

# Cosmogony: Creation, Evolution, and the Science of Origins

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## Unit 1 – Overview

### I. Origins – the “Great Debate” – Creation vs. Evolution

The subject of origins is constantly in the news. Every month for as long as I have watched, there have been multiple stories dealing with origins. These stories may involve field discoveries or they may relate to the controversy surrounding origins, what I call the “Great Debate.” There are stories regarding controversial court decisions, controversial school board decisions, and controversial statements by individuals. There are editorials and posts that reflect the author’s opinion and there are some who even state that certain views of origins should be banned from schools and the public arena!

In this text we’ll begin the process of understanding origins and why a “Great Debate” surrounds the views of origins. We’ll investigate:

what is evolution?

what is creation?

what are the facts behind the headline hype?

why are origins important?

why should I care?



Cosmogony is the scientific study of origins. Cosmogony proposes models (ideas) about the origin of the universe. The purpose of cosmogony is to answer “where did everything come from?” Don’t confuse cosmogony with cosmology. Cosmology deals with the current workings (operation) of the universe while cosmogony deals with its origin. While the operation can give us insight into the origin, the two are separate issues. The Greek root ‘*cosmo*’ refers to the world and universe, that is, everything. The suffix ‘*gony*’ means origin. Cosmogony is a fascinating field that explores the origin of everything in the universe.

There are two accepted pronunciations of “cosmogony.” One uses a hard “g” sound, “koz-**mog**-uh-nee.” The other uses a soft “g” sound, “koz-**mah**-juh-nee.” I prefer the second for no particular reason.

Evolution is a cosmogonic model which states that natural processes formed the universe gradually (“step-by-step”) over vast periods of time. All life is related through common ancestors back to the first living cell. Natural laws not only govern the operation of the universe today, they were responsible for its origin. The Latin root ‘*evolutio*’ refers to unrolling, or turning out.



Creation is a cosmogonic model which states that a supreme intelligence created the universe fully formed and fully functional (“ready-to-run”). Basic kinds of life were created which later diversified. Natural laws were established to govern the operation of the universe. The Latin root ‘*creare*’ refers to bringing something into existence.



Both evolution and creation are total, complete, and self-sufficient ideas (models) regarding the origin of the universe, life, diverse life, and humans. They are both powerful models which provide insight into the world. Each model has adherents who are firmly convinced of its truthfulness. Since the models are radically different, debate over origins is inevitable.

The purpose of this text is to provide information about cosmogony so you can decide between models of origins. The logical way to choose between models is to be armed with all of the information regarding both of them; otherwise, the Great Debate degenerates into a shouting match.

### *approach*

Ultimately, you will investigate and decide among the cosmogonic models regarding origins. While there are a number of variations, there are really only two major models: creation and evolution. Either the universe formed itself naturally (evolution) or it was formed by an outside intelligence (creation). As D. J. Futuyma stated, “Creation and Evolution, between them, exhaust the possible explanations for the origin of living things.”

In order to understand origins, we will first examine the nature of science, the different “kinds” of science, and the tools of science, such as logic.

Secondly, we will investigate the evolution model as fairly, completely, and accurately as possible.

Thirdly, we will investigate the creation model as fairly, completely, and accurately as possible.

In order to think clearly about origins, you need to understand both models. While some only want one idea of origins presented, merely presenting one side is propaganda at best and indoctrination at worst.



John Milton wrote, “Let her [Truth] and Falsehood grapple; who ever knew Truth put to the worse in a free and open encounter?” As university students in a community of scholars we won’t be afraid to present the best case for each model.

Finally, we will analyze both models critically. “Critically” doesn’t necessarily mean to find fault, but to examine carefully using the tools of philosophy and logic. In order to properly debate any subject, you need to understand, and be fluent in, arguments for both sides.

Paul, writing to the Christians in Thessalonica in 50AD urged them to “test everything; hold fast what is good.” 1 Thessalonians 5:21 (ESV) I encourage you to do the same.

### *scientism*

There are some who claim that science alone can make pronouncements about the truth of the universe and all reality. Scientism is an exaggerated trust in the efficacy of the scientific method, a belief that science is the only, ultimate reality. Scientism views science as the only and absolute road to the truth. Dr. Austin Hughes in an article entitled *The Folly of Scientism* wrote,

### **STAND BACK**



### **I'M GOING TO TRY SCIENCE**

“The temptation to overreach, however, seems increasingly indulged today in discussions about science. Both in the work of professional philosophers and in popular writings by natural scientists, it is frequently claimed that natural science does or soon will constitute the entire domain of truth.”

The Hoover institution in an article entitled *The Dangerous Rise Of Scientism* stated,

“Blind faith in ‘settled science’ has justified some of the worst horrors of human history.”

Paul Sutter in an article entitled *The Dangers of Scientism* wrote,

“*Scientism* is the position that science isn't just a cool way to learn things about the universe, but The One True Way, superior to all other paths of knowledge and understanding.”

Adam Frank in an article entitled *The Power Of Science And The Danger Of Scientism* stated,

“scientism is the ‘science can explain everything,’ (or, at least, ‘science explains everything important’), kind of position some folks take in arguments about religion, philosophy, the value of the humanities, etc.”

Douglas Todd in an article entitled *The danger of “scientism:” When science becomes an ideology* wrote,

“Those who unknowingly fall into the trap of scientism act as if hard science is the only way of knowing reality. If something can’t be ‘proved’ through the

scientific method, through observable and measurable evidence, they say it's irrelevant.”

This text rejects scientism. Science is wonderful, fascinating, useful, and interesting; however, science is not the only domain for truth.

There are truths which can't be proven by science. There are philosophical and metaphysical claims which are true but can't be proven by science or tested by the scientific method. Consider,

- I love my wife
- Corvettes are the best cars
- Teachers are idiots
- God exists

### *objectivity*

Is science objective? Are scientists objective? Is it possible to remain unbiased or do the biases of scientists creep into their work?

Dr. Stephen Gould, a leading evolutionary scientist of the 20<sup>th</sup> century, said, “There is this myth about science: that science is different, that science is objective, that there is a scientific method, that there are right answers, that there is a special way of doing things, that scientists are a priesthood that have latched on to an arcane set of techniques that enable them to find the truth. Now, of course, science is trying to understand the truth of the world and we do get there in fitful ways, but we are just human beings struggling, embedded in cultural and social context like everyone else - trouble is, you can't analyze that at the present because we don't know what our biases are. If we knew, we would eliminate them.”



Mr. Ken Ham, a leading proponent of creation, stated that both evolutionary and creationary scientists are biased. He then asked, “which bias is the best bias to be biased with?”

The article *Studies of scientific bias targeting the right problems* cites Dr. John Ioannidis who says, “Virtually all scientific work may be afflicted by some kind of bias.”

Angela Potochnik in an article entitled *Awareness of Our Biases Is Essential to Good Science* wrote, “Ideological commitments and social and political values have always influenced scientific research.” and “Science does not occur in a social vacuum, as it were. Rather, scientific research reflects the priorities, unquestioned assumptions,

and blind spots of individual scientists and the broader cultures they participate in.”

In his article *How Much Scientific Research Is Actually Fraudulent?*, Ronald Bailey answers, “It may be more than you think” and “Fraud may be rampant in biomedical research.”

People, including scientists, have cultural and personal biases which distort the view of reality and truth presented by science.

### *relevance*

The “Great Debate” over origins is important and has relevance to our lives. Everyone has an interest in their own family tree and personal origin. Extending from one’s personal origin to ultimate origins is an altogether human interest.



For more than 30 years, the Gallup Poll has asked Americans about their views on origins. The poll presents three choices. The “Strict Creationist View” (God created humans pretty much in their present form at one time within the last 10,000 years [creation model]), the “Centrist View” (human beings have developed over millions of years from less advanced forms of life, but God guided this process [otherwise known as Theistic Evolution), or the “Strict Naturalist View” (human beings have developed over

millions of years from less advanced forms of life, but God had no part in this process [Evolution model]).

Over the years, the percentage responding has been:

- creation, 39-47%
- theistic evolution, 31-40%
- evolution, 9-22%

It should be noted that we don’t make scientific decisions by popular vote, however.

The relevance and importance of origins was expressed in this article from U.S. News commenting on a Gallup poll survey related to origins:

“It is a primordial mystery that has engaged the human imagination from the dawn of time: Who are we? Where did we come from? What is our ultimate destiny? The story of [origins] ... is the story of what it means to be human”

Origin gives meaning. The meaning of anything is related to its origin. If you want to understand something (anything), you must understand where it came from. The reason origins is relevant to us is that the meaning of life is related to the ultimate origin of life.

*opening arguments*

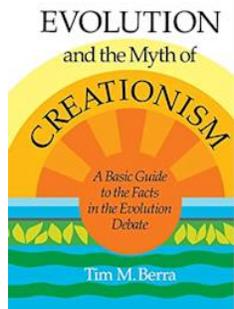
There is plenty of misinformation surrounding the “Great Debate.” On one side, I’ve heard, “Evolution? That’s just a theory.” On the other side I’ve heard, “Creation? That’s just religion.” Both of these statements are simplistic and incorrect.

There are no simple answers in Cosmogony. If you’re looking for a silver bullet phrase that can be leveled against the other side and destroy their model, you’re out of luck. Two books on the opposite side of the Great Debate will provide an idea of the complexity of the issue. Dodson and Dodson’s *Evolution: Process and Product* spends 6 chapters (more than 100 pages) just on the definition of evolution! Bird’s *The Origin of Species Revisited* is two volumes (more than 1100 pages) outlining a creationary argument! There’s nothing simple or simplistic in cosmogony.



Here are two different viewpoints on the Great Debate.

Dr. Tim Berra, an evolutionary scientist, in his book *Evolution and the Myth of Creationism*, writes:

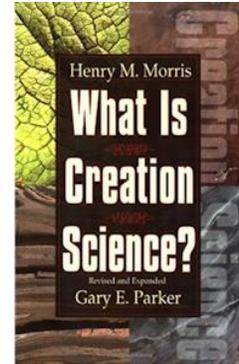


“I was originally drawn into the evolution/creation controversy in 1982 ...Until then, I had shared the view of most scientists that the creationists were not to be taken seriously. “Just ignore them, and their demands will soon be forgotten,” ...but ... I was shocked to see that this Biology Curriculum guide ... was about 50 percent creationist. It considered such fundamentalist Christian beliefs as that the Earth is only a few thousand years old to be the scientific equal of modern radiometric-dating techniques. ... That was when I realized that science education was in trouble! ... scientists are now writing and speaking out to inform the public that creationism has no scientific validity and is a threat to the growth and spread of knowledge. ...To teach students [creation] that the foundations of biology, most of geology and astronomy, and a good deal of physics are flawed is to cheat them, shackle their intellectual growth, erode their ability to compete for jobs, and stifle their prospects for a rewarding life. Creationists, for the most part, are fundamentalist Christians whose central premise is a literal interpretation of the Bible and a belief in its inerrancy. ...These ideas [creation, flood, young earth] constitute the biblical story of creation and, as such, are inherently religious. And because they depend on supernatural intervention, not natural law, they are unscientific. ... The creationists are determined to force their will on society and the schools, through the courts if possible. Their strategy – ironically enough, considering the moral precepts of Christianity – is founded in deception, misrepresentation, and obfuscation designed to dupe the public into thinking that there is a genuine scientific controversy about the validity of evolution. ... I am writing for the open-minded reader ... Those

readers who demand a literal interpretation of the Bible will probably not be swayed by this book, for they have chosen to abandon reason and evidence in favor of dogma and blind faith.”

Drs. Morris and Parker, creationary scientists, in their book *What is Creation Science?*, write:

“Just what is this creation science the newspapers keep writing about? ... ‘But is it really possible that there is scientific evidence for creation, as the creationists claim? Isn’t creation just a religious belief, as the evolutionists claim?’ This book has been written to answer such questions as these and to show that the concept of creation is every bit as scientific as the concept of an ongoing naturalistic evolutionary process. ... The creation/evolution question is, after all, not merely a trivial issue that concerns only biologists on the one hand or religious people on the other. The issue permeates in one way or another every field of academic study and every aspect of national life. It deals with two opposing basic world views – two philosophies of origins and destinies, of life and meaning. ... Both the creation model and the evolution model are, at least potentially, true explanations of the scientific data related to origins, and so should be continually compared and evaluated in scientific studies related to origins. Creation Science, therefore, is a perfectly valid area of scientific study. The creation model is as legitimate a scientific model as the evolution model. ... Consequently, this is an issue that will not be going away, and sooner or later everyone will need to know these evidences and arguments, in order to make his or her own decision. It will be an important decision – perhaps the most important they will ever make.”



As you can see, from these authors writing years ago up until the present, the Great Debate is interesting and meaningful. Those involved with the Great Debate feel the issue is vital.

### *possible solutions*

There are three possible answers to the question “where did everything come from?” While there are numerous sub models (variations), there are only three basic answers.



The first possible answer is the agnostic one. Simply, the answer is, “we don’t know and we can never know.” Someone who is agnostic regarding origins would neither affirm nor deny any origin model. While this might be a legitimate answer, it leaves nothing to investigate.

The second possible answer is evolution. There are two major submodels of evolution, namely atheistic and theistic. I will refer to atheistic evolution as simply evolution. When we discuss theistic evolution, we'll use the qualifier.

The third possible answer is creation. As we'll see later, don't confuse theistic evolution with creation as the two models have very little in common. There are variations within the creation model too, such as "old" earth and "young" earth.

According to evolutionary scientist D. J. Futuyma, "Creation and Evolution, between them, exhaust the possible explanations for the origin of living things. Organisms either appeared on the earth fully developed or they did not. If they did not, they must have developed from preexisting species by some process of modification. If they did appear in a fully developed state, they must have been created by some omnipotent intelligence."

As I mentioned earlier, my goal is to present the case for both creation and evolution as fairly, accurately, and completely as possible. You may suspect (or know) that I have a bias toward one model of origins and you are correct. Even so, it is possible to present and investigate both models in a systematic and balanced way.

Creation and evolution are ideas about ultimate origins. They are cosmogonic models which attempt to answer the question "where did everything come from?" Because creation and evolution provide radically different answers to the question, a Great Debate rages. Evolution answers the origins question using only naturalistic causes. For example, the universe developed gradually over eons of time due to the laws of physics. Creation answers the origins question using supernatural causes. For example, the universe was produced fully formed and functional by an intelligent being. Even though they are scientific models, there are more powerful elements involved with each as they have a philosophical foundation and provide a foundation for worldviews.



## II. Science

Creation and evolution are scientific models, but what, exactly, is science? Some common definitions of science are possession of knowledge, knowledge attained through study or practice (Webster's), and, a branch of knowledge or study dealing with a body of facts or truths systematically arranged and showing the operation of general laws (Random House). The word science is derived from the Latin "scientia" which means knowledge.

Many scientists over time have indicated that science is a search for truth. Einstein stated, "Science can only be created by those who are thoroughly imbued with the aspiration toward truth and understanding"

When most people think of "science" they envision women and men with white lab coats huddled over chemical apparatus performing experiments. This picture does represent empirical or operation science. While this is an important and valuable form of science, it isn't the only type of science.



### *operation science*

Operation Science may be defined as scientific endeavors characterized by observation and experimentation of present phenomena. Operation science deals with regularities and is associated with the "scientific method." Operation science analyzes claims using inductive reasoning. The hallmarks of operation science are observation and experimentation. This is exactly the picture that we envisioned earlier.

Regularities are normal, regularly occurring events. A good example is gravity. If you toss an object in the air, it will return to your hand due to the effects of the earth's gravity on the object. Gravity "works" regularly. The object always returns, it doesn't float away 30% of the time, or remain suspended 5% of the time. Gravity works regularly and constantly. The fundamental forces of nature (gravity, electromagnetic, strong nuclear, and weak nuclear) are regularities.

Because regularities continually recur, operation science has predictive power. Gravity worked yesterday and today so we assume it will work tomorrow. I know that if I toss an object in the air tomorrow, it will return. Operation science can actually predict the future! We know that next winter when the temperature falls below 0 degrees C, a layer of ice will form on the outdoor birdbath. We know that tomorrow when we power up our phone, electricity will still behave in the same way and we can begin to use the device productively.

Operation science reasons using inductive arguments. An inductive argument is basically observational evidence for a hypothesis. The process of operation science is the “scientific method” which many attribute to Sir Frances Bacon. During observation, data (or facts) are collected. These data are used to formulate a hypothesis (a starting point explanation based upon the limited data available). The hypothesis is subjected to testing via experimentation which will either confirm or deny it. Oftentimes the initial hypothesis needs to be modified due to the result of experimentation. Over time this process can be repeated to refine our initial proposal into a powerful explanation of a natural phenomenon. Sometimes an explanation is so powerful and so consistently verified that it is referred to as a



theory, an acceptable principle used to explain a phenomenon.

Because of the characteristics of observation and experimentation, operation science is objective in nature. No one has to accept the word of another scientist regarding a result. Since we are dealing with regularities, any scientist should be able to repeat the experiment and verify the outcome personally. When a scientific paper is published, anyone can then repeat the experiment and obtain the same result (assuming the original paper was not in error).

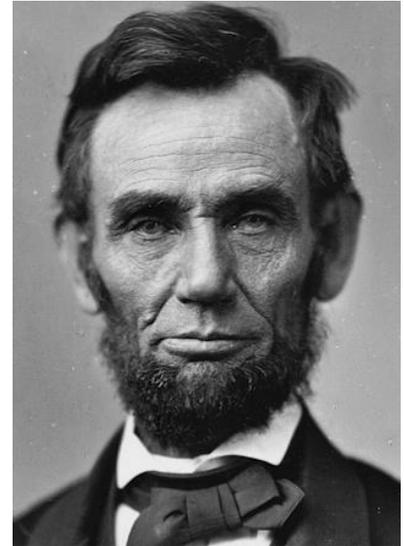
Operation science is a great tool, but it does have a limitation. Operation science deals with the present, as it requires observation in the present and experimentation in the present. When dealing with regularities we may assume that the processes worked in the past and will work in the future (good assumptions as we saw), but we are limited to investigating present phenomenon. If we want to investigate past events, like origins, we need another type of science to assist us.

### *origin science*

We are familiar with the work of the medical examiner and other forensic experts due to the popularity of crime scene investigation shows. One of the forerunners of the genre was the television program *Quincy M.E.* Dr. Quincy was the medical examiner who needed to determine whether the cause of death was natural or the result of a human plot. His famous quip was, “I believe this death was more than a simple accident.” The medical examiner needs to investigate something that happened in the past. To do so requires searching for clues and putting them together to form a cohesive case. Forensics is one type of origin science. Rather than investigating the present, we are attempting to reconstruct past events.

Cosmogony is an origin science. To investigate ultimate origins, the scientist will gather evidence and then construct a model, or idea, of what happened in the past. Origin Science concerns scientific endeavors characterized by the analysis and interpretation of evidence for past events. Origin science deals with singularities and is associated with a “model building” process. Origin science analyzes claims using abductive reasoning.

Origin science deals with a different kind of phenomenon. Rather than investigating regularities as is done in operation science, origin science investigates singularities. Singularities are unique, one-time events. An historic occurrence is a singularity. Examples of singularities include Daniel appointed as an official under King Nebuchadnezzar, the birth of Jesus Christ, Martin Luther nailing the 95 theses to the Wittenberg Castle church, the election of Abraham Lincoln as the 16th president of the United States, and your birth. None of these events occur regularly and repeatedly!

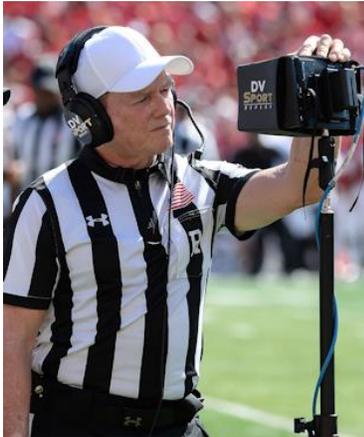


How can we rigorously and scientifically investigate the past? The process followed by origin science is model building. A model is a description or analogy used to visualize something that can't be directly observed. Sometimes we build models of present phenomenon such as the model of the atom. When dealing with the unobservable past, we are forced to construct models.

In order to build a model, we begin by collecting evidence. Sometimes we can use operation science to collect evidence. Once the evidence has been collected, it is used to construct a model or explanation of the past event. The model is then subjected to critical analysis. If our analysis reveals weaknesses in the model, we can search for more evidence or refine the model (or both). In other words, we apply the evidence we know to the model and see if it makes sense. When new data is uncovered, we check that the model can effectively explain it also.

Consider the proceedings in a court of law. Based upon input from witnesses and forensic experts, attorneys for each side prepare their case. The attorneys will use the data and evidence to make a model which attempts to explain the “facts” in context and bolster their case. Attorneys for each side prepare their case (construct their model) with positive evidences to support their side and negative evidences to discredit the other side. They then use the tools of logic to argue from effect to cause. Some of the evidence comes from operation science (eg, blood alcohol content or DNA), some comes from eye-witness testimony, and some comes from the realm of plausibility.

Evidence, data, and facts do not speak for themselves. If they did, there would be no need for lawyers! Evidence must be interpreted within the framework of a model. For example, if a person's blood alcohol content was .079, was that person competent to drive? Attorneys must create a strong model using many lines of reasoning to sway the jury. In a court of law, we don't prove models beyond a shadow of a doubt. We demand a preponderance of evidence. In other words, the "weight" of the evidence points strongly in one direction.



Interestingly, no one can be 100% sure (ie, absolutely certain) of past, unobserved events. In spite of the weight of the evidence, there will always be a level of doubt. Even if the event has been observed, some doubt could still remain. Consider instant replay in football for example. After viewing the play in slow motion, different viewers will still have different opinions regarding what happened. Although we can't make a conclusion with 100% certainty in cosmogony, we can uncover evidence, construct models, analyze via logic, and be reasonably sure of a conclusion.

Evolution and creation are *models* of origins, not *theories*. This is true because they deal with the unobserved past and they cannot be tested in the present. Theories arise from operation science where we can observe and test. No one witnessed the origin of the universe and it is impossible to reproduce the event as an experiment in the present.



Origin science is not less scientific than operation science. It is simply different since the former investigates past singularities while the latter deals with present regularities.

### *cause*

All science "works" due to several underlying assumptions, one of which is the "Law of Cause and Effect." In science we recognize that effects have a cause. From our ordinary experience, we understand that nothing happens in isolation. There are two kinds of causes that will be of interest to our investigation in cosmogony.

If the effect is the result of an intelligent act, then we have a primary cause. Intelligent beings are able to create and produce artifacts by their will. If we found a computer in the middle of a field, we wouldn't assume the computer was produced naturally. Even though we didn't witness its creation, we can accurately conclude

that the computer was a result of a primary cause. Intelligence is an agent acting with plan and purpose.

If the effect is the result of a natural act, then we have a secondary cause. The regularities (gravity) and singularities (flood) of nature produce many effects that we recognize as natural. While you might claim that the Grand Canyon was carved by the flying spaghetti monster using a laser pointer, we would recognize that to be fallacious since the evidence indicates the canyon was carved by secondary causes (likely water erosion).



What is, scientifically speaking, at the heart of the Great Debate between evolution and creation? Fundamentally, it is an argument over cause. The evolution model cites secondary causes for ultimate origins while the creation model cites primary causes for ultimate origins. Therefore, one key to understanding the “Great Debate” will be the ability to distinguish between primary and secondary causes.

Why is there a Great Debate between creation and evolution? Scientifically it is because we can't prove either model using operation science. If it were strictly an issue in operation science, we could devise an experiment for all to observe and repeat. Because we are dealing with historic singularities, however, we must use evidence and build models to understand the past. Even the best of cosmogonic models leaves some questions unanswered and leaves us with some level of doubt.

*proof*

Operation and Origin Science cannot prove anything; there is no such thing as a “scientific proof” in the natural and forensic sciences.

“One consequence of Popper's work with falsifiability is the understanding that you never really prove a theory. What scientists do is instead come up with implications of the theory, make hypotheses based on those implications, and then try to prove that specific hypothesis true or false through either experiment or careful observation. If the experiment or observation matches the prediction of the hypothesis, the scientist has gained support for the hypothesis (and therefore the underlying theory), but has not proven it. It's always possible that there's another explanation for the result.”

<https://www.thoughtco.com/can-science-prove-anything-3973922>

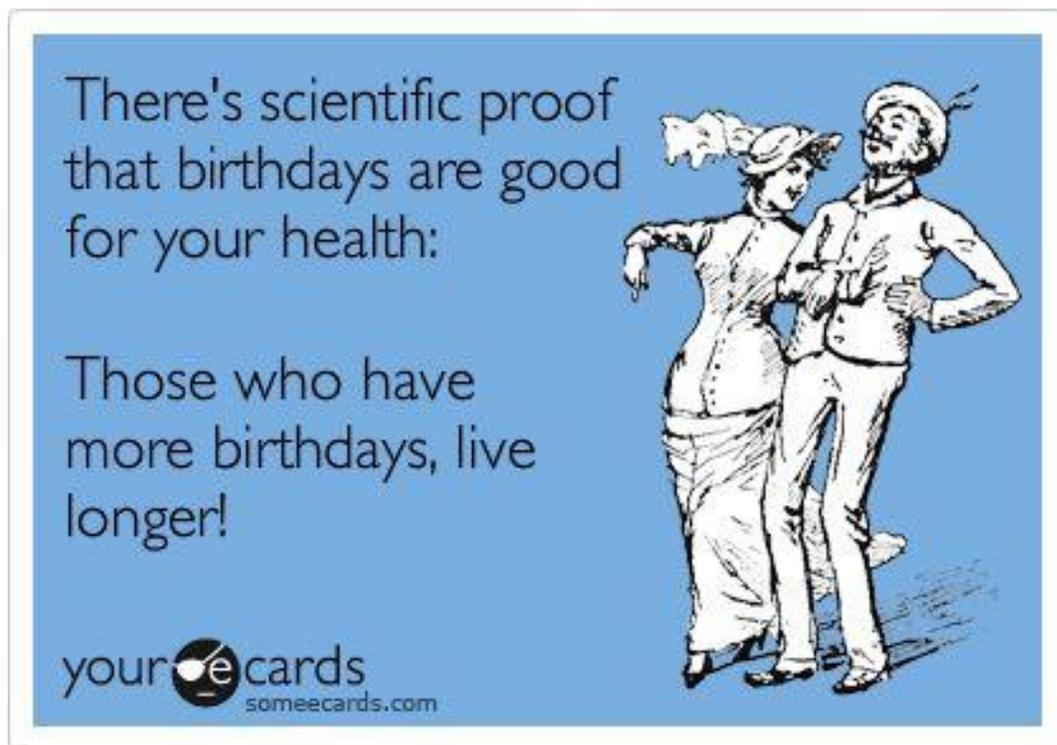
“Proofs exist only in mathematics and logic, not in science. Mathematics and logic are both closed, self-contained systems of propositions, whereas science is empirical

and deals with nature as it exists. The primary criterion and standard of evaluation of scientific theory is evidence, not proof. All else equal (such as internal logical consistency and parsimony), scientists prefer theories for which there is more and better evidence to theories for which there is less and worse evidence. Proofs are not the currency of science.

Proofs have two features that do not exist in science: They are final, and they are binary ...

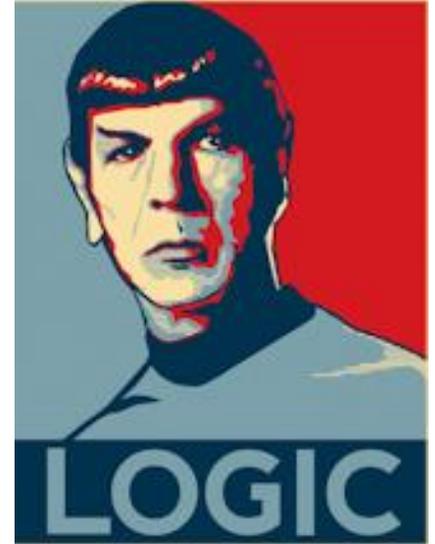
In contrast, all scientific knowledge is tentative and provisional, and nothing is final. There is no such thing as final proven knowledge in science. The currently accepted theory of a phenomenon is simply the best explanation for it among all available alternatives. Its status as the accepted theory is contingent on what other theories are available and might suddenly change tomorrow if there appears a better theory or new evidence that might challenge the accepted theory. No knowledge or theory (which embodies scientific knowledge) is final. That, by the way, is why science is so much fun.”

<https://www.psychologytoday.com/us/blog/the-scientific-fundamentalist/200811/common-misconceptions-about-science-i-scientific-proof>



### III. Logic

Logic is the science of good and bad reasoning. Of course, we wish to avoid bad reasoning, and logic helps us determine whether our reasoning is good or bad. Another way to think about logic is as a method of stating arguments in a formal way. The image of Mr. Spock relying on “pure logic” to assess a situation free of human emotions is somewhat helpful. Rather than being swept up by feelings and emotions, logic helps us to investigate a claim calmly and rationally.



Using logic helps us think critically. When Dr. Ravi Zacharias was asked what critical thinking means, he responded,

The word “critical” often comes through as negative; that is, you’re criticizing somebody. Strangely enough, if you use the word “critique,” it comes through more positively because you are critiquing a book or critiquing an essay. I think critical thinking has two components to it. The main component is when you’re analyzing any propositional statement or system of thought, you are engaged with critical thinking whether you like it or not. So the only question is, are you doing it well? Are you doing it in a way that is befitting the subject or are you doing it unjustly? The second aspect of it is the ethical implications of whatever it is you have processed.

So I like to think of critical thinking as an analytical process of evaluating the truth component of the statement or thought you are processing. That has to be done. If you are looking at a worldview, any assertion, or any challenge to your own worldview, you have to evaluate it on the basis of truth, the coherence of what is being claimed, and then the implications of what this means for your personal life. So first there is an analytical component to it—the truth component, the synthesizing component. And second, at the end of it there must be an application or an imperative component to it. We must think critically especially in defending our worldview or in challenging a counter perspective. So critical analysis of worldviews is what critical thinking is all about.

#### *arguments*

An argument consists of statements of evidence, the premises, and a conclusion, the thesis. For example, an argument in cosmogony might be phrased as,

(P1) everything that begins to exist had a cause;

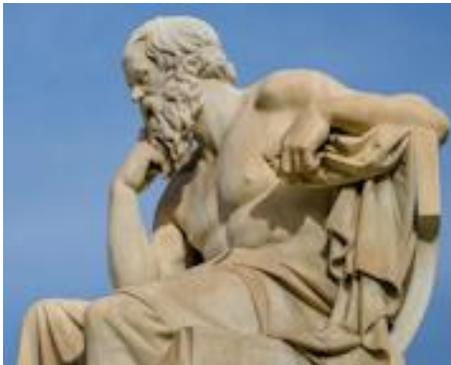
(P2) the universe began to exist;

(C) therefore the universe had a cause

An argument in logic is not a heated exchange of the type we witness constantly online, but it is a formal method used to establish a conclusion. If someone asks, “why do you believe the universe had a cause?” we can point to the argument above and its logic as the answer.

There are several different kinds of arguments used in logic. A valid argument is one in which if we assume that all the premises are true, the conclusion necessarily follows. In other words, given the premise(s), the conclusion is correct. Good arguments must be valid. If the conclusion does not follow from the premise(s), then the argument is invalid.

### *deductive arguments*



Deductive arguments aim at proof. Deductive arguments are used often in arithmetic and geometry. Joe Boot points out that “Logic demands that only deductive knowledge is strictly provable. To deduce something we must start with a truth definitely known and then by the logical process of inference arrive at certain facts that bring us to a conclusion.”

Deductive arguments work in a defined system since we can begin with something that is definitely known. For example, in algebra we can argue:

(P1)  $A > B$

(P2)  $B > C$

(C) therefore  $A > C$

This is a valid deductive argument. The conclusion is true given the premises.

Here is an example of an invalid argument,

(P1) person “A” can see person “B”

(P2) person “B” can see person “C”

(C) therefore person “A” can see person “C”

We do not have to grant the conclusion given these premises. We can show the argument is invalid by providing a counterexample, such as: person “B” is at a corner, and while person “A” and “C” can each see person “B”, person “A” cannot directly see person “C” because of the wall.

Notice that we don’t show an argument to be invalid by attacking its premises. We assume the premises as information and then show the conclusion cannot be derived. At this point in time we are not questioning the truthfulness of the premises, but only the logic of argumentation.

Because we are looking at the logic of the argumentation and not the truthfulness of the premises, it is possible to have a valid argument with false premises.

(P1) Chuck Norris is French

(P2) All Frenchmen are weak

(C) Chuck Norris is weak

While this is a valid argument, the premises are false. Ultimately we strive for an ideal argument. An ideal argument is sound, that is, its logic is valid and its premises are true.

### *inductive arguments*

Inductive arguments are observational evidence for a hypothesis. Inductive arguments are the method of operation science. Unlike deductive argumentation we cannot start with “truth definitely known,” but we begin with good observational evidence. The premises are not offered as proof, but as good evidence for the conclusion.

Astronomers have observed that planetary orbits are elliptical. Thus a premise in astronomy would be,

(P1) All observed planetary orbits are elliptical

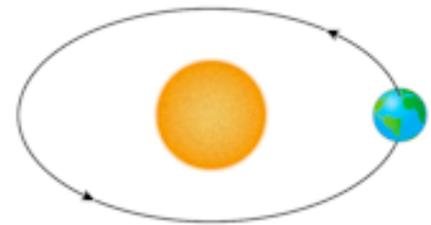
The valid inductive argument would conclude

(C) Some planetary orbits are elliptical

Note that to conclude

(C) All planetary orbits are elliptical

would be invalid. We have no basis to conclude this in a universal sense.



Strong inductive arguments have diverse premises drawn from a variety of sources. Weak inductive arguments have little evidence or homogeneous samples.

### *abductive arguments*

Abductive arguments are inferences to the best explanation. Abductive arguments are the method of origin science. Abductive arguments are similar to inductive arguments except the conclusion is offered as the best explanation for the premises. The “best explanation” depends upon currently available evidence and could be overturned or modified when new evidence is uncovered.

When a jury considers the case and renders a verdict, it is using abductive arguments to form the conclusion. No juror can be 100% certain of the conclusion, but the preponderance of the evidence points powerfully to one conclusion versus the other.

Consider the following argument,

(P1) Colonel Mustard was shot inside his locked study  
(P2) Only Colonel Mustard and Ms. Scarlet have a key to the study  
(C) Therefore Ms. Scarlet shot Colonel Mustard

The conclusion is plausible and abductively valid, but it's not the only possible conclusion. Someone else could have stolen the key and shot Colonel Mustard, for example, or he may have shot himself.



(P1) Carbon dating performed on the wooden handle of a sword found in area "A" indicates it is over 3000 years old

(C) Area "A" was inhabited over 3000 years ago

The conclusion is abductively valid and plausible given the amount of evidence we have. But as you easily see, it isn't the only possible conclusion. Perhaps the sword was washed into area "A" from area "B" by a flood.

### *branches of science*

Since science is a search for truth, there are many types of science all with a similar goal but acting in different venues. For instance, the social sciences (psychology) and applied sciences (software engineering) are different branches of science. For our discussion, we can view the different branches as:

Origin science – cosmogony, forensics, history, etc

Operation science or Natural sciences – Chemistry, Physics, Bioinformatics, etc

Formal Sciences – Logic, Mathematics, Statistics, Computer Science, etc

Queen of the Sciences – Theology

The astronomer Johannes Kepler stated that science is thinking God's thoughts after Him. Therefore, many historic and modern scientists put Theology as the pinnacle of science (the "queen"). Thomas Aquinas described theology as the queen of science in *Summa Theologica*. Theology was named queen of the sciences in the European universities of the High Middle Ages (11<sup>th</sup> – 13<sup>th</sup> centuries). "As to theology being the 'queen,' scholars believed that the various focuses of study were covered by the overarching standard of the Bible. They considered the Bible as the source of truth and therefore theology reigned above, or was queen, over all the other sciences and areas of study."

#### IV. Examples of The Great Debate

Understanding origins is important because the meaning of anything is tied to its origin. College students at liberal arts universities are usually required to take core, or general education, courses. One typical core requirement is “culture,” where students are exposed to cultures other than their own. A common “culture” course deals with the history of a people group, perhaps the history of China, or the history of the near middle east. You will gain an understanding of a culture if you understand its history, its origin. In order to answer the important “why” questions of history, one must understand the origin of the event. A culture is shaped and molded by its historic experiences. In order to understand any culture today, you must understand its history since the meaning of anything is connected to its origin.

People are often passionate when discussing origins. They see the importance of origin models, as a model can provide direction and meaning to life. As you investigate examples of the Great Debate you will notice that the proponents are enthused about their model!

While the Great Debate has raged for millennia, there have been some significant specific debates during the past half century. One of the earliest televised national debates on creation and evolution was between Dr. Russell Doolittle, evolutionary scientist, and Dr. Duane Gish, creationary scientist. It was held in 1981 at Dr. Jerry Falwell’s Liberty Baptist Church and viewed by many Americans on TV. Doolittle and Gish knew each other and had debated on college campuses several times before this meeting. While the debate was friendly, each scientist held their model of origins in high esteem, which was clearly evident in the dialog. I encourage you to view this debate, if not in its entirety, then at least the opening argument from each scientist. While the specifics are 40 years old, the general arguments and ideas are extremely relevant today.

A decade ago, a Great Debate was held between Bill Nye, evolutionary scientist, and Ken Ham, creationary scientist, at *Answers in Genesis* (February 2014). The recent debates between Richard Dawkins and John Lennox are illuminating. I encourage you to view these debates also.

Now that we have concluded our overview of cosmogony, it’s time to investigate origin models in depth. For each model, evolution and creation, we’ll follow a similar outline by examining how each model addresses four major origin events: the origin of the universe, the origin of life, the origin of diverse life, and the origin of human beings. Each model will initially be presented as “opening arguments” as in a court of law. Each side (evolution and creation) will be allowed to present its case without interruption or debate. While there are hard questions to be asked, and “cross examination” needs to occur, that will happen after each model has been initially presented.