, there's a first item, a second item, a third item, and so on. However, (20) and (21) would each need to be reordered, in different ways, to be counted. As they stand, despite the 0 in (20), there is no way to get the counting started because of the "...".

In fact, the situation is even worse than that, because the same case can be made for any two events in any of the sequences. To get from *any* one event to "the next" event, we first have to traverse an infinite sequence of intervening events that begins with "...". This leads to a nested sequence of such sequences and thus an infinite sequence of "...". In other words, the notion "next event" begins to reveal itself as incoherent, bringing purely abstract discussions of causality, which Moreland also seems to like, into doubt. Perhaps Moreland will have to spend eternity contemplating all this in Hell. I doubt it, but not for the reason that he would like.

It would be a fun path to pursue. However, by now you should have begun to detect the distinctive scent of sophistry, from my argument no less than Moreland's. That acrid aroma always arises when one tries to prove claims about material reality entirely from formal abstractions. The medieval scholastics, Moreland's spiritual predecessors, were masters of that game (as were the great Talmudic commentators of the same time period) and he fits their footsteps well. Considering the age we live in, he really ought to know better:

The Seventh Rule of Common Sense:

1. Abstract arguments yield abstract results.
2. Concrete results require concrete evidence.

Physical evidence about real matter may yet provide conclusive proof that the universe had a beginning. The question will ultimately be answered, if at all, on primarily empirical grounds. Current theories that point to a big bang appear to be steps in that direction. However, the idealizations and simplifying assumptions that are required to make calculations from such theories tractable still make it necessary to exercise caution in making definitive judgments on the matter. Is the universe really homogeneous and isotropic in all directions, as those calculations typically assume? On what scale? Is there really "dark matter" or does Newton's law of gravitation have a finite distance limit? Is it

really impossible to have an absolute reference frame for motion? What about the all-pervasive background radiation thought to stem from the big bang? Can that serve as an absolute reference frame? I don't know the answers to those questions and, unlike Moreland and his crew, I don't have a scriptural ax to grind, so I'm willing to admit I don't know. The arguments for a big bang still depend crucially on assumed answers to such questions. Perhaps they always will, perhaps not. Moreland's sophisticated shenanigans only cloud the issue by diverting attention away from the empirical work - and the empirically based theoretical work - that still needs to be done.

It used to be believed that water pumps work because Nature abhors a vacuum. Water rises in a pump as air is extracted, because Nature won't permit a vacuum to exist. What a surprise it was to discover that pumps only work down to a certain depth. When a pump is dug too deeply, the water fails to rise. Why does Nature suddenly stop abhorring vacuums at a particular underground depth? Is this the gate to Hell??? Is Nature demurring to Satan by permitting vacuums in his domain? As it happens, the discovery led to a wholesale revamping of the science of water pumps, including the discovery of air pressure and Boyle's law, as well as the realization that Nature doesn't abhor a vacuum after all. It just seems to, down to a certain depth. Today we know that most of matter is vacuum. Electrons can exist only in discretely distanced shells around the nucleus. Between those shells there's nothing at all, and that's vacuum. Interstellar space is filled with widely distanced hydrogen atoms. Between any two such atoms is vacuum, and lots of it. And so on. Satan and Hell have nothing to do with it. Neither does a personified, anthropomorphized Nature. And neither do sophisticated contortions of the sort that Moreland revels in.

Regardless of how the on-going big-bang debates turn out, on the empirical grounds that really matter, the way around the conceptual difficulties of a potentially non-beginning universe is simply to acknowledge that, just as we observed in connection with thermodynamics, the universe as a whole is a very peculiar kind of thing. Why would anyone expect it not to be? Since the universe consists of everything there is and everything there ever has been, it doesn't need to have gotten started. The "... " has been (or could have been) going on forever. We are just what happens to be here now, at this point in the sequence. That the sequence didn't get started is precisely the point; it didn't have to, because it has (or could have) been going on forever. We got to be here now precisely *because an infinite span of time preceded us* (or could have).

Picture yourself trying to climb out of a bottomless pit. You were born on the side of the pit, as were your parents and their parents before them. Your climb started at a particular point on the side of the pit, somewhere above the points where your parents started their climbs, which were somewhere above the points where their parents started theirs. If you have offspring, they will start their climbs somewhere above the points where you started yours. Everyone in the pit is climbing in the same direction and everyone's climb has a starting point. But the pit itself doesn't. Nor does the sequence of climbings.

Picture the pit as consisting of an infinitely long sequence of kilometers. You and everyone else traverse one kilometer each during your lifetime. There is an infinite sequence of kilometers and an infinite sequence of traversals and there is a one-to-one correspondence between the two infinite sequences. Everyone in the climbing sequence corresponds to one kilometer along the side of the pit. Everyone got to be where they are by virtue of coming after whoever it was that came before. You are where you are precisely

because an *infinite* number of people have climbed below you, each one associated with one of the kilometers along the *infinite* side of the pit. There doesn't need to have been a first one, precisely because each one is preceded by an infinite number who have come before. That's how you got to be where you are. *That's what infinity is all about.* That's why Zeno was wrong. That's what J. P. Moreland doesn't understand.

7. DNA and "information theory"

Civility is another notion that Moreland doesn't understand. His self-righteous contributors show no compunctions whatsoever about offending the religious sensibilities of non-Christians (as they define them). Ross even describes Judaism, Islam, and Mormonism as religions that "appropriate at least a portion of" the Christian Scriptures (p. 153). That's right. No kidding! *Judaism* appropriates a part of the *Christian* Scriptures. He actually says that. I'm not making this up!

Keeping in the same spirit - why should they have all the fun? -, let's return to Dembski's pulsar and ask the mirror image of his question: What could we ever discover about the world that would require Moreland's groupies to admit that they've been wrong, renounce their fundamentalist faith, and finally come to their senses? (Sorry, Austin. I didn't start this.) Granting that actually discovering the hypothetical pulsar would provide a compelling (though still not *completely* conclusive) case to the effect that the universe had a designer, what is that pulsar likely to tell us about the designer it admittedly speaks for? What if the pulsar were to tell us that the designer is not, like Caesar's Gaul, divided into three parts - Father, Son, and Holy Whatever -, but is indeed One, as the Jews, Muslims, Unitarians, and Bahai have insisted; that It did not come to earth as a holy spirit to have unsolicited sex with a Jewish virgin; that It did not deliberately bear a son for the specific purpose of having him killed on a cross to exonerate sins, in a blood sacrifice of exactly the sort that It had already told Abraham was unnecessary? What if their own magical pulsar, revealed to be speaking for the all-powerful designer of all things, were to tell Moreland's gang these Truths about its Master? Would that be enough to convince them to mend their ways and follow the True and Proper Path?

As for Moreland, Ross, and Dembski, I really don't know. However, for two of their collaborators, the answer is a resounding "NO!" Walter Bradley and Charles Thaxton are identified in their biographical descriptions as being Fellows of the so-called American Scientific Affiliation, an organization that requires its members to take an oath to defend the literal truth of the Christian Bible no matter what. In other words, even if the Lord, God, Himself were to tell these people, in terms that were unmistakably His, that they are wrong and should recant (Would they even know Him if they met Him face to face?), they would still deny Him, not just three times, but for all eternity, because they have taken an oath that requires them to do so. These people claim to be scientists. Why should anyone take them seriously?

The answer is, unfortunately, because they wrote a chapter of *The Creation Hypothesis*. There isn't any other. Bradley and Thaxton base their case on a perceived similarity between DNA and language. They argue that life must have had a designer because DNA, like language, is high in information and in specified complexity. In contrast to a crystal, which grows by simply duplicating the same pattern over and over again, the

components of a DNA molecule must be very precisely arranged for the molecule to perform its function in a living organism, just as the words of a sentence must be precisely arranged to convey an intended message. It contains lots of information and that information is very highly specified in the sense just described. It therefore could not have arisen by chance, as they say evolutionists contend.

There are two things wrong with their argument. First, there isn't anyone who claims that life arose by chance - not if you take what people say in context. In his lectures and writings, Stephen J. Gould keeps urging fellow evolutionists, such as Richard Dawkins, to allow more of a role for chance in the accounts that they give of how evolution works. He wouldn't have to do that if they were already claiming that chance is all there is. It's like the claim that the ancient Hebrews were monotheists. The Biblical prophets wouldn't have had to keep haranguing them to worship only one God, if they really already did.

Second, Bradley and Thaxton assume that the meaning of a message, whether in DNA or language, is contained entirely in the message itself, when in fact it arises from the interaction of the message with its receiver. Consider a humongous sequence of 0's and 1's that contains a segment like the one given in (26).

(26) ...100010100011101001100100001101001110010010100001110100110
 1001101001001001001000011010110010010010010010001110101010
 1100110101001101010011010011010010010100100111010101010100
 110100110101001001110101001001110101010...

That sequence can be considered to be a "file" that represents the electronic "bits" of a computer, with 0 standing for *off* and 1 standing for *on*. If you "drag" the "icon" that represents that "file" across your computer screen and "drop" it into the "icon" that represents a word processor, you will see the content of **Figure 1** on your screen. If you "drag" the "icon" for (26) across your screen and "drop" it into the "icon" that represents a web browser, you will see the content of **Figure 2** on your screen. If you "drop" (26)'s "icon" into the trash (or recycle-bin) "icon", it just disappears.

So what is the meaning of the "message" (26)? What is its "information content"? Relative to a word processor, (26) means **Figure 1**. Relative to a web browser, (26) means **Figure 2**. Its "information content" depends entirely on where you "drop" it. In fact, the situation is even worse than that. **Figure 1** and **Figure 2** were obtained from the screen of a Macintosh, specifically, a Power Macintosh 7100/66 (not 666!) running Mac OS 8, SimpleText 1.4, and Netscape Communicator 4.04. To get the same "meanings" from a Windows or Unix machine (or any other) or even from the same machine running a different operating system, word processor, or web browser, you would have to use a completely different sequence of 0's and 1's. (26) would not do the job, because the internal "bits" of the computer would be arranged (or configured) in an entirely different way.

Given a particular receiver, the meaning of a message depends entirely on the message. Given a particular message, the meaning of the message depends entirely on the receiver. You can talk about the meaning the message has for the receiver or about the meaning the receiver gets from the message. Neither the message nor the receiver has any "information content" in and of itself. Any notion of meaning that ignores that fact is

mistaken. Any “theory of information” that fails to incorporate it is wrong. Any argument that is based on such errors is fallacious. This is true for any message at all:⁸

The Eighth Rule of Common Sense:

1. The meaning of a message depends as much on the structure of the receiver as it does on the structure of the message.
2. Any claim to be measuring the “information content” of a message that does not take into account the intended or actual receiver, as well as the message itself, is bogus.

Figure 1: What (26) means to a word processor (SimpleText)

⁸ This point has been argued most compellingly over the years, I think, by Morris Halle. My own understanding of The Eighth Rule owes much to him. Halle has the unique distinction of being known as the man who “discovered” Noam Chomsky. His influence was also instrumental in my own decision to go to graduate school in linguistics, rather than logic. I have no doubt that, as an ordained rabbi, he disagrees with the secularist views I express here on religion as much as he does with Chomsky’s well-known anarchist views on politics. Somehow, we all manage to get along.

Figure 2: What (26) means to a web browser (Netscape Communicator)

Consider the example that Bradley and Thaxton give to show that “there is no connection at all between the origin of order [which they grant can occur by chance] and the origin of specified complexity [which they claim can come only from an intelligent designer]” (p. 208):

There is nothing inherent in the letters *g-i-f-t* that tells us the word means “present.” In fact, in German the same sequence of letters means “poison.” (p. 208, *The Creation Hypothesis*, 1994)

Ironically, this is exactly the same example I published four years earlier to make an essentially opposite point.⁹ Here’s what I said about the same sequence of letters:

⁹ That Bradley and Thaxton do not cite my earlier publication of this example places them on the horns of an uncomfortable dilemma. If they knew about my article and still failed to cite it, then they are thieves, a result that dovetails with the ethical standard we discovered Moreland following when we caught him cheating at Bayes’ theorem. If they didn’t know about my article, then they have to admit that the coincidence of very meaningful sentences with lots of “specified complexity” can occur “purely by chance,” a result that destroys their argument. There are hundreds of words that Bradley and Thaxton could have chosen to try to make their point. What’s the probability that they would have chosen exactly the same one I did purely by chance, especially with my having shown that it actually illustrates exactly the opposite of what they want it to?

In a text that is written in English, these marks signify a present, something good that one likes to receive. In a text that is written in German, however, they signify, instead, a poison, something that one would prefer very much not to receive. (p. 3)

(Steven Cushing, "The Uniformity Principle in System Design," *CC-AI: The Journal for the Integrated Study of Artificial Intelligence, Cognitive Science, and Applied Epistemology* 7.1: 3-22, 1990)

As I pointed out then, those letters "have no meaning in and of themselves, but derive their meaning from the communicative context in which they appear" (p. 3). If the letters are read by a person whose brain has been configured by experience with other people to understand them in English, then they will be understood as meaning a present, just as a word processor (on a PowerMac, etc.) will generate **Figure 1** when presented with (26). If the letters are read by a person whose brain has been configured by experience with other people to understand them in German, then they will be understood as meaning poison, just as a web browser (on a PowerMac, etc.) will generate **Figure 2** when presented with (26).

The point, of course, is that the same thing can be expected to occur with DNA. The close analogy between DNA and language is the whole basis of Bradley and Thaxton's argument. The meaning of a DNA molecule - that is, its biochemical effect - depends just as much on the biochemical environment the molecule finds itself in as it does on the arrangement of nucleotides in the molecule itself. That environment is the receiver of the message. The *g-i-f-t example* is a perfect model for understanding this fact. The message contained in the DNA molecule is simply whatever other molecules get generated when the DNA molecule interacts chemically with whatever other bits of matter it finds itself with, just as the meaning of *g-i-f-t* is whatever understanding gets generated when it impinges on a brain that is configured to understand it in one or another language.

Miscommunications become especially important here if we want to understand how new features can arise, whether from language or from DNA. It is only in exceptional circumstances, such as the aircraft accidents that I've studied and reported on, that linguistic miscommunications have fatally disastrous results. The more normal circumstance is that the interlocutors recover from their misunderstanding and continue going about their business, which might then be quite different from whatever it would have been otherwise.

Consider the following scenario. Joe Schmoe is walking through a restaurant and overhears a snatch of conversation. Jane Schmane asks George Porge if he would like her to pass him the orange juice and he responds, "No thanks. I'll do without. I just don't like juice." Joe doesn't hear Jane's question or George's first two sentences. He just catches: "I just don't like juice." Missing the context, he is shocked at his discovery that George is anti-Semitic. He runs and tells all of their mutual acquaintances what he has just heard George say. George is then shunned by all of his friends (except Jane), to his astonishment and dismay.

That's how rumors start. That's how gossip spreads. (It's also how religions begin, but never mind.) Now, what was the meaning of George's sentence about juice? What was its "information content"? Was the sentence really even about juice? For Joe it was about Jews. That's what *he* heard. The world has been drastically changed as a result of the incident, at least as far as George is concerned. He's had to develop a whole new circle of friends within which to seek a mate. His offspring will not be those he would have had otherwise, just because one message was misheard. But he'll still have them, if he wants to.

In my book, *Fatal Words*, I discuss two documented cases in which a pilot hears what the controller says to him, responds appropriately to show that he's heard it all correctly, does everything he's been told to do exactly as he's been told to do it, and then discovers, to dismay at least as deep as George's, that he's landed at the wrong airport. I've been told anecdotally by pilots and controllers that this sort of thing happens a lot. What is the "information content" of the instructions that the controller gives the pilot in such an instance? Which airport are the instructions really about? The pilot did malfunction relative to the intentions of the controller who gave the instructions. However, he functioned nonetheless. He didn't end up where an observer standing next to the controller would have expected him to, but he did end up somewhere and he's still alive to tell about it.

Bradley and Thaxton are emphatic about the deep significance of the similarity they see between DNA and language, as are John Oller and John Omdahl in their chapter, so the analogy implicit in these examples is not out of place. It's precisely the point. They tell us that the same sort of communicative thing is going on with both DNA and language. If they're right, then we should expect miscommunications, in particular, to behave similarly in both of these modes of conveying information.

If a DNA molecule gets messed up, so it can't perform its usual function, there's every reason to expect that, at least sometimes, it will perform a different function, just as happens with a misheard sentence of English. It's not as if the DNA molecule is a conscious being, after all. It's not obligated by feudal social norms to commit hari kiri after a failure. It does what it does for entirely chemical reasons. The right atom in the right place will interact with another atom that's there, not because of "information theory," which is just a human observer's attempt to make sense of it all, but because of the chemical properties of the atoms themselves. If an atom finds itself next to a different atom from the one it would normally otherwise have been next to, it will react (or not) with that one instead, as determined by its chemical properties. Sometimes that will interfere fatally with the life processes of the cell the DNA is in. Other times it will just land at a different airport.

8. Language

Like Bradley and Thaxton, John Oller and John Omdahl see a deep similarity between DNA and language. Even more than the other authors of *The Creation Hypothesis*, they embed their argument in a "golly-gee-whiz!" ambiance reminiscent of the eagerly expectant sky-watchers of the movie, "Close Encounters of the Third Kind." Wow! It's so big! It's so complicated! It's all just for us! Wow! It's a bird! It's a plane! It's the Designer! They hone this adolescent foolishness almost to perfection in the final chapter of the book. Their review of the opinions of some of their favorite authors, most notably C.S. Peirce, Albert Einstein, and Noam Chomsky, is an orgy of guru glorification that is enough to make any self-respecting adult want to puke.

Peirce, they tell us, quoting Ernest Nagel, was "the most original, versatile, and comprehensive philosophical mind this country has yet produced." (p. 240) His approach, they go on, "improved on that of Aristotle and that of Immanuel Kant and surpassed even the later reasoning of Einstein" (p. 240), whom they take care to describe as "the great physicist" (p. 242). Peirce, we're told, was "the first logician since Aristotle to contribute

any new material advance to the study of logic” (p. 241). He also discovered the periodicity of the elements (p. 240), showed that our Milky Way is a spiral galaxy, (p. 240), and proved that “any plurality of relations can always be reduced to a complex of triadic (three-way) relations but that they can never be further reduced” (p. 241). That fact, they suggest, was related somehow to the fact that Peirce was an evangelical Christian and thus a believer in the Trinity.

Peirce “singlehandedly overturned decades of research on gravitational measurements” (p. 241). His work not only provided the basis for that of William James and John Dewey, but also “provided the best philosophical basis for the modern approaches to linguistics as developed by MIT professor Noam Avram Chomsky - indisputably the foremost language scientist of the twentieth century” (p. 241). Chomsky, they tell us, “has been able to win over nearly everyone in the biological sciences who has looked closely at the evidence” (p. 255).

In other words, these guys suffer from a very severe case of hero worship, a condition that typically co-exists with low self-esteem. The brilliance of Peirce, Einstein, and Chomsky is somehow supposed to constitute an argument for the claims of Oller and Omdahl. Turning the more common ad hominem form of argument inside out, they want us to agree with them, because these other guys are so intelligent. Again, common sense tells us something quite different:

The Ninth Rule of Common Sense:

1. Appealing to authority to prove a point proves nothing about the point.
2. Appealing to authority to prove a point can reveal a lot about the appealer.

Let me put all of this in some perspective. I happen to know Noam Chomsky socially, as well as professionally. His wife, Carol Chomsky, also a linguist, plays the accordion and I play the fidola, a five-string viola that I had specially made by a master luthier specifically for the purpose of playing traditional music. Together with several other people, we comprise a band that rehearses regularly in the Chomsky living room. I can attest from long personal observation that, while Noam is definitely a nice guy and is certainly smart, he does not have a halo or glow in the dark, nor does he have any other magical powers, such as walking on water, that would justify the deep reverence that people like Oller and Omdahl seem to need to feel toward their heroes. I never knew Pierce or Einstein, or the historical Jesus for that matter, but I suspect that the same was also true of them.

The real issue here is not, “Who was the greatest this or that?” or “What did the GREAT ones think?” but “What are the facts?” and “What patterns do the facts reveal about the underlying logic that ties them together?” Oller and Omdahl say nothing that bears on these issues other than to point out, correctly, that language is peculiar to humans, that other species show no real capacity to acquire it, and that there must be something unique about the human genome that accounts for that situation. The same is true, of course, for every species. Humans show no capacity to acquire the ability to swim like whales or sharks, to fly like bats or eagles, or to make honey like bees or peck wood like woodpeckers. As biologists have long observed, every species finds its niche in the ecosystem and gradually changes both itself and its environment to optimize that fit for its own benefit. That’s

precisely what natural selection is all about. What we observe at any moment is just a snapshot of that on-going process. There's nothing in any of this that shows that there's a designer, other than the species itself and its environment, as they mutually alter each other.

There's an interesting parallel between the effect that Moreland's group is trying to have on biology and the effect that Chomsky did have on linguistics. By making a compelling case that the language capacity must be innate in the human mind at birth, Chomsky diverted attention away from the study of the methods that children might use to acquire language to the study of what they must have already known at birth that enables them to do so. Moreland and company express hope that by convincing people that life was created by a designer, they can divert attention away from the study of how life actually developed to the study of the characteristics the designer must have had in order to have created it. Oller and Omdahl don't mention this parallel in their swoonings over Chomsky, but it would be surprising if they failed to see it.

There are two important differences, however. First, though Chomsky's confidence in the existence of what he calls "Universal Grammar" has remained unshaken from the moment he first espoused it, he has never claimed actually to have found it. At any given moment, he has claimed only that current theories are better than those that came before, improvements having been made through on-going research. In particular, he has never claimed that the Universal Grammar he seeks was already worked out and provided in full detail in a book that was written two thousand years ago by someone in a pre-scientific culture who could not have even formulated the concepts required to understand the phenomena under study. Chomsky looks at the facts of language for his hypotheses, not at some scripture that he's already decided to believe.

Second, there's a big difference between inferring the internal structure of a "black box" from its observable behavior (the linguistic module of the human mind from linguistic intuitions and behaviors) and inferring the characteristics of the maker of a black box from the observable behavior of the box itself (God from biology). The former problem is standard engineering practice; the latter is tenuous at best. If you're walking on the beach and you come across a watch, you can infer that the person who made it was able to have done so, but that's about all you can infer. You will not likely be able to discover, just from the watch itself, whether its maker was a craftsman who loved making watches or a greedy hack just out to make a buck. Maybe watches are a religious symbol in that person's society or a purely decorative item. Archeologists do try to infer the social characteristics and behaviors of earlier peoples from the artifacts they left behind, but we already know that those people were human and the kinds of constraints that that fact must have imposed on what they could or had to do. How likely is it that we could make the corresponding inferences for Martians or for a Being so superior to us in its capabilities that it could create an entire universe? Imagine challenging a person snatched from the 1940's to identify the function of a compact disk or to explain the purpose its maker had in creating it. How likely is it that such a person would be able to infer the essential characteristics *of its maker*?

Ironically, the reverence that Oller and Omdahl express towards "the foremost language scientist of the twentieth century" (p. 241) stands in sharp contrast to the reception Chomsky's ideas received when Austin Hale first began introducing them to his part of the evangelical linguistic community in 1965. Attitudes then ranged from understandable indifference ("I just don't see the point of it.") to belligerent hostility ("How could WE ever have anything to learn from someone with a name like Noam Avram Chomsky?"). To his

credit, Austin said he considered the latter attitude “uncharitable,” when I asked him about it. I think he even agreed that it was “unChristian,” but he might have just been assenting to my own flip characterization of it.

My, how things have changed in thirty years! Everyone loves a winner. No, the real lesson, I think, is not that people love winners, but that these guys - and I do mean, specifically, Moreland and his gang, *not* Christians in general - will use anything they can to bolster their pre-decided verdict in the kangaroo court they have been holding on evolution. The fact that Peirce was an evangelical Christian is somehow supposed to count in support of their view. The fact that Einstein wasn't and Chomsky isn't is conveniently considered irrelevant.

In fact, as Oller and Omdahl acknowledge, with the self-righteous pique of adolescent boys who have suddenly discovered they are going to be punished for some petty prank that they did just for fun, *Chomsky doesn't even agree with their verdict*. Oller and Omdahl reluctantly admit that Chomsky declines to jump to their conclusion that language could only have been created by a designer, even given the facts about language that he himself has “won everyone over to.” Not surprisingly, they break with their guru's brilliance only at the point where his view conflicts with their scripture. Some people will find such commitment to “faith” commendable. I think it's sick. No one can get away with calling it science.

9. Conclusion

The Creation Hypothesis ends with an extensive appendix, but I, for one, have had enough of this stuff.¹⁰ I know no more about the origin of life or about the purpose of the universe after reading Moreland's book than I did before. As Heidegger might have put it, I still don't know why there is something rather than nothing. However, as far as that book is concerned, I do know now that there isn't something rather than nothing. Its reasoning is rancid and its ethics, perverse. It's a scientific and philosophical vacuum that both God and Nature can assuredly be expected to abhor. Its only positive feature is the deep appreciation that it helps you to develop for public libraries. I'm glad I didn't have to buy it.

To adapt a phrase from Douglas Adams, I still don't have a clue as to whether or not there was a designer, of life, the universe, or anything, or as to what that designer, if there was one, is likely to have been like. I doubt that either science or religion will ever have anything definitive to say about these matters, but I expect that the cultural and cognitive sciences - – anthropology, psychology, archeology, Scriptural analysis, and the like - will continue to have interesting things to say about people who claim to have definitive things to say about them.

Ross insists, for example, that “the Creator is a person” and that “the findings about design provide evidence of what that Person is like. One characteristic that stands out dramatically is his interest and care for living things and particularly for the human race” (p. 164). Somehow, key aspects of that “design” - death, disability, disease, infirmity, senility, starvation, famine, earthquakes, tornados, typhoons, tidal waves, poverty, pain, indigestion, constipation, flatulence, and other so-called “acts of God” - entirely escape his

¹⁰ I've said nothing about the logic of Kurt Wise's chapter, because I couldn't find any in it.

notice. How Ross and others like him continue to manage to pull that off is an intriguing open research question for each of the listed sciences.

In reference to those more positive aspects of “design” that he does selectively choose to notice, Ross predicts that “we will continue to be awed” and he poses the question, “where will that awe be aimed, at the created thing or at the Creator?” (p. 171) Judging by the tone of their chapter in *The Creation Hypothesis*, it would not be surprising to find Oller and Omdahl rejecting both of the proffered alternatives and answering Ross’ question instead with a resounding “Noam Chomsky!” Moreland, as we’ve seen, chooses the second of Ross’ alternatives as the target of his awe and advocates making that choice a part of science as an explicit “extrinsic goal”. The question, of course, is ill-formed, because it presupposes a category error. Awe is a feeling that you get from what you encounter unexpectedly in the world, not an activity that you can direct or aim. Einstein implicitly acknowledged that fact when he specified the first of Ross’ alternatives as the source, not the target, of his awe, in a very well-known and widely quoted statement.

I have nothing definitive to say in connection with Ross’ question. There isn’t any scripture that I’m obligated to defend. However, I do have an opinion. Whatever loving and compassionate Deity there might actually be and whatever Its role might have been in bringing humanity into existence, I have no doubt that It will continue to be disgusted at humans wasting their lives glorifying It, rather than getting down to doing the nitty-gritty work that needs to be done to improve the human condition. In other words:

The Tenth Rule of Common Sense:

1. God can take care of Itself.
2. Humanity should do the same.

Music, dance, and humor - the three art forms that I indulge in - are essential to that work. So are the other arts, including mythic metaphor in epic poetry (and in movies and television sagas) — as long as it isn’t misconstrued, à la Moreland, as literal description. So is sincerely selfless spirituality - but not the “New Age” variety, which is totally self-absorbed. So are political activity and “good works” generally. And so is science. We cannot do without it. Moreland’s “total strategy” for destroying science and replacing it with a mind-numbing infatuation with fairy tales can only get in the way.

Reading Moreland’s book is like spending some time as The King of Hearts, in the movie by that name. Every once in a while things begin to look like they’re making sense and then, wham, the insanity jumps out and grabs you. Hero-worship, low self-esteem, question-begging, misconstrual, jousting at straw windmills, jumping to conclusions that are exactly opposite to those that the presented evidence actually implies, outright cheating in calculations - all these demons lay in wait, as you wend your way through the arcane labyrinth of what passes for Moreland’s mind and those of his co-conspirators. Yes, it’s an entertaining place to visit. But don’t ever want to live there.