Scientific Thinking and Fallacies of Scientific Thinking
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In this paper I will be discussing scientific thinking and fallacies of scientific thinking. As we begin this discussion, I want to share a few thoughts with you about science, and a few quotes from some of the great scientists of history about how science and the study of this material world reveals God to man.

The ancient Greeks viewed science as a philosophical matter. Reason was the chief tool of science rather than experimentation. Much of this attitude came from their belief that the world was a corruption of perfection. The world was to them an uncreated, unknowable, yet necessary evil which God directed but did not really control. Only when the theistic view of Creation took over did science begin to study the world experimentally. It was the thought that God had created matter that made it a thing worth studying. In this view, matter was real, good, and knowable. By seeing God as the Creator in complete control, science could make the assumption that the universe made sense. Most of the scientists who formulated modern science were creationists. Without this basis, modern science would probably never have gotten started.[1]

Following is a list of Creationists who founded modern science:
Kepler- Astronomy
Pascal - Hydrostatics
Boyle – Chemistry
Newton – Physics
Steno – Stratigraphy
Faraday – Magnetic theory
Babbage – Computers
Agassiz – Ichthyology
Simpson – Gynecology
Mendel – Genetics
Pasteur – Cacteriology
Kelvin – Thermodynamics
Lister – Antiseptic surgery
Maxwell – Electrodynamics
Ramsay – Isotopic chemistry[2]

Francis Bacon, the father of modern science, was inspired by the theistic doctrine of creation. He concentrated on the secondary scientific causes (natural laws) used by God to operate the

[1] Norman L. Geisler and Ronald M. Brooks, *When Skeptics Ask,* (Baker Books 1996) pg. 212
[2] Geisler and Brooks, *When Skeptics Ask* pg. 214

universe. Bacon replaced the deductive method of Aristotle with a more inductive and experimental method that established a fresh new direction for modern science. Belief in a Creator who works through secondary causes did not harm science. In point of fact, this belief helped to inspire great thinkers and to advance science significantly.[3]

Another great scientist, Albert Einstein, also spoke of God's creation of nature, he said, "I want to know how God created this world. I am not interested in this or that phenomenon, in the spectrum of this or that element. I want to know his thoughts, the rest are details….God does not play dice with the world.[4]

The very well known and respected American Scientist, George Washington Carver said the following:

"…..to me, my dear young friends, nature in its varied forms are the little windows through which God permits me to commune with Him, and to see much of His glory, majesty, and power by simply lifting the curtain and looking."

"More and more as we come closer and closer in touch with nature and its teaching we are able to see the Divine and are therefore fitted to interpret correctly the various languages spoken by all forms of nature about us."

"My prayers seem to be more of an attitude than anything else. I indulge in very little lip service, but ask the Great Creator silently, daily and often many times per day to permit me to speak to Him through the three great Kingdoms of the world, which He has created, viz. – the Animal, Mineral and Vegetable Kingdoms; their relations to each other, to us; our relations to them and the Great God who made all of us."[5]

Many in the scientific world today say that we must separate science and God. That is not true. There is no need to separate the two. The above quotes and information shows us that many of the great minds of science believed that nature and the study of this physical world would lead us right to the God who created it all, and isn't that exactly what the Word of God tells us:

"The heavens declare the glory of God; and the firmament shows His handiwork."[6]

SCIENTIFIC THINKING

As Francis Bacon noted, science is the search for causes.[7] The scientific search for causes can be divided into two broad categories : *historical* and *empirical* or *origin science* and *operation science.* The following chart shows the basic difference in these categories:

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[3] Norman Geisler and Peter Bocchino, *Unshakable Foundations,* (Bethany House Publishers 2001) pg. 85
[4] Ronald W. Clark, *Einstein: The Life and Times* (New York: Avon, 1972) pg. 37-38
[5] National Park Service, U.S. Department of the Interior, George Washington Carver National Monument, *Trail Quotes*
[6] Psalm 19:1

Origin or Historical Science	**Operation or Empirical Science**
Studies past	Studies present
Studies singularities	Studies regularities
Studies unrepeatable	Studies repeatable
Re-creation not possible	Re-creation possible
How things began	How things work
May find primary cause	Finds secondary causes
Conclusions not falsifiable	Conclusions falsifiable[8]

The origin or historical category of science deals with events that occurred in the past but are not occurring in the present. The operation or empirical category of science deals with present events.

THE DIFFERENCE BETWEEN OPERATION AND ORIGIN SCIENCE: Operation science deals with the way things normally operate. It examines how the world normally works in the present. It studies things that happen over and over again in a regular and repeated way. Operation science seeks answers that are testable by repeating the experiment over and over, and falsifiable if the cause does not always yield the same effect. Its conclusions should allow one to project what will happen in future experiments. Operation science likes things to be very regular and predictable. No changes; no surprises. So the idea of a supernatural being coming around to stir things up occasionally is strongly resisted. Because of this, it usually seeks out natural (secondary) causes for the events it studies.

Origin science is not just another name for giving evidence to support creationism. It is a different kind of science. Origin science studies past singularities, rather than present normalities. It looks at how things began, not how they work. It studies things that only happened once and, by their nature, don't happen again. It is a different type of study that requires a different approach. Rather than being an empirical science like physics or biology, it is more like a forensic science.[9]

We will first look at the operation or empirical category of science.

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[7] Geisler and Brooks, *Come, Let Us Reason* (Baker Book House, 1990) pg. 149
[8] Geisler and Brooks, *When Skeptics Ask*, (Baker Books 1996) pg. 215
[9] Geisler and Brooks, *When Skeptics Ask,* (Baker Books 1996) pgs. 214-215

Scientific Approaches to Events Present

Operation or Empirical Science: dealing with how the physical and biological worlds operate in the present. These approaches have one thing in common: they can measure their views against a regular pattern of events that can be observed in nature.[10]

Hypothesis-and-Testing Method:
There are at least eight steps in this method.

1. The situation: the first step is recognizing a situation that generates a problem or question. A disease that needs a cure, a way to improve a product, etc.
2. Formulate the problem: narrowing the subject down to a bite-sized chunk. What aspects of the problem to study. What kind of experiment to do. If you don't know where you are going there's a good chance you won't get there.
3. Observation: All research starts with observation, very keen observation. The smallest clue may change the whole direction of your understanding.
4. Reflection: Reflecting on previous knowledge. Other research findings, similar problems, principles that apply. These are provisional assumptions – working ideas that we trust until they are disproven
5. Formulate the hypothesis: Formulating the hypothesis is the central feature of the scientific method. The hypothesis is a statement of what we expect to find. It is usually defined as an intelligent guess about the way things work. It is nothing more than a guess at this point. A hypothesis is a way of stating what we think is going on, so that we can test to see if we are right. It is like an insight. It is a speculation that leaps beyond what the available evidence can tell us.
6. Predictions: If our hypothesis is right, then what we are studying should behave in a certain way under certain conditions. We should be able to make true predictions about the problem, if our hypothesis is true. If our hypothesis is that fire cannot burn without oxygen, then taking away the oxygen should put out the fire.
7. Testing: Test by experimentation and further observation. If our predictions come true, then we may be on the right track. If they don't, then our premise was false.
8. Accept or reject the hypothesis: The hypothesis has been either confirmed or disconfirmed. If the success of the hypothesis was in the 40 to 60% range, then further study needs to be done to see why there is such a discrepancy. If the results were less than 40%, it doesn't sound very likely that the hypothesis is right. If they were greater than 70%, the probability is good and the hypothesis is confirmed (at least to the extent of the probability). If the hypothesis is confirmed with a high degree of probability, then it can be accepted and use as working knowledge for new problems. That is, it moves from a mere hypothesis to a theory.[11]

[10] Geisler and Brooks, *Come, Let us Reason, (Baker Books* 1990) pg. 149
[11] Geisler and Brooks, *Come, Let Us Reason* (Baker Books 1990) pg. 150-153

The Experimental Method

Experimentation is the method used to formulate and test a hypothesis. These tests have both positive and negative sides. A negative testis more certain, because it tells us for sure that what we have tested is not the cause. However, it can't tell us what is the cause. For this, a positive test is needed, but the results of positive tests are only probable. It is always possible that another factor is entering the test and causing the effect, but we are not aware of it.[12]

A Few Terms Defined:
Antecedent factor: something that happens before the effect is seen. The factor we believe to be the cause.
Effect: the event we are trying to understand.
Concomitant factor: happens at the same time as the cause, but does not really cause the effect.

Method of Agreement:
There are both positive and negative aspects of this method. Approaching this method negatively, it can be presented as follows: the cause must be there to produce the effect. When the method of agreement is used positively, it says that the single antecedent factor common to all situations where the effect occurs is probably* the cause. (*There may be an unknown cause, and this common antecedent may only be a concomitant factor, not the real cause.) It was thought for years that rats caused the bubonic plague that ravaged Europe in the Middle Ages. It turned out that fleas that lived on the rats were the real cause.[13]

Method of Difference:
This is a reverse of the method of agreement. Negatively, no antecedent factor can be the cause in whose presence the effect fails to occur. If it really is the cause, then it must be able to produce the same effect over and over under the same circumstances. If the effect fails to occur in the presence of the supposed cause, then the supposed cause cannot be the true cause. The positive side of the method of difference says, in otherwise identical situations, the antecedent factor unique to one situation is probably the cause.[14]

An example of this is the other day during praise team rehearsal the bass guitar was not working. We tried a different cord, still no sound from the bass guitar. We tried all the different buttons on the sound board, still no sound from the bass guitar. We tried the

[12] Geisler and Brooks, *Come, Let Us Reason* (Baker Books 1990) pg. 153
[13] Geisler and Brooks, *Come, Let Us Reason* (Baker Books) pgs. 154-155
[14] Geisler and Brooks, *Come, Let Us Reason* (Baker Books) pgs. 155-156

volume control on the bass guitar itself, still no sound. Then, we tried a new battery in the bass guitar and praise the Lord we finally had sound from the bass guitar. The antecedent factor unique to our situation was a good battery.

Joint Method:
The joint method is simply a combination of the first two methods. If you use both the method of agreement and the method of difference to test for a cause, then you are using the joint method and have a pretty good certainty that you really have found the real cause. This is a method of cross-checking. If you know that the television will turn on with the cord plugged in (positive method of difference) and that it will not turn on when not plugged in (negative method of agreement), then you can be pretty sure that you have located the problem. Ideally, all scientific evidence should be checked in this way, but that is not always possible.[15]

Method of Concomitant Variation:
When you are studying effects that vary, you have to study what makes them vary. The method of concomitant variation says that when one possible cause and the effect vary together, you may have found the cause.[16] The fact that I lose weight in proportion to the regularity of my workout habits shows that there is probably a causal connection.

Method of Residues:
Another name for this method is the process of elimination. This method states: the antecedent factor that remains after the other antecedent factors are found to be related to other effects is probably the cause.[17]

These are the methods for testing any hypothesis.

A Scientific Approach to Events Past

Now let's look at Origin or Historical Science. Again, Origin or Historical Science deals with unobserved and unrepeated events of the past.

Since the past, unlike the present, cannot be known by direct observation, it must be inferred by way of the principles of causality and uniformity.[18]

The Principle of Causality:
It does not state that everything has a cause. It does state that everything that begins has a cause.

[15] Geisler and Brooks, *Come, Let Us Reason* (Baker Books, 1990) pg. 157
[16] Geisler and Brooks, *Come, Let Us Reason* (Baker Books, 1990) pg. 157-158
[17] Geisler and Brooks, *Come, Let Us Reason* (Baker Books, 1990) pg.158
[18] See Norman L. Geisler, et al., *Origin Science* (Grand Rapids: Baker Book House, 1987) for further discussion on origin science.

The principle of causality states that every event has an adequate cause.[19] The causality principle does not say that *everything* needs a cause. Rather, that which is *finite and limited* needs a cause; that is, anything that had a beginning must have had a cause.[20]

When the law of causality is applied to the origin of the universe, something interesting happens. It leads to a First Cause, which is generally called God. Consider the following:
Whatever has a beginning is caused.
The universe had a beginning.
Therefore, the universe is caused.

So the first principle of origin science, the principle of causality, leads to a First Cause (Creator). By Creator we mean a powerful First Cause of the universe.[21]

The Principle of Uniformity (Analogy)
Is this "Creator" intelligent of just a Blind Force? Applying the principle of uniformity to the origin of first life provides an answer to our question. For example, we know that coded messages (such as human language) are put together by intelligent beings. But if coded messages need an intelligent cause now, then we can reasonably conclude that they did in the past as well. This is reasoning by analogy, comparing the present with the past. It is called the *principle of uniformity* (or Analogy). The law of uniformity says that *the present is the key to understanding the past.* If we know how the universe operates now, then we can assume that it has always operated in the same way. If things that go up must come down, it is safe to believe that gravity was also in effect when Galileo was dropping things from the tower.[22]

There are two possible kinds of causes for the origin of first life: a purely natural non-intelligent cause and an intelligent cause. The latter is called a primary cause and the former a secondary cause. For example, only secondary causes are needed to explain the Grand Canyon. Wind and water erosion can easily be seen as the factors that cut the river's path deep through the rock. There is no need to suppose that there was any intelligent cause behind this. But what about Mount Rushmore? Did that happen by wind and erosion? Any reasonable person can see that a mountain with four human faces on it must have had an intelligent cause. It would be ludicrous to look for a natural cause for something that displays both complex organization and purposefulness. So for all singularities, we need to decide whether we are searching for a primary (intelligent) or secondary (natural) cause.[23]

How do we know when to seek an intelligent cause? This decision is not arbitrary or capricious. In fact, it is based on the uniform experience of our daily lives. If you see

[19] Norman Geisler and Peter Bocchino, *Unshakable Foundations* (Bethany House, 2000) pg. 73
[20] Geisler and Bocchino, *Unshakable Foundations* (Bethany House, 2000) pg. 78
[21] Geisler and Brooks, *Come, Let Us Reason* (Baker Books, 1990) pg. 161
[22] Geisler and Brooks, *Come, Let Us Reason* pg. 161
[23] Geisler and Brooks, *Come, Let Us Reason* pg. 162

"Drink Coke" written in smoke in the sky, you don't say, "My what an interesting cloud formation." You immediately know that it was put there by an intelligent cause. Why? First, you know it has a cause because of the law of causality. Every event has a cause, so this event must have a cause. But what kind of cause? Second, you know it has a primary cause because of the principle of uniformity. Whenever you have seen a design that carried complex information (or served a specific purpose), it was caused by intelligent action.[24]

Stephen Jay Gould, Harvard professor and paleontologist, has said, "Science simply cannot (by its legitimate methods) adjudicate the issue of God's possible superintendence of nature. We neither affirm it nor deny it; we simply cannot comment on it as scientists….Science can work only with naturalistic explanations; it can neither affirm nor deny other types of actors (like God).[25]

If Gould speaks the truth, why does he (along with so many of his scientific colleagues) continue to write and speak so prolifically on this topic? If silence rules, why do we continue to hear so much opposition from them on this issue? With all due respect to Professor Gould, he is guilty of breaking his own rules because he has made many comments about "the issue of God's possible superintendence of nature." After critiquing William Paley's design argument for the existence of God, Gould said, "Good design exists, and implies production for its current purpose; but adaptations are built naturally, by slow evolution towards desired ends, not by immediate, divine fiat."[26]

How could Gold as a scientist know this to be true if science cannot make such pronouncements? Many scientists, including Gould, not only "adjudicate the issue of God's possible superintendence of nature" but also write as if they have a passion to use science to come to terms with this question about God's existence.[27]

The Principle of Comprehensiveness
A good hypothesis must explain all the relevant data. It must be comprehensive. Any Hypothesis that cannot account for all the know facts is inadequate. There is micro-evolution just not macro-evolution.

The Principle of Consistency
A hypothesis cannot contradict itself or other known facts. No two contradictory statements can both be true at the same time and in the same sense. For example, it is inconsistent to claim that everything in the universe is winding down but was never wound up, or that there is a cause for everything that begins but not for the beginning of the universe.

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[24] Geisler and Brooks, *Come, Let Us Reason* pg.162
[25] Stephen Jay Gould, "Impeaching a Self-Appointed Judge," *Scientific American,* July, 1992, pg. 120
[26] Stephen Jay Gould, *Eight Little Piggies: Reflections in Natural History* (NewYork: W.W. Norton& Co., 1993), pg. 144
[27] Geisler and Bocchino, *Unshakable Foundations* pg. 81

The differences in scientific studies of the *origin* and those of the *operation* of the world have been overlooked by most of the scientific community. This leads to confusion, since they deal with different objects and use different principles. A failure to distinguish these leads only to misunderstanding and misleading charges, such as, "Creationism is not scientific."[28]

Origin science works on different principles than operation science does. Since the past events that it studies cannot be repeated today, it uses analogies between the kinds of cause/effect relationships that we see today and the kind of effect that is being studied. Also, origin science does not claim to give definitive answers, but only plausible ones. We did not observe the events of origins, and we cannot repeat them. So the remaining evidence must be studied and interpretations of it measured by what seems most likely to explain the evidence. And just as operation science recognizes that some events demand an intelligent cause, origin science also admits an intelligent cause when the evidence calls for it.[29]

Now we are going to look at several fallacies in scientific thinking.

1. Post Hoc Fallacy – the name comes from an old Latin phrase that means After this; therefore, because of this. – this assumes that a common antecedent factor is the cause. The problem is that the mere fact that something happens before an event does not guarantee that it is the cause. If it did, then every time the national anthem was played a ball game would start. The *post hoc* fallacy is like assuming that the sound of a rooster crossing causes the sun to rise.
2. Fallacy of Emphasizing Irrelevant Factors – *confusing a concomitant factor rather than an antecedent) with the cause.* It assumes that a *common* antecedent factor that happen to be present is the *relevant* factor when it is not. The cause has to have the ability to produce the effect. Flipping my hand upward does not generate enough power to make a light bulb run for several hours. What it does do, when it hits a light switch, is allow electricity to run the light bulb. The hand motion causes the switch to close, but it is not the relevant factor in making the light burn.
3. Fallacy of Neglecting Negative Evidence – being blind to the evidence that tells him he is wrong. Overlooking instances where the supposed cause does not produce the effect. Like the evangelist that says watching TV corrupts morals. He points to all kinds of instances where crimes seen on TV are reenacted in real life, or violent behavior is adapted, or the effects of violence seem unreal, etc. But he just might be overlooking many other instances where these effects are not found. After all, it is possible to use discernment in watching TV, and not everyone who watches will reenact the crime.

[28] Geisler and Brooks, *Come, Let Us Reason,* pg.163
[29] Geisler and Brooks, *When Skeptics Ask,* pgs. 215-216

4. Fallacy of Neglecting Differences – overlooking the fact that the common antecedent factors compared in different experiments are not identical. We have to be sure that the causes we examine are identical, not just similar.
   Some overly zealous lovers of the *King James Version* of the Bible have noted that certain verses on the blood of Jesus are not found in the *New International Version* (e.g., Col. 1:14). They have concluded from this that the NIV is a "liberal" translation. They looked at the effect and saw a difference, then assumed that this difference was caused by the same thing that makes many liberal pastors play down or reject the doctrine of atonement. In this case, however, the cause was quite different. The fact is that the *King James* is based on a Greek text that was compiled from only a handful of manuscripts. Since that time, our knowledge of and access to older manuscripts has shown us that some words and phrases in the KJV were probably not in the original manuscripts of the Bible. Some verses on the blood happen to have been among those that were left out of the NIV, not to destroy doctrine, but to preserve the truth of the Scriptures as they were originally given. This is not a "liberal" trend, but a very conservative move to protect the Word of God from corruption. These causes might accidentally have the same effect, but they are hardly identical.
5. Fallacy of Reversing Cause And Effect – This is a case of putting the cart before the horse. It confuses the effect with the cause or the cause with the effect. When the two happen almost together or as concomitant, it can be very hard to tell which caused which. This fallacy is even more typical when you can only assume which factor is really antecedent to the other. For example, at Podunk Bible College, it might be found that the students with the highest scholastic average are Christian education majors. The conclusion might be reached that Christian education develops the smartest people. But is that conclusion justified? It is just as likely that only smart people go into the Christian education department. How do you know whether the effect (higher grades) is caused by the department's program, or if the people were smart to begin with? A cause must always exist before its effect.
6. Fallacy of Reciprocal Causality – The fallacy of reciprocal causality is assuming that causality is only one-directional when it is two-way. Usually, that assumption is valid. But not always, and particularly when you can't say which came first. Take the relationship between violence on television and violent crime. Does watching violence cause people to do violent things? Or does television simply reflect the violence that exists in society? It may be that both are true.
7. Fallacy of Confusing Cause And Condition – There is a big difference between the things needed to set up an effect and making the effect happen. You can set the stage for a play, but until the actors arrive and the curtain goes up, the play doesn't happen. We speak of this distinction as the difference between a cause and a condition. A condition is a necessary condition for the effect to occur. It is the stage that must be set. The play cannot happen without it, but it does not cause the play. A cause is a necessary and sufficient condition for the effect to occur. Let's say there is a grass fire In your front yard. After putting it out, the fireman comes to you and says, "it looks like what caused this fire was that pile of leaves you left by the road."

Wait a minute! Since when can a pile of leaves start a fire all by itself? The dry leaves may have been a condition for the fire to start, but it was the cigarette thrown from a passing car that started the leaves on fire. The cigarette was the cause; the leaves were only a condition. Being tempted is not sin; giving in to temptation is. Seeing the money and wanting the money are only conditions for our sin, but those things don't make us pick up the money. It is our own free will – our ability to choose – that causes sin. Temptation is only a necessary condition for sin. It is not sufficient to make us actually do the sin.

8. Fallacy of Confusing Various Kinds of Causes – There are really six different kinds of causes for any event. That sounds strange at first, but each of these causes refers to different aspects of the event.
   Efficient Cause. This is what we normally think of when we say "cause." It produces the effect.
   Final Cause. This speaks of the purpose of an event or thing. It tells us why something happened, not that by which it happened. A chair is made to sit in.
   Formal Cause, This tells us what form the effect takes. Its essence.
   Material Cause. What is it made of?
   Exemplar Cause. Everything follows some kind of pattern. The pattern after which something is done.
   Instrumental Cause. The instruments used to produce the effect are the instrumental cause.[30]

   Confusing Causes. Neo-orthodox theology says that the Bible is not the Word of God in itself, but that the Word of God comes to us through the Bible. They claim that the Holy Spirit may speak to us in a special way while we are reading the Bible, but that the revelation is directly from Him and not in the words of the Scriptures. This makes the Bible the tool that God uses to communicate with us. However, the Bible claims to be the Word of God itself. In its words we are to find the revelation of God, not in a mystical experience apart from the text. The neo-orthodox confuse the instrumental cause with the formal cause. The Bible is not merely God's instrument. The very nature of inspired Scripture is that it is the Word of God. Revelation does not happen around or through the text, but in the text. The text is not the means of revelation; it is revelation itself. God is its efficient cause, using the human authors as a secondary cause. Its final cause is the purpose (why) for which that message (what) was written. Its material cause is paper and ink, and it is patterned after the ideas in the mind of the author. Its instrumental cause is the pen that wrote it and the words that were written. To reduce what the Bible is to the status of an instrument of revelation is a great theological error.[31]

[30] Geisler and Brooks, *Come, Let Us Reason,* pgs. 166-175
[31] Geisler and Brooks, *Come, Let Us Reason, pgs. 175-176*